

# List of Heuristics Tasks (Pipeline 2022.2.0.64)

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## Generic

13 tasks available.

<b>task name</b>	<b>description</b>
h_applycal	Apply the calibration(s) to the data
h_export_calstate	Save the pipeline calibration state to disk
h_exportdata	Prepare interferometry data for export
h_import_calstate	Import a calibration state from disk
h_importdata	Imports data into the interferometry pipeline
h_init	Initialize the interferometry pipeline
h_mssplit	Select data from calibrated MS(s) to form new MS(s) for imaging
h_restoredata	Restore flags and calibration state from a pipeline run
h_resume	Restore a save pipeline state
h_save	Save the pipeline state to disk
h_show_calstate	Show the current pipeline calibration state
h_tsyscal	Derive a Tsys calibration table
h_weblog	Open the pipeline weblog in a browser

## Interferometry Generic

23 tasks available.

<b>task name</b>	<b>description</b>
hif_analyzealpha	Extract spectral index from intensity peak in VLA/VLASS images
hif_antpos	Derive an antenna position calibration table
hif_applycal	Apply the calibration(s) to the data
hif_bandpass	Compute bandpass calibration solutions
hif_checkproductsize	Check imaging product size
hif_correctedampflag	Flag corrected - model amplitudes based on calibrators.
hif_editimlist	Add to a list of images to be produced with hif_makeimages()
hif_findcont	Find continuum frequency ranges
hif_gaincal	Determine temporal gains from calibrator observations
hif_lowgainflag	Flag antennas with low or high gain
hif_makecutoutimages	Cutout central 1 sq. degree from VLASS QL, SE, and Coarse Cube images
hif_makeimages	Compute clean map
hif_makeimlist	Compute list of clean images to be produced
hif_makermsimages	Create RMS images for VLASS data.
hif_mstransform	Create new MeasurementSets for science target imaging
hif_polarization	Base polarization task
hif_rawflagchans	Flag deviant baseline/channels in raw data
hif_refant	Select the best reference antennas
hif_setjy	Fill the model column with calibrated visibilities
hif_setmodels	Set calibrator source models
hif_transformimagedata	Extract fields for the desired VLASS image to a new MS and reset weights if desired
hif_uvcontfit	Fit the continuum in the UV plane
hif_uvcontsub	Subtract the fitted continuum from the data

## Interferometry ALMA

26 tasks available.

<b>task name</b>	<b>description</b>
hifa_antpos	Derive an antenna position calibration table
hifa_bandpassflag	Bandpass calibration flagging
hifa_bandpass	Compute bandpass calibration solutions
hifa_bpsolint	Compute optimal bandpass calibration solution intervals
hifa_exportdata	Prepare interferometry data for export
hifa_flagdata	Do meta data based flagging of a list of MeasurementSets.
hifa_flagtargets	Do science target flagging
hifa_fluxcalflag	Locate and flag line regions in solar system flux calibrators
hifa_gaincalsnr	Compute gaincal signal to noise ratios per spw
hifa_gfluxscaleflag	Flag the phase, pol, flux calibrators
hifa_gfluxscale	Derive flux density scales from standard calibrators
hifa_imageprecheck	Calculates the best Briggs robust parameter to achieve sensitivity and angular resolution goals.
hifa_importdata	Imports data into the interferometry pipeline
hifa_lock_refant	Lock reference antenna list
hifa_polcalflag	Flag polarization calibrators
hifa_renorm	Base renorm task
hifa_restoredata	Restore flagged and calibration interferometry data from a pipeline run
hifa_session_bandpass	Compute bandpass calibration solutions (Experimental)
hifa_session_refant	Select best reference antenna for session(s)
hifa_spwphaseup	Compute phase calibration spw map and per spw phase offsets
hifa_targetflag	Flag target source outliers
hifa_timegaincal	Determine temporal gains from calibrator observations
hifa_tsysflag	Flag deviant system temperatures for ALMA interferometry measurements. This is done by running a sequence of flagging subtasks, each looking for a different type of possible error.

hifa_unlock_refant	Unlock reference antenna list
hifa_wvrgcalflag	Generate a gain table based on Water Vapor Radiometer data, interpolating over antennas with bad radiometers.
hifa_wvrgcal	Generate a gain table based on Water Vapor Radiometer data, and calculate a QA score based on its effect on the interferometric data.

## Interferometry ALMA SRDP

1 tasks available.

task name	description
hifas_imageprecheck	Calculates the best robust value and Briggs weighting parameter to achieve sensitivity and angular resolution goals.

## Interferometry VLA

33 tasks available.

task name	description
hifv_analyzestokescubes	Characterize stokes IQUV flux densities as a function of frequency for VLASS coarse cube images
hifv_applycals	Apply calibration tables to measurement set
hifv_checkflag	Run RFI flagging using flagdata in various modes
hifv_circfeedpolcal	Perform polarization calibration for VLA circular feeds.
hifv_exportdata	Prepare and export interferometry and imaging data
hifv_exportvlassdata	Export Image data from QL, SE, and Coarse Cube modes of VLASS Survey
hifv_finalcals	Compute final gain calibration tables
hifv_fixpointing	Base fixpointing task
hifv_flagcal	Flagcal task
hifv_flagdata	Do basic deterministic flagging of a list of MeasurementSets
hifv_flagtargetsdata	Apply a flagtemplate to target data prior to running imaging pipeline tasks
hifv_fluxboot	Fluxboot
hifv_gaincurves	Runs gencal in gc mode

hifv_hanning	Hanning smoothing on a dataset
hifv_importdata	Imports data into the VLA pipeline
hifv_opcal	Runs gencal in opac mode
hifv_pbcor	Apply primary beam correction to VLA and VLASS images
hifv_plotsummary	Create pipeline summary plots
hifv_priorcal	Runs gaincurves, opacities, requantizer gains, antenna position corrections, tec_maps, switched power.
hifv_restoredata	Restore flagged and calibration interferometry data from a pipeline run
hifv_restorepims	Restore VLASS SE per-image measurement set data, resetting flagging, weights, and applying self-calibration.
hifv_rqcal	Runs gencal in rq mode
hifv_selfcal	Perform phase-only self-calibration, per scan row, on VLASS SE images
hifv_semiFinalBPdcal	Runs a second delay and bandpass calibration and applies to calibrators to setup for RFI flagging
hifv_solint	Determines different solution intervals
hifv_statwt	Compute statistical weights and write them to measurement set
hifv_swpowcal	Runs gencal in swpow mode
hifv_syspower	Determine amount of gain compression affecting VLA data below Ku-band
hifv_targetflag	Targetflag
hifv_tecmaps	Base tecmaps task
hifv_testBPdcal	Runs initial delay and bandpass calibration to setup for RFI flagging
hifv_vlasetjy	Sets flux density scale and fills calibrator model to measurement set
hifv_vlassmasking	Create clean masks for VLASS SE images

## Single-Dish

12 tasks available.

<b>task name</b>	<b>description</b>
hsd_applycal	Apply the calibration(s) to the data
hsd_atmcor	Apply offline ATM correction to the data.
hsd_baseline	Detect and validate spectral lines, subtract baseline by masking detected lines
hsd_bflag	Flag spectra based on predefined criteria of single dish pipeline
hsd_exportdata	Prepare single dish data for export
hsd_flagdata	Do basic flagging of a list of MeasurementSets
hsd_imaging	Generate single dish images
hsd_importdata	Imports data into the single dish pipeline
hsd_k2jycal	Derive Kelvin to Jy calibration tables
hsd_restoredata	Restore flagged and calibration single dish data from a pipeline run
hsd_skycal	Calibrate data
hsd_tsysflag	Flag deviant system temperature measurements

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## Summary of generic tasks and parameters

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### h\_applycal

#### Task Description

Apply the calibration(s) to the data

1. Apply the calibration to the target data

hif\_applycal (intent='TARGET')

#### Parameter List

<b>name</b>	<b>type</b>	<b>default</b>	<b>description</b>
vis	stringVec	None	The list of input MeasurementSets. Defaults to the list of MeasurementSets in the pipeline context. Parameter is not available when pipelinemode='automatic'. example: ['X227.ms']

field	string	None	A string containing the list of field names or field ids to which the calibration will be applied. Defaults to all fields in the pipeline context. Parameter is not available when pipelinemode='automatic'. example: '3C279', '3C279, M82'
intent	string	None	A string containing the list of intents against which the selected fields will be matched. Defaults to all supported intents in the pipeline context. Parameter is not available when pipelinemode='automatic'. example: '*TARGET*'
spw	string	None	The list of spectral windows and channels to which the calibration will be applied. Defaults to all science windows in the pipeline context. Parameter is not available when pipelinemode='automatic'. example: '17', '11, 15'
antenna	string	None	The list of antennas to which the calibration will be applied. Defaults to all antennas. Not currently supported. Parameter is not available when pipelinemode='automatic'.
applymode	string	None	Calibration apply mode ''='calflagstrict': calibrate data and apply flags from solutions using the strict flagging convention 'trial': report on flags from solutions, dataset entirely unchanged 'flagonly': apply flags from solutions only, data not calibrated 'calonly': calibrate data only, flags from solutions NOT applied 'calflagstrict': 'flagonlystrict': same as above except flag spws for which calibration is unavailable in one or more tables (instead of allowing them to pass uncalibrated and unflagged)
flagbackup	bool	True	Backup the flags before the apply
flagsum	bool	True	Compute before and after flagging summary statistics
flagdetailedsum	bool	False	Compute detailed before and after flagging statistics summaries. Parameter available only when if flagsum is True.
pipelinemode	string	automatic	The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task.
dryrun	bool	False	Run task (False) or display the command(True). Parameter is available only when pipelinemode='interactive'.
acceptresults	bool	True	Add the results of the task to the pipeline context (True) or reject them (False). Parameter is available only when pipelinemode='interactive'.

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## h\_export\_calstate

### Task Description

Save the pipeline calibration state to disk

Example

1. Save the calibration state.

```
h_export_calstate()
```

2. Save the active calibration state with a custom filename

```
h_export_calstate(filename='afterbandpass.calstate')
```

3. Save the applied calibration state with a custom filename

```
h_export_calstate(filename='applied.calstate', state='applied')
```

### Parameter List

name	type	default	description
filename	string	None	Name for saved calibration state
state	string	active	The calibration state to export

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## h\_exportdata

### Task Description

Prepare interferometry data for export

Examples

1. Export the pipeline results for a single session to the data products directory

```
!mkdir ../products
```

```
hif_exportdata (products_dir='../products')
```

2. Export the pipeline results to the data products directory specify that only the gain calibrator images be saved.

```
!mkdir ../products
```

```
hif_exportdata (products_dir='../products', calintents='*PHASE*')
```

### Parameter List

name	type	default	description
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vis	stringVec	None	List of visibility data files for which flagging and calibration information will be exported. Defaults to the list maintained in the pipeline context. Can only be set in pipelinemode='interactive' example: vis=['X227.ms', 'X228.ms']
session	stringVec	None	session -- List of sessions one per visibility file. Defaults to a single virtual session containing all the visibility files in vis. Can only be set in pipelinemode='interactive' example: session=['session1', 'session2']
imaging_products_only	bool	False	Export the science target image products only
exportmses	bool	False	Export MeasurementSets defined in vis instead of flags, caltables, and calibration instructions. Can only be set in pipelinemode='interactive' example: exportmses = True
pprfile	string	None	Name of the pipeline processing request to be exported. Defaults to a file matching the template 'PPR_*.xml'. Can only be set in pipelinemode='interactive' example: pprfile=['PPR_GRB021004.xml']
calintents	string	None	calintents -- List of calibrator image types to be exported. Defaults to all standard calibrator intents 'BANDPASS', 'PHASE', 'FLUX' Can only be set in pipelinemode='interactive' example: calintents='PHASE'
calimages	stringVec	None	List of calibrator images to be exported. Defaults to all calibrator images recorded in the pipeline context. Can only be set in pipelinemode='interactive' example: calimages=['3C454.3.bandpass', '3C279.phase']
targetimages	stringVec	None	List of science target images to be exported. Science target images recorded in the pipeline context. Can only be set in pipelinemode='interactive' example: targetimages=['NGC3256.band3', 'NGC3256.band6']
products_dir	string	None	Name of the data products subdirectory. Can only be set in pipelinemode='interactive' example: products_dir='../products'

pipelinemode	string	automatic	The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task.
dryrun	bool	False	Run the task (False) or display task command (True)
acceptresults	bool	True	Add the results into the pipeline context

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## h\_import\_calstate

### Task Description

Import a calibration state from disk

Example

1. Import a calibration state from disk.

```
h_import_calstate(filename='aftergaincal.calstate')
```

### Parameter List

name	type	default	description
filename	string	None	Name of the saved calibration state

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## h\_importdata

### Task Description

Imports data into the interferometry pipeline

Examples

1. Load an ASDM list in the ../rawdata subdirectory into the context"

```
h_importdata(vis=['../rawdata/uid__A002_X30a93d_X43e',
                '../rawdata/uid_A002_x30a93d_X44e'])
```

2. Load an MS in the current directory into the context:

```
h_importdata(vis=[uid__A002_X30a93d_X43e.ms])
```

3. Load a tarred ASDM in ../rawdata into the context:

```
h_importdata(vis=['../rawdata/uid__A002_X30a93d_X43e.tar.gz'])
```

4. Check the h\_importdata inputs, then import the data:

```
myvislist = ['uid__A002_X30a93d_X43e.ms', 'uid_A002_x30a93d_X44e.ms']
h_importdata(vis=myvislist, pipelinemode='getinputs')
```

- ```

h_importdata(vis=myvislist)
5. Load an ASDM but check the results before accepting them into the context.
   results = h_importdata(vis=['uid__A002_X30a93d_X43e.ms'],
                           acceptresults=False)
   results.accept()
6. Run in dryrun mode before running for real
   results = h_importdata(vis=['uid__A002_X30a93d_X43e.ms'], dryrun=True)
   results = h_importdata(vis=['uid__A002_X30a93d_X43e.ms'])

```

### Parameter List

| name              | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|-------------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis               | stringVec | None      | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSs, or tar files of MSs, If ASDM files are specified, they will be converted to MS format. example: vis=['X227.ms', 'asdms.tar.gz']                                                                                                                                 |
| session           | stringVec | None      | List of sessions to which the visibility files belong. Defaults to a single session containing all the visibility files, otherwise a session must be assigned to each vis file. example: session=['session_1', 'session_2']                                                                                                                 |
| pipelinemode      | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| asis              | string    | None      | ASDM tables to convert as is default: 'Antenna Station Receiver CalAtmosphere' Can only be set in pipelinemode='interactive' example: 'Receiver', ''                                                                                                                                                                                        |
| process_caldevice | bool      | False     | Ingest the ASDM caldevice table. Can only be set in pipelinemode='interactive'                                                                                                                                                                                                                                                              |
| overwrite         | bool      | False     | Overwrite existing files on import. Can only be set in pipelinemode='interactive'. When converting ASDM to MS, if overwrite=False and the MS already exists in output directory, then this existing MS dataset will be used instead.                                                                                                        |
| nocopy            | bool      | False     | When importing an MS, disable copying of the MS to the working directory. Can only be set in pipelinemode='interactive'.                                                                                                                                                                                                                    |
| bdfflags          | bool      | True      | Apply BDF flags on import. Can only be set in pipelinemode='interactive'.                                                                                                                                                                                                                                                                   |

|               |        |           |                                                                                                                                                                                                                                                   |
|---------------|--------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| lazy          | bool   | False     | Use the lazy import option. Can only be set in pipelinemode='interactive'.                                                                                                                                                                        |
| ocorr_mode    | string | ca        | Read in cross- and auto-correlation data(ca), cross-correlation data only (co), or autocorrelation data only (ao).                                                                                                                                |
| createmms     | string | automatic | Create a multi-MeasurementSet ('true') ready for parallel processing, or a standard MeasurementSet ('false'). The default setting ('automatic') creates an MMS if running in a cluster environment. Can only be set in pipelinemode='interactive' |
| dryrun        | bool   | False     | Run the task (False) or display task command (True)                                                                                                                                                                                               |
| acceptresults | bool   | True      | Add the results into the pipeline context                                                                                                                                                                                                         |

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## **h\_init**

### **Task Description**

Initialize the interferometry pipeline

Examples

1. Create the pipeline context

h\_init()

### **Parameter List**

| name          | type   | default   | description                                                                                                                                                                                                                                                                                                                               |
|---------------|--------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pipelinemode  | string | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| loglevel      | string | info      | Log level for pipeline messages. Log messages below this threshold will not be displayed.                                                                                                                                                                                                                                                 |
| plotlevel     | string | default   | Toggle generation of detail plots in the web log. A level of 'all' generates all plots; 'summary' omits detail plots; 'default' generates all plots apart from for the hif_applycal task.                                                                                                                                                 |
| weblog        | bool   | True      | Generate the web log                                                                                                                                                                                                                                                                                                                      |
| overwrite     | bool   | True      | Overwrite existing files on import                                                                                                                                                                                                                                                                                                        |
| dryrun        | bool   | False     | Run the task (False) or display the task command (True)                                                                                                                                                                                                                                                                                   |
| acceptresults | bool   | True      | Add the results into the pipeline context                                                                                                                                                                                                                                                                                                 |

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## **h\_mssplit**

### **Task Description**

Select data from calibrated MS(s) to form new MS(s) for imaging

Examples

1. Create a 4X channel smoothed output MS from the input MS

```
h_mssplit(chanbin=4)
```

### **Parameter List**

| <b>name</b>   | <b>type</b> | <b>default</b> | <b>description</b>                                                                                                                                                                                                                                                                                                                          |
|---------------|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec   | None           | The list of input MeasurementSets to be transformed. Defaults to the list of MeasurementSets specified in the pipeline import data task. default '': Split all MeasurementSets in the context. Can only use with pipelinemode='interactive' example: 'ngc5921.ms', ['ngc5921a.ms', ngc5921b.ms', 'ngc5921c.ms']                             |
| outputvis     | stringVec   | None           | The list of output split MeasurementSets. The output list must be the same length as the input list and the output names must be different from the input names. default '', The output name defaults to _split.ms Can only use with pipelinemode='interactive' example: 'ngc5921.ms', ['ngc5921a.ms', ngc5921b.ms', 'ngc5921c.ms']         |
| field         | string      | None           | Set of data selection field names or ids, '\\' for all                                                                                                                                                                                                                                                                                      |
| intent        | string      | None           | Select intents to split default: '', All data is selected. Can only use with pipelinemode='interactive' example: 'TARGET'                                                                                                                                                                                                                   |
| spw           | string      | None           | Select spectral windows to split. Can only use with pipelinemode='interactive' default: '', All spws are selected example: '9', '9,13,15'                                                                                                                                                                                                   |
| datacolumn    | string      | data           | Select spectral windows to split. The standard CASA options are supported. Can only use with pipelinemode='interactive' example: 'corrected', 'model'                                                                                                                                                                                       |
| chanbin       | int         | 1              | The channel binning factor. 1 for no binning, otherwise 2, 4, 8, or 16. Can only use with pipelinemode='interactive' example: 2, 4                                                                                                                                                                                                          |
| timebin       | string      | 0s             | The time binning factor. '0s' for no binning Can only use with pipelinemode='interactive' example: '10s' for 10 second binning                                                                                                                                                                                                              |
| replace       | bool        | True           | If a split was performed delete the parent MS and remove it from the context. Can only use with pipelinemode='interactive'                                                                                                                                                                                                                  |
| pipelinemode  | string      | automatic      | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool        | False          | Run the task (False) or display the command(True)                                                                                                                                                                                                                                                                                           |
| acceptresults | bool        | True           | Add the results to the pipeline context                                                                                                                                                                                                                                                                                                     |

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## h\_restoredata

### Task Description

Restore flags and calibration state from a pipeline run

1. Restore the pipeline results for a single ASDM in a single session

h\_restoredata (vis=['uid\_\_\_A002\_X30a93d\_X43e'], session=['session\_1'], ocorr\_mode='ca')

### Parameter List

| name         | type      | default     | description                                                                                                                                                                                                                                                                                         |
|--------------|-----------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis          | stringVec | None        | List of raw visibility data files to be restored. Assumed to be in the directory specified by rawdata_dir. example: vis=['uid___A002_X30a93d_X43e'] Can only set when pipelinemode='interactive'                                                                                                    |
| session      | stringVec | None        | List of sessions, one per visibility file. example: session=['session_3'] Can only set when pipelinemode='interactive'                                                                                                                                                                              |
| products_dir | string    | ../products | Path to the data products directory, used to copy calibration products from. The parameter is effective only when copytoraw=True. When copytoraw=False, calibration products in rawdata_dir will be used. example: products_dir='/path/to/my/products' Can only set when pipelinemode='interactive' |
| copytoraw    | bool      | True        | Copy calibration and flagging tables from products_dir to rawdata_dir directory. example: copytoraw=False Can only set when pipelinemode='interactive'                                                                                                                                              |
| rawdata_dir  | string    | ../rawdata  | Path to the rawdata subdirectory. example: rawdata_dir='/path/to/my/rawdata' Can only set when pipelinemode='interactive'                                                                                                                                                                           |
| lazy         | bool      | False       | Use the lazy filler option example: lazy=True Can only set when pipelinemode='interactive'                                                                                                                                                                                                          |
| bdfflags     | bool      | True        | Set the BDF flags example: bdfflags=False Can only set when pipelinemode='interactive'                                                                                                                                                                                                              |
| ocorr_mode   | string    | ca          | Set correlation import mode example: ocorr_mode='ca' Can only set when pipelinemode='interactive'                                                                                                                                                                                                   |

|               |        |           |                                                                                                                                                                                                                                                                                                                                             |
|---------------|--------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| asis          | string | None      | Set list of tables to import as-is into the Measurement Set<br>example: <code>ocorr_mode='Source Receiver'</code> Can only set when <code>pipelinemode='interactive'</code>                                                                                                                                                                 |
| pipelinemode  | string | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool   | False     | Run the commands (True) or generate the commands to be run but do not execute (False). Can only set when <code>pipelinemode='interactive'</code>                                                                                                                                                                                            |
| acceptresults | bool   | True      | Add the results into the pipeline context                                                                                                                                                                                                                                                                                                   |

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## h\_resume

### Task Description

Restore a save pipeline state

1. Resume the last saved session

`h_resume()`

2. Resume the named saved session

`h_resume(filename='context.s3.2012-02-13T10:49:11')`

### Parameter List

| name     | type   | default | description                                                                                                                                    |
|----------|--------|---------|------------------------------------------------------------------------------------------------------------------------------------------------|
| filename | string | last    | Name of the saved pipeline state. Setting filename to 'last' restores the most recently saved pipeline state whose name begins with 'context*' |

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## h\_save

### Task Description

Save the pipeline state to disk

1. Save the current state in the default file

`h_save()`

2. Save the current state to a file called 'savestate\_1'

`h_save(filename='savestate_1')`

### Parameter List

| name     | type   | default | description                                                                                                                                                                              |
|----------|--------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| filename | string | None    | Name of the saved pipeline state. If filename is '' then a unique name will be generated computed several components: the root, 'context', the current stage number, and the time stamp. |

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## h\_show\_calstate

### Task Description

Show the current pipeline calibration state

### Parameter List

No parameter

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## h\_tsyscal

### Task Description

Derive a Tsys calibration table

### Parameter List

| <b>name</b>   | <b>type</b> | <b>default</b> | <b>description</b>                                                                                                                                                                                                                                                                                                                        |
|---------------|-------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec   | None           | List of input visibility files. Parameter is not available when pipelinemode='automatic'. example: vis=['ngc5921.ms']                                                                                                                                                                                                                     |
| caltable      | stringVec   | None           | Name of output gain calibration tables. Parameter is not available when pipelinemode='automatic'. example: caltable='ngc5921.gcal'                                                                                                                                                                                                        |
| chantol       | int         | 1              | The tolerance in channels for mapping atmospheric calibration windows (TDM) to science windows (FDM or TDM). example: chantol=5                                                                                                                                                                                                           |
| pipelinemode  | string      | automatic      | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool        | False          | Run the task (False) or list commands (True). Parameter is available only when pipelinemode='interactive'.                                                                                                                                                                                                                                |
| acceptresults | bool        | True           | Add the results of the task to the pipeline context (True) or Parameter is available only when pipelinemode='interactive'.                                                                                                                                                                                                                |

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## **h\_weblog**

### **Task Description**

Open the pipeline weblog in a browser

### **Parameter List**

| <b>name</b>  | <b>type</b> | <b>default</b> | <b>description</b>                                                                                                                                                                                                                                                                                                                          |
|--------------|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pipelinemode | string      | automatic      | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| relpath      | string      | None           | Relative path to the weblog index file. This file must be located in a child directory of the CASA working directory. If relpath is left unspecified, the most recent weblog will be located and displayed.                                                                                                                                 |

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## Summary of generic interferometric tasks and parameters

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### hif\_analyzealpha

#### Task Description

Extract spectral index from intensity peak in VLA/VLASS images

Examples

1. Basic analyzealpha task

hif\_analyzealpha()

#### Parameter List

| name           | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|----------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis            | stringVec | None      | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSs, or tar files of MSs. If ASDM files are specified, they will be converted to MS format. example: vis=['X227.ms', 'asdms.tar.gz']                                                                                                                                 |
| image          | string    | None      | Restored subimage                                                                                                                                                                                                                                                                                                                           |
| alphafile      | string    | None      | Input spectral index map                                                                                                                                                                                                                                                                                                                    |
| alphaerrorfile | string    | None      | Input spectral index error map                                                                                                                                                                                                                                                                                                              |
| pipelinemode   | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun         | bool      | False     | Run the task (False) or display task command (True)                                                                                                                                                                                                                                                                                         |
| acceptresults  | bool      | True      | Add the results into the pipeline context                                                                                                                                                                                                                                                                                                   |

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## **hif\_antpos**

### **Task Description**

Derive an antenna position calibration table

1. Correct the position of antenna 5 for all the visibility files in a single pipeline run:

```
hif_antpos(antenna='DV05', offsets=[0.01, 0.02, 0.03])
```

2. Correct the position of antennas for all the visibility files in a single pipeline run using antenna positions files on disk. These files are assumed to conform to a default naming scheme if 'antposfile' is unspecified by the user:

```
hif_antpos(hm_antpos='file', antposfile='myantposfile.csv')
```

### **Parameter List**

| name          | type      | default   | description                                                                                                                                                                                                                                                                                                                               |
|---------------|-----------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None      | List of input visibility files. Not available when pipelinemode='automatic'. example: ['ngc5921.ms']                                                                                                                                                                                                                                      |
| caltable      | stringVec | None      | Name of output gain calibration tables. Not available when pipelinemode='automatic'. example: ['ngc5921.gcal']                                                                                                                                                                                                                            |
| hm_antpos     | string    | manual    | Heuristics method for retrieving the antenna position corrections. The options are 'online' (not yet implemented), 'manual', and 'file'.                                                                                                                                                                                                  |
| antenna       | string    | None      | The list of antennas for which the positions are to be corrected. Available when hm_antpos='manual'. example: antenna='DV05,DV07'                                                                                                                                                                                                         |
| offsets       | doubleVec | None      | The list of antenna offsets for each antenna in 'antennas'. Each offset is a set of 3 floating point numbers separated by commas, specified in the ITRF frame. Available when hm_antpos='manual'. example: offsets=[0.01, 0.02, 0.03, 0.03, 0.02, 0.01]                                                                                   |
| antposfile    | string    | None      | The file(s) containing the antenna offsets. Used if hm_antpos is 'file'. example: 'antennapos.csv'                                                                                                                                                                                                                                        |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool      | False     | Run the task (False) or list commands (True). Available when pipelinemode='interactive'.                                                                                                                                                                                                                                                  |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False). Available when pipelinemode='interactive'.                                                                                                                                                                                                             |

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## hif\_applycal

### Task Description

Apply the calibration(s) to the data

1. Apply the calibration to the target data

hif\_applycal (intent='TARGET')

## Parameter List

| name            | type      | default | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------|-----------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis             | stringVec | None    | The list of input MeasurementSets. Defaults to the list of MeasurementSets in the pipeline context. Parameter is not available when pipelinemode='automatic'. example: ['X227.ms']                                                                                                                                                                                                                                                                                                                                              |
| field           | string    | None    | A string containing the list of field names or field ids to which the calibration will be applied. Defaults to all fields in the pipeline context. Parameter is not available when pipelinemode='automatic'. example: '3C279', '3C279, M82'                                                                                                                                                                                                                                                                                     |
| intent          | string    | None    | A string containing the list of intents against which the selected fields will be matched. Defaults to all supported intents in the pipeline context. Parameter is not available when pipelinemode='automatic'. example: '*TARGET*'                                                                                                                                                                                                                                                                                             |
| spw             | string    | None    | The list of spectral windows and channels to which the calibration will be applied. Defaults to all science windows in the pipeline context. Parameter is not available when pipelinemode='automatic'. example: '17', '11, 15'                                                                                                                                                                                                                                                                                                  |
| antenna         | string    | None    | The list of antennas to which the calibration will be applied. Defaults to all antennas. Not currently supported. Parameter is not available when pipelinemode='automatic'.                                                                                                                                                                                                                                                                                                                                                     |
| applymode       | string    | None    | Calibration apply mode. ''='calflagstrict': calibrate data and apply flags from solutions using the strict flagging convention 'trial': report on flags from solutions, dataset entirely unchanged 'flagonly': apply flags from solutions only, data not calibrated 'calonly': calibrate data only, flags from solutions NOT applied 'calflagstrict': 'flagonlystrict': same as above except flag spws for which calibration is unavailable in one or more tables (instead of allowing them to pass uncalibrated and unflagged) |
| calwt           | boolVec   | True    | Calibrate the weights as well as the data                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| flagbackup      | bool      | True    | Backup the flags before the apply                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| flagsum         | bool      | True    | Compute before and after flagging summary statistics                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| flagdetailedsum | bool      | True    | Compute detailed before and after flagging statistics summaries. Parameter available only when if flagsum is True.                                                                                                                                                                                                                                                                                                                                                                                                              |

|               |        |           |                                                                                                                                                                                                                                                                                                                                           |
|---------------|--------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pipelinemode  | string | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool   | False     | Run task (False) or display the command(True). Parameter is available only when pipelinemode='interactive'.                                                                                                                                                                                                                               |
| acceptresults | bool   | True      | Add the results of the task to the pipeline context (True) or reject them (False). Parameter is available only when pipelinemode='interactive'.                                                                                                                                                                                           |

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## hif\_bandpass

### Task Description

Compute bandpass calibration solutions

1. Compute a channel bandpass for all visibility files in the pipeline context using the CASA reference antenna determination scheme:

hif\_bandpass()

2. Same as the above but precompute a prioritized reference antenna list:

hif\_refant()

hif\_bandpass()

### Parameter List

| name     | type      | default | description                                                                                                                                                                                                                                 |
|----------|-----------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis      | stringVec | None    | The list of input MeasurementSets. Defaults to the list of MeasurementSets specified in the h_init or hif_importdata task. ``: use all MeasurementSets in the context Examples: 'ngc5921.ms', ['ngc5921a.ms', 'ngc5921b.ms', 'ngc5921c.ms'] |
| caltable | stringVec | None    | The list of output calibration tables. Defaults to the standard pipeline naming convention. Example: caltable=['M82.gcal', 'M82B.gcal']                                                                                                     |
| field    | string    | None    | The list of field names or field ids for which bandpasses are computed. Defaults to all fields. Examples: field='3C279', field='3C279, M82'                                                                                                 |
| intent   | string    | None    | A string containing a comma delimited list of intents against which the selected fields are matched. Defaults to all data with bandpass intent. Example: intent='*PHASE*'                                                                   |

|               |        |           |                                                                                                                                                                                                                                                                                                                                             |
|---------------|--------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| spw           | string | None      | The list of spectral windows and channels for which bandpasses are computed. Defaults to all science spectral windows. Example: spw='11,13,15,17'                                                                                                                                                                                           |
| antenna       | string | None      | Set of data selection antenna IDs                                                                                                                                                                                                                                                                                                           |
| phaseup       | bool   | True      | Do a phaseup on the data before computing the bandpass solution.                                                                                                                                                                                                                                                                            |
| phaseupsolint | any    | int       | The phase correction solution interval in CASA syntax. Used when phaseup is True. Example: phaseupsolint=300                                                                                                                                                                                                                                |
| phaseupbw     | string | None      | Bandwidth to be used for phaseup. Defaults to 500MHz. Used when phaseup is True. Examples: phaseupbw='' to use entire bandpass phaseupbw='500MHz' to use central 500MHz                                                                                                                                                                     |
| solint        | any    | inf       | Time and channel solution intervals in CASA syntax. Examples: solint='inf,10ch', 'inf'                                                                                                                                                                                                                                                      |
| combine       | string | scan      | Data axes to combine for solving. Axes are '', 'scan', 'spw', 'field' or any comma-separated combination. Example: combine='scan,field'                                                                                                                                                                                                     |
| refant        | string | None      | Reference antenna names. Defaults to the value(s) stored in the pipeline context. If undefined in the pipeline context defaults to the CASA reference antenna naming scheme. Examples: refant='DV01', refant='DV06,DV07'                                                                                                                    |
| solnorm       | bool   | True      | Normalise the bandpass solution                                                                                                                                                                                                                                                                                                             |
| minblperant   | int    | 4         | Minimum number of baselines required per antenna for each solve. Antennas with fewer baselines are excluded from solutions.                                                                                                                                                                                                                 |
| minsnr        | double | 3.0       | Reject solutions below this SNR                                                                                                                                                                                                                                                                                                             |
| pipelinemode  | string | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool   | False     | Run the task (False) or just display the command (True)                                                                                                                                                                                                                                                                                     |
| acceptresults | bool   | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                          |

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## hif\_checkproductsize

### Task Description

Check imaging product size

### Parameter List

| name           | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|----------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis            | stringVec | None      | The list of input MeasurementSets. Defaults to the list of MeasurementSets specified in the h_init or hif_importdata task. \\: use all MeasurementSets in the context Examples: 'ngc5921.ms', ['ngc5921a.ms', 'ngc5921b.ms', 'ngc5921c.ms']                                                                                                 |
| maxcubeseize   | double    | -1.0      | Maximum allowed cube size in gigabytes (mitigation goal) -1: automatic from performance parameters                                                                                                                                                                                                                                          |
| maxcubelimit   | double    | -1.0      | Maximum allowed cube limit in gigabytes (mitigation failure limit) -1: automatic from performance parameters                                                                                                                                                                                                                                |
| maxproductsize | double    | -1.0      | Maximum allowed product size in gigabytes (mitigation goal and failure limit) -1: automatic from performance parameters                                                                                                                                                                                                                     |
| maximize       | double    | -1.0      | Maximum allowed image count size (mitigation goal and hard maximum). Parameter maximize must be even and divisible by 2,3,5,7 only. Note that maximize is disabled by default and cannot be set at the same time as maxcubeseize, maxcubelimit and maxproductsize! -1: disables mitigation for this parameter                               |
| calcsb         | bool      | False     | Force (re-)calculation of sensitivities and beams                                                                                                                                                                                                                                                                                           |
| parallel       | string    | automatic | Use MPI cluster where possible                                                                                                                                                                                                                                                                                                              |
| pipelinemode   | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun         | bool      | False     | Run the task (False) or just display the command (True)                                                                                                                                                                                                                                                                                     |
| acceptresults  | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                          |

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## hif\_correctedampflag

### Task Description

Flag corrected - model amplitudes based on calibrators.

Run default flagging on bandpass calibrator with recommended settings:

```
hif_correctedampflag()
```

### Parameter List

| name        | type      | default | description                                                                                                                                                                                                                                 |
|-------------|-----------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis         | stringVec | None    | The list of input MeasurementSets. Defaults to the list of MeasurementSets specified in the h_init or hif_importdata task. ``: use all MeasurementSets in the context Examples: 'ngc5921.ms', ['ngc5921a.ms', 'ngc5921b.ms', 'ngc5921c.ms'] |
| intent      | string    | None    | A string containing a comma delimited list of intents against which the selected fields are matched. If undefined (default), it will select all data with the BANDPASS intent. Example: intent='*PHASE*'                                    |
| field       | string    | None    | The list of field names or field ids for which bandpasses are computed. If undefined (default), it will select all fields. Examples: field='3C279', '3C279, M82'                                                                            |
| spw         | string    | None    | The list of spectral windows and channels for which bandpasses are computed. If undefined (default), it will select all science spectral windows. Example: spw='11,13,15,17'                                                                |
| antnegsig   | double    | 4.0     | Lower sigma threshold for identifying outliers as a result of bad antennas within individual timestamps                                                                                                                                     |
| antpossig   | double    | 4.6     | Upper sigma threshold for identifying outliers as a result of bad antennas within individual timestamps                                                                                                                                     |
| tmantint    | double    | 0.063   | Threshold for maximum fraction of timestamps that are allowed to contain outliers                                                                                                                                                           |
| tmint       | double    | 0.085   | Initial threshold for maximum fraction of "outlier timestamps" over "total timestamps" that a baseline may be a part of                                                                                                                     |
| tmb1        | double    | 0.175   | Initial threshold for maximum fraction of "bad baselines" over "all timestamps" that an antenna may be a part of                                                                                                                            |
| antblnegsig | double    | 3.4     | Lower sigma threshold for identifying outliers as a result of "bad baselines" and/or "bad antennas" within baselines (across all timestamps)                                                                                                |

|                |        |           |                                                                                                                                                                                                                                                                                                                                             |
|----------------|--------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| antblpossig    | double | 3.2       | Upper sigma threshold for identifying outliers as a result of "bad baselines" and/or "bad antennas" within baselines (across all timestamps)                                                                                                                                                                                                |
| relaxed_factor | double | 2.0       | Relaxed value to set the threshold scaling factor to under certain conditions (see task description)                                                                                                                                                                                                                                        |
| niter          | int    | 2         | Maximum number of times to iterate on evaluation of flagging heuristics. If an iteration results in no new flags, then subsequent iterations are skipped.                                                                                                                                                                                   |
| pipelinemode   | string | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun         | bool   | False     | Run the task (False) or just display the command (True)                                                                                                                                                                                                                                                                                     |
| acceptresults  | bool   | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                          |

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## hif\_editimlist

### Task Description

Add to a list of images to be produced with hif\_makeimages()

### Parameter List

| name                 | type      | default | description                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------|-----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| imagename            | string    | None    | Prefix for output image names.                                                                                                                                                                                                                                                                                                                                                 |
| search_radius_arcsec | double    | 1000.0  | Size of the field finding beam search radius in arcsec.                                                                                                                                                                                                                                                                                                                        |
| cell                 | stringVec | None    | Image X and Y cell size(s) with units or pixels per beam. Single value same for both. '\ppb\' for pixels per beam. Compute cell size based on the UV coverage of all the fields to be imaged and use a 5 pix per beam sampling. The pix per beam specification uses the above default cell size ('5ppb') and scales it accordingly. example: ['0.5arcsec', '0.5arcsec'] '3ppb' |
| cfcache              | string    | None    | Convolution function cache directory name                                                                                                                                                                                                                                                                                                                                      |

|                |           |        |                                                                                                                                                         |
|----------------|-----------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| conjbeams      | bool      | False  | Use conjugate frequency in tclean for wideband A-terms.                                                                                                 |
| cyclefactor    | double    | -999.0 | Controls the depth of clean in minor cycles based on PSF.                                                                                               |
| cycleniter     | int       | -999   | Controls max number of minor cycle iterations in a single major cycle.                                                                                  |
| datacolumn     | string    | None   | Data column to image                                                                                                                                    |
| deconvolver    | string    | None   | Minor cycle algorithm (multiscale or mtmfs)                                                                                                             |
| editmode       | string    | None   | The edit mode of the task ('add' or 'replace'). Defaults to 'add'.                                                                                      |
| field          | stringVec | None   | Set of data selection field names or ids.                                                                                                               |
| imaging_mode   | string    | None   | Identity of product type (e.g. VLASS quick look) desired. This will determine the heuristics used.                                                      |
| imsize         | any       | None   | Image X and Y size(s) in pixels or PB level (single fields), \\ for default. Single value same for both. 'pb' for PB level.                             |
| intent         | string    | None   | Set of data selection intents                                                                                                                           |
| gridded        | string    | None   | Name of the gridded to use with tclean                                                                                                                  |
| mask           | string    | None   | Used to declare whether to use a predefined mask for tclean.                                                                                            |
| pblink         | float     | None   | Used to declare primary beam gain level for cleaning with primary beam mask (usemask='pb'), used only for VLASS-SE-CONT imaging mode.                   |
| nbin           | int       | -1     | Channel binning factor.                                                                                                                                 |
| nchan          | int       | -1     | Number of channels, -1 = all                                                                                                                            |
| niter          | int       | 0      | The max total number of minor cycle iterations allowed for tclean                                                                                       |
| nterms         | int       | 0      | Number of Taylor coefficients in the spectral model                                                                                                     |
| parameter_file | string    | None   | keyword=value text file as alternative method of input parameters                                                                                       |
| pblink         | double    | -999.0 | PB gain level at which to cut off normalizations                                                                                                        |
| phasecenter    | any       | None   | The default phase center is set to the mean of the field directions of all fields that are to be image together. example: 0, 'J2000 19h30m00 -40d00m00' |

|               |        |           |                                                                                                                                                                                                                                                                                                                                             |
|---------------|--------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| reffreq       | string | None      | Reference frequency of the output image coordinate system                                                                                                                                                                                                                                                                                   |
| restfreq      | string | None      | List of rest frequencies or a rest frequency in a string for output image.                                                                                                                                                                                                                                                                  |
| robust        | double | -999.0    | Briggs robustness parameter for tclean                                                                                                                                                                                                                                                                                                      |
| scales        | any    | None      | The scales for multi-scale imaging.                                                                                                                                                                                                                                                                                                         |
| specmode      | string | None      | Spectral gridding type (mfs, cont, cube, '\') for default)                                                                                                                                                                                                                                                                                  |
| spw           | any    | None      | Set of data selection spectral window/channels, '\')                                                                                                                                                                                                                                                                                        |
| start         | any    | None      | First channel for frequency mode images. Starts at first input channel of the spw. example: '22.3GHz'                                                                                                                                                                                                                                       |
| stokes        | string | None      | Stokes Planes to make                                                                                                                                                                                                                                                                                                                       |
| sensitivity   | double | 0.0       | None                                                                                                                                                                                                                                                                                                                                        |
| threshold     | string | None      | Stopping threshold (number in units of Jy, or string)                                                                                                                                                                                                                                                                                       |
| nsigma        | double | -999.0    | Multiplicative factor for rms-based threshold stopping                                                                                                                                                                                                                                                                                      |
| uvtaper       | string | None      | Used to set a uv-taper during clean.                                                                                                                                                                                                                                                                                                        |
| uvrange       | string | None      | Set of data selection uv ranges, '\')                                                                                                                                                                                                                                                                                                       |
| width         | any    | None      | Channel width                                                                                                                                                                                                                                                                                                                               |
| pipelinemode  | string | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool   | False     | Run the task (False) or display the command(True)                                                                                                                                                                                                                                                                                           |
| acceptresults | bool   | True      | Add the results to the pipeline context                                                                                                                                                                                                                                                                                                     |

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## hif\_findcont

### Task Description

Find continuum frequency ranges

## Parameter List

| name                    | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|-------------------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis                     | stringVec | None      | The list of input MeasurementSets. Defaults to the list of MeasurementSets specified in the h_init or hif_importdata task. '\\': use all MeasurementSets in the context Examples: 'ngc5921.ms', ['ngc5921a.ms', ngc5921b.ms', 'ngc5921c.ms']                                                                                                |
| target_list             | any       | {}        | Dictionary specifying targets to be imaged; blank will read list from context                                                                                                                                                                                                                                                               |
| hm_mosweight            | any       | None      | Mosaic weighting Defaults to '' to enable the automatic heuristics calculation. Can be set to True or False manually.                                                                                                                                                                                                                       |
| hm_perchanweightdensity | any       | None      | Calculate the weight density for each channel independently Defaults to '' to enable the automatic heuristics calculation. Can be set to True or False manually.                                                                                                                                                                            |
| hm_weighting            | any       | None      | Weighting scheme (natural,uniform,briggs,briggsabs[experimental],briggsbwtaper[experimental])                                                                                                                                                                                                                                               |
| datacolumn              | string    | None      | Data column to image. Only to be used for manual overriding when the automatic choice by data type is not appropriate.                                                                                                                                                                                                                      |
| parallel                | string    | automatic | Use MPI cluster where possible                                                                                                                                                                                                                                                                                                              |
| pipelinemode            | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun                  | bool      | False     | Run the task (False) or just display the command (True)                                                                                                                                                                                                                                                                                     |
| acceptresults           | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                          |

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## hif\_gaincal

### Task Description

Determine temporal gains from calibrator observations  
 Compute standard per scan gain solutions that will be used to calibrate the target:  
 hif\_gaincal()

### Parameter List

| name | type | default | description |
|------|------|---------|-------------|
|------|------|---------|-------------|

|             |           |       |                                                                                                                                                                                                                                                                                    |
|-------------|-----------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis         | stringVec | None  | The list of input MeasurementSets. Defaults to the list of MeasurementSets specified in the h_init or hif_importdata task. '' : use all MeasurementSets in the context Examples: 'ngc5921.ms', ['ngc5921a.ms', ngc5921b.ms', 'ngc5921c.ms']                                        |
| caltable    | stringVec | None  | The list of output calibration tables. Defaults to the standard pipeline naming convention. Example: caltable=['M82.gcal', 'M82B.gcal']                                                                                                                                            |
| field       | string    | None  | The list of field names or field ids for which gain solutions are to be computed. Defaults to all fields with the standard intent. Example: field='3C279', field='3C279, M82'                                                                                                      |
| intent      | string    | None  | A string containing a comma delimited list of intents against which the selected fields are matched. Defaults to *PHASE*. Examples: intent='', intent='*AMP*,*PHASE*'                                                                                                              |
| spw         | string    | None  | The list of spectral windows and channels for which gain solutions are computed. Defaults to all science spectral windows. Examples: spw='3C279', spw='3C279, M82'                                                                                                                 |
| antenna     | string    | None  | Set of data selection antenna ids                                                                                                                                                                                                                                                  |
| hm_gaintype | string    | gtype | The type of gain calibration. The options are 'gtype' and 'gspline' for CASA gain types = 'G' and 'GSPLINE' respectively.                                                                                                                                                          |
| calmode     | string    | ap    | Type of solution. The options are 'ap' (amp and phase), 'p' (phase only) and 'a' (amp only). Examples: calmode='p', calmode='a', calmode='ap'                                                                                                                                      |
| solint      | any       | inf   | Time solution intervals in CASA syntax. Works for hm_gaintype='gtype' only. Examples: solint='inf', solint='int', solint='100sec'                                                                                                                                                  |
| combine     | string    | None  | Data axes to combine for solving. Options are '', 'scan', 'spw', 'field' or any comma-separated combination. Works for hm_gaintype='gtype' only.                                                                                                                                   |
| refant      | string    | None  | Reference antenna name(s) in priority order. Defaults to most recent values set in the pipeline context. If no reference antenna is defined in the pipeline context use the CASA defaults. Examples: refant='DV01', refant='DV05,DV07'                                             |
| refantmode  | string    | None  | Controls how the refant is applied. Currently available choices are 'flex', 'strict', and the default value of ''. Setting to '' allows the pipeline to select the appropriate mode based on the state of the reference antenna list. Examples: refantmode='strict', refantmode='' |

|               |           |           |                                                                                                                                                                                                                                                                                                                                             |
|---------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| solnorm       | bool      | False     | Normalize average solution amplitudes to 1.0                                                                                                                                                                                                                                                                                                |
| minblperant   | int       | 4         | Minimum number of baselines required per antenna for each solve. Antennas with fewer baselines are excluded from solutions. Works for hm_gaintype='gtype' only.                                                                                                                                                                             |
| minsnr        | double    | 3.0       | Solutions below this SNR are rejected. Works for hm_gaintype='channel' only.                                                                                                                                                                                                                                                                |
| smodel        | doubleVec | None      | Point source Stokes parameters for source model (experimental). Defaults to using standard MODEL_DATA column data. Example: smodel=[1,0,0,0] - (I=1, unpolarized)                                                                                                                                                                           |
| splintime     | double    | 3600.0    | Spline timescale (sec). Used for hm_gaintype='gspline'. Typical splintime should cover about 3 to 5 calibrator scans.                                                                                                                                                                                                                       |
| npointaver    | int       | 3         | Tune phase-unwrapping algorithm. Used for hm_gaintype='gspline'. Keep at default value.                                                                                                                                                                                                                                                     |
| phaseswap     | double    | 180.0     | Wrap the phase for changes larger than this amount (degrees). Used for hm_gaintype='gspline'. Keep at default value.                                                                                                                                                                                                                        |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool      | False     | Run the task (False) or just display the command (True)                                                                                                                                                                                                                                                                                     |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                          |

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## hif\_lowgainflag

### Task Description

Flag antennas with low or high gain

### Parameter List

| name          | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|---------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None      | The list of input MeasurementSets. Defaults to the list of MeasurementSets specified in the h_init or hif_importdata task. ``: use all MeasurementSets in the context Examples: 'ngc5921.ms', ['ngc5921a.ms', ngc5921b.ms', 'ngc5921c.ms']                                                                                                  |
| intent        | string    | None      | A string containing the list of intents to be checked for antennas with deviant gains. The default is blank, which causes the task to select the 'BANDPASS' intent.                                                                                                                                                                         |
| spw           | string    | None      | The list of spectral windows and channels to which the calibration will be applied. Defaults to all science windows in the pipeline context. Examples: spw='17', spw='11, 15'                                                                                                                                                               |
| refant        | string    | None      | A string containing a prioritized list of reference antenna name(s) to be used to produce the gain table. Defaults to the value(s) stored in the pipeline context. If undefined in the pipeline context defaults to the CASA reference antenna naming scheme. Examples: refant='DV01', refant='DV06,DV07'                                   |
| flag_nmedian  | bool      | True      | True to flag figures of merit greater than fnm_hi_limit * median or lower than fnm_lo_limit * median.                                                                                                                                                                                                                                       |
| fnm_lo_limit  | double    | 0.5       | Flag values lower than fnm_lo_limit * median                                                                                                                                                                                                                                                                                                |
| fnm_hi_limit  | double    | 1.5       | Flag values higher than fnm_hi_limit * median                                                                                                                                                                                                                                                                                               |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool      | False     | Run the task (False) or just display the command (True)                                                                                                                                                                                                                                                                                     |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                          |

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## hif\_makecutoutimages

### Task Description

Cutout central 1 sq. degree from VLASS QL, SE, and Coarse Cube images

1. Basic makecutoutimages task

hif\_makecutoutimages()

## Parameter List

| name          | type      | default   | description                                                                                                                                                                                                                                                                                                                                                                   |
|---------------|-----------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None      | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSs, or tar files of MSs. If ASDM files are specified, they will be converted to MS format. (can be set only in 'interactive mode') example: vis=['X227.ms', 'asdms.tar.gz']                                                                                                                           |
| offsetblc     | doubleVec | None      | -x and -y offsets to the bottom lower corner (blc) in arcseconds (can be set in any pipeline mode)                                                                                                                                                                                                                                                                            |
| offsettrc     | doubleVec | None      | +x and +y offsets to the top right corner (trc) in arcseconds (can be set in any pipeline mode)                                                                                                                                                                                                                                                                               |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. (can be set in any pipeline mode) |
| dryrun        | bool      | False     | Run the commands (False) or generate the commands to be run but do not execute (True).                                                                                                                                                                                                                                                                                        |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                                                            |

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## hif\_makeimages

### Task Description

Compute clean map

### Parameter List

| name                 | type      | default | description                                                                                                                                                                                                                                 |
|----------------------|-----------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis                  | stringVec | None    | The list of input MeasurementSets. Defaults to the list of MeasurementSets specified in the h_init or hif_importdata task. '': use all MeasurementSets in the context Examples: 'ngc5921.ms', ['ngc5921a.ms', 'ngc5921b.ms', 'ngc5921c.ms'] |
| target_list          | any       | { }     | Dictionary specifying targets to be imaged; blank will read list from context                                                                                                                                                               |
| hm_masking           | string    | auto    | Clean masking mode. Options are 'centralregion', 'auto', 'manual' and 'none'                                                                                                                                                                |
| hm_sidelobethreshold | double    | -999.0  | sidelobethreshold * the max sidelobe level                                                                                                                                                                                                  |
| hm_noisethreshold    | double    | -999.0  | noisethreshold * rms in residual image                                                                                                                                                                                                      |

|                         |        |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------|--------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| hm_lownoisethreshold    | double | -999.0    | lownoisethreshold * rms in residual image                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| hm_negativethreshold    | double | -999.0    | negativethreshold * rms in residual image                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| hm_minbeamfrac          | double | -999.0    | Minimum beam fraction for pruning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| hm_growiterations       | int    | -999      | Number of binary dilation iterations for growing the mask                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| hm_dogrowprune          | any    | None      | Do pruning on the grow mask Defaults to '' to enable the automatic heuristics calculation. Can be set to True or False manually.                                                                                                                                                                                                                                                                                                                                                                                              |
| hm_minpercentchange     | double | -999.0    | Mask size change threshold                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| hm_fastnoise            | any    | None      | Faster noise calculation for automask or nsigma stopping Defaults to '' to enable the automatic heuristics calculation. Can be set to True or False manually.                                                                                                                                                                                                                                                                                                                                                                 |
| hm_nsigma               | double | 0.0       | Multiplicative factor for rms-based threshold stopping                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| hm_perchanweightdensity | any    | None      | Calculate the weight density for each channel independently Defaults to '' to enable the automatic heuristics calculation. Can be set to True or False manually.                                                                                                                                                                                                                                                                                                                                                              |
| hm_npixels              | int    | 0         | Number of pixels to determine uv-cell size for super-uniform weighting                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| hm_cyclefactor          | double | -999.0    | Scaling on PSF sidelobe level to compute the minor-cycle stopping threshold                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| hm_minpsffraction       | double | -999.0    | PSF fraction that marks the max depth of cleaning in the minor cycle                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| hm_maxpsffraction       | double | -999.0    | PSF fraction that marks the minimum depth of cleaning in the minor cycle                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| hm_weighting            | any    | None      | Weighting scheme<br>(natural,uniform,briggs,briggsabs[experimental],briggsbw taper[experimental])                                                                                                                                                                                                                                                                                                                                                                                                                             |
| hm_cleaning             | string | None      | Pipeline cleaning mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| tlimit                  | double | 2.0       | Times the sensitivity limit for cleaning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| masklimit               | int    | 4         | Times good mask pixels for cleaning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| cleanconranges          | bool   | False     | Clean continuum frequency ranges in cubes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| calcsb                  | bool   | False     | Force (re-)calculation of sensitivities and beams                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| hm_mosweight            | any    | None      | Mosaic weighting Defaults to '' to enable the automatic heuristics calculation. Can be set to True or False manually.                                                                                                                                                                                                                                                                                                                                                                                                         |
| overwrite_on_export     | bool   | True      | Replace existing image products when h/hifa/hifv_exportdata is called. If False, images that would have the same FITS name on export, are amended to include a version number. For example, if oussid.J1248-4559_ph.spw21.mfs.I.pbcor.fits would already be exported by a previous call to hif_makeimags, then 'oussid.J1248-4559_ph.spw21.mfs.I.pbcor.v2.fits' would also be exported to the products/ directory. The first exported product retains the same name. Additional products start counting with 'v2', 'v3', etc. |
| parallel                | string | automatic | Clean images using MPI cluster                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| pipelinemode            | string | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task.                                                                                                                                                                                   |
| dryrun                  | bool   | False     | Run the task (False) or just display the command (True)                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

|               |      |      |                                         |
|---------------|------|------|-----------------------------------------|
| acceptresults | bool | True | Add the results to the pipeline context |
|---------------|------|------|-----------------------------------------|

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## hif\_makeimlist

### Task Description

Compute list of clean images to be produced

1. Make a list of science target images to be cleaned, one image per science spw.

`hif_makeimlist()`

2. Make a list of PHASE and BANDPASS calibrator targets to be imaged, one image per science spw.

`hif_makeimlist(intent='PHASE,BANDPASS')`

3. Make a list of PHASE calibrator images observed in spw 1, images limited to 50 pixels on a side.

`hif_makeimlist(intent='PHASE',spw='1',calmaxpix=50)`

### Parameter List

| name      | type      | default | description                                                                                                                                                                                                                                                                                                                      |
|-----------|-----------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis       | stringVec | None    | The list of input MeasurementSets. Defaults to the list of MeasurementSets specified in the <code>h_init</code> or <code>hif_importdata</code> task. <code>""</code> : use all MeasurementSets in the context Examples: <code>'ngc5921.ms', ['ngc5921a.ms', 'ngc5921b.ms', 'ngc5921c.ms']</code>                                 |
| imagename | string    | None    | Prefix for output image names, <code>""</code> for automatic.                                                                                                                                                                                                                                                                    |
| intent    | string    | TARGET  | Select intents for which associated fields will be imaged. Possible choices are PHASE, BANDPASS, AMPLITUDE, CHECK and TARGET or combinations thereof. Examples: <code>'PHASE,BANDPASS', 'TARGET'</code>                                                                                                                          |
| field     | string    | None    | Select fields to image. Use field name(s) NOT id(s). Mosaics are assumed to have common source / field names. If intent is specified only fields with data matching the intent will be selected. The fields will be selected from MeasurementSets in "vis". <code>""</code> Fields matching intent, one image per target source. |
| spw       | string    | None    | Select spectral windows to image. <code>""</code> : Images will be computed for all science spectral windows.                                                                                                                                                                                                                    |
| contfile  | string    | None    | Name of file with frequency ranges to use for continuum images.                                                                                                                                                                                                                                                                  |
| linesfile | string    | None    | Name of file with line frequency ranges to exclude for continuum images.                                                                                                                                                                                                                                                         |

|             |           |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------|-----------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| uvrange     | string    | None | Select a set of uv ranges to image. "": All uv data is included<br>Examples: '0~1000klambda', ['0~100klambda',<br>100~1000klambda]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| specmode    | string    | None | Frequency imaging mode, 'mfs', 'cont', 'cube', 'repBW'. '' defaults to 'cube' if intent parameter includes 'TARGET' otherwise 'mfs'. specmode='mfs' produce one image per source and spw specmode='cont' produce one image per source and aggregate over all specified spws specmode='cube' produce an LSRK frequency cube, channels are specified in frequency specmode='repBW' produce an LSRK frequency cube at representative channel width                                                                                                                                                                   |
| outframe    | string    | None | velocity frame of output image (LSRK, '' for automatic)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| hm_imsz     | any       | None | Image X and Y size in pixels or PB level for single fields. The explicit sizes must be even and divisible by 2,3,5,7 only. The default values are derived as follows: 1. Determine phase center and spread of field centers around it. 2. Set the size of the image to cover the spread of field centers plus a border of width 0.75 * beam radius, to first null. 3. Divide X and Y extents by cell size to arrive at the number of pixels required. The PB level setting for single fields leads to an imsize extending to the specified level plus 5% padding in all directions. Examples: '0.3pb', [120, 120] |
| hm_cell     | stringVec | None | Image X and Y cell sizes. "" computes the cell size based on the UV coverage of all the fields to be imaged and uses a 5 pix per beam sampling. The pix per beam specification ('ppb') uses the above default cell size ('5ppb') and scales it accordingly. The cells can also be specified as explicit measures. Examples: '3ppb', ['0.5arcsec', '0.5arcsec']                                                                                                                                                                                                                                                    |
| calmaxpix   | int       | 300  | Maximum image X or Y size in pixels if a calibrator is being imaged ('PHASE', 'BANDPASS', 'AMPLITUDE' or 'FLUX' intent).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| phasecenter | any       | None | Direction measure or field id of the image center. The default phase center is set to the mean of the field directions of all fields that are to be image together. Examples: 'J2000 19h30m00 -40d00m00', 0                                                                                                                                                                                                                                                                                                                                                                                                       |
| nchan       | int       | -1   | Total number of channels in the output image(s) -1 selects enough channels to cover the data selected by spw consistent with start and width.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| start       | any       | None | Start of image frequency axis as frequency or velocity. "" selects start frequency automatically.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

|               |           |           |                                                                                                                                                                                                                                                                                                                                             |
|---------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| width         | any       | None      | Output channel width. Difference in frequency between 2 selected channels for frequency mode images. 'pilotimage' for 15 MHz / 8 channel heuristic                                                                                                                                                                                          |
| nbins         | any       | None      | Channel binning factors for each spw. Format: 'spw1:nb1,spw2:nb2,...' with optional wildcards: '*:nb'<br>Examples: '9:2,11:4,13:2,15:8', '*:2'                                                                                                                                                                                              |
| robust        | double    | -999.0    | Briggs robustness parameter Values range from -2.0 (uniform) to 2.0 (natural)                                                                                                                                                                                                                                                               |
| uvtaper       | stringVec | None      | uv-taper on outer baselines                                                                                                                                                                                                                                                                                                                 |
| clearlist     | bool      | True      | Clear any existing target list                                                                                                                                                                                                                                                                                                              |
| per_eb        | bool      | False     | Make an image target per EB                                                                                                                                                                                                                                                                                                                 |
| calcsb        | bool      | False     | Force (re-)calculation of sensitivities and beams                                                                                                                                                                                                                                                                                           |
| datacolumn    | string    | None      | Data column to image. Only to be used for manual overriding when the automatic choice by data type is not appropriate.                                                                                                                                                                                                                      |
| parallel      | string    | automatic | Use MPI cluster where possible                                                                                                                                                                                                                                                                                                              |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool      | False     | Run the task (False) or just display the command (True)                                                                                                                                                                                                                                                                                     |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                          |

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## hif\_makermsimages

### Task Description

Create RMS images for VLASS data.

1. Basic makermsimages task  
hif\_makermsimages()

### Parameter List

| <b>name</b>   | <b>type</b> | <b>default</b> | <b>description</b>                                                                                                                                                                                                                                                                                                                          |
|---------------|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec   | None           | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSs, or tar files of MSs, If ASDM files are specified, they will be converted to MS format. example: vis=['X227.ms', 'asdms.tar.gz']                                                                                                                                 |
| pipelinemode  | string      | automatic      | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool        | False          | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                      |
| acceptresults | bool        | True           | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                          |

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## **hif\_mstransform**

### **Task Description**

Create new MeasurementSets for science target imaging

1. Create a science target MS from the corrected column in the input MS.

hif\_mstransform()

2. Make a phase and bandpass calibrator targets MS from the corrected column in the input MS.

hif\_mstransform(intent='PHASE,BANDPASS')

### **Parameter List**

| name          | type      | default   | description                                                                                                                                                                                                                                            |
|---------------|-----------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None      | The list of input MeasurementSets. Defaults to the list of MeasurementSets specified in the h_init or hif_importdata task. '' : use all MeasurementSets in the context Examples: 'ngc5921.ms', ['ngc5921a.ms', ngc5921b.ms', 'ngc5921c.ms']            |
| outputvis     | stringVec | None      | The list of output transformed MeasurementSets to be used for imaging. The output list must be the same length as the input list. The default output name defaults to _targets.ms Examples: 'ngc5921.ms', ['ngc5921a.ms', ngc5921b.ms', 'ngc5921c.ms'] |
| field         | string    | None      | Select fields name(s) or id(s) to transform. Only fields with data matching the intent will be selected. Examples: '3C279', 'Centaurus*', '3C279,J1427-421'                                                                                            |
| intent        | string    | None      | Select intents for which associated fields will be imaged. By default only TARGET data is selected. Examples: 'PHASE,BANDPASS'                                                                                                                         |
| spw           | string    | None      | Select spectral window/channels to image. By default all science spws for which the specified intent is valid are selected .                                                                                                                           |
| chanbin       | int       | 1         | Width (bin) of input channels to average to form an output channel. If chanbin > 1 then chanaverage is automatically switched to True.                                                                                                                 |
| timebin       | string    | 0s        | Bin width for time averaging. If timebin > 0s then timeaverage is automatically switched to True.                                                                                                                                                      |
| pipelinemode  | string    | automatic | The pipeline operating mode                                                                                                                                                                                                                            |
| dryrun        | bool      | False     | Run the task (False) or just display the command (True)                                                                                                                                                                                                |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                     |

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## hif\_polarization

### Task Description

Base polarization task

The hif\_polarization task

Keyword arguments:

---- pipeline parameter arguments which can be set in any pipeline mode

vis -- List of visibility data files. These may be ASDMs, tar files of ASDMs, MSs, or tar files of MSs, If ASDM files are specified, they will be converted to MS format.

default: []  
 example: vis=['X227.ms', 'asdms.tar.gz']  
 pipelinemode -- The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task.  
 default: 'automatic'.  
 ---- pipeline context defined parameter argument which can be set only in 'interactive mode'  
 --- pipeline task execution modes  
 dryrun -- Run the commands (True) or generate the commands to be run but do not execute (False).  
 default: True  
 acceptresults -- Add the results of the task to the pipeline context (True) or reject them (False).  
 default: True  
 Output:  
 results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.  
 Examples  
 1. Basic polarization task  
 hif\_polarization()

## Parameter List

| name          | type      | default   | description                                         |
|---------------|-----------|-----------|-----------------------------------------------------|
| vis           | stringVec | None      | List of input visibility data                       |
| pipelinemode  | string    | automatic | The pipeline operating mode                         |
| dryrun        | bool      | False     | Run the task (False) or display task command (True) |
| acceptresults | bool      | True      | Add the results into the pipeline context           |

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## hif\_rawflagchans

### Task Description

Flag deviant baseline/channels in raw data

1. Flag bad quadrants and wild outliers, default method:

hif\_rawflagchans()

equivalent to:

hif\_rawflagchans(flag\_hilo=True, fh1\_limit=20,

flag\_bad\_quadrant=True, fbq\_hilo\_limit=8,  
fbq\_antenna\_frac\_limit=0.2, fbq\_baseline\_frac\_limit=1.0)

### Parameter List

| name                    | type      | default | description                                                                                                                                                                                                                                                                             |
|-------------------------|-----------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis                     | stringVec | None    | List of input MeasurementSets. default: [] - Use the MeasurementSets currently known to the pipeline context.                                                                                                                                                                           |
| spw                     | string    | None    | The list of spectral windows and channels to which the calibration will be applied. Defaults to all science windows in the pipeline context. example: spw='17', spw='11, 15'                                                                                                            |
| intent                  | string    | None    | A string containing the list of intents to be checked for antennas with deviant gains. The default is blank, which causes the task to select the 'BANDPASS' intent. example: intent='*BANDPASS*'                                                                                        |
| flag_hilo               | bool      | True    | True to flag channel/baseline data further from the view median than fhl_limit * MAD.                                                                                                                                                                                                   |
| fhl_limit               | double    | 20.0    | If flag_hilo is True then flag channel/baseline data further from the view median than fhl_limit * MAD.                                                                                                                                                                                 |
| fhl_minsample           | double    | 5       | Do no flagging if the view median and MAD are derived from fewer than fhl_minsample view pixels.                                                                                                                                                                                        |
| flag_bad_quadrant       | bool      | True    | True to search for and flag bad antenna quadrants and baseline quadrants. Here a /'quadrant/' is one quarter of the channel axis.                                                                                                                                                       |
| fbq_hilo_limit          | double    | 8.0     | If flag_bad_quadrant is True then channel/baselines further from the view median than fbq_hilo_limit * MAD will be noted as 'suspect'. If there are enough of them to indicate that an antenna or baseline quadrant is bad then all channel/baselines in that quadrant will be flagged. |
| fbq_antenna_frac_limit  | double    | 0.2     | If flag_bad_quadrant is True and the fraction of suspect channel/baselines in a particular antenna/quadrant exceeds fbq_antenna_frac_limit then all data for that antenna/quadrant will be flagged.                                                                                     |
| fbq_baseline_frac_limit | double    | 1.0     | If flag_bad_quadrant is True and the fraction of suspect channel/baselines in a particular baseline/quadrant exceeds fbq_baseline_frac_limit then all data for that baseline/quadrant will be flagged.                                                                                  |

|               |        |           |                                                                                                                                                                                                                                                                                                                                           |
|---------------|--------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pipelinemode  | string | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool   | False     | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                    |
| acceptresults | bool   | True      | This parameter has no effect. The Tsyscal file is already in the pipeline context and is flagged in situ.                                                                                                                                                                                                                                 |

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## hif\_refant

### Task Description

Select the best reference antennas

1. Compute the references antennas to be used for bandpass and gain calibration.

hif\_refant()

### Parameter List

| <b>name</b>   | <b>type</b> | <b>default</b>                        | <b>description</b>                                                                                                                                                                                                                                                                                                                        |
|---------------|-------------|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec   | None                                  | The list of input MeasurementSets. Defaults to the list of MeasurementSets in the pipeline context. Not available when pipelinemode='automatic'. example: ['M31.ms']                                                                                                                                                                      |
| field         | string      | None                                  | The comma delimited list of field names or field ids for which flagging scores are computed if hm_refant='automatic' and flagging = True Not available when pipelinemode='automatic'. example: '' (Default to fields with the specified intents), '3C279', '3C279,M82'                                                                    |
| spw           | string      | None                                  | A string containing the comma delimited list of spectral window ids for which flagging scores are computed if hm_refant='automatic' and flagging = True. Not available when pipelinemode='automatic'. example: '' (all spws observed with the specified intents), '11,13,15,17'                                                           |
| intent        | string      | AMPLITUDE,BANDPASS,PHASE,POLARIZATION | A string containing a comma delimited list of intents against which the selected fields are matched. Defaults to all supported intents. Not available when pipelinemode='automatic'. example: 'BANDPASS', 'AMPLITUDE,BANDPASS,PHASE,POLARIZATION'                                                                                         |
| hm_refant     | string      | automatic                             | The heuristics method or mode for selection the reference antenna. The options are 'manual' and 'automatic. In manual mode a user supplied reference antenna refant is supplied. In 'automatic' mode the antennas are selected automatically.                                                                                             |
| refant        | string      | None                                  | The user supplied reference antenna for hm_refant='manual'. If no antenna list is supplied an empty list is returned. example: 'DV05'                                                                                                                                                                                                     |
| geometry      | bool        | True                                  | Score antenna by proximity to the center of the array. This option is quick as only the ANTENNA table must be read. Parameter is available when hm_refant='automatic'.                                                                                                                                                                    |
| flagging      | bool        | True                                  | Score antennas by percentage of unflagged data. This option requires computing flagging statistics. Parameter is available when hm_refant='automatic'.                                                                                                                                                                                    |
| pipelinemode  | string      | automatic                             | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool        | False                                 | Run the task (False) or display the command (True) Available when pipelinemode='interactive'.                                                                                                                                                                                                                                             |
| acceptresults | bool        | True                                  | Add the results of the task to the pipeline context (True) or reject them (False). Available when pipelinemode='interactive'.                                                                                                                                                                                                             |
| refantignore  | string      | None                                  | string list to be ignored as reference antennas. example: refantignore='ea02,ea03'                                                                                                                                                                                                                                                        |

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## hif\_setjy

### Task Description

Fill the model column with calibrated visibilities

1. Set the model flux densities for all the amplitude calibrators:

hif\_setjy()

### Parameter List

| name       | type      | default | description                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------|-----------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis        | stringVec | None    | The list of input MeasurementSets. Defaults to the list of MeasurementSets defined in the pipeline context.                                                                                                                                                                                                                                                                                                                           |
| field      | string    | None    | The list of field names or field ids for which the models are to be set. Defaults to all fields with intent '*AMPLITUDE*'. example: field='3C279', field='3C279, M82'                                                                                                                                                                                                                                                                 |
| intent     | string    | None    | A string containing a comma delimited list of intents against which the selected fields are matched. Defaults to all data with amplitude intent. example: intent='*AMPLITUDE*'                                                                                                                                                                                                                                                        |
| spw        | string    | None    | The list of spectral windows and channels for which bandpasses are computed. Defaults to all science spectral windows. example: spw='11,13,15,17'                                                                                                                                                                                                                                                                                     |
| model      | string    | None    | Model image for setting model visibilities. Not fully supported. example: see details in help for CASA setjy task                                                                                                                                                                                                                                                                                                                     |
| reffile    | string    | None    | Path to a file containing flux densities for calibrators unknown to CASA. Values given in this file take precedence over the CASA-derived values for all calibrators except solar system calibrators. By default the path is set to the CSV file created by h_importdata, consisting of catalogue fluxes extracted from the ASDM. example: reffile='', reffile='working/flux.csv'                                                     |
| normfluxes | bool      | False   | Normalize lookup fluxes.                                                                                                                                                                                                                                                                                                                                                                                                              |
| reffreq    | string    | 1GHz    | The reference frequency for spix, given with units. Provided to avoid division by zero. If the flux density is being scaled by spectral index, then reffreq must be set to whatever reference frequency is correct for the given fluxdensity and spix. It cannot be determined from vis. On the other hand, if spix is 0, then any positive frequency can be used and will be ignored. example: reffreq='86.0GHz', reffreq='4.65e9Hz' |

|               |         |           |                                                                                                                                                                                                                                                                                                                                                                 |
|---------------|---------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| fluxdensity   | any     | -1        | Specified flux density [I,Q,U,V] in Jy. Uses [1,0,0,0] flux density for unrecognized sources, and standard flux densities for ones recognized by 'standard', including 3C286, 3C48, 3C147, and several planets, moons, and asteroids. example: [3.06,0.0,0.0,0.0]                                                                                               |
| spix          | double  | 0.0       | Spectral index for fluxdensity $S = \text{fluxdensity} * (\text{freq}/\text{reffreq})^{**}\text{spix}$ Only used if fluxdensity is being used. If fluxdensity is positive, and spix is nonzero, then reffreq must be set too. It is applied in the same way to all polarizations, and does not account for Faraday rotation or depolarization.                  |
| scalebychan   | bool    | True      | This determines whether the fluxdensity set in the model is calculated on a per channel basis. If False then only one fluxdensity value is calculated per spw.                                                                                                                                                                                                  |
| standard      | variant | None      | Flux density standard, used if fluxdensity[0] less than 0.0. The options are: 'Baars', 'Perley 90', 'Perley-Taylor 95', 'Perley-Taylor 99', 'Perley-Butler 2010' and 'Butler-JPL-Horizons 2010'. default: 'Butler-JPL-Horizons 2012' for solar system object 'Perley-Butler 2010' otherwise                                                                     |
| pipelinemode  | string  | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. default: 'automatic'. |
| dryrun        | bool    | False     | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                                          |
| acceptresults | bool    | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                                              |

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## hif\_setmodels

### Task Description

Set calibrator source models

1. Set model fluxes for the flux, bandpass, phase, and check sources.

hif\_setmodels()

### Parameter List

| <b>name</b>   | <b>type</b> | <b>default</b> | <b>description</b>                                                                                                                                                                                                                                                                                                                         |
|---------------|-------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | string      | None           | The list of input MeasurementSets. Defaults to the list of MeasurementSets specified in the pipeline context. example: ['M32A.ms', 'M32B.ms']                                                                                                                                                                                              |
| reference     | variant     | None           | A string containing a comma delimited list of field names defining the reference calibrators. Defaults to field names with intent 'AMPLITUDE'. example: 'M82,3C273'                                                                                                                                                                        |
| refintent     | string      | AMPLITUDE      | A string containing a comma delimited list of intents used to select the reference calibrators. Defaults to 'AMPLITUDE'. example: 'BANDPASS'                                                                                                                                                                                               |
| transfer      | variant     | None           | A string containing a comma delimited list of field names defining the transfer calibrators. Defaults to field names with intent ''. example: 'J1328+041,J1206+30'                                                                                                                                                                         |
| transintent   | string      | BANDPASS       | A string containing a comma delimited list of intents defining the transfer calibrators. Defaults to 'BANDPASS,PHASE,CHECK'. '' stands for no transfer sources. example: 'PHASE'                                                                                                                                                           |
| reffile       | string      | None           | The reference file containing a lookup table of point source models This file currently defaults to 'flux.csv' in the working directory. This file must conform to the standard pipeline 'flux.csv' format example: 'myfluxes.csv'                                                                                                         |
| normfluxes    | bool        | True           | Normalize the transfer source flux densities.                                                                                                                                                                                                                                                                                              |
| scalebychan   | bool        | True           | Scale the flux density on a per channel basis or else on a per spw basis                                                                                                                                                                                                                                                                   |
| pipelinemode  | string      | automatic      | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the users can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool        | False          | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                     |
| acceptresults | bool        | True           | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                         |

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## **hif\_transformimagedata**

### **Task Description**

Extract fields for the desired VLASS image to a new MS and reset weights if desired

1. Basic transformimagedata task

hif\_transformimagedata()

### **Parameter List**

| <b>name</b>    | <b>type</b> | <b>default</b> | <b>description</b>                                                                                                                                                                                                                                                                                                                          |
|----------------|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis            | stringVec   | None           | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSs, or tar files of MSs, If ASDM files are specified, they will be converted to MS format. example:<br>vis=['X227.ms', 'asdms.tar.gz']                                                                                                                              |
| outputvis      | string      | None           | The output MeasurementSet.                                                                                                                                                                                                                                                                                                                  |
| field          | string      | None           | Set of data selection field names or ids, '\\' for all.                                                                                                                                                                                                                                                                                     |
| intent         | string      | None           | Set of data selection intents, '\\' for all.                                                                                                                                                                                                                                                                                                |
| spw            | string      | None           | Set of data selection spectral window ids '\\' for all.                                                                                                                                                                                                                                                                                     |
| datacolumn     | string      | corrected      | Select spectral windows to split. The standard CASA options are supported example: 'data', 'model'                                                                                                                                                                                                                                          |
| chanbin        | int         | 1              |                                                                                                                                                                                                                                                                                                                                             |
| timebin        | string      | 0s             | Bin width for time averaging.                                                                                                                                                                                                                                                                                                               |
| replace        | bool        | False          | If a split was performed delete the parent MS and remove it from the context. example: True or False                                                                                                                                                                                                                                        |
| clear_pointing | bool        | True           | Clear the pointing table.                                                                                                                                                                                                                                                                                                                   |
| modify_weights | bool        | False          | Re-initialize the weights.                                                                                                                                                                                                                                                                                                                  |
| wtmode         | string      | None           | optional weight initialization mode when modify_weights=True                                                                                                                                                                                                                                                                                |
| pipelinemode   | string      | automatic      | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun         | bool        | False          | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                      |
| acceptresults  | bool        | True           | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                          |

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## **hif\_uvcontfit**

### **Task Description**

Fit the continuum in the UV plane

### **Parameter List**

| <b>name</b>   | <b>type</b> | <b>default</b> | <b>description</b>                                                                                                                                                                                                                                                                                                                          |
|---------------|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec   | None           | The list of input MeasurementSets. Defaults to the list of MeasurementSets specified in the h_init or hif_importdata task. '' : use all MeasurementSets in the context Examples: 'ngc5921.ms', ['ngc5921a.ms', ngc5921b.ms', 'ngc5921c.ms']                                                                                                 |
| caltable      | stringVec   | None           | The list of output Mueller matrix calibration tables one per input MS. '' : The output names default to the standard pipeline name scheme                                                                                                                                                                                                   |
| contfile      | string      | None           | Name of the input file of per source / spw continuum regions '' : Defaults first to the file named in the context, next to a file called 'cont.dat' in the pipeline working directory.                                                                                                                                                      |
| field         | string      | None           | The list of field names or field ids for which UV continuum fits are computed. Defaults to all fields. Eexamples: '3C279', '3C279, M82'                                                                                                                                                                                                     |
| intent        | string      | None           | A string containing a comma delimited list of intents against which the selected fields are matched. '' : Defaults to all data with TARGET intent.                                                                                                                                                                                          |
| spw           | string      | None           | The list of spectral windows and channels for which uv continuum fits are computed. '', Defaults to all science spectral windows. Example: '11,13,15,17'                                                                                                                                                                                    |
| combine       | string      | None           | Data axes to be combined for solving. Axes are 'scan', 'spw', or ''. This option is currently not supported.                                                                                                                                                                                                                                |
| solint        | any         | int            | Time scale for the continuum fit                                                                                                                                                                                                                                                                                                            |
| fitorder      | int         | 1              | Polynomial order for the continuum fits                                                                                                                                                                                                                                                                                                     |
| pipelinemode  | string      | automatic      | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool        | False          | Run the task (False) or just display the command (True)                                                                                                                                                                                                                                                                                     |
| acceptresults | bool        | True           | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                          |

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## hif\_uvcontsub

### Task Description

Subtract the fitted continuum from the data

### Parameter List

| name          | type      | default   | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------|-----------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None      | The list of input MeasurementSets. Defaults to the list of MeasurementSets specified in the h_init or hif_importdata task. '' : use all MeasurementSets in the context Examples: 'ngc5921.ms', ['ngc5921a.ms', 'ngc5921b.ms', 'ngc5921c.ms']                                                                                                                                                                                                                                                                                   |
| field         | string    | None      | The list of field names or field ids for which UV continuum fits are computed. Defaults to all fields. Eexamples: '3C279', '3C279, M82'                                                                                                                                                                                                                                                                                                                                                                                        |
| intent        | string    | None      | A string containing a comma delimited list of intents against which the selected fields are matched. '' : Defaults to all data with TARGET intent.                                                                                                                                                                                                                                                                                                                                                                             |
| spw           | string    | None      | The list of spectral windows and channels for which uv continuum fits are computed. '', Defaults to all science spectral windows. Example: '11,13,15,17'                                                                                                                                                                                                                                                                                                                                                                       |
| applymode     | string    | None      | Calibration apply mode ''='calflagstrict': calibrate data and apply flags from solutions using the strict flagging convention 'trial': report on flags from solutions, dataset entirely unchanged 'flagonly': apply flags from solutions only, data not calibrated 'calonly': calibrate data only, flags from solutions NOT applied 'calflagstrict': 'flagonlystrict': same as above except flag spws for which calibration is unavailable in one or more tables (instead of allowing them to pass uncalibrated and unflagged) |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task.                                                                                                                                                                                    |
| dryrun        | bool      | False     | Run the task (False) or just display the command (True)                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                                                                                                                                                                                                             |

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## Summary of ALMA-specific interferometric tasks and parameters

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### hifa\_antpos

#### Task Description

Derive an antenna position calibration table

1. Correct the position of antenna 5 for all the visibility files in a single pipeline run:

```
hifa_antpos(antenna='DV05', offsets=[0.01, 0.02, 0.03])
```

2. Correct the position of antennas for all the visibility files in a single pipeline run using antenna positions files on disk. These files are assumed to conform to a default naming scheme if 'antposfile' is unspecified by the user:

```
hifa_antpos(hm_antpos='file', antposfile='myantposfile.csv')
```

#### Parameter List

| <b>name</b>   | <b>type</b> | <b>default</b> | <b>description</b>                                                                                                                                                                                                                                                                                                                        |
|---------------|-------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec   | None           | List of input MeasurementSets. Defaults to the list of MeasurementSets specified in the pipeline context. Example: vis=['ngc5921.ms']                                                                                                                                                                                                     |
| caltable      | stringVec   | None           | List of names for the output calibration tables. Defaults to the standard pipeline naming convention. Example: caltable=['ngc5921.gcal']                                                                                                                                                                                                  |
| hm_antpos     | string      | file           | Heuristics method for retrieving the antenna position corrections. The options are 'online' (not yet implemented), 'manual', and 'file'. Example: hm_antpos='manual'                                                                                                                                                                      |
| antenna       | string      | None           | The list of antennas for which the positions are to be corrected if hm_antpos is 'manual'. Example: antenna='DV05,DV07'                                                                                                                                                                                                                   |
| offsets       | doubleVec   | None           | The list of antenna offsets for each antenna in 'antennas'. Each offset is a set of 3 floating point numbers separated by commas, specified in the ITRF frame. Example: offsets=[0.01, 0.02, 0.03, 0.03, 0.02, 0.01]                                                                                                                      |
| antposfile    | string      | antennapos.csv | The file(s) containing the antenna offsets. Used if hm_antpos is 'file'.                                                                                                                                                                                                                                                                  |
| pipelinemode  | string      | automatic      | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool        | False          | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                    |
| acceptresults | bool        | True           | Automatically accept the results of the task into the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                     |
| threshold     | double      | 1.0            | Highlight antenna position offsets greater than this value in the weblog. Units are wavelengths and the default is 1.0. Example: threshold=1.0                                                                                                                                                                                            |

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## hifa\_bandpassflag

### Task Description

Bandpass calibration flagging

1. run with recommended settings to create bandpass solution with flagging using recommended thresholds:

```
hifa_bandpassflag()
```

### Parameter List

| name          | type      | default | description                                                                                                                                                                                                                     |
|---------------|-----------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None    | List of input MeasurementSets. Defaults to the list of MeasurementSets specified in the pipeline context. Example: vis=['ngc5921.ms']                                                                                           |
| caltable      | stringVec | None    | List of names for the output calibration tables. Defaults to the standard pipeline naming convention. Example: caltable=['ngc5921.gcal']                                                                                        |
| intent        | string    | None    | A string containing a comma delimited list of intents against which the selected fields are matched. Set to intent='' by default, which means the task will select all data with the BANDPASS intent. Example: intent='*PHASE*' |
| field         | string    | None    | The list of field names or field ids for which bandpasses are computed. Set to field='' by default, which means the task will select all fields. Example: field='3C279', field='3C279,M82'                                      |
| spw           | string    | None    | The list of spectral windows and channels for which bandpasses are computed. Set to spw='' by default, which means the task will select all science spectral windows. Example: spw='11,13,15,17'                                |
| antenna       | string    | None    | Set of data selection antenna IDs                                                                                                                                                                                               |
| hm_phaseup    | string    | snr     | The pre-bandpass solution phaseup gain heuristics. The options are: 'snr': compute solution required to achieve the specified SNR 'manual': use manual solution parameters '': skip phaseup Example: hm_phaseup='manual'        |
| phaseupsolint | any       | int     | The phase correction solution interval in CASA syntax. Used when hm_phaseup='manual' or as a default if the hm_phaseup='snr' heuristic computation fails. Example: phaseupsolint='300s'                                         |
| phaseupbw     | string    | None    | Bandwidth to be used for phaseup. Used when hm_phaseup='manual'. Example: phaseupbw='' to use entire bandpass phaseupbw='500MHz' to use central 500MHz                                                                          |

|              |        |      |                                                                                                                                                                                                                                                                                                                                                        |
|--------------|--------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| phaseupsnr   | double | 20.0 | The required SNR for the phaseup solution. Used only if hm_phaseup='snr'. Example: phaseupsnr=10.0                                                                                                                                                                                                                                                     |
| phaseupnsols | int    | 2    | The minimum number of phaseup gain solutions. Used only if hm_phaseup='snr'. Example: phaseupnsols=4                                                                                                                                                                                                                                                   |
| hm_bandpass  | string | snr  | The bandpass solution heuristics. The options are: 'snr': compute the solution required to achieve the specified SNR 'smoothed': simple smoothing heuristics 'fixed': use the user defined parameters for all spws                                                                                                                                     |
| solint       | any    | inf  | Time and channel solution intervals in CASA syntax. Default is solint='inf', which is used when hm_bandpass='fixed'. If hm_bandpass is set to 'snr', then the task will attempt to compute and use an optimal SNR-based solint (and warn if this solint is not good enough). If hm_bandpass is set to 'smoothed', the task will use a smoothed solint. |
| maxchannels  | int    | 240  | The bandpass solution smoothing factor in channels. The solution interval is bandwidth / 240. Set to 0 for no smoothing. Used if hm_bandpass='smoothed'. Example: maxchannels=0                                                                                                                                                                        |
| evenbpints   | bool   | True | Force the per spw frequency solint to be evenly divisible into the spw bandpass if hm_bandpass='snr'. Example: evenbpints=False                                                                                                                                                                                                                        |
| bpsnr        | double | 50.0 | The required SNR for the bandpass solution. Used only if hm_bandpass='snr'. Example: bpsnr=30.0                                                                                                                                                                                                                                                        |
| minbpsnr     | double | 20.0 | The minimum required SNR for the bandpass solution when strong atmospheric lines exist in Tsys spectra. Used only if hm_bandpass='snr'. Example: minbpsnr=10.0                                                                                                                                                                                         |
| bpsols       | int    | 8    | The minimum number of bandpass solutions. Used only if hm_bandpass='snr'.                                                                                                                                                                                                                                                                              |
| combine      | string | scan | Data axes to combine for solving. Axes are '', 'scan', 'spw', 'field' or any comma-separated combination. Example: combine='scan,field'                                                                                                                                                                                                                |
| refant       | string | None | List of reference antenna names. Defaults to the value(s) stored in the pipeline context. If undefined in the pipeline context defaults to the CASA reference antenna naming scheme. Example: refant='DV06,DV07'                                                                                                                                       |
| minblperant  | int    | 4    | Minimum number of baselines required per antenna for each solve. Antennas with fewer baselines are excluded from solutions.                                                                                                                                                                                                                            |
| minsnr       | double | 2.0  | Solutions below this SNR are rejected                                                                                                                                                                                                                                                                                                                  |

|                |        |           |                                                                                                                                                                                                                                                                                                                                           |
|----------------|--------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| solnorm        | bool   | True      | Normalise the bandpass solution                                                                                                                                                                                                                                                                                                           |
| antnegsig      | double | 4.0       | Lower sigma threshold for identifying outliers as a result of bad antennas within individual timestamps.                                                                                                                                                                                                                                  |
| antpossig      | double | 4.6       | Upper sigma threshold for identifying outliers as a result of bad antennas within individual timestamps.                                                                                                                                                                                                                                  |
| tmantint       | double | 0.063     | Threshold for maximum fraction of timestamps that are allowed to contain outliers.                                                                                                                                                                                                                                                        |
| tmint          | double | 0.085     | Initial threshold for maximum fraction of 'outlier timestamps' over 'total timestamps' that a baseline may be a part of.                                                                                                                                                                                                                  |
| tmb1           | double | 0.175     | Initial threshold for maximum fraction of 'bad baselines' over 'all baselines' that an antenna may be a part of.                                                                                                                                                                                                                          |
| antblnegsig    | double | 3.4       | Lower sigma threshold for identifying outliers as a result of 'bad baselines' and/or 'bad antennas' within baselines (across all timestamps).                                                                                                                                                                                             |
| antblpossig    | double | 3.2       | Upper sigma threshold for identifying outliers as a result of 'bad baselines' and/or 'bad antennas' within baselines (across all timestamps).                                                                                                                                                                                             |
| relaxed_factor | double | 2.0       | Relaxed value to set the threshold scaling factor to under certain conditions (see documentation of the underlying correctedampflag task).                                                                                                                                                                                                |
| niter          | int    | 2         | Maximum number of times to iterate on evaluation of flagging heuristics. If an iteration results in no new flags, then subsequent iterations are skipped.                                                                                                                                                                                 |
| pipelinemode   | string | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun         | bool   | False     | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                    |
| acceptresults  | bool   | True      | Automatically accept the results of the task into the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                     |

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## hifa\_bandpass

### Task Description

Compute bandpass calibration solutions

1. Compute a channel bandpass for all visibility files in the pipeline context using the CASA reference antenna determination scheme:

```
hifa_bandpass()
```

2. Same as the above but precompute a prioritized reference antenna list:

```
hif_refant()
```

```
hifa_bandpass()
```

### Parameter List

| name       | type      | default | description                                                                                                                                                                                                                     |
|------------|-----------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis        | stringVec | None    | List of input MeasurementSets. Defaults to the list of MeasurementSets specified in the pipeline context. Example: vis=['ngc5921.ms']                                                                                           |
| caltable   | stringVec | None    | List of names for the output calibration tables. Defaults to the standard pipeline naming convention. Example: caltable=['ngc5921.gcal']                                                                                        |
| field      | string    | None    | The list of field names or field ids for which bandpasses are computed. Set to field='' by default, which means the task will select all fields. Example: field='3C279', field='3C279,M82'                                      |
| intent     | string    | None    | A string containing a comma delimited list of intents against which the selected fields are matched. Set to intent='' by default, which means the task will select all data with the BANDPASS intent. Example: intent='*PHASE*' |
| spw        | string    | None    | The list of spectral windows and channels for which bandpasses are computed. Set to spw='' by default, which means the task will select all science spectral windows. Example: spw='11,13,15,17'                                |
| antenna    | string    | None    | Set of data selection antenna IDs                                                                                                                                                                                               |
| hm_phaseup | string    | snr     | The pre-bandpass solution phaseup gain heuristics. The options are: 'snr': compute solution required to achieve the specified SNR 'manual': use manual solution parameters '': skip phaseup Example: hm_phaseup='manual'        |

|               |        |      |                                                                                                                                                                                                                                                                                                                                                        |
|---------------|--------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| phaseupsolint | any    | int  | The phase correction solution interval in CASA syntax. Used when hm_phaseup='manual' or as a default if the hm_phaseup='snr' heuristic computation fails. Example: phaseupsolint='300s'                                                                                                                                                                |
| phaseupbw     | string | None | Bandwidth to be used for phaseup. Used when hm_phaseup='manual'. Example: phaseupbw='' to use entire bandpass phaseupbw='500MHz' to use central 500MHz                                                                                                                                                                                                 |
| phaseupsnr    | double | 20.0 | The required SNR for the phaseup solution. Used to calculate the phaseup time solint, and only if hm_phaseup='snr'. Example: phaseupsnr=10.0                                                                                                                                                                                                           |
| phaseupnsols  | int    | 2    | The minimum number of phaseup gain solutions. Used only if hm_phaseup='snr'. Example: phaseupnsols=4                                                                                                                                                                                                                                                   |
| hm_bandpass   | string | snr  | The bandpass solution heuristics. The options are: 'snr': compute the solution required to achieve the specified SNR 'smoothed': simple smoothing heuristics 'fixed': use the user defined parameters for all spws                                                                                                                                     |
| solint        | any    | inf  | Time and channel solution intervals in CASA syntax. Default is solint='inf', which is used when hm_bandpass='fixed'. If hm_bandpass is set to 'snr', then the task will attempt to compute and use an optimal SNR-based solint (and warn if this solint is not good enough). If hm_bandpass is set to 'smoothed', the task will use a smoothed solint. |
| maxchannels   | int    | 240  | The bandpass solution smoothing factor in channels. The solution interval is bandwidth / 240. Set to 0 for no smoothing. Used if hm_bandpass='smoothed'. Example: maxchannels=0                                                                                                                                                                        |
| evenbpints    | bool   | True | Force the per spw frequency solint to be evenly divisible into the spw bandpass if hm_bandpass='snr'. Example: evenbpints=False                                                                                                                                                                                                                        |
| bpsnr         | double | 50.0 | The required SNR for the bandpass solution. Used only if hm_bandpass='snr'. Example: bpsnr=30.0                                                                                                                                                                                                                                                        |
| minbpsnr      | double | 20.0 | The minimum required SNR for the bandpass solution when strong atmospheric lines exist in Tsys spectra. Used only if hm_bandpass='snr'. Example: minbpsnr=10.0                                                                                                                                                                                         |
| bpnsols       | int    | 8    | The minimum number of bandpass solutions. Used only if hm_bandpass='snr'.                                                                                                                                                                                                                                                                              |

|                     |        |           |                                                                                                                                                                                                                                                                                                                                           |
|---------------------|--------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| combine             | string | scan      | Data axes to combine for solving. Axes are '', 'scan', 'spw', 'field' or any comma-separated combination. Example: combine='scan,field'                                                                                                                                                                                                   |
| refant              | string | None      | List of reference antenna names. Defaults to the value(s) stored in the pipeline context. If undefined in the pipeline context defaults to the CASA reference antenna naming scheme. Example: refant='DV06,DV07'                                                                                                                          |
| solnorm             | bool   | True      | Normalise the bandpass solution                                                                                                                                                                                                                                                                                                           |
| minblperant         | int    | 4         | Minimum number of baselines required per antenna for each solve. Antennas with fewer baselines are excluded from solutions.                                                                                                                                                                                                               |
| minsnr              | double | 3.0       | Solutions below this SNR are rejected in the phaseup and bandpass solves                                                                                                                                                                                                                                                                  |
| unregister_existing | bool   | False     | Unregister all bandpass calibrations from the pipeline context before registering the new bandpass calibrations from this task.                                                                                                                                                                                                           |
| pipelinemode        | string | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun              | bool   | False     | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                    |
| acceptresults       | bool   | True      | Automatically accept the results of the task into the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                     |

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## hifa\_bpsolint

### Task Description

Compute optimal bandpass calibration solution intervals

1. Estimate the phaseup gain time interval and the bandpass frequency interval required to match the desired signal to noise for bandpass solutions:

hifa\_bpsolint()

### Parameter List

| <b>name</b>    | <b>type</b> | <b>default</b> | <b>description</b>                                                                                                                                                                                                        |
|----------------|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis            | stringVec   | None           | The list of input MeasurementSets. Defaults to the list of MeasurementSets specified in the pipeline context example: vis=['M82A.ms', 'M82B.ms']                                                                          |
| field          | string      | None           | The list of field names of sources to be used for signal to noise estimation. Defaults to all fields with the standard intent. example: field='3C279'                                                                     |
| intent         | string      | BANDPASS       | A string containing a comma delimited list of intents against which the selected fields are matched. Defaults to 'BANDPASS'. example: intent='PHASE'                                                                      |
| spw            | string      | None           | The list of spectral windows and channels for which gain solutions are computed. Defaults to all the science spectral windows for which there are both 'intent' and TARGET intents. example: spw='13,15'                  |
| phaseupsnr     | double      | 20.0           | The required phaseup gain time interval solution signal to noise. example: phaseupsnr=10.0                                                                                                                                |
| minphaseupints | int         | 2              | The minimum number of time intervals in the phaseup gain. solution. example: minphaseupints=4                                                                                                                             |
| evenbpints     | bool        | False          | Use a bandpass frequency solint that is an integer divisor of the spw bandwidth, to prevent the occurrence of one narrower fractional frequency interval.                                                                 |
| bpsnr          | double      | 50.0           | The required bandpass frequency interval solution signal to noise. example: bpsnr=30.0                                                                                                                                    |
| minbpsnr       | double      | 20.0           | The minimum required bandpass frequency interval solution signal to noise when strong atmospheric lines exist in Tsys spectra. example: minbpsnr=10.0                                                                     |
| minbpnchan     | int         | 8              | The minimum number of frequency intervals in the bandpass solution. example: minbpnchan=16                                                                                                                                |
| hm_nantennas   | string      | all            | The heuristics for determines the number of antennas to use in the signal to noise estimate. The options are 'all' and 'unflagged'. The 'unflagged' options is not currently supported. example: hm_nantennas='unflagged' |
| maxfracflagged | double      | 0.90           | The maximum fraction of an antenna that can be flagged before it is excluded from the signal to noise estimate. example: maxfracflagged=0.80                                                                              |

|               |        |           |                                                                                                                                                                                                                                                                                                                                           |
|---------------|--------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pipelinemode  | string | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool   | False     | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                    |
| acceptresults | bool   | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                        |

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## hifa\_exportdata

### Task Description

Prepare interferometry data for export

1. Export the pipeline results for a single session to the data products directory:

```
!mkdir ../products
hif_exportdata(products_dir='../products')
```

2. Export the pipeline results to the data products directory specify that only the gain calibrator images be saved:

```
!mkdir ../products
hif_exportdata(products_dir='../products', calintents='*PHASE*')
```

### Parameter List

| name                  | type      | default | description                                                                                                                                                                                                                                                                                                         |
|-----------------------|-----------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis                   | stringVec | None    | List of visibility data files for which flagging and calibration information will be exported. Defaults to the list maintained in the pipeline context. Not available in pipelinemode='automatic'. example: vis=['X227.ms', 'X228.ms']                                                                              |
| session               | stringVec | None    | List of sessions one per visibility file. Currently defaults to a single virtual session containing all the visibility files in vis. In the future, this will default to the set of observing sessions defined in the context. Not available in pipelinemode='automatic'. example: session=['session1', 'session2'] |
| imaging_products_only | bool      | False   | Export science target imaging products only                                                                                                                                                                                                                                                                         |

|               |           |           |                                                                                                                                                                                                                                                                                                                                             |
|---------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| exportmses    | bool      | False     | Export the final MeasurementSets instead of the final flags, calibration tables, and calibration instructions.                                                                                                                                                                                                                              |
| pprfile       | string    | None      | Name of the pipeline processing request to be exported. Defaults to a file matching the template 'PPR_*.xml'. Not available in pipelinemode='automatic'. example: pprfile=['PPR_GRB021004.xml']                                                                                                                                             |
| calintents    | string    | None      | List of calibrator image types to be exported. Defaults to all standard calibrator intents, 'BANDPASS', 'PHASE', 'FLUX'. Not available in pipelinemode='automatic'. example: 'PHASE'                                                                                                                                                        |
| calimages     | stringVec | None      | List of calibrator images to be exported. Defaults to all calibrator images recorded in the pipeline context. Not available in pipelinemode='automatic'. example: calimages=['3C454.3.bandpass', '3C279.phase']                                                                                                                             |
| targetimages  | stringVec | None      | List of science target images to be exported. Defaults to all science target images recorded in the pipeline context. Not available in pipelinemode='automatic'. example: targetimages=['NGC3256.band3', 'NGC3256.band6']                                                                                                                   |
| products_dir  | string    | None      | Name of the data products subdirectory. Defaults to './' Not available in pipelinemode='automatic'. example: './products'                                                                                                                                                                                                                   |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool      | False     | Run the task (False) or display task command (True). Only available in pipelinemode='interactive'.                                                                                                                                                                                                                                          |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False). Only available in pipelinemode='interactive'.                                                                                                                                                                                                            |

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## hifa\_flagdata

### Task Description

Do meta data based flagging of a list of MeasurementSets.

1. Do basic flagging on a MeasurementSet:

hifa\_flagdata()

2. Do basic flagging on a MeasurementSet flagging additional scans selected by number as well:

hifa\_flagdata(scannumber='13,18')

### Parameter List

| name       | type      | default                            | description                                                                                                                                                                                                                                |
|------------|-----------|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis        | stringVec | None                               | The list of input MeasurementSets. Defaults to the list of MeasurementSets defined in the pipeline context.                                                                                                                                |
| autocorr   | bool      | True                               | Flag autocorrelation data.                                                                                                                                                                                                                 |
| shadow     | bool      | True                               | Flag shadowed antennas.                                                                                                                                                                                                                    |
| tolerance  | double    | 0.0                                | Amount of antenna shadowing tolerated, in meters. A positive number allows antennas to overlap in projection. A negative number forces antennas apart in projection. Zero implies a distance of radius_1+radius_2 between antenna centers. |
| scan       | bool      | True                               | Flag a list of specified scans.                                                                                                                                                                                                            |
| scannumber | string    | None                               | A string containing a comma delimited list of scans to be flagged. example: scannumber='3,5,6'                                                                                                                                             |
| intents    | string    | POINTING,FOCUS,ATMOSPHERE,SIDEBAND | A string containing a comma delimited list of intents against which the scans to be flagged are matched. example: intents='*BANDPASS*'                                                                                                     |

|                   |        |          |                                                                                                                                                                                         |
|-------------------|--------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| edgespw           | bool   | True     | Flag the edge spectral window channels.                                                                                                                                                 |
| fracspw           | double | 0.03125  | Fraction of channels to flag at both edges of TDM spectral windows.                                                                                                                     |
| fracspwfps        | double | 0.048387 | Fraction of channels to flag at both edges of ACA TDM spectral windows that were created with the earlier (original) implementation of the frequency profile synthesis (FPS) algorithm. |
| online            | bool   | True     | Apply the online flags.                                                                                                                                                                 |
| partialpol        | bool   | True     | Identify integrations in multi-polarisation data where part of the polarization products are already flagged, and flag the other polarization products in those integrations.           |
| lowtrans          | bool   | True     | Flag spectral windows for which a significant fraction of the channels have atmospheric transmission below the threshold (mintransrepspw, mintransnonrepsws).                           |
| mintransnonrepsws | double | 0.1      | This atmospheric transmissivity threshold is used to flag a non-representative science spectral window when more than 60% of its channels have a transmissivity below this level.       |

|                |           |         |                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------|-----------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| mintransrepspw | double    | 0.05    | This atmospheric transmissivity threshold is used to flag the representative science spectral window when more than 60% of its channels have a transmissivity below this level.                                                                                                                                                                                                  |
| fileonline     | string    | None    | File containing the online flags. These are computed by the h_init or hif_importdata data tasks. If the online flags files are undefined a name of the form 'msname.flagonline.txt' is assumed.                                                                                                                                                                                  |
| template       | bool      | True    | Apply flagging templates                                                                                                                                                                                                                                                                                                                                                         |
| filetemplate   | stringVec | None    | The name of a text file that contains the flagging template for RFI, birdies, telluric lines, etc. If the template flags files is undefined a name of the form 'msname.flagtemplate.txt' is assumed.                                                                                                                                                                             |
| hm_tbuff       | string    | halfint | The heuristic for computing the default time interval padding parameter. The options are 'halfint' and 'manual'. In 'halfint' mode tbuff is set to half the maximum of the median integration time of the science and calibrator target observations. The value of 0.048 seconds is subtracted from the lower time limit to accommodate the behavior of the ALMA Control system. |

|               |        |           |                                                                                                                                                                                                                                                                                                                                           |
|---------------|--------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| tbuff         | any    | [0.0,0.0] | The time in seconds used to pad flagging command time intervals if hm_tbuff='manual'. The default in manual mode is no flagging.                                                                                                                                                                                                          |
| qa0           | bool   | True      | QA0 flags.                                                                                                                                                                                                                                                                                                                                |
| qa2           | bool   | True      | QA2 flags.                                                                                                                                                                                                                                                                                                                                |
| pipelinemode  | string | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| flagbackup    | bool   | True      | Back up any pre-existing flags.                                                                                                                                                                                                                                                                                                           |
| dryrun        | bool   | False     | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                    |
| acceptresults | bool   | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                        |

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## hifa\_flagtargets

### Task Description

Do science target flagging

1. Do basic flagging on a science target MeasurementSet:

```
hifa_flagtargets()
```

## Parameter List

| name          | type      | default   | description                                                                                                                                                                                                                                                                                                                               |
|---------------|-----------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None      | The list of input MeasurementSets. Defaults to the list of MeasurementSets defined in the pipeline context. (can be set only in 'interactive mode')                                                                                                                                                                                       |
| template      | bool      | True      | Apply flagging templates. (can be set in any pipeline mode)                                                                                                                                                                                                                                                                               |
| filetemplate  | stringVec | None      | The name of a text file that contains the flagging template for issues with the science target data etc. If the template flags files is undefined a name of the form 'msname_flagtargetstemplate.txt' is assumed. (can be set in any pipeline mode)                                                                                       |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| flagbackup    | bool      | False     | Back up any pre-existing flags. (can be set only in 'interactive mode')                                                                                                                                                                                                                                                                   |
| dryrun        | bool      | False     | Run the commands (False) or generate the commands to be run but do not execute (True).                                                                                                                                                                                                                                                    |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                        |

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## hifa\_fluxcalflag

### Task Description

Locate and flag line regions in solar system flux calibrators

1. Locate known lines in any solar system object flux calibrators:

hifa\_fluxcalflag()

### Parameter List

| <b>name</b>   | <b>type</b> | <b>default</b> | <b>description</b>                                                                                                                                                                                                                                                                                                                        |
|---------------|-------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec   | None           | The list of input MeasurementSets. Defaults to the list of MeasurementSets defined in the pipeline context.                                                                                                                                                                                                                               |
| field         | string      | None           | The list of field names or field ids for which the models are to be set. Defaults to all fields with intent 'AMPLITUDE'. example: field='3C279', field='3C279, M82'                                                                                                                                                                       |
| intent        | string      | None           | A string containing a comma delimited list of intents against which the selected fields are matched. Defaults to all data with amplitude intent. example: intent='AMPLITUDE'                                                                                                                                                              |
| spw           | string      | None           | The list of spectral windows and channels for which bandpasses are computed. Defaults to all science spectral windows. example: spw='11,13,15,17'                                                                                                                                                                                         |
| pipelinemode  | string      | automatic      | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| threshold     | double      | 0.75           | If the fraction of an spw occupied by line regions is greater than threshold flag the entire spectral window.                                                                                                                                                                                                                             |
| appendlines   | bool        | False          | Append user defined line regions to the line dictionary.                                                                                                                                                                                                                                                                                  |
| linesfile     | string      | None           |                                                                                                                                                                                                                                                                                                                                           |
| applyflags    | bool        | True           |                                                                                                                                                                                                                                                                                                                                           |
| dryrun        | bool        | False          | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                    |
| acceptresults | bool        | True           | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                        |

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## **hifa\_gaincalsnr**

### **Task Description**

Compute gaincal signal to noise ratios per spw

1. Estimate the per scan gaincal solution sensitivities and signal to noise ratios for all the science spectral windows:

```
hifa_gaincalsnr()
```

## Parameter List

| name           | type      | default   | description                                                                                                                                                                                                                                                                                                                               |
|----------------|-----------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis            | stringVec | None      | The list of input MeasurementSets. Defaults to the list of MeasurementSets specified in the pipeline context. example: vis=['M82A.ms', 'M82B.ms']                                                                                                                                                                                         |
| field          | string    | None      | The list of field names of sources to be used for signal to noise estimation. Defaults to all fields with the standard intent. example: field='3C279'                                                                                                                                                                                     |
| intent         | string    | PHASE     | A string containing a comma delimited list of intents against which the selected fields are matched. Defaults to 'PHASE'. example: intent='BANDPASS'                                                                                                                                                                                      |
| spw            | string    | None      | The list of spectral windows and channels for which gain solutions are computed. Defaults to all the science spectral windows for which there are both 'intent' and TARGET intents. example: spw='13,15'                                                                                                                                  |
| phasesnr       | double    | 25.0      | The required gaincal solution signal to noise. example: phasesnr=20.0                                                                                                                                                                                                                                                                     |
| bwedgefrac     | double    | 0.03125   | The fraction of the bandwidth edges that is flagged. example: bwedgefrac=0.0                                                                                                                                                                                                                                                              |
| hm_nantennas   | string    | all       | The heuristics for determines the number of antennas to use in the signal to noise estimate. The options are 'all' and 'unflagged'. The 'unflagged' options is not currently supported. example: hm_nantennas='unflagged'                                                                                                                 |
| maxfracflagged | double    | 0.90      | The maximum fraction of an antenna that can be flagged before it is excluded from the signal to noise estimate. example: maxfracflagged=0.80                                                                                                                                                                                              |
| pipelinemode   | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun         | bool      | False     | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                    |
| acceptresults  | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                        |

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## hifa\_gfluxscaleflag

### Task Description

Flag the phase, pol, flux calibrators

1. run with recommended settings to create flux scale calibration with flagging using recommended thresholds:

```
hifa_gfluxscaleflag()
```

### Parameter List

| name          | type      | default | description                                                                                                                                                                                                                                                                                                                                                                            |
|---------------|-----------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None    | The list of input MeasurementSets. Defaults to the list of MeasurementSets specified in the pipeline context. example: vis=['M51.ms']                                                                                                                                                                                                                                                  |
| intent        | string    | None    | A string containing a comma delimited list of intents against which the selected fields are matched. If undefined (default), it will select all data with the AMPLITUDE, PHASE, and CHECK intents, except for one case: if one of the AMPLITUDE intent fields was also used for BANDPASS, then this task will select only data with PHASE and CHECK intents. example: intent='*PHASE*' |
| phaseupsolint | any       | int     | The phase correction solution interval in CASA syntax. example: phaseupsolint='300s'                                                                                                                                                                                                                                                                                                   |
| solint        | any       | inf     | Time and channel solution intervals in CASA syntax. example: solint='inf,10ch', solint='inf'                                                                                                                                                                                                                                                                                           |
| minsnr        | double    | 2.0     | Solutions below this SNR are rejected.                                                                                                                                                                                                                                                                                                                                                 |
| refant        | string    | None    | Reference antenna names. Defaults to the value(s) stored in the pipeline context. If undefined in the pipeline context defaults to the CASA reference antenna naming scheme. example: refant='DV01', refant='DV06,DV07'                                                                                                                                                                |
| antnegsig     | double    | 4.0     | Lower sigma threshold for identifying outliers as a result of bad antennas within individual timestamps.                                                                                                                                                                                                                                                                               |
| antpossig     | double    | 4.6     | Upper sigma threshold for identifying outliers as a result of bad antennas within individual timestamps.                                                                                                                                                                                                                                                                               |
| tmantint      | double    | 0.063   | Threshold for maximum fraction of timestamps that are allowed to contain outliers.                                                                                                                                                                                                                                                                                                     |

|                |        |           |                                                                                                                                                                                                                                                                                                                                                                 |
|----------------|--------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| tmint          | double | 0.085     | Initial threshold for maximum fraction of "outlier timestamps" over "total timestamps" that a baseline may be a part of.                                                                                                                                                                                                                                        |
| tmb1           | double | 0.175     | Initial threshold for maximum fraction of "bad baselines" over "all baselines" that an antenna may be a part of.                                                                                                                                                                                                                                                |
| antblnegsig    | double | 3.4       | Lower sigma threshold for identifying outliers as a result of "bad baselines" and/or "bad antennas" within baselines, across all timestamps.                                                                                                                                                                                                                    |
| antblpossig    | double | 3.2       | Upper sigma threshold for identifying outliers as a result of "bad baselines" and/or "bad antennas" within baselines, across all timestamps.                                                                                                                                                                                                                    |
| relaxed_factor | double | 2.0       | Relaxed value to set the threshold scaling factor to under certain conditions (see task description).                                                                                                                                                                                                                                                           |
| niter          | int    | 2         | Maximum number of times to iterate on evaluation of flagging heuristics. If an iteration results in no new flags, then subsequent iterations are skipped.                                                                                                                                                                                                       |
| pipelinemode   | string | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. default: 'automatic'. |
| dryrun         | bool   | False     | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                                          |
| acceptresults  | bool   | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                                              |

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## hifa\_gfluxscale

### Task Description

Derive flux density scales from standard calibrators

1. Compute flux values for the phase calibrator using model data from the amplitude calibrator:

```
hifa_gfluxscale()
```

### Parameter List

| name            | type    | default   | description                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------|---------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis             | string  | None      | The list of input MeasurementSets. Defaults to the list of MeasurementSets specified in the pipeline context example: ['M32A.ms', 'M32B.ms']                                                                                                                                                                                                                                                                                                  |
| reference       | variant | None      | A string containing a comma delimited list of field names defining the reference calibrators. Defaults to field names with intent '*AMP*'. example: reference='M82,3C273'                                                                                                                                                                                                                                                                     |
| transfer        | variant | None      | A string containing a comma delimited list of field names defining the transfer calibrators. Defaults to field names with intent '*PHASE*'. example: transfer='J1328+041,J1206+30'                                                                                                                                                                                                                                                            |
| refintent       | string  | None      | A string containing a comma delimited list of intents used to select the reference calibrators. Defaults to 'AMPLITUDE'. example: refintent='', refintent='AMPLITUDE'                                                                                                                                                                                                                                                                         |
| transintent     | string  | None      | A string containing a comma delimited list of intents defining the transfer calibrators. Defaults to 'PHASE,BANDPASS,CHECK,POLARIZATION,POLANGLE,POLLEAKAGE'. example: transintent='', transintent='PHASE,BANDPASS'                                                                                                                                                                                                                           |
| refspwmap       | intVec  | None      | Vector of spectral window ids enabling scaling across spectral windows. Defaults to no scaling. example: refspwmap=[1,1,3,3] - (4 spws, reference fields in 1 and 3, transfer fields in 0,1,2,3)                                                                                                                                                                                                                                              |
| reffile         | string  | None      | Path to a file containing flux densities for calibrators. Setjy will be run for any that have both reference and transfer intents. Values given in this file will take precedence over MODEL column values set by previous tasks. By default, the path is set to the CSV file created by hifa_importdata, consisting of catalogue fluxes extracted from the ASDM and / or edited by the user. example: reffile='', reffile='working/flux.csv' |
| phaseupsolint   | any     | int       | Time solution intervals in CASA syntax for the phase solution. example: phaseupsolint='inf', phaseupsolint='int', phaseupsolint='100sec'                                                                                                                                                                                                                                                                                                      |
| solint          | any     | inf       | Time solution intervals in CASA syntax for the amplitude solution. example: solint='inf', solint='int', solint='100sec'                                                                                                                                                                                                                                                                                                                       |
| minsnr          | double  | 2.0       | Minimum signal to noise ratio for gain calibration solutions. example: minsnr=1.5, minsnr=0.0                                                                                                                                                                                                                                                                                                                                                 |
| refant          | string  | None      | A string specifying the reference antenna(s). By default this is read from the context. example: refant='DV05'                                                                                                                                                                                                                                                                                                                                |
| hm_resolvedcals | string  | automatic | Heuristics method for handling resolved calibrators. The options are 'automatic' and 'manual'. In automatic mode antennas closer to the reference antenna than the uv distance where visibilities fall to 'peak_fraction' of the peak are used. In manual mode the antennas specified in 'antenna' are used.                                                                                                                                  |
| antenna         | string  | None      | A comma delimited string specifying the antenna names or ids to be used for the fluxscale determination. Used in hm_resolvedcals='manual' mode. example: antenna='DV16,DV07,DA12,DA08'                                                                                                                                                                                                                                                        |
| peak_fraction   | double  | 0.2       | The limiting UV distance from the reference antenna for antennas to be included in the flux calibration. Defined as the point where the calibrator visibilities have fallen to 'peak_fraction' of the peak value.                                                                                                                                                                                                                             |

|               |        |           |                                                                                                                                                                                                                                                                                                                                            |
|---------------|--------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pipelinemode  | string | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the users can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool   | False     | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                     |
| acceptresults | bool   | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                         |

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## hifa\_imageprecheck

### Task Description

Calculates the best Briggs robust parameter to achieve sensitivity and angular resolution goals.

### Parameter List

| name          | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|---------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None      | The list of input MeasurementSets. Defaults to the list of MeasurementSets specified in the h_init or hif_importdata task. ``: use all MeasurementSets in the context Examples: 'ngc5921.ms', ['ngc5921a.ms', 'ngc5921b.ms', 'ngc5921c.ms']                                                                                                 |
| calcsb        | bool      | False     | Force (re-)calculation of sensitivities and beams                                                                                                                                                                                                                                                                                           |
| parallel      | string    | automatic | Use MPI cluster where possible                                                                                                                                                                                                                                                                                                              |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool      | False     | Run the task (False) or just display the command (True)                                                                                                                                                                                                                                                                                     |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                          |

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## hifa\_importdata

### Task Description

Imports data into the interferometry pipeline

1. Load an ASDM list in the ../rawdata subdirectory into the context:  

```
hifa_importdata(vis=['../rawdata/uid___A002_X30a93d_X43e',  
                    '../rawdata/uid_A002_x30a93d_X44e'])
```
2. Load an MS in the current directory into the context:  

```
hifa_importdata(vis=['uid___A002_X30a93d_X43e.ms'])
```
3. Load a tarred ASDM in ../rawdata into the context:  

```
hifa_importdata(vis=['../rawdata/uid___A002_X30a93d_X43e.tar.gz'])
```
4. Check the hifa\_importdata inputs, then import the data:  

```
myvislist = ['uid___A002_X30a93d_X43e.ms', 'uid_A002_x30a93d_X44e.ms']  
hifa_importdata(vis=myvislist, pipelinemode='getinputs')  
hifa_importdata(vis=myvislist)
```
5. Load an ASDM but check the results before accepting them into the context.  

```
results = hifa_importdata(vis=['uid___A002_X30a93d_X43e.ms'],  
                           acceptresults=False)  
results.accept()
```
6. Run in dryrun mode before running for real:  

```
results = hifa_importdata(vis=['uid___A002_X30a93d_X43e.ms'], dryrun=True)  
results = hifa_importdata(vis=['uid___A002_X30a93d_X43e.ms'])
```
7. Run with explicit setting of data column types:  

```
hifa_importdata(vis=['uid___A002_X30a93d_X43e_targets.ms'], datacolumns={'data':  
'regcal_contline'})  
hifa_importdata(vis=['uid___A002_X30a93d_X43e_targets_line.ms'], datacolumns={'data':  
'regcal_line', 'corrected': 'selfcal_line'})
```

### Parameter List

| name         | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|--------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis          | stringVec | None      | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSes, or tar files of MSes. If ASDM files are specified, they will be converted to MS format. example: vis=['X227.ms', 'asdms.tar.gz']                                                                                                                               |
| session      | stringVec | None      | List of visibility data sessions                                                                                                                                                                                                                                                                                                            |
| pipelinemode | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |

|                   |        |                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------|--------|----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| asis              | string | SBSummary<br>ExecBlock<br>Annotation<br>Antenna Station<br>Receiver Source<br>CalAtmosphere<br>CalWVR<br>CalPointing | Extra ASDM tables to convert as is                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| process_caldevice | bool   | False                                                                                                                | Import the caldevice table from the ASDM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| overwrite         | bool   | False                                                                                                                | Overwrite existing files on import. Can only be set in pipelinemode='interactive'. When converting ASDM to MS, if overwrite=False and the MS already exists in output directory, then this existing MS dataset will be used instead.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| nocopy            | bool   | False                                                                                                                | Disable copying of MS to working directory                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| bdfflags          | bool   | True                                                                                                                 | Apply BDF flags on import                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| datacolumns       | any    | { }                                                                                                                  | Dictionary defining the data types of existing columns. The format is: { 'data': 'data type 1' } or { 'data': 'data type 1', 'corrected': 'data type 2' } For ASDMs the data type can only be RAW and one can only specify it for the data column. For MSes one can define two different data types for the DATA and CORRECTED_DATA columns and they can be any of the known data types (RAW, REGCAL_CONTLINE_ALL, REGCAL_CONTLINE_SCIENCE, SELFCAL_CONTLINE_SCIENCE, REGCAL_LINE_SCIENCE, SELFCAL_LINE_SCIENCE, BASELINED, ATMCORR). The intent selection strings _ALL or _SCIENCE can be skipped. In that case the task determines this automatically by inspecting the existing intents in the dataset. Usually, a single datacolumns dictionary is used for all datasets. If necessary, one can define a list of dictionaries, one for each EB, with different setups per EB. If no types are specified, { 'data': 'raw', 'corrected': 'regcal_contline' } or { 'data': 'raw' } will be assumed, depending on whether the corrected column exists or not. |
| lazy              | bool   | False                                                                                                                | Use the lazy filler import                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| dbservice         | bool   | False                                                                                                                | Use the online flux catalog                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

|               |        |       |                                                                                                                                               |
|---------------|--------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| ocorr_mode    | string | ca    | ALMA default set to ca                                                                                                                        |
| createmms     | string | false | Create an MMS                                                                                                                                 |
| minparang     | double | 0.0   | Minimum required parallactic angle range for polarisation calibrator, in degrees. The default of 0.0 is used for non-polarisation processing. |
| dryrun        | bool   | False | Run the task (False) or display task command (True)                                                                                           |
| acceptresults | bool   | True  | Add the results into the pipeline context                                                                                                     |

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## hifa\_lock\_refant

### Task Description

Lock reference antenna list

### Parameter List

| name          | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|---------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None      | List of input MeasurementSets. Defaults to the list of MeasurementSets specified in the pipeline context. Example: vis=['ngc5921.ms']                                                                                                                                                                                                       |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool      | False     | Run the task (False) or display task command (True)                                                                                                                                                                                                                                                                                         |
| acceptresults | bool      | True      | Add the results into the pipeline context                                                                                                                                                                                                                                                                                                   |

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## hifa\_polcalflag

### Task Description

Flag polarization calibrators

## Parameter List

| name          | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|---------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None      | The list of input MeasurementSets. Defaults to the list of MeasurementSets specified in the h_init or hif_importdata task. ''': use all MeasurementSets in the context Examples: 'ngc5921.ms', ['ngc5921a.ms', 'ngc5921b.ms', 'ngc5921c.ms']                                                                                                |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool      | False     | Run the task (False) or display task command (True)                                                                                                                                                                                                                                                                                         |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                          |

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## hifa\_renorm

### Task Description

Base renorm task

### Parameter List

| name             | type      | default   | description                                                                                                                                                                         |
|------------------|-----------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis              | stringVec | None      | List of input visibility data                                                                                                                                                       |
| apply            | bool      | False     | Apply renormalization correction                                                                                                                                                    |
| threshold        | float     | 1.02      | Apply correction if max correction is above threshold and apply=True. Default is 1.02 (i.e. 2%)                                                                                     |
| correctATM       | bool      | False     | Use the ATM model transmission profiles to try and correct for any ATM residual features that get into the scaling spectra                                                          |
| spw              | string    | None      | The list of spectral windows to evaluate. Set to spw='' by default, which means the task will select all relevant (science FDM) spectral windows. Example: spw="11,13,15,17"        |
| excludechan      | any       | {}        | Channels to exclude in either channel or frequency space (TOPO, GHz) Examples:<br>excludechan={'22': '100~150;800~850', '24': '100~200'}<br>excludechan={'22': '230.1GHz~230.2GHz'} |
| atm_auto_exclude | bool      | False     | Automatically find and exclude regions with atmospheric features. Default is False                                                                                                  |
| pipelinemode     | string    | automatic | The pipeline operating mode                                                                                                                                                         |
| dryrun           | bool      | False     | Run the task (False) or display task command (True)                                                                                                                                 |
| acceptresults    | bool      | True      | Add the results into the pipeline context                                                                                                                                           |

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## hifa\_restoredata

### Task Description

Restore flagged and calibration interferometry data from a pipeline run

1. Restore the pipeline results for a single ASDM in a single session:

```
hifa_restoredata(vis=['uid___A002_X30a93d_X43e'], session=['session_1'],
                occur_mode='ca')
```

### Parameter List

| name | type | default | description |
|------|------|---------|-------------|
|------|------|---------|-------------|

|               |           |                                                                                                                |                                                                                                                                                                                                                                                                                        |
|---------------|-----------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None                                                                                                           | List of raw visibility data files to be restored. Assumed to be in the directory specified by rawdata_dir. (can be set only in 'interactive mode') example: vis=['uid__A002_X30a93d_X43e']                                                                                             |
| session       | stringVec | None                                                                                                           | List of sessions one per visibility file. (can be set only in 'interactive mode') example: session=['session_3']                                                                                                                                                                       |
| products_dir  | string    | ../products                                                                                                    | Name of the data products directory to copy calibration products from. The parameter is effective only when copytoraw = True. When copytoraw = False, calibration products in rawdata_dir will be used. (can be set only in 'interactive mode') example: products_dir='myproductspath' |
| copytoraw     | bool      | True                                                                                                           | Copy calibration and flagging tables from products_dir to rawdata_dir directory. (can be set only in 'interactive mode') example: copytoraw=False                                                                                                                                      |
| rawdata_dir   | string    | ../rawdata                                                                                                     | Name of the rawdata subdirectory. (can be set only in 'interactive mode') example: rawdata_dir='myrawdatapath'                                                                                                                                                                         |
| lazy          | bool      | False                                                                                                          | Use the lazy filler option. (can be set only in 'interactive mode') example: lazy=True                                                                                                                                                                                                 |
| bdfflags      | bool      | True                                                                                                           | Set the BDF flags. (can be set only in 'interactive mode') example: bdfflags=False                                                                                                                                                                                                     |
| ocorr_mode    | string    | ca                                                                                                             | Set ocorr_mode. (can be set only in 'interactive mode') example: ocorr_mode='ca'                                                                                                                                                                                                       |
| asis          | string    | SBSummary<br>ExecBlock Antenna<br>Annotation Station<br>Receiver Source<br>CalAtmosphere<br>CalWVR CalPointing | Set list of tables to import as is. (can be set only in 'interactive mode') example: asis='Source Receiver'                                                                                                                                                                            |
| pipelinemode  | string    | automatic                                                                                                      | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. (can be set in any pipeline mode)                                                                                                            |
| dryrun        | bool      | False                                                                                                          | Run the commands (False) or generate the commands to be run but do not execute (True).                                                                                                                                                                                                 |
| acceptresults | bool      | True                                                                                                           | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                     |

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## hifa\_session\_bandpass

### Task Description

Compute bandpass calibration solutions (Experimental)

1. Compute a channel bandpass for all visibility files in the pipeline context using the CASA reference antenna determination scheme:

```
hifa_session_bandpass()
```

2. Same as the above but precompute a prioritized reference antenna list:

```
hif_refant()
```

```
hifa_session_bandpass()
```

### Parameter List

| name          | type      | default | description                                                                                                                                                                                                               |
|---------------|-----------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None    | The list of input MeasurementSets. Defaults to the list of MeasurementSets specified in the pipeline context. example: vis=['M51.ms']                                                                                     |
| caltable      | stringVec | None    | The list of output calibration tables. Defaults to the standard pipeline naming convention. example: caltable=['M51.bcal']                                                                                                |
| field         | string    | None    | The list of field names or field ids for which bandpasses are computed. Defaults to all fields. example: field='3C279', field='3C279, M82'                                                                                |
| intent        | string    | None    | A string containing a comma delimited list of intents against which the selected fields are matched. Defaults to all data with bandpass intent. example: intent='*PHASE*'                                                 |
| spw           | string    | None    | The list of spectral windows and channels for which bandpasses are computed. Defaults to all science spectral windows. example: spw='11,13,15,17'                                                                         |
| antenna       | string    | None    |                                                                                                                                                                                                                           |
| hm_phaseup    | string    | snr     | The pre-bandpass solution phaseup gain heuristics. The options are 'snr' (compute solution required to achieve the specified SNR), 'manual' (use manual solution parameters), and '' (none). example: hm_phaseup='manual' |
| phaseupsolint | any       | int     | The phase correction solution interval in CASA syntax. Used when hm_phaseup='manual' or as a default if the hm_phaseup='snr' heuristic computation fails. example: phaseupsolint='300s'                                   |

|              |        |         |                                                                                                                                                                                                                             |
|--------------|--------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| phaseupbw    | string | None    | Bandwidth to be used for phaseup. Defaults to 500MHz. Used when hm_phaseup='manual'. example: phaseupbw='' to use entire bandpass, phaseupbw='500MHz' to use central 500MHz                                                 |
| phaseupsnr   | double | 20.0    | The required SNR for the phaseup solution. Used only if hm_phaseup='snr'. example: phaseupsnr=10.0                                                                                                                          |
| phaseupnsols | int    | 2       | The minimum number of phaseup gain solutions. Used only if hm_phaseup='snr'. example: phaseupnsols=4                                                                                                                        |
| hm_bandpass  | string | snr     | The bandpass solution heuristics. The options are 'snr' (compute the solution required to achieve the specified SNR), 'smoothed' (simple smoothing heuristics), and 'fixed' (use the user defined parameters for all spws). |
| solint       | any    | inf     | Time and channel solution intervals in CASA syntax. default: 'inf' Used for hm_bandpass='fixed', and as a default for the 'snr' and 'smoothed' options. default: 'inf,7.8125MHz' example: solint='inf,10ch', solint='inf'   |
| maxchannels  | int    | 240     | The bandpass solution smoothing factor in channels. The solution interval is bandwidth / 240. Set to 0 for no smoothing. Used if hm_bandpass='smoothed'. example: 0                                                         |
| evenbpints   | bool   | True    | Force the per spw frequency solint to be evenly divisible into the spw bandpass if hm_bandpass='snr'. example: evenbpints=False                                                                                             |
| bpsnr        | double | 50.0    | The required SNR for the bandpass solution. Used only if hm_bandpass='snr' example: bpsnr=30.0                                                                                                                              |
| minbpsnr     | double | 20.0    | The minimum required SNR for the bandpass solution when strong atmospheric lines exist in Tsys spectra. Used only if hm_bandpass='snr'. example: minbpsnr=10.0                                                              |
| bpnsols      | int    | 8       | The minimum number of bandpass solutions. Used only if hm_bandpass='snr'.                                                                                                                                                   |
| hm_bandtype  | string | channel | The type of bandpass. The options are 'channel' and 'polynomial' for CASA bandpass types = 'B' and 'BPOLY' respectively.                                                                                                    |
| combine      | string | scan    | Data axes to combine for solving. Axes are '', 'scan', 'spw', 'field' or any comma-separated combination. example: combine='scan,field'                                                                                     |
| refant       | string | None    | Reference antenna names. Defaults to the value(s) stored in the pipeline context. If undefined in the pipeline context defaults to the CASA reference antenna naming scheme. example: refant='DV01', refant='DV06,DV07'     |
| solnorm      | bool   | True    | Normalise the bandpass solutions.                                                                                                                                                                                           |

|               |         |           |                                                                                                                                                                                                                                                                                                                                           |
|---------------|---------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| minblperant   | int     | 4         | Minimum number of baselines required per antenna for each solve. Antennas with fewer baselines are excluded from solutions. Used for hm_bandtype='channel' only.                                                                                                                                                                          |
| minsnr        | double  | 3.0       | Solutions below this SNR are rejected. Used for hm_bandtype='channel' only.                                                                                                                                                                                                                                                               |
| degamp        | variant | None      |                                                                                                                                                                                                                                                                                                                                           |
| degphase      | variant | None      |                                                                                                                                                                                                                                                                                                                                           |
| pipelinemode  | string  | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool    | False     | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                    |
| acceptresults | bool    | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                        |
| parallel      | string  | automatic | Execute using CASA HPC functionality, if available.                                                                                                                                                                                                                                                                                       |

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## hifa\_session\_refant

### Task Description

Select best reference antenna for session(s)

1. Compute a single common reference antenna per session:  
hifa\_session\_refant()

### Parameter List

| name            | type      | default   | description                                                                                                                                                                                                                                                                                                                               |
|-----------------|-----------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis             | stringVec | None      | List of input MeasurementSets. Defaults to the list of MeasurementSets specified in the pipeline context. Example: vis=['ngc5921.ms']                                                                                                                                                                                                     |
| phase_threshold | double    | 0.005     | Threshold (in degrees) used to identify absolute phase solution outliers in caltables. Example: phase_threshold=0.005                                                                                                                                                                                                                     |
| pipelinemode    | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun          | bool      | False     | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                    |
| acceptresults   | bool      | True      | Automatically accept the results of the task into the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                     |

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## hifa\_spwphaseup

### Task Description

Compute phase calibration spw map and per spw phase offsets

Examples

1. Compute the default spectral window map and the per spectral window phase offsets:

```
hifa_spwphaseup()
```

2. Compute the default spectral window map and the per spectral window phase offsets set the spectral window mapping mode to 'simple':

```
hifa_spwphaseup(hm_spwmapmode='simple')
```

### Parameter List

| name     | type      | default | description                                                                                                                                       |
|----------|-----------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| vis      | stringVec | None    | The list of input MeasurementSets. Defaults to the list of MeasurementSets specified in the pipeline context. example: vis=['M82A.ms', 'M82B.ms'] |
| caltable | stringVec | None    | The list of output calibration tables. Defaults to the standard pipeline naming convention. example: caltable=['M82.gcal', 'M82B.gcal']           |

|                |        |         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------|--------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| field          | string | None    | The list of field names or field ids for which phase offset solutions are to be computed. Defaults to all fields with the default intent. example: field='3C279', field='3C279, M82'                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| intent         | string | None    | A string containing a comma delimited list of intents against which the selected fields are matched. Defaults to the BANDPASS observations. example: intent='PHASE'                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| spw            | string | None    | The list of spectral windows and channels for which gain solutions are computed. Defaults to all the science spectral windows. example: spw='13,15'                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| hm_spwmapmode  | string | auto    | The spectral window mapping mode. The options are: 'auto', 'combine', 'simple', and 'default'. In 'auto' mode hifa_spwphaseup estimates the SNR of the phase calibrator observations and uses these estimates to choose between 'combine' mode (low SNR) and 'default' mode (high SNR). In combine mode all spectral windows are combined and mapped to one spectral window. In 'simple' mode narrow spectral windows are mapped to wider ones using an algorithm defined by 'maxnarrowbw', 'minfracmaxbw', and 'samebb'. In 'default' mode the spectral window map defaults to the standard one to one mapping. example: hm_spwmapmode='combine' |
| maxnarrowbw    | string | 300MHz  | The maximum bandwidth defining narrow spectral windows. Values must be in CASA compatible frequency units. example: maxnarrowbw=''                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| minfracmaxbw   | double | 0.8     | The minimum fraction of the maximum bandwidth in the set of spws to use for matching. example: minfracmaxbw=0.75                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| samebb         | bool   | True    | Match within the same baseband if possible. example: samebb=False                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| phasesnr       | double | 32.0    | The required gaincal solution signal to noise. example: phaseupsnr=20.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| bwedgefrac     | double | 0.03125 | The fraction of the bandwidth edges that is flagged. example: bwedgefrac=0.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| hm_nantennas   | string | all     | The heuristics for determines the number of antennas to use in the signal to noise estimate. The options are 'all' and 'unflagged'. The 'unflagged' options is not currently supported. example: hm_nantennas='unflagged'                                                                                                                                                                                                                                                                                                                                                                                                                         |
| maxfracflagged | double | 0.90    | The maximum fraction of an antenna that can be flagged before it is excluded from the signal to noise estimate. example: maxfracflagged=0.80                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

|                     |        |           |                                                                                                                                                                                                                                                                                                                                           |
|---------------------|--------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| combine             | string | None      | Data axes to combine for solving. Options are '', 'scan', 'spw', 'field' or any comma-separated combination. example: combine=''                                                                                                                                                                                                          |
| refant              | string | None      | Reference antenna name(s) in priority order. Defaults to most recent values set in the pipeline context. If no reference antenna is defined in the pipeline context the CASA defaults are used. example: refant='DV01', refant='DV05,DV07'                                                                                                |
| minblperant         | int    | 4         | Minimum number of baselines required per antenna for each solve. Antennas with fewer baselines are excluded from solutions. example: minblperant=2                                                                                                                                                                                        |
| minsnr              | double | 3.0       | Solutions below this SNR are rejected.                                                                                                                                                                                                                                                                                                    |
| unregister_existing | bool   | False     | Unregister previous spwphaseup calibrations from the pipeline context before registering the new calibrations from this task.                                                                                                                                                                                                             |
| pipelinemode        | string | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun              | bool   | False     | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                    |
| acceptresults       | bool   | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                        |

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## hifa\_targetflag

### Task Description

Flag target source outliers

### Parameter List

| name          | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|---------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None      | The list of input MeasurementSets. Defaults to the list of MeasurementSets specified in the h_init or hif_importdata task. ``: use all MeasurementSets in the context Examples: 'ngc5921.ms', ['ngc5921a.ms', 'ngc5921b.ms', 'ngc5921c.ms']                                                                                                 |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool      | False     | Run the task (False) or display task command (True)                                                                                                                                                                                                                                                                                         |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                          |

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## hifa\_timegaincal

### Task Description

Determine temporal gains from calibrator observations

1. Compute standard per scan gain solutions that will be used to calibrate the target:

hifa\_timegaincal()

### Parameter List

| name         | type      | default | description                                                                                                                                                                                           |
|--------------|-----------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis          | stringVec | None    | The list of input MeasurementSets. Defaults to the list of MeasurementSets specified in the pipeline context. example: vis=['M82A.ms', 'M82B.ms']                                                     |
| calamptable  | stringVec | None    | The list of output diagnostic calibration amplitude tables for the calibration targets. Defaults to the standard pipeline naming convention. example: calamptable=['M82.gacal', 'M82B.gacal']         |
| offsetstable | stringVec | None    | The list of output diagnostic phase offset tables for the calibration targets. Defaults to the standard pipeline naming convention. example: offsetstable=['M82.offsets.gacal', 'M82B.offsets.gacal'] |

|                  |           |       |                                                                                                                                                                                                                                                                                    |
|------------------|-----------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| calphasetable    | stringVec | None  | The list of output calibration phase tables for the calibration targets. Defaults to the standard pipeline naming convention. example: calphasetable=['M82.gcal', 'M82B.gcal']                                                                                                     |
| targetphasetable | stringVec | None  | The list of output phase calibration tables for the science targets. Defaults to the standard pipeline naming convention. example: targetphasetable=['M82.gcal', 'M82B.gcal']                                                                                                      |
| amptable         | stringVec | None  | The list of output calibration amplitude tables for the calibration and science targets. Defaults to the standard pipeline naming convention. example: amptable=['M82.gcal', 'M82B.gcal']                                                                                          |
| field            | string    | None  | The list of field names or field ids for which gain solutions are to be computed. Defaults to all fields with the standard intent. example: field='3C279', field='3C279, M82'                                                                                                      |
| spw              | string    | None  | The list of spectral windows and channels for which gain solutions are computed. Defaults to all science spectral windows. example: spw='3C279', spw='3C279, M82'                                                                                                                  |
| antenna          | string    | None  | None                                                                                                                                                                                                                                                                               |
| calsolint        | any       | int   | Time solution interval in CASA syntax for calibrator source solutions. example: calsolint='inf', calsolint='int', calsolint='100sec'                                                                                                                                               |
| targetsolint     | any       | inf   | Time solution interval in CASA syntax for target source solutions. example: targetsolint='inf', targetsolint='int', targetsolint='100sec'                                                                                                                                          |
| refant           | string    | None  | Reference antenna name(s) in priority order. Defaults to most recent values set in the pipeline context. If no reference antenna is defined in the pipeline context use the CASA defaults. example: refant='DV01', refant='DV05,DV07'                                              |
| refantmode       | string    | None  | Controls how the refant is applied. Currently available choices are 'flex', 'strict', and the default value of ''. Setting to '' allows the pipeline to select the appropriate mode based on the state of the reference antenna list. Examples: refantmode='strict', refantmode='' |
| solnorm          | bool      | False | Normalise the gain solutions.                                                                                                                                                                                                                                                      |
| minblperant      | int       | 4     | Minimum number of baselines required per antenna for each solve. Antennas with fewer baselines are excluded from solutions. example: minblperant=2                                                                                                                                 |
| calminsnr        | double    | 2.0   | Solutions below this SNR are rejected for calibrator solutions.                                                                                                                                                                                                                    |

|               |           |           |                                                                                                                                                                                                                                                                                                                                           |
|---------------|-----------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| targetminsnr  | double    | 3.0       | Solutions below this SNR are rejected for science target solutions.                                                                                                                                                                                                                                                                       |
| smodel        | doubleVec | None      | Point source Stokes parameters for source model (experimental) Defaults to using standard MODEL_DATA column data. example: smodel=[1,0,0,0] - (I=1, unpolarized)                                                                                                                                                                          |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool      | False     | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                    |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                        |

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## hifa\_tsysflag

### Task Description

Flag deviant system temperatures for ALMA interferometry measurements. This is done by running a sequence of flagging subtasks, each looking for a different type of possible error.

1. Flag Tsys measurements using currently recommended tests:  
hifa\_tsysflag()
2. Flag Tsys measurements using all recommended tests apart from that using the 'fieldshape' metric:  
hifa\_tsysflag(flag\_fieldshape=False)

### Parameter List

| name         | type      | default | description                                                                                                                                               |
|--------------|-----------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis          | stringVec | None    | List of input MeasurementSets (Not used).                                                                                                                 |
| caltable     | stringVec | None    | List of input Tsys calibration tables. default: [] - Use the table currently stored in the pipeline context. example:<br>caltable=['X132.ms.tsys.s2.tbl'] |
| flag_nmedian | bool      | True    | True to flag Tsys spectra with high median value.                                                                                                         |

|                 |        |          |                                                                                                                                                                                                 |
|-----------------|--------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| fnm_limit       | double | 2.0      | Flag spectra with median value higher than $\text{fnm\_limit} * \text{median}$ of this measure over all spectra.                                                                                |
| fnm_byfield     | bool   | True     | Evaluate the nmedian metric separately for each field.                                                                                                                                          |
| flag_derivative | bool   | True     | True to flag Tsys spectra with high median derivative.                                                                                                                                          |
| fd_max_limit    | double | 13.0     | Flag spectra with median derivative higher than $\text{fd\_max\_limit} * \text{median}$ of this measure over all spectra.                                                                       |
| flag_edgechans  | bool   | True     | True to flag edges of Tsys spectra.                                                                                                                                                             |
| fe_edge_limit   | double | 3.0      | Flag channels whose channel to channel difference $> \text{fe\_edge\_limit} * \text{median}$ across spectrum.                                                                                   |
| flag_fieldshape | bool   | True     | True to flag Tsys spectra with a radically different shape to those of the ff_refintent.                                                                                                        |
| ff_refintent    | string | BANDPASS | Data intent that provides the reference shape for 'flag_fieldshape'.                                                                                                                            |
| ff_max_limit    | double | 13       | Flag Tsys spectra with 'fieldshape' metric values $> \text{ff\_max\_limit}$ .                                                                                                                   |
| flag_birdies    | bool   | True     | True to flag channels covering sharp spectral features.                                                                                                                                         |
| fb_sharps_limit | double | 0.15     | Flag channels bracketing a channel to channel difference $> \text{fb\_sharps\_limit}$ .                                                                                                         |
| flag_toomany    | bool   | True     | True to flag Tsys spectra for which a proportion of antennas for given timestamp and/or proportion of antennas that are entirely flagged in all timestamps exceeds their respective thresholds. |
| tmf1_limit      | double | 0.666    | Flag Tsys spectra for all antennas in a timestamp and spw if proportion of antennas already flagged in this timestamp and spw exceeds $\text{tmf1\_limit}$ .                                    |

|                |           |                                                         |                                                                                                                                                                                                                                                                                                                                           |
|----------------|-----------|---------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| tmefl_limit    | double    | 0.666                                                   | Flag Tsys spectra for all antennas and all timestamps in a spw, if proportion of antennas that are already entirely flagged in all timestamps exceeds tmefl_limit.                                                                                                                                                                        |
| metric_order   | string    | nmedian,derivative,edgechans,fieldshape,birdies,toomany | Order in which to evaluate the flagging metrics that are enables. Disabled metrics are skipped.                                                                                                                                                                                                                                           |
| normalize_tsys | bool      | False                                                   | True to create a normalized Tsys table that is used to evaluate the Tsys flagging metrics. All newly found flags are also applied to the original Tsys caltable that continues to be used for subsequent calibration.                                                                                                                     |
| filetemplate   | stringVec | None                                                    | The name of a text file that contains the manual Tsys flagging template. If the template flags file is undefined, a name of the form 'msname.flagsystemplate.txt' is assumed.                                                                                                                                                             |
| pipelinemode   | string    | automatic                                               | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun         | bool      | False                                                   | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                    |
| acceptresults  | bool      | True                                                    | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                        |

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## hifa\_unlock\_refant

### Task Description

Unlock reference antenna list

### Parameter List

| name          | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|---------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None      | List of input MeasurementSets. Defaults to the list of MeasurementSets specified in the pipeline context. Example: vis=['ngc5921.ms']                                                                                                                                                                                                       |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool      | False     | Run the task (False) or display task command (True)                                                                                                                                                                                                                                                                                         |
| acceptresults | bool      | True      | Add the results into the pipeline context                                                                                                                                                                                                                                                                                                   |

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## hifa\_wvrgcalflag

### Task Description

Generate a gain table based on Water Vapor Radiometer data, interpolating over antennas with bad radiometers.

1. Compute the WVR calibration for all the MeasurementSets:  
hifa\_wvrgcalflag(hm\_tie='automatic')

### Parameter List

| name | type      | default | description                                                                                                                                     |
|------|-----------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| vis  | stringVec | None    | List of input visibility files. default: none, in which case the vis files to be used will be read from the context example: vis=['ngc5921.ms'] |

|              |           |           |                                                                                                                                                                                                                                                                    |
|--------------|-----------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| caltable     | stringVec | None      | List of output gain calibration tables. default: none, in which case the names of the caltables will be generated automatically example: caltable='ngc5921.wvr'                                                                                                    |
| offsetstable | stringVec | None      | List of input temperature offsets table files to subtract from WVR measurements before calculating phase corrections. default: none, in which case no offsets are applied example: offsetstable=['ngc5921.cloud_offsets']                                          |
| hm_toffset   | string    | automatic | If 'manual', set the 'toffset' parameter to the user-specified value. If 'automatic', set the 'toffset' parameter according to the date of the MeasurementSet; toffset=-1 if before 2013-01-21T00:00:00 toffset=0 otherwise.                                       |
| toffset      | double    | 0         | Time offset (sec) between interferometric and WVR data.                                                                                                                                                                                                            |
| segsource    | bool      | True      | If True calculate new atmospheric phase correction coefficients for each source, subject to the constraints of the 'tie' parameter. 'segsource' is forced to be True if the 'tie' parameter is set to a non-empty value by the user or by the automatic heuristic. |
| sourceflag   | stringVec | None      | Flag the WVR data for these source(s) as bad and do not produce corrections for it. Requires segsource=True. example: sourceflag=['3C273']                                                                                                                         |
| hm_tie       | string    | automatic | If 'manual', set the 'tie' parameter to the user-specified value. If 'automatic', set the 'tie' parameter to include with the target all calibrators that are within 15 degrees of it: if no calibrators are that close then 'tie' is left empty.                  |
| tie          | stringVec | None      | Use the same atmospheric phase correction coefficients when calculating the WVR correction for all sources in the 'tie'. If 'tie' is not empty then 'segsource' is forced to be True. Ignored unless hm_tie='manual'. example: tie=['3C273,NGC253', 'IC433,3C279'] |

|             |           |           |                                                                                                                                                                                                                                                                                                                            |
|-------------|-----------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| nsol        | int       | 1         | Number of solutions for phase correction coefficients during this observation, evenly distributed in time throughout the observation. It is used only if segsource=False because if segsource=True then the coefficients are recomputed whenever the telescope moves to a new source (within the limits imposed by 'tie'). |
| disperse    | bool      | False     | Apply correction for dispersion. (Deprecated; will be removed)                                                                                                                                                                                                                                                             |
| wvrflag     | stringVec | None      | Flag the WVR data for these antenna(s) as bad and replace its data with interpolated values. example:<br>wvrflag=['DV03','DA05','PM02']                                                                                                                                                                                    |
| hm_smooth   | string    | automatic | If 'manual' set the 'smooth' parameter to the user-specified value. If 'automatic', run the wvrgcal task with the range of 'smooth' parameters required to match the integration time of the WVR data to that of the interferometric data in each spectral window.                                                         |
| smooth      | string    | None      | Smooth WVR data on this timescale before calculating the correction. Ignored unless hm_smooth='manual'.                                                                                                                                                                                                                    |
| scale       | double    | 1         | Scale the entire phase correction by this factor.                                                                                                                                                                                                                                                                          |
| maxdism     | double    | -1        | Maximum distance in meters of an antenna used for interpolation from a flagged antenna. default: -1 (automatically set to 100m if >50% of antennas are 7m antennas without WVR and otherwise set to 500m) example: maxdism=550                                                                                             |
| minnumants  | int       | 2         | Minimum number of nearby antennas (up to 3) used for interpolation from a flagged antenna. example: minnumants=3                                                                                                                                                                                                           |
| mingoodfrac | double    | 0.8       | Minimum fraction of good data per antenna. example: mingoodfrac=0.7                                                                                                                                                                                                                                                        |
| refant      | string    | None      | Ranked comma delimited list of reference antennas. example: refant='DV02,DV06'                                                                                                                                                                                                                                             |

|                    |        |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------|--------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| flag_intent        | string | None           | The data intent(s) on whose WVR correction results the search for bad WVR antennas is to be based. A 'flagging view' will be calculated for each specified intent, in each spectral window in each vis file. Each 'flagging view' will consist of a 2-d image with dimensions ['ANTENNA', 'TIME'], showing the phase noise after the WVR correction has been applied. If flag_intent is left blank, the default, the flagging views will be derived from data with the default bandpass calibration intent i.e. the first in the list BANDPASS, PHASE, AMPLITUDE for which the MeasurementSet has data.                                                                                                                                                                                                                                                                                                                                                        |
| qa_intent          | string | BANDPASS,PHASE | The list of data intents on which the WVR correction is to be tried as a means of estimating its effectiveness. A QA 'view' will be calculated for each specified intent, in each spectral window in each vis file. Each QA 'view' will consist of a pair of 2-d images with dimensions ['ANTENNA', 'TIME'], one showing the data phase-noise before the WVR application, the second showing the phase noise after (both 'before' and 'after' images have a bandpass calibration applied as well). An overall QA score is calculated for each vis file, by dividing the 'before' images by the 'after' and taking the median of the result. An overall score of 1 would correspond to no change in the phase noise, a score > 1 implies an improvement. If the overall score for a vis file is less than the value in 'accept_threshold' then the WVR calibration file is not made available for merging into the context for use in the subsequent reduction. |
| qa_bandpass_intent | string | None           | The data intent to use for the bandpass calibration in the qa calculation. The default is blank to allow the underlying bandpass task to select a sensible intent if the dataset lacks BANDPASS data.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

|                      |        |           |                                                                                                                                                                                                                                                                                                                            |
|----------------------|--------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| accept_threshold     | double | 1.0       | The phase-rms improvement ratio (rms without WVR / rms with WVR) above which the wrvg file will be accepted into the context for subsequent application.                                                                                                                                                                   |
| flag_hi              | bool   | True      | True to flag high figure of merit outliers.                                                                                                                                                                                                                                                                                |
| fhi_limit            | double | 10.0      | Flag figure of merit values higher than limit * MAD.                                                                                                                                                                                                                                                                       |
| fhi_minsample        | int    | 5         | Minimum number of samples for valid MAD estimate/                                                                                                                                                                                                                                                                          |
| ants_with_wvr_thresh | double | 0.2       | this threshold sets the minimum fraction of antennas that should have WVR data for WVR calibration and flagging to proceed; the same threshold is used to determine, after flagging, whether there remain enough unflagged antennas with WVR data for the WVR calibration to be applied. example: ants_with_wvr_thresh=0.5 |
| pipelinemode         | string | automatic | The pipeline operating mode                                                                                                                                                                                                                                                                                                |
| dryrun               | bool   | False     | Run the task (False) or display the command(True)                                                                                                                                                                                                                                                                          |
| acceptresults        | bool   | True      | Add the results to the pipeline context                                                                                                                                                                                                                                                                                    |

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## hifa\_wvrgcal

### Task Description

Generate a gain table based on Water Vapor Radiometer data, and calculate a QA score based on its effect on the interferometric data.

Example

1. Compute the WVR calibration for all the MeasurementSets:  
hifa\_wvrgcal(hm\_tie='automatic')

### Parameter List

| name | type      | default | description                                                                                                                                      |
|------|-----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| vis  | stringVec | None    | List of input visibility files. default: none, in which case the vis files to be used will be read from the context. example: vis=['ngc5921.ms'] |

|              |           |           |                                                                                                                                                                                                                                                                                                                            |
|--------------|-----------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| caltable     | stringVec | None      | List of output gain calibration tables. default: none, in which case the names of the caltables will be generated automatically. example: caltable='ngc5921.wvr'                                                                                                                                                           |
| offsetstable | stringVec | None      | List of input temperature offsets table files to subtract from WVR measurements before calculating phase corrections. default: none, in which case no offsets are applied. example: offsetstable=['ngc5921.cloud_offsets']                                                                                                 |
| hm_toffset   | string    | automatic | If 'manual', set the 'toffset' parameter to the user-specified value. If 'automatic', set the 'toffset' parameter according to the date of the MeasurementSet; toffset=-1 if before 2013-01-21T00:00:00 toffset=0 otherwise.                                                                                               |
| toffset      | double    | 0         | Time offset (sec) between interferometric and WVR data.                                                                                                                                                                                                                                                                    |
| segsource    | bool      | True      | If True calculate new atmospheric phase correction coefficients for each source, subject to the constraints of the 'tie' parameter. 'segsource' is forced to be True if the 'tie' parameter is set to a non-empty value by the user or by the automatic heuristic.                                                         |
| sourceflag   | stringVec | None      | Flag the WVR data for these source(s) as bad and do not produce corrections for it. Requires segsource=True. example: ['3C273']                                                                                                                                                                                            |
| hm_tie       | string    | automatic | If 'manual', set the 'tie' parameter to the user-specified value. If 'automatic', set the 'tie' parameter to include with the target all calibrators that are within 15 degrees of it: if no calibrators are that close then 'tie' is left empty.                                                                          |
| tie          | stringVec | None      | Use the same atmospheric phase correction coefficients when calculating the wvr correction for all sources in the 'tie'. If 'tie' is not empty then 'segsource' is forced to be True. Ignored unless hm_tie='manual'. example: ['3C273,NGC253', 'IC433,3C279']                                                             |
| nsol         | int       | 1         | Number of solutions for phase correction coefficients during this observation, evenly distributed in time throughout the observation. It is used only if segsource=False because if segsource=True then the coefficients are recomputed whenever the telescope moves to a new source (within the limits imposed by 'tie'). |
| disperse     | bool      | False     | Apply correction for dispersion. (Deprecated; will be removed)                                                                                                                                                                                                                                                             |

|             |           |           |                                                                                                                                                                                                                                                                    |
|-------------|-----------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| wvrflag     | stringVec | None      | Flag the WVR data for the listed antennas as bad and replace their data with values interpolated from the 3 nearest antennas with unflagged data. example: ['DV03', 'DA05', 'PM02']                                                                                |
| hm_smooth   | string    | automatic | If 'manual' set the 'smooth' parameter to the user-specified value. If 'automatic', run the wvrscal task with the range of 'smooth' parameters required to match the integration time of the wvr data to that of the interferometric data in each spectral window. |
| smooth      | string    | None      | Smooth WVR data on this timescale before calculating the correction. Ignored unless hm_smooth='manual'.                                                                                                                                                            |
| scale       | double    | 1.        | Scale the entire phase correction by this factor.                                                                                                                                                                                                                  |
| maxdistm    | double    | -1        | Maximum distance in meters of an antenna used for interpolation from a flagged antenna. default: -1 (automatically set to 100m if >50% of antennas are 7m antennas without WVR and otherwise set to 500m) example: maxdistm=550                                    |
| minnumants  | int       | 2         | Minimum number of nearby antennas (up to 3) used for interpolation from a flagged antenna. example: minnumants=3                                                                                                                                                   |
| mingoodfrac | double    | 0.8       | Minimum fraction of good data per antenna.                                                                                                                                                                                                                         |
| refant      | string    | None      | Ranked comma delimited list of reference antennas. example: refant='DV01,DV02'                                                                                                                                                                                     |

|                    |        |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------|--------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| qa_intent          | string | None      | The list of data intents on which the wvr correction is to be tried as a means of estimating its effectiveness. A QA 'view' will be calculated for each specified intent, in each spectral window in each vis file. Each QA 'view' will consist of a pair of 2-d images with dimensions ['ANTENNA', 'TIME'], one showing the data phase-noise before the wvr application, the second showing the phase noise after (both 'before' and 'after' images have a bandpass calibration applied as well). An overall QA score is calculated for each vis file, by dividing the 'before' images by the 'after' and taking the median of the result. An overall score of 1 would correspond to no change in the phase noise, a score > 1 implies an improvement. If the overall score for a vis file is less than the value in 'accept_threshold' then the wvr calibration file is not made available for merging into the context for use in the subsequent reduction. If you do not want any QA calculations then set qa_intent=''. example: qa_intent='PHASE' |
| qa_bandpass_intent | string | None      | The data intent to use for the bandpass calibration in the qa calculation. The default is blank to allow the underlying bandpass task to select a sensible intent if the dataset lacks BANDPASS data.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| qa_spw             | string | None      | The SpW(s) to use for the qa calculation, in the order that they should be tried. Input as a comma-separated list. The default is blank, in which case the task will try SpWs in order of decreasing median sky opacity.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| accept_threshold   | double | 1.0       | The phase-rms improvement ratio (rms without wvr / rms with wvr) above which the wrvg file will be accepted into the context for subsequent application.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| pipelinemode       | string | automatic | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| dryrun             | bool   | False     | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| acceptresults      | bool   | True      | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

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# Summary of ALMA-specific SRDP interferometric tasks and parameters

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## hifas\_imageprecheck

### Task Description

Calculates the best robust value and Briggs weighting parameter to achieve sensitivity and angular resolution goals.

### Parameter List

| name                       | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|----------------------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis                        | stringVec | None      | The list of input MeasurementSets. Defaults to the list of MeasurementSets specified in the h_init or hif_importdata task. '': use all MeasurementSets in the context Examples: 'ngc5921.ms', ['ngc5921a.ms', ngc5921b.ms', 'ngc5921c.ms']                                                                                                  |
| desired_angular_resolution | string    | None      | User specified angular resolution goal string. '': automatic from performance parameters (default) Example: '1.0arcsec'                                                                                                                                                                                                                     |
| calcsb                     | bool      | False     | Force (re-)calculation of sensitivities and beams                                                                                                                                                                                                                                                                                           |
| parallel                   | string    | automatic | Use MPI cluster where possible                                                                                                                                                                                                                                                                                                              |
| pipelinemode               | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun                     | bool      | False     | Run the task (False) or just display the command (True)                                                                                                                                                                                                                                                                                     |
| acceptresults              | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                          |

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# Summary of VLA-specific interferometric tasks and parameters

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## hifv\_analyzestokescubes

### Task Description

Characterize stokes IQUV flux densities as a function of frequency for VLASS coarse cube images

The hifv\_analyzestokescubes task

Keyword arguments:

---- pipeline parameter arguments which can be set in any pipeline mode

vis -- List of visibility data files. These may be ASDMs, tar files of ASDMs, MSs, or tar files of MSs. If ASDM files are specified, they will be converted to MS format.

default: []

example: vis=['X227.ms', 'asdms.tar.gz']

pipelinemode -- The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task.

default: 'automatic'.

---- pipeline context defined parameter argument which can be set only in 'interactive mode'

--- pipeline task execution modes

dryrun -- Run the commands (True) or generate the commands to be run but do not execute (False).

default: True

acceptresults -- Add the results of the task to the pipeline context (True) or reject them (False).

default: True

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Basic analyzestokescubes task

```
hifv_analyzestokescubes()
```

### Parameter List

| name          | type      | default   | description                                         |
|---------------|-----------|-----------|-----------------------------------------------------|
| vis           | stringVec | None      | List of input visibility data                       |
| pipelinemode  | string    | automatic | The pipeline operating mode                         |
| dryrun        | bool      | False     | Run the task (False) or display task command (True) |
| acceptresults | bool      | True      | Add the results into the pipeline context           |

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## hifv\_applycals

### Task Description

Apply calibration tables to measurement set

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned

Issues

There is some discussion about the appropriate values of calwt. Given properly scaled data, the correct value should be the CASA default of True. However at the current time ALMA is suggesting that calwt be set to True for applying observatory calibrations, e.g. antenna positions, WVR, and system temperature corrections, and to False for applying instrument calibrations, e.g. bandpass, gain, and flux.

Examples

1. Run the final applycals stage of the VLA CASA pipeline.  
hifv\_applycals()

### Parameter List

| name  | type      | default | description                                                                                                                                                                                                                      |
|-------|-----------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis   | stringVec | None    | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSes, or tar files of MSes, If ASDM files are specified, they will be converted to MS format. example: vis=['X227.ms', 'asdms.tar.gz']                    |
| field | string    | None    | A string containing the list of field names or field ids to which the calibration will be applied. Defaults to all fields in the pipeline context. Only can be set in pipelinemode='interactive'. example: '3C279', '3C279, M82' |

|                 |        |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|--------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| intent          | string | None      | A string containing the list of intents against which the selected fields will be matched. Defaults to all supported intents in the pipeline context. Only can be set in pipelinemode='interactive'. example: '*TARGET*'                                                                                                                                                                                                                                                                                                       |
| spw             | string | None      | The list of spectral windows and channels to which the calibration will be applied. Defaults to all science windows in the pipeline. Only can be set in pipelinemode='interactive'. example: '17', '11, 15'                                                                                                                                                                                                                                                                                                                    |
| antenna         | string | None      | The list of antennas to which the calibration will be applied. Defaults to all antennas. Not currently supported. Only can be set in pipelinemode='interactive'.                                                                                                                                                                                                                                                                                                                                                               |
| applymode       | string | None      | Calibration apply mode ''='calflagstrict': calibrate data and apply flags from solutions using the strict flagging convention 'trial': report on flags from solutions, dataset entirely unchanged 'flagonly': apply flags from solutions only, data not calibrated 'calonly': calibrate data only, flags from solutions NOT applied 'calflagstrict': 'flagonlystrict': same as above except flag spws for which calibration is unavailable in one or more tables (instead of allowing them to pass uncalibrated and unflagged) |
| flagbackup      | bool   | True      | Backup the flags before the apply. Only can be set in pipelinemode='interactive'.                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| flagsum         | bool   | True      | Compute before and after flagging summary statistics                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| flagdetailedsum | bool   | True      | Compute detailed flagging statistics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| gainmap         | bool   | False     | Mode to map gainfields to scans.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| pipelinemode    | string | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task.                                                                                                                                                                                    |
| dryrun          | bool   | False     | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                                                                                                                                                                                                                 |
| acceptresults   | bool   | True      | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                                                                                                                                                                                                     |

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## hifv\_checkflag

### Task Description

Run RFI flagging using flagdata in various modes

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Run RFLAG with associated heuristics in the VLA CASA pipeline.  
hifv\_checkflag()

### Parameter List

| name | type      | default | description                                                                                                                                                                                                   |
|------|-----------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis  | stringVec | None    | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSes, or tar files of MSes, If ASDM files are specified, they will be converted to MS format. example: vis=['X227.ms', 'asdms.tar.gz'] |

|                    |        |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|--------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| checkflagmode      | string | None      | -- Standard VLA modes with improved RFI flagging heuristics: 'bpd-vla', 'allcals-vla', 'target-vla' -- blank string default use of rflag on bandpass and delay calibrators -- use string 'semi' after hifv_semiFinalBPdcals() for executing rflag on calibrators -- use string 'bpd', for the bandpass and delay calibrators: execute rflag on all calibrated cross-hand corrected data; extend flags to all correlations execute rflag on all calibrated parallel-hand residual data; extend flags to all correlations execute tfcrop on all calibrated cross-hand corrected data, per visibility; extend flags to all correlations execute tfcrop on all calibrated parallel-hand corrected data, per visibility; extend flags to all correlations -- use string 'allcals', for all the other calibrators, with delays and BPcal applied: similar procedure as 'bpd' mode, but uses corrected data throughout -- use string 'target', for the target data: similar procedure as 'allcals' mode, but with a higher SNR cutoff for rflag to avoid flagging data due to source structure, and with an additional series of tfcrop executions to make up for the higher SNR cutoff in rflag -- VLASS specific modes include 'bpd-vlass', 'allcals-vlass', and 'target-vlass' which calculate thresholds to use per spw/field/scan (action='calculate', then, per baseband/field/scan, replace all spw thresholds above the median with the median, before re-running rflag with the new thresholds. This has the effect of lowering the thresholds for spws with RFI to be closer to the RFI-free thresholds, and catches more of the RFI. -- Mode 'vlass-imaging' is similar to 'target-vlass', except that it executes on the split off target data, intent='*TARGET', datacolumn='data' and uses a timedevscale of 4.0. |
| growflags          | bool   | True      | Grow flags in time at the end of the following checkflagmodes: default=True, for 'bpd-vla', 'allcals-vla', 'bpd', and 'allcals' default=False, for '' and 'semi'                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| pipelinemode       | string | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| overwrite_modelcol | bool   | False     | Always write the model column, even if it already exists                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

|               |      |       |                                                                                                                                |
|---------------|------|-------|--------------------------------------------------------------------------------------------------------------------------------|
| dryrun        | bool | False | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode. |
| acceptresults | bool | True  | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.     |

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## hifv\_circfeedpolcal

### Task Description

Perform polarization calibration for VLA circular feeds.

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Basic circfeedpolcal task  
hifv\_circfeedpolcal()

### Parameter List

| name            | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|-----------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis             | stringVec | None      | List of input visibility data                                                                                                                                                                                                                                                                                                               |
| Dterm_solint    | string    | 2MHz      | D-terms spectral averaging. Example: refantignore='ea02,ea03'                                                                                                                                                                                                                                                                               |
| refantignore    | string    | None      | Help appears with Dterm_solint parameter                                                                                                                                                                                                                                                                                                    |
| leakage_poltype | string    | None      | poltype to use in first polcal execution - blank string means use default heuristics                                                                                                                                                                                                                                                        |
| mbdkcross       | bool      | True      | Run gaincal KCROSS grouped by baseband                                                                                                                                                                                                                                                                                                      |
| clipminmax      | doubleVec | 0.25      | Acceptable range for leakage amplitudes, values outside will be flagged.                                                                                                                                                                                                                                                                    |
| pipelinemode    | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun          | bool      | False     | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                              |
| acceptresults   | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                  |

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## hifv\_exportdata

### Task Description

Prepare and export interferometry and imaging data

1. Export the pipeline results for a single session to the data products directory

```
!mkdir ../products
```

```
hifv_exportdata (products_dir='../products')
```

2. Export the pipeline results to the data products directory specify that only the gain calibrator images be saved.

```
!mkdir ../products
```

```
hifv_exportdata (products_dir='../products', calintents='*PHASE*')
```

## Parameter List

| name                  | type      | default | description                                                                                                                                                                                                                                                                                                         |
|-----------------------|-----------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis                   | stringVec | None    | List of visibility data files for which flagging and calibration information will be exported. Defaults to the list maintained in the pipeline context. Not available in pipelinemode='automatic'. example: vis=['X227.ms', 'X228.ms']                                                                              |
| session               | stringVec | None    | List of sessions one per visibility file. Currently defaults to a single virtual session containing all the visibility files in vis. In the future, this will default to the set of observing sessions defined in the context. Not available in pipelinemode='automatic'. example: session=['session1', 'session2'] |
| imaging_products_only | bool      | False   | Export science target imaging products only                                                                                                                                                                                                                                                                         |
| exportmses            | bool      | False   | Export the final MeasurementSets instead of the final flags, calibration tables, and calibration instructions.                                                                                                                                                                                                      |
| tarms                 | bool      | True    | Tar final MeasurementSets                                                                                                                                                                                                                                                                                           |
| exportcalprods        | bool      | False   | Export flags and caltables in addition to MeasurementSets. this parameter is only valid when exportmses = True.                                                                                                                                                                                                     |
| pprfile               | string    | None    | Name of the pipeline processing request to be exported. Defaults to a file matching the template 'PPR_*.xml'. Not available in pipelinemode='automatic'. example: pprfile=['PPR_GRB021004.xml']                                                                                                                     |
| calintents            | string    | None    | List of calibrator image types to be exported. Defaults to all standard calibrator intents, 'BANDPASS', 'PHASE', 'FLUX'. Not available in pipelinemode='automatic'. example: 'PHASE'                                                                                                                                |
| calimages             | stringVec | None    | List of calibrator images to be exported. Defaults to all calibrator images recorded in the pipeline context. Not available in pipelinemode='automatic'. example: calimages=['3C454.3.bandpass', '3C279.phase']                                                                                                     |
| targetimages          | stringVec | None    | List of science target images to be exported. Defaults to all science target images recorded in the pipeline context. Not available in pipelinemode='automatic'. example: targetimages=['NGC3256.band3', 'NGC3256.band6']                                                                                           |

|               |        |           |                                                                                                                                                                                                                                                                                                                                                               |
|---------------|--------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| products_dir  | string | None      | Name of the data products subdirectory. Defaults to './'<br>Not available in pipelinemode='automatic'. example:<br>'../products'                                                                                                                                                                                                                              |
| gainmap       | bool   | False     | The value of gainmap parameter in hifv_restoredata<br>task put in casa_piperestorescript.py                                                                                                                                                                                                                                                                   |
| pipelinemode  | string | automatic | The pipeline operating mode. In 'automatic' mode the<br>pipeline determines the values of all context defined<br>pipeline inputs automatically. In 'interactive' mode the<br>user can set the pipeline context defined parameters<br>manually. In 'getinputs' mode the user can check the<br>settings of all pipeline parameters without running the<br>task. |
| dryrun        | bool   | False     | Run the task (False) or display task command (True).<br>Only available in pipelinemode='interactive'.                                                                                                                                                                                                                                                         |
| acceptresults | bool   | True      | Add the results of the task to the pipeline context (True)<br>or reject them (False). Only available in<br>pipelinemode='interactive'.                                                                                                                                                                                                                        |

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## hifv\_exportvlassdata

### Task Description

Export Image data from QL, SE, and Coarse Cube modes of VLASS Survey

Examples

1. Basic exportvlassdata task  
hifv\_exportvlassdata()

### Parameter List

| name          | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|---------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None      | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSes, or tar files of MSes, If ASDM files are specified, they will be converted to MS format. example: vis=['X227.ms', 'asdms.tar.gz']                                                                                                                               |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool      | False     | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                              |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                  |

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## hifv\_finalcals

### Task Description

Compute final gain calibration tables

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Create the final calibration tables to be applied to the data in the VLA CASA pipeline.  
hifv\_finalcals()

### Parameter List

| name          | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|---------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None      | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSes, or tar files of MSes, If ASDM files are specified, they will be converted to MS format. example: vis=['X227.ms', 'asdms.tar.gz']                                                                                                                               |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool      | False     | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                              |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                  |
| weakbp        | bool      | False     | Activate weak bandpass heuristics                                                                                                                                                                                                                                                                                                           |
| refantignore  | string    | None      | String list of antennas to ignore                                                                                                                                                                                                                                                                                                           |

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## hifv\_fixpointing

### Task Description

Base fixpointing task

The hifv\_fixpointing task

Keyword arguments:

---- pipeline parameter arguments which can be set in any pipeline mode

vis -- List of visibility data files. These may be ASDMs, tar files of ASDMs, MSs, or tar files of MSs, If ASDM files are specified, they will be converted to MS format.

default: []

example: vis=['X227.ms', 'asdms.tar.gz']

pipelinemode -- The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task.

default: 'automatic'.

---- pipeline context defined parameter argument which can be set only in 'interactive mode'

--- pipeline task execution modes

dryrun -- Run the commands (True) or generate the commands to be run but do not execute (False).

default: True

acceptresults -- Add the results of the task to the pipeline context (True) or reject them (False).

default: True

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Basic fixpointing task

hifv\_fixpointing()

## Parameter List

| name          | type      | default   | description                                         |
|---------------|-----------|-----------|-----------------------------------------------------|
| vis           | stringVec | None      | List of input visibility data                       |
| pipelinemode  | string    | automatic | The pipeline operating mode                         |
| dryrun        | bool      | False     | Run the task (False) or display task command (True) |
| acceptresults | bool      | True      | Add the results into the pipeline context           |

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## hifv\_flagcal

### Task Description

Flagcal task

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Flag existing caltable

hifv\_flagcal()

### Parameter List

| name          | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|---------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None      | List of input visibility data                                                                                                                                                                                                                                                                                                               |
| caltable      | string    | None      | String name of the caltable                                                                                                                                                                                                                                                                                                                 |
| clipminmax    | any       | None      | Range to use for clipping                                                                                                                                                                                                                                                                                                                   |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool      | False     | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                              |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                  |

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## hifv\_flagdata

### Task Description

Do basic deterministic flagging of a list of MeasurementSets

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Do basic flagging on a MeasurementSet

```
hifv_flagdata()
```

2. Do basic flagging on a MeasurementSet as well as flag pointing and atmosphere data

```
hifv_flagdata(scan=True intent='*BANDPASS*')
```

### Parameter List

| name | type | default | description |
|------|------|---------|-------------|
|------|------|---------|-------------|

|            |           |                                                                                                                     |                                                                                                                                                                                                               |
|------------|-----------|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis        | stringVec | None                                                                                                                | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSes, or tar files of MSes, If ASDM files are specified, they will be converted to MS format. example: vis=['X227.ms', 'asdms.tar.gz'] |
| autocorr   | bool      | True                                                                                                                | Flag autocorrelation data                                                                                                                                                                                     |
| shadow     | bool      | True                                                                                                                | Flag shadowed antennas                                                                                                                                                                                        |
| scan       | bool      | True                                                                                                                | Flag specified scans                                                                                                                                                                                          |
| scannumber | string    | None                                                                                                                | A string containing a comma delimited list of scans to be flagged. example: '3,5,6'                                                                                                                           |
| quack      | bool      | True                                                                                                                | Quack scans                                                                                                                                                                                                   |
| clip       | bool      | True                                                                                                                | Clip mode                                                                                                                                                                                                     |
| baseband   | bool      | True                                                                                                                | Flag 20MHz of each edge of basebands                                                                                                                                                                          |
| intents    | string    | *POINTING*,*FOCUS*,*ATMOSPHERE*,*SIDEBAND_RATIO*,<br>*UNKNOWN*,*SYSTEM_CONFIGURATION*,<br>*UNSPECIFIED#UNSPECIFIED* | A string containing a comma delimited list of intents against which the scans to be flagged are matched. example: '*BANDPASS*'                                                                                |
| edgespw    | bool      | True                                                                                                                | Fraction of the baseline correlator TDM edge channels to be flagged.                                                                                                                                          |
| fracspw    | double    | 0.05                                                                                                                | Fraction of baseline correlator edge channels to be flagged                                                                                                                                                   |
| online     | bool      | True                                                                                                                | Apply the online flags                                                                                                                                                                                        |
| fileonline | string    | None                                                                                                                | File containing the online flags. These are computed by the h_init or hif_importdata data tasks. If the online flags files are undefined a name of the form 'msname.flagonline.txt' is assumed.               |
| template   | bool      | True                                                                                                                | Apply a flagging template                                                                                                                                                                                     |

|               |           |           |                                                                                                                                                                                                                                                                                                                                           |
|---------------|-----------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| filetemplate  | stringVec | None      | The name of a text file that contains the flagging template for RFI, birdies, telluric lines, etc. If the template flags files is undefined a name of the form 'msname.flagtemplate.txt' is assumed.                                                                                                                                      |
| hm_tbuff      | string    | 1.5int    | The time buffer computation heuristic                                                                                                                                                                                                                                                                                                     |
| tbuff         | any       | 0.0       | List of time buffers (sec) to pad timerange in flag commands                                                                                                                                                                                                                                                                              |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| flagbackup    | bool      | False     | Backup pre-existing flags before applying new ones. Only can be set in pipelinemode='interactive'.                                                                                                                                                                                                                                        |
| dryrun        | bool      | False     | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                            |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                |

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## hifv\_flagtargetsdata

### Task Description

Apply a flagtemplate to target data prior to running imaging pipeline tasks

The hifv\_flagtargetsdata task

Keyword arguments:

---- pipeline parameter arguments which can be set in any pipeline mode

vis -- List of visibility data files. These may be ASDMs, tar files of ASDMs, MSs, or tar files of MSs. If ASDM files are specified, they will be converted to MS format.

default: []

example: vis=['X227.ms', 'asdms.tar.gz']

pipelinemode -- The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task.

default: 'automatic'.

---- pipeline context defined parameter argument which can be set only in 'interactive mode'

--- pipeline task execution modes

dryrun -- Run the commands (True) or generate the commands to be run but do not execute (False).

default: True

acceptresults -- Add the results of the task to the pipeline context (True) or reject them (False).

default: True

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Basic flagtargetsdata task

hifv\_flagtargetsdata()

### Parameter List

| <b>name</b>   | <b>type</b> | <b>default</b> | <b>description</b>                                                                                                                                                                                                                                                                                                                        |
|---------------|-------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec   | None           | The list of input MeasurementSets. Defaults to the list of MeasurementSets defined in the pipeline context. (can be set only in 'interactive mode')                                                                                                                                                                                       |
| template      | bool        | True           | Apply flagging templates. (can be set in any pipeline mode)                                                                                                                                                                                                                                                                               |
| filetemplate  | stringVec   | None           | The name of a text file that contains the flagging template for issues with the science target data etc. If the template flags files is undefined a name of the form 'msname_flagtargetstemplate.txt' is assumed. (can be set in any pipeline mode)                                                                                       |
| pipelinemode  | string      | automatic      | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| flagbackup    | bool        | True           | Back up any pre-existing flags. (can be set only in 'interactive mode')                                                                                                                                                                                                                                                                   |
| dryrun        | bool        | False          | Run the commands (False) or generate the commands to be run but do not execute (True).                                                                                                                                                                                                                                                    |
| acceptresults | bool        | True           | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                        |

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## **hifv\_fluxboot**

### **Task Description**

Fluxboot

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. VLA CASA pipeline flux density bootstrapping.

hifv\_fluxboot()

### **Parameter List**

| <b>name</b>   | <b>type</b> | <b>default</b> | <b>description</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------|-------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec   | None           | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSes, or tar files of MSes, If ASDM files are specified, they will be converted to MS format. example: vis=['X227.ms', 'asdms.tar.gz']                                                                                                                                                                                                                                                                |
| caltable      | string      | None           | String name of the flagged caltable                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| fitorder      | int         | -1             | Polynomial order of the spectral fitting for valid flux densities with multiple spws. The default value of -1 means that the heuristics determine the fit order based on fractional bandwidth and receiver bands present in the observation. An override value of 1,2,3 or 4 may be specified by the user. Spectral index (1) and, if applicable, curvature (2) are reported in the weblog. If no determination can be made by the heuristics, a fitorder of 1 will be used. |
| pipelinemode  | string      | automatic      | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task.                                                                                                                                  |
| dryrun        | bool        | False          | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                                                                                                                                                               |
| acceptresults | bool        | True           | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                                                                                                                                                   |
| refantignore  | string      | None           | String list of antennas to ignore Example: refantignore='ea02,ea03'                                                                                                                                                                                                                                                                                                                                                                                                          |

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## **hifv\_gaincurves**

### **Task Description**

Runs gencal in gc mode

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Load an ASDM list in the ../rawdata subdirectory into the context.

hifv\_gaincurves()

### Parameter List

| name          | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|---------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None      | List of input visibility data                                                                                                                                                                                                                                                                                                               |
| caltable      | string    | None      | String name of caltable                                                                                                                                                                                                                                                                                                                     |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool      | False     | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                              |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                  |

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## hifv\_hanning

### Task Description

Hanning smoothing on a dataset

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Run the task to execute hanning smoothing on a VLA CASA pipeline loaded MeasurementSet.

hifv\_hanning()

### Parameter List

| name          | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|---------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None      | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSs, or tar files of MSs, If ASDM files are specified, they will be converted to MS format. example: vis=['X227.ms', 'asdms.tar.gz']                                                                                                                                 |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool      | False     | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                              |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                  |

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## hifv\_importdata

### Task Description

Imports data into the VLA pipeline

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Load an ASDM list in the ../rawdata subdirectory into the context.  

```
hifv_importdata (vis=['../rawdata/uid___A002_X30a93d_X43e',
'../rawdata/uid_A002_x30a93d_X44e'])
```
2. Load an MS in the current directory into the context.  

```
hifv_importdata (vis=[uid___A002_X30a93d_X43e.ms])
```
3. Load a tarred ASDM in ../rawdata into the context.  

```
hifv_importdata (vis=['../rawdata/uid___A002_X30a93d_X43e.tar.gz'])
```
4. Check the hifv\_importdata inputs, then import the data  

```
myvislist = ['uid___A002_X30a93d_X43e.ms', 'uid_A002_x30a93d_X44e.ms']
hifv_importdata(vis=myvislist, pipelinemode='getinputs')
hifv_importdata(vis=myvislist)
```
5. Load an ASDM but check the results before accepting them into the context.  

```
results = hifv_importdata (vis=['uid___A002_X30a93d_X43e.ms'],
acceptresults=False)
results.accept()
```
6. Run in dryrun mode before running for real  

```
results = hifv_importdata (vis=['uid___A002_X30a93d_X43e.ms'], dryrun=True)
```

```
results = hifv_importdata (vis=['uid___A002_X30a93d_X43e.ms'])
```

7. Run with explicit setting of data column types:

```
hifv_importdata(vis=['uid___A002_X30a93d_X43e_targets.ms'], datacolumns={'data':  
'regcal_contline'})
```

```
hifv_importdata(vis=['uid___A002_X30a93d_X43e_targets_line.ms'], datacolumns={'data':  
'regcal_line', 'corrected': 'selfcal_line'})
```

## Parameter List

| name         | type      | default                   | description                                                                                                                                                                                                                                                                                                                                 |
|--------------|-----------|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis          | stringVec | None                      | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSes, or tar files of MSes, If ASDM files are specified, they will be converted to MS format. example: vis=['X227.ms', 'asdms.tar.gz']                                                                                                                               |
| session      | stringVec | None                      | List of sessions to which the visibility files belong. Defaults to a single session containing all the visibility files, otherwise a session must be assigned to each vis file. example: session=['Session_1', 'Sessions_2']                                                                                                                |
| pipelinemode | string    | automatic                 | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| asis         | string    | Receiver<br>CalAtmosphere | ASDM to convert as is Only can be set in pipelinemode='interactive' examples: 'Receiver CalAtmosphere' 'Receiver', ''                                                                                                                                                                                                                       |
| overwrite    | bool      | False                     | Only can be set in pipelinemode='interactive'                                                                                                                                                                                                                                                                                               |
| nocopy       | bool      | False                     | When importing an MS, disable copying of the MS to the working directory. Only can be set in pipelinemode='interactive'                                                                                                                                                                                                                     |
| createmms    | string    | false                     | Create a multi-MeasurementSet ('true') ready for parallel processing, or a standard MeasurementSet ('false'). The default setting ('automatic') creates an MMS if running in a cluster environment.                                                                                                                                         |
| ocorr_mode   | string    | co                        | Read in cross- and auto-correlation data(ca), cross-correlation data only (co), or autocorrelation data only (ao).                                                                                                                                                                                                                          |

|               |      |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------|------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| datacolumns   | any  | {}    | Dictionary defining the data types of existing columns. The format is: {'data': 'data type 1'} or {'data': 'data type 1', 'corrected': 'data type 2'} For ASDMs the data type can only be RAW and one can only specify it for the data column. For MSes one can define two different data types for the DATA and CORRECTED_DATA columns and they can be any of the known data types (RAW, REGCAL_CONTLINE_ALL, REGCAL_CONTLINE_SCIENCE, SELFCAL_CONTLINE_SCIENCE, REGCAL_LINE_SCIENCE, SELFCAL_LINE_SCIENCE, BASELINED, ATMCORR). The intent selection strings _ALL or _SCIENCE can be skipped. In that case the task determines this automatically by inspecting the existing intents in the dataset. Usually, a single datacolumns dictionary is used for all datasets. If necessary, one can define a list of dictionaries, one for each EB, with different setups per EB. If no types are specified, {'data': 'raw', 'corrected': 'regcal_contline'} or {'data': 'raw'} will be assumed, depending on whether the corrected column exists or not. |
| dryrun        | bool | False | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| acceptresults | bool | True  | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

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## hifv\_opcal

### Task Description

Runs gencal in opac mode

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Load an ASDM list in the ../rawdata subdirectory into the context.  
hifv\_opcal()

### Parameter List

| <b>name</b>   | <b>type</b> | <b>default</b> | <b>description</b>                                                                                                                                                                                                                                                                                                                          |
|---------------|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec   | None           | List of input visibility data                                                                                                                                                                                                                                                                                                               |
| pipelinemode  | string      | automatic      | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool        | False          | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                              |
| acceptresults | bool        | True           | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                  |

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## **hifv\_pbcor**

### **Task Description**

Apply primary beam correction to VLA and VLASS images

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Basic pbcor task  
hifv\_pbcor()

### **Parameter List**

| <b>name</b>   | <b>type</b> | <b>default</b> | <b>description</b>                                                                                                                                                                                                                                                                                                                          |
|---------------|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec   | None           | List of input visibility data                                                                                                                                                                                                                                                                                                               |
| pipelinemode  | string      | automatic      | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool        | False          | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                              |
| acceptresults | bool        | True           | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                  |

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## **hifv\_plotsummary**

### **Task Description**

Create pipeline summary plots

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Execute the pipeline plotting task.  
hifv\_plotsummary()

### **Parameter List**

| <b>name</b>   | <b>type</b> | <b>default</b> | <b>description</b>                                                                                                                                                                                                                                                                                                                          |
|---------------|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec   | None           | List of input visibility data                                                                                                                                                                                                                                                                                                               |
| pipelinemode  | string      | automatic      | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool        | False          | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                              |
| acceptresults | bool        | True           | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                  |

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## **hifv\_priorcals**

### **Task Description**

Runs gaincurves, opacities, requantizer gains, antenna position corrections, tec\_maps, switched power.

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Run gaincurves, opacities, requantizer gains and antenna position corrections.  
hifv\_priorcals()

### **Parameter List**

| name                 | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|----------------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis                  | stringVec | None      | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSes, or tar files of MSes, If ASDM files are specified, they will be converted to MS format. example: vis=['X227.ms', 'asdms.tar.gz']                                                                                                                               |
| show_tec_maps        | bool      | True      | Plot tec maps                                                                                                                                                                                                                                                                                                                               |
| apply_tec_correction | bool      | False     | Apply tec correction                                                                                                                                                                                                                                                                                                                        |
| swpow_spw            | any       | None      | Spectral-window(s) for plotting: "" ==>all, spw="6,14"                                                                                                                                                                                                                                                                                      |
| pipelinemode         | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun               | bool      | False     | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                              |
| acceptresults        | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                  |

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## hifv\_restoredata

### Task Description

Restore flagged and calibration interferometry data from a pipeline run

Examples

1. Restore the pipeline results for a single ASDM in a single session

```
hifv_restoredata (vis=['myVLAasm'], session=['session_1'], ocorr_mode='ca')
```

### Parameter List

| name | type      | default | description                                                                                                                                                                                                   |
|------|-----------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis  | stringVec | None    | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSes, or tar files of MSes, If ASDM files are specified, they will be converted to MS format. example: vis=['X227.ms', 'asdms.tar.gz'] |

|               |           |             |                                                                                                                                                                                                                                                                                                                                             |
|---------------|-----------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| session       | stringVec | None        | List of sessions one per visibility file. Only can be set in pipelinemode='interactive'. Example: session=['session_3']                                                                                                                                                                                                                     |
| products_dir  | string    | ../products | Name of the data products directory to copy calibration products from. The parameter is effective only when copytoraw = True<br>When copytoraw = False, calibration products in rawdata_dir will be used. Only can be set in pipelinemode='interactive'.<br>example: products_dir='myproductspath'                                          |
| copytoraw     | bool      | True        | Copy calibration and flagging tables from products_dir to rawdata_dir directory. Only can be set in pipelinemode='interactive'. Example: copytoraw=False.                                                                                                                                                                                   |
| rawdata_dir   | string    | ../rawdata  | The rawdata directory. Only can be set in pipelinemode='interactive'. Example: rawdata_dir='myrawdatapath'                                                                                                                                                                                                                                  |
| lazy          | bool      | False       | Use the lazy filler option. Only can be set in pipelinemode='interactive'.                                                                                                                                                                                                                                                                  |
| bdfflags      | bool      | False       | Set the BDF flags. Only can be set in pipelinemode='interactive'.                                                                                                                                                                                                                                                                           |
| ocorr_mode    | string    | co          | Correlation import mode                                                                                                                                                                                                                                                                                                                     |
| gainmap       | bool      | False       | If True, map gainfields to a particular list of scans when applying calibration tables.                                                                                                                                                                                                                                                     |
| asis          | string    | None        | List of tables to import asis. Only can be set in pipelinemode='interactive'.                                                                                                                                                                                                                                                               |
| pipelinemode  | string    | automatic   | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool      | False       | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                              |
| acceptresults | bool      | True        | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                  |

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## hifv\_restorepims

### Task Description

Restore VLASS SE per-image measurement set data, resetting flagging, weights, and applying self-calibration.

The hifv\_restorepims task

Keyword arguments:

---- pipeline parameter arguments which can be set in any pipeline mode

vis -- List of visibility data files. These may be ASDMs, tar files of ASDMs, MSs, or tar files of MSs, If ASDM files are specified, they will be converted to MS format.

default: []

example: vis=['X227.ms', 'asdms.tar.gz']

pipelinemode -- The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task.

default: 'automatic'.

---- pipeline context defined parameter argument which can be set only in 'interactive mode'

--- pipeline task execution modes

dryrun -- Run the commands (True) or generate the commands to be run but do not execute (False).

default: True

acceptresults -- Add the results of the task to the pipeline context (True) or reject them (False).

default: True

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Basic restorepims task

hifv\_restorepims()

### Parameter List

| <b>name</b>         | <b>type</b> | <b>default</b> | <b>description</b>                                               |
|---------------------|-------------|----------------|------------------------------------------------------------------|
| vis                 | stringVec   | None           | List of input visibility data                                    |
| reimaging_resources | string      | None           | file path of reimaging_resources.tgz from the SE imaging product |
| pipelinemode        | string      | automatic      | The pipeline operating mode                                      |
| dryrun              | bool        | False          | Run the task (False) or display task command (True)              |
| acceptresults       | bool        | True           | Add the results into the pipeline context                        |

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## hifv\_rqcal

### Task Description

Runs gencal in rq mode

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Load an ASDM list in the ../rawdata subdirectory into the context.  
hifv\_rqcal()

### Parameter List

| <b>name</b>   | <b>type</b> | <b>default</b> | <b>description</b>                                                                                                                                                                                                                                                                                                                          |
|---------------|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec   | None           | List of input visibility data                                                                                                                                                                                                                                                                                                               |
| caltable      | string      | None           | String name of caltable                                                                                                                                                                                                                                                                                                                     |
| pipelinemode  | string      | automatic      | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool        | False          | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                              |
| acceptresults | bool        | True           | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                  |

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## **hfv\_selfcal**

### **Task Description**

Perform phase-only self-calibration, per scan row, on VLASS SE images

Examples

1. Basic selfcal task

```
hfv_selfcal()
```

2. VLASS-SE selfcal usage

```
hfv_selfcal(selfcalmode='VLASS-SE', combine='field,spw')
```

### **Parameter List**

| name               | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|--------------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis                | stringVec | None      | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSes, or tar files of MSes, If ASDM files are specified, they will be converted to MS format. example: vis=['X227.ms', 'asdms.tar.gz']                                                                                                                               |
| pipelinemode       | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun             | bool      | False     | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                              |
| acceptresults      | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                  |
| refantignore       | string    | None      | String list of antennas to ignore                                                                                                                                                                                                                                                                                                           |
| combine            | string    | spw,field | Data axes which to combine for solve Options: '', 'obs', 'scan', 'spw', 'field', or any comma-separated combination in a single string Example: combine='scan,spw' - Extend solutions over scan boundaries (up to the solint), and combine spws for solving. In selfcalmode='VLASS-SE' use the default value.                               |
| selfcalmode        | string    | VLASS     | Heuristics mode selection. Known modes are 'VLASS' and 'VLASS-SE'. Default value is 'VLASS'.                                                                                                                                                                                                                                                |
| refantmode         | string    | strict    | Reference antenna mode                                                                                                                                                                                                                                                                                                                      |
| overwrite_modelcol | bool      | False     | Always write the model column, even if it already exists                                                                                                                                                                                                                                                                                    |

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## hifv\_semiFinalBPdcal

### Task Description

Runs a second delay and bandpass calibration and applies to calibrators to setup for RFI flagging

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Heuristic flagging  
hifv\_semiFinalBPdcalcs()

### Parameter List

| name          | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|---------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None      | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSes, or tar files of MSes, If ASDM files are specified, they will be converted to MS format. example: vis=['X227.ms', 'asdms.tar.gz']                                                                                                                               |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool      | False     | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                              |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                  |
| weakbp        | bool      | False     | Activate weak bandpass heuristics                                                                                                                                                                                                                                                                                                           |
| refantignore  | string    | None      | String list of antennas to ignore                                                                                                                                                                                                                                                                                                           |

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## hifv\_solint

### Task Description

Determines different solution intervals

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Determines different solution intervals:

hifv\_solint()

### Parameter List

| name               | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|--------------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis                | stringVec | None      | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSes, or tar files of MSes, If ASDM files are specified, they will be converted to MS format. example: vis=['X227.ms', 'asdms.tar.gz']                                                                                                                               |
| pipelinemode       | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun             | bool      | False     | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                              |
| acceptresults      | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                  |
| limit_short_solint | any       | None      | Keyword argument in units of seconds to limit the short solution interval. Can be a string or float numerical value in units of seconds of '0.45' or 0.45. Can be set to a string value of 'int'.                                                                                                                                           |
| refantignore       | string    | None      | String list of antennas to ignore Example: refantignore='ea02,ea03'                                                                                                                                                                                                                                                                         |

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## hifv\_statwt

### Task Description

Compute statistical weights and write them to measurement set

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Statistical weighting of the visibilities:

hifv\_statwt()

2. Statistical weighting of the visibilities in the Very Large Array Sky Survey Single Epoch use case:

hifv\_statwt(mode='vlass-se', datacolumn='residual\_data')

### Parameter List

| name               | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|--------------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis                | stringVec | None      | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSes, or tar files of MSes, If ASDM files are specified, they will be converted to MS format. example: vis=['X227.ms', 'asdms.tar.gz']                                                                                                                               |
| datacolumn         | string    | corrected | Data column used to compute weights. Supported values are "data", "corrected", "residual", and "residual_data" (case insensitive, minimum match supported).                                                                                                                                                                                 |
| pipelinemode       | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| overwrite_modelcol | bool      | False     | Always write the model column, even if it already exists                                                                                                                                                                                                                                                                                    |
| statwtmode         | string    | VLA       | Sets the weighting parameters for general VLA ('VLA') or VLASS Single Epoch ('VLASS-SE') use case. Note that the 'VLASS-SE' mode is meant to be used with datacolumn='residual_data'. Default is 'VLA'.                                                                                                                                     |
| dryrun             | bool      | False     | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                              |
| acceptresults      | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                  |

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## hifv\_swpowcal

### Task Description

Runs gencal in swpow mode

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Load an ASDM list in the ../rawdata subdirectory into the context.  
hifv\_swpowcal()

## Parameter List

| name          | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|---------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None      | List of input visibility data                                                                                                                                                                                                                                                                                                               |
| caltable      | string    | None      | String name of caltable                                                                                                                                                                                                                                                                                                                     |
| spw           | any       | None      | Spectral-window/frequency/channel: '' ==> all, spw="0:17~19"                                                                                                                                                                                                                                                                                |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool      | False     | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                              |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                  |

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## hifv\_syspower

### Task Description

Determine amount of gain compression affecting VLA data below Ku-band

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Basic syspower task

```
hifv_syspower()
```

### Parameter List

| <b>name</b>      | <b>type</b> | <b>default</b> | <b>description</b>                                                                                                                                                                                                                                                                                                                          |
|------------------|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis              | stringVec   | None           | List of input visibility data                                                                                                                                                                                                                                                                                                               |
| clip_sp_template | doubleVec   | 1.2            | Acceptable range for Pdiff data; data are clipped outside this range and flagged                                                                                                                                                                                                                                                            |
| antexclude       | string      | None           | csv string list of antennas to exclude                                                                                                                                                                                                                                                                                                      |
| usemedian        | bool        | True           | If antexclude is specified with usemedian=False, the template values are replaced with 1.0. If usemedian = True, the template values are replaced with the median of the good antennas.                                                                                                                                                     |
| apply            | bool        | False          | Apply task results to RQ table                                                                                                                                                                                                                                                                                                              |
| pipelinemode     | string      | automatic      | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun           | bool        | False          | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                              |
| acceptresults    | bool        | True           | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                  |

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## **hifv\_targetflag**

### **Task Description**

Targetflag

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Run rflag on both the science targets and calibrators:

hifv\_targetflag()

### **Parameter List**

| name          | type      | default              | description                                                                                                                                                                                                                                                                                                                                 |
|---------------|-----------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None                 | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSes, or tar files of MSes. If ASDM files are specified, they will be converted to MS format. example: vis=['X227.ms', 'asdms.tar.gz']                                                                                                                               |
| pipelinemode  | string    | automatic            | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool      | False                | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                              |
| acceptresults | bool      | True                 | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                  |
| intents       | string    | *CALIBRATE*,*TARGET* | List of intents of scans to be flagged                                                                                                                                                                                                                                                                                                      |

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## hifv\_tecmaps

### Task Description

Base tecmaps task

Examples

1. Basic tecmaps task

hifv\_tecmaps()

### Parameter List

| <b>name</b>   | <b>type</b> | <b>default</b> | <b>description</b>                                                                                                                                                                                                                                                                                                                          |
|---------------|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec   | None           | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSes, or tar files of MSes, If ASDM files are specified, they will be converted to MS format. example: vis=['X227.ms', 'asdms.tar.gz']                                                                                                                               |
| pipelinemode  | string      | automatic      | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool        | False          | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                              |
| acceptresults | bool        | True           | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                  |

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## **hifv\_testBPdcals**

### **Task Description**

Runs initial delay and bandpass calibration to setup for RFI flagging

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Initial delay calibration to set up heuristic flagging.  
hifv\_testBPdcals()

### **Parameter List**

| name                 | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|----------------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis                  | stringVec | None      | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSes, or tar files of MSes, If ASDM files are specified, they will be converted to MS format. example: vis=['X227.ms', 'asdms.tar.gz']                                                                                                                               |
| pipelinemode         | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun               | bool      | False     | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                              |
| acceptresults        | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                  |
| weakbp               | bool      | False     | Activate weak bandpass heuristics                                                                                                                                                                                                                                                                                                           |
| refantignore         | string    | None      | String list of antennas to ignore Example: refantignore='ea02,ea03'                                                                                                                                                                                                                                                                         |
| doflagundernspwlimit | bool      | False     | If the number of bad spws is greater than zero, and the keyword is True, then spws are flagged individually.                                                                                                                                                                                                                                |

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## hifv\_vlasetjy

### Task Description

Sets flux density scale and fills calibrator model to measurement set

The hifv\_vlasetjy task does an initial run of setjy on the vis

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

standard -- Flux density standard

default: ''

Examples

1. Initial run of setjy:

```
hifv_vlasetjy()
```

## Parameter List

| name          | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|---------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None      | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSes, or tar files of MSes, If ASDM files are specified, they will be converted to MS format. example: vis=['X227.ms', 'asdms.tar.gz']                                                                                                                               |
| field         | string    | None      | List of field names or ids. Only can be set in pipelinemode='interactive'.                                                                                                                                                                                                                                                                  |
| intent        | string    | None      | Observing intent of flux calibrators. Only can be set in pipelinemode='interactive'.                                                                                                                                                                                                                                                        |
| spw           | string    | None      | List of spectral window ids. Only can be set in pipelinemode='interactive'.                                                                                                                                                                                                                                                                 |
| model         | string    | None      | File location for field model. Only can be set in pipelinemode='interactive'.                                                                                                                                                                                                                                                               |
| reffile       | string    | None      | Path to file with fluxes for non-solar system calibrators. Only can be set in pipelinemode='interactive'                                                                                                                                                                                                                                    |
| fluxdensity   | any       | -1        | Specified flux density [I,Q,U,V]; -1 will lookup values                                                                                                                                                                                                                                                                                     |
| spix          | double    | 0.0       | Spectral index of fluxdensity. Can be set when fluxdensity is not -1                                                                                                                                                                                                                                                                        |
| reffreq       | string    | 1GHz      | Reference frequency for spix. Can be set when fluxdensity is not -1                                                                                                                                                                                                                                                                         |
| scalebychan   | bool      | True      | Scale the flux density on a per channel basis or else on a per spw basis                                                                                                                                                                                                                                                                    |
| standard      | variant   | None      | Flux density standard                                                                                                                                                                                                                                                                                                                       |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool      | False     | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                              |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                  |

## hifv\_vlassmasking

### Task Description

Create clean masks for VLASS SE images

The hifv\_vlassmasking task

Keyword arguments:

---- pipeline parameter arguments which can be set in any pipeline mode

vis -- List of visibility data files. These may be ASDMs, tar files of ASDMs, MSs, or tar files of MSs. If ASDM files are specified, they will be converted to MS format.

default: []

example: vis=['X227.ms', 'asdms.tar.gz']

pipelinemode -- The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task.

default: 'automatic'.

---- pipeline context defined parameter argument which can be set only in 'interactive mode'

--- pipeline task execution modes

dryrun -- Run the commands (True) or generate the commands to be run but do not execute (False).

default: True

acceptresults -- Add the results of the task to the pipeline context (True) or reject them (False).

default: True

Output:

results -- If pipeline mode is 'getinputs' then None is returned. Otherwise the results object for the pipeline task is returned.

Examples

1. Basic vlassmasking task

hifv\_vlassmasking()

### Parameter List

| name                | type      | default         | description                                                                                                                                                                                                                                                                                                                                 |
|---------------------|-----------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis                 | stringVec | None            | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSes, or tar files of MSes, If ASDM files are specified, they will be converted to MS format. example: vis=['X227.ms', 'asdms.tar.gz']                                                                                                                               |
| vlass_ql_database   | string    | None            | vlass_ql_database - usage in Socorro: /home/vlass/packages/VLASS1Q.fits                                                                                                                                                                                                                                                                     |
| maskingmode         | string    | vlass-se-tier-1 | maskingmode options are vlass-se-tier-1 or vlass-se-tier-2                                                                                                                                                                                                                                                                                  |
| catalog_search_size | any       | 1.5             | catalog_search_size in units of degrees                                                                                                                                                                                                                                                                                                     |
| pipelinemode        | string    | automatic       | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun              | bool      | False           | Run the commands (True) or generate the commands to be run but do not execute (False). This is a pipeline task execution mode.                                                                                                                                                                                                              |
| acceptresults       | bool      | True            | Add the results of the task to the pipeline context (True) or reject them (False). This is a pipeline task execution mode.                                                                                                                                                                                                                  |

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## Summary of single-dish tasks and parameters

### hsd\_applycal

#### Task Description

Apply the calibration(s) to the data

1. Apply the calibration to the target data

hsd\_applycal (intent='TARGET')

Issues

There is some discussion about the appropriate values of calwt. Given

properly scaled data, the correct value should be the CASA default of True. However at the current time ALMA is suggesting that calwt be set to True for applying observatory calibrations, e.g. antenna positions, WVR, and system temperature corrections, and to False for applying instrument calibrations, e.g. bandpass, gain, and flux.

### Parameter List

| name       | type      | default | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------|-----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis        | stringVec | None    | The list of input MeasurementSets. Defaults to the list of MeasurementSets in the pipeline context. Parameter not available in pipelinemode='automatic'. example: ['X227.ms']                                                                                                                                                                                                                                                                                                                                                  |
| field      | string    | None    | A string containing the list of field names or field ids to which the calibration will be applied. Defaults to all fields in the pipeline context. Parameter not available in pipelinemode='automatic'. example: '3C279', '3C279, M82'                                                                                                                                                                                                                                                                                         |
| intent     | string    | None    | A string containing the list of intents against which the selected fields will be matched. Defaults to all supported intents in the pipeline context. Parameter not available in pipelinemode='automatic'. example: '*TARGET*'                                                                                                                                                                                                                                                                                                 |
| spw        | string    | None    | The list of spectral windows and channels to which the calibration will be applied. Defaults to all science windows in the pipeline context. Parameter not available in pipelinemode='automatic'. example: '17', '11, 15'                                                                                                                                                                                                                                                                                                      |
| antenna    | string    | None    | The list of antennas to which the calibration will be applied. Defaults to all antennas. Not currently supported.                                                                                                                                                                                                                                                                                                                                                                                                              |
| applymode  | string    | None    | Calibration apply mode ''='calflagstrict': calibrate data and apply flags from solutions using the strict flagging convention 'trial': report on flags from solutions, dataset entirely unchanged 'flagonly': apply flags from solutions only, data not calibrated 'calonly': calibrate data only, flags from solutions NOT applied 'calflagstrict': 'flagonlystrict': same as above except flag spws for which calibration is unavailable in one or more tables (instead of allowing them to pass uncalibrated and unflagged) |
| calwt      | boolVec   | True    | Calibrate the weights as well as the data. Parameter not available in pipelinemode='automatic'.                                                                                                                                                                                                                                                                                                                                                                                                                                |
| flagbackup | bool      | True    | Backup the flags before the apply                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

|               |        |           |                                                                                                                                                                                                                                                                                                                                           |
|---------------|--------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pipelinemode  | string | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool   | False     | Run task (False) or display the command(True). Available only when pipelinemode='interactive'.                                                                                                                                                                                                                                            |
| acceptresults | bool   | True      | Add the results of the task to the pipeline context (True) or reject them (False). Available only when pipelinemode='interactive'.                                                                                                                                                                                                        |

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## hsd\_atmcor

### Task Description

Apply offline ATM correction to the data.

### Parameter List

| name    | type | default  | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------|------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| atmtype | any  | auto     | Type of atmospheric transmission model represented as an integer. Available options are as follows. Integer values can be given as either integer or string, i.e. both 1 and '1' are acceptable. 'auto': perform heuristics to choose best model (default) 1: tropical 2: mid latitude summer 3: mid latitude winter 4: subarctic summer 5: subarctic winter If list of integer is given, it also performs heuristics using the provided values instead of default, [1, 2, 3, 4], which is used when 'auto' is provided. List input should not contain 'auto'. Default: 'auto' |
| dtem_dh | any  | -5.6K/km | temperature gradient [K/km], e.g. -5.6. ("" = Tool default) The value is directly passed to initialization method for ATM model. Float and string types are acceptable. Float value is interpreted as the value in K/km. String value should be the numeric value with unit such as '-5.6K/km'. When list of values are given, it will trigger heuristics to choose best model from the provided value. Default: '' (tool default, -5.6K/km, is used)                                                                                                                          |

|               |           |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------|-----------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| h0            | any       | 2km       | scale height for water [km], e.g. 2.0. (" = Tool default) The value is directly passed to initialization method for ATM model. Float and string types are acceptable. Float value is interpreted as the value in kilometer. String value should be the numeric value with unit compatible with length, such as '2km' or '2000m'. When list of values are given, it will trigger heuristics to choose best model from the provided value. Default: '' (tool default, 2.0km, is used) |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task.                                                                                                                                           |
| infiles       | stringVec | None      | ASDM or MS files to be processed. This parameter behaves as data selection parameter. The name specified by infiles must be registered to context before you run hsd_atmcor.                                                                                                                                                                                                                                                                                                        |
| antenna       | string    | None      | Data selection by antenna names or ids. example: 'PM03,PM04' '' (all antennas)                                                                                                                                                                                                                                                                                                                                                                                                      |
| field         | string    | None      | Data selection by field names or ids. example: '*Sgr*,M100' '' (all fields)                                                                                                                                                                                                                                                                                                                                                                                                         |
| spw           | string    | None      | Data selection by spw ids. example: '3,4' (spw 3 and 4) '' (all spws)                                                                                                                                                                                                                                                                                                                                                                                                               |
| pol           | string    | None      | Data selection by polarizations. example: 'XX,YY' (correlation XX and YY) '' (all polarizations)                                                                                                                                                                                                                                                                                                                                                                                    |
| dryrun        | bool      | False     | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                                                                                                                                                              |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                                                                                                                                                                  |
| parallel      | string    | automatic | Execute using CASA HPC functionality, if available.                                                                                                                                                                                                                                                                                                                                                                                                                                 |

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## hsd\_baseline

### Task Description

Detect and validate spectral lines, subtract baseline by masking detected lines

## Parameter List

| <b>name</b> | <b>type</b> | <b>default</b> | <b>description</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------|-------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| fitfunc     | string      | cspline        | fitting function for baseline subtraction. You can only choose cubic spline ('spline' or 'cspline')                                                                                                                                                                                                                                                                                                                                                                                       |
| fitorder    | int         | -1             | Fitting order for polynomial. For cubic spline, it is used to determine how much the spectrum is segmented into. Default (-1) is to determine the order automatically.                                                                                                                                                                                                                                                                                                                    |
| switchpoly  | bool        | True           | If True, switch to 1st or 2nd order polynomial fit when large mask exists at edge regardless of whatever fitfunc or fitorder are specified. Condition for switching is as follows: if $n_{mask} > n_{chan}/2 \Rightarrow$ 1st order polynomial else if $n_{mask} > n_{chan}/4 \Rightarrow$ 2nd order polynomial else $\Rightarrow$ use fitfunc and fitorder where $n_{mask}$ is a number of channels for mask at edge while $n_{chan}$ is a number of channels of entire spectral window. |

|            |     |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------|-----|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| linewindow | any | None | <p>Pre-defined line window. If this is set, specified line windows are used as a line mask for baseline subtraction instead to determine masks based on line detection and validation stage. Several types of format are acceptable. One is channel-based window, [min_chan, max_chan] where min_chan and max_chan should be an integer. For multiple windows, nested list is also acceptable, [[min_chan0, max_chan0], [min_chan1, max_chan1], ...] Another way is frequency-based window, [min_freq, max_freq] where min_freq and max_freq should be either a float or a string. If float value is given, it is interpreted as a frequency in Hz. String should be a quantity consisting of "value" and "unit", e.g., '100GHz'. Multiple windows are also supported. [[min_freq0, max_freq0], [min_freq1, max_freq1], ...] Note that the specified frequencies are assumed to be the value in LSRK frame. Note also that there is a limitation when multiple MSes are processed. If native frequency frame of the data is not LSRK (e.g. TOPO), frequencies need to be converted to that frame. As a result, corresponding channel range may vary between MSes. However, current implementation is not able to handle such case. Frequencies are converted to desired frame using representative MS (time, position, direction). In the above cases, specified line windows are applied to all science spws. In case when line windows vary with spw, line windows can be specified by a dictionary whose key is spw id while value is line window. For example, the following dictionary gives different line windows to spws 17 and 19. Other spws, if available, will have an empty line window. {17: [[100, 200], [1200, 1400]], 19: ['112115MHz', '112116MHz']} Furthermore, linewindow accepts MS selection string. The following string gives [[100,200],[1200,1400]] for spw 17 while [1000,1500] for spw 21. "17:100~200;1200~1400,21:1000~1500" The string also accepts frequency with units. Note, however, that frequency reference frame in this case is not fixed to LSRK. Instead, the frame will be taken from the MS (typically TOPO for ALMA). Thus, the following two frequency-based line windows result different channel selections. {19: ['112115MHz', '112116MHz']} # frequency frame is LSRK "19:11215MHz~11216MHz" # frequency frame is taken from the data # (TOPO for ALMA) example: [100,200] (channel), [115e9, 115.1e9] (frequency in Hz) ['115GHz', '115.1GHz'], see above for more examples</p> |
|------------|-----|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                     |           |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------|-----------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| linewindowmode      | string    | replace   | Merge or replace given manual line window with line detection/validation result. If 'replace' is given, line detection and validation will not be performed. On the other hand, when 'merge' is specified, line detection/validation will be performed and manually specified line windows are added to the result. Note that this has no effect when linewindow for target spw is empty. In that case, line detection/validation will be performed regardless of the value of linewindowmode. |
| edge                | intVec    | None      | Number of edge channels to be dropped from baseline subtraction. The value must be a list with length of 2, whose values specify left and right edge channels, respectively. example: [10,10]                                                                                                                                                                                                                                                                                                  |
| broadline           | bool      | True      | Try to detect broad component of spectral line if True.                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| clusteringalgorithm | string    | hierarchy | Selection of the algorithm used in the clustering analysis to check the validity of detected line features. 'kmean' algorithm and hierarchical clustering algorithm 'hierarchy', and their combination ('both') are so far implemented.                                                                                                                                                                                                                                                        |
| deviationmask       | bool      | True      | Apply deviation mask in addition to masks determined by the automatic line detection.                                                                                                                                                                                                                                                                                                                                                                                                          |
| pipelinemode        | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task.                                                                                                                                                    |
| infiles             | stringVec | None      | List of data files. These must be a name of MeasurementSets that are registered to context via hsd_importdata task. example: vis=['X227.ms', 'X228.ms']                                                                                                                                                                                                                                                                                                                                        |
| field               | string    | None      | Data selection by field. example: '1' (select by FIELD_ID) 'M100*' (select by field name) '' (all fields)                                                                                                                                                                                                                                                                                                                                                                                      |
| antenna             | string    | None      | Data selection by antenna. example: '1' (select by ANTENNA_ID) 'PM03' (select by antenna name) '' (all antennas)                                                                                                                                                                                                                                                                                                                                                                               |
| spw                 | any       | None      | Data selection by spw. example: '3,4' (generate caltable for spw 3 and 4) ['0','2'] (spw 0 for first data, 2 for second) '' (all spws)                                                                                                                                                                                                                                                                                                                                                         |

|               |        |           |                                                                                                                                                                |
|---------------|--------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pol           | any    | None      | Data selection by polarizations. example: '0' (generate caltable for pol 0) ['0~1','0'] (pol 0 and 1 for first data, only 0 for second) '' (all polarizations) |
| dryrun        | bool   | False     | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                         |
| acceptresults | bool   | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                             |
| parallel      | string | automatic | Execute using CASA HPC functionality, if available.                                                                                                            |

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## hsd\_bflag

### Task Description

Flag spectra based on predefined criteria of single dish pipeline

### Parameter List

| name         | type   | default | description                                                                                                                                                                                                     |
|--------------|--------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| iteration    | int    | 5       | Number of iterations to perform sigma clipping to calculate threshold value of flagging.                                                                                                                        |
| edge         | intVec | 0       | Number of channels to be dropped from the edge. The value must be a list of integer with length of one or two. If list length is one, same number will be applied both side of the band. example: [10,20], [10] |
| flag_tsys    | bool   | True    | Activate (True) or deactivate (False) Tsys flag.                                                                                                                                                                |
| tsys_thresh  | double | 3.0     | Threshold value for Tsys flag.                                                                                                                                                                                  |
| flag_prfre   | bool   | True    | Activate (True) or deactivate (False) flag by expected rms of pre-fit spectra.                                                                                                                                  |
| prfre_thresh | double | 3.0     | Threshold value for flag by expected rms of pre-fit spectra.                                                                                                                                                    |
| flag_pofre   | bool   | True    | Activate (True) or deactivate (False) flag by expected rms of post-fit spectra.                                                                                                                                 |
| pofre_thresh | double | 1.3333  | Threshold value for flag by expected rms of post-fit spectra.                                                                                                                                                   |
| flag_prfr    | bool   | True    | Activate (True) or deactivate (False) flag by rms of pre-fit spectra.                                                                                                                                           |
| prfr_thresh  | double | 4.5     | Threshold value for flag by rms of pre-fit spectra.                                                                                                                                                             |

|               |           |           |                                                                                                                                                                                                                                                                                                                                           |
|---------------|-----------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| flag_pofr     | bool      | True      | Activate (True) or deactivate (False) flag by rms of post-fit spectra.                                                                                                                                                                                                                                                                    |
| pofr_thresh   | double    | 4.0       | Threshold value for flag by rms of post-fit spectra.                                                                                                                                                                                                                                                                                      |
| flag_prfrm    | bool      | True      | Activate (True) or deactivate (False) flag by running mean of pre-fit spectra.                                                                                                                                                                                                                                                            |
| prfrm_thresh  | double    | 5.5       | Threshold value for flag by running mean of pre-fit spectra.                                                                                                                                                                                                                                                                              |
| prfrm_nmean   | int       | 5         | Number of channels for running mean of pre-fit spectra.                                                                                                                                                                                                                                                                                   |
| flag_pofrm    | bool      | True      | Activate (True) or deactivate (False) flag by running mean of post-fit spectra.                                                                                                                                                                                                                                                           |
| pofrm_thresh  | double    | 5.0       | Threshold value for flag by running mean of post-fit spectra.                                                                                                                                                                                                                                                                             |
| pofrm_nmean   | int       | 5         | Number of channels for running mean of post-fit spectra.                                                                                                                                                                                                                                                                                  |
| plotflag      | bool      | True      | True to plot result of data flagging.                                                                                                                                                                                                                                                                                                     |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| infile        | stringVec | None      | ASDM or MS files to be processed. This parameter behaves as data selection parameter. The name specified by infile must be registered to context before you run hsd_blflag.                                                                                                                                                               |
| antenna       | string    | None      | Data selection by antenna names or ids. example: 'PM03,PM04' '' (all antennas)                                                                                                                                                                                                                                                            |
| field         | string    | None      | Data selection by field names or ids. example: '*Sgr*,M100' '' (all fields)                                                                                                                                                                                                                                                               |
| spw           | string    | None      | Data selection by spw ids. example: '3,4' (spw 3 and 4) '' (all spws)                                                                                                                                                                                                                                                                     |
| pol           | string    | None      | Data selection by polarizations. example: 'XX,YY' (correlation XX and YY) '' (all polarizations)                                                                                                                                                                                                                                          |
| dryrun        | bool      | False     | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                    |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                        |
| parallel      | string    | automatic | Execute using CASA HPC functionality, if available.                                                                                                                                                                                                                                                                                       |

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## hsd\_exportdata

### Task Description

Prepare single dish data for export

1. Export the pipeline results for a single session to the data products directory

```
!mkdir ../products
```

```
hsd_exportdata (products_dir='../products')
```

### Parameter List

| name          | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|---------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pprfile       | string    | None      | Name of the pipeline processing request to be exported. Defaults to a file matching the template 'PPR_*.xml'. Parameter is not available when pipelinemode='automatic'. example: pprfile=['PPR_GRB021004.xml']                                                                                                                              |
| targetimages  | stringVec | None      | List of science target images to be exported. Defaults to all science target images recorded in the pipeline context. Parameter is not available when pipelinemode='automatic'. example: targetimages=['r_aqr.CM02.spw5.line0.XXYY.sd.im', 'r_aqr.CM02.spw5.XXYY.sd.cont.im']                                                               |
| products_dir  | string    | None      | Name of the data products subdirectory. Defaults to './' Parameter is not available when pipelinemode='automatic'. example: products_dir='../products'                                                                                                                                                                                      |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool      | False     | Run the task (False) or display task command (True). Only available when pipelinemode='interactive'.                                                                                                                                                                                                                                        |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False). Only available when pipelinemode='interactive'.                                                                                                                                                                                                          |

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## hsd\_flagdata

### Task Description

Do basic flagging of a list of MeasurementSets

1. Do basic flagging on a MeasurementSet

`hsd_flagdata()`

2. Do basic flagging on a MeasurementSet flagging additional scans selected by number as well.

`hsd_flagdata(scannumber='13,18')`

### Parameter List

| name       | type      | default                                  | description                                                                                                                                 |
|------------|-----------|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| vis        | stringVec | None                                     | The list of input MeasurementSets. Defaults to the list of MeasurementSets defined in the pipeline context.                                 |
| autocorr   | bool      | False                                    | Flag autocorrelation data.                                                                                                                  |
| shadow     | bool      | True                                     | Flag shadowed antennas.                                                                                                                     |
| scan       | bool      | True                                     | Flag a list of specified scans.                                                                                                             |
| scannumber | string    | None                                     | A string containing a comma delimited list of scans to be flagged.                                                                          |
| intents    | string    | POINTING,FOCUS,ATMOSPHERE,SIDEBAND,CHECK | A string containing a comma delimited list of intents against which the scans to be flagged are matched. example: <code>'*BANDPASS*'</code> |
| edgespw    | bool      | True                                     | Flag the edge spectral window channels.                                                                                                     |
| fracspw    | any       | 1.875GHz                                 | Fraction of the baseline correlator TDM edge channels to be flagged.                                                                        |
| fracspwfps | double    | 0.048387                                 | Fraction of the ACS correlator TDM edge channels to be flagged.                                                                             |
| online     | bool      | True                                     | Apply the online flags.                                                                                                                     |

|                  |           |         |                                                                                                                                                                                                                                                       |
|------------------|-----------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| fileonline       | string    | None    | File containing the online flags. These are computed by the h_init or hif_importdata data tasks. If the online flags files are undefined a name of the form 'msname.flagonline.txt' is assumed.                                                       |
| template         | bool      | True    | Apply a flagging template.                                                                                                                                                                                                                            |
| filetemplate     | stringVec | None    | The name of a text file that contains the flagging template for RFI, birdies, telluric lines, etc. If the template flags files is undefined a name of the form 'msname.flagtemplate.txt' is assumed.                                                  |
| pointing         | bool      | True    | Apply a flagging template for pointing flag.                                                                                                                                                                                                          |
| filepointing     | stringVec | None    | The name of a text file that contains the flagging template for pointing flag. If the template flags files is undefined a name of the form 'msname.flagpointing.txt' is assumed.                                                                      |
| incompleteraster | bool      | True    | Apply commands to flag incomplete raster sequence. If this is False, relevant commands in filepointing are simply commented out.                                                                                                                      |
| hm_tbuff         | string    | halfint | The heuristic for computing the default time interval padding parameter. The options are 'halfint' and 'manual'. In 'halfint' mode tbuff is set to half the maximum of the median integration time of the science and calibrator target observations. |

|               |        |           |                                                                                                                                                                                                                                                                                                                                           |
|---------------|--------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| tbuff         | any    | 0.0       | The time in seconds used to pad flagging command time intervals if hm_tbuff='manual'.                                                                                                                                                                                                                                                     |
| qa0           | bool   | True      | QA0 flags                                                                                                                                                                                                                                                                                                                                 |
| qa2           | bool   | True      | QA2 flags                                                                                                                                                                                                                                                                                                                                 |
| pipelinemode  | string | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| flagbackup    | bool   | False     | Back up any pre-existing flags before applying new ones.                                                                                                                                                                                                                                                                                  |
| dryrun        | bool   | False     | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                    |
| acceptresults | bool   | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                        |

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## hsd\_imaging

### Task Description

Generate single dish images

### Parameter List

| name          | type      | default   | description                                                                                                                                                                                                                                                                                                                                 |
|---------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| mode          | string    | line      | imaging mode controls imaging parameters in the task. Accepts either "line" (spectral line imaging) or "ampcal" (image settings for amplitude calibrator)                                                                                                                                                                                   |
| restfreq      | stringVec | None      | Rest frequency                                                                                                                                                                                                                                                                                                                              |
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| infiles       | stringVec | None      | List of data files. These must be a name of MeasurementSets that are registered to context via hsd_importdata task. example: vis=['uid__A002_X85c183_X36f.ms', 'uid__A002_X85c183_X60b.ms']                                                                                                                                                 |
| field         | string    | None      | Data selection by field names or ids. example: "*Sgr*,M100"                                                                                                                                                                                                                                                                                 |
| spw           | any       | None      | Data selection by spw ids. example: "3,4" (generate images for spw 3 and 4)                                                                                                                                                                                                                                                                 |
| dryrun        | bool      | False     | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                      |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                          |

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## hsd\_importdata

### Task Description

Imports data into the single dish pipeline

1. Load an ASDM list in the ../rawdata subdirectory into the context.

```
hsd_importdata (vis=['../rawdata/uid__A002_X30a93d_X43e',
'../rawdata/uid_A002_x30a93d_X44e'])
```

2. Load an MS in the current directory into the context.

```
hsd_importdata (vis=['uid__A002_X30a93d_X43e.ms'])
```

3. Load a tarred ASDM in ../rawdata into the context.

```
hsd_importdata (vis=['../rawdata/uid__A002_X30a93d_X43e.tar.gz'])
```

4. Check the hsd\_importdata inputs, then import the data

```
myvislist = ['uid__A002_X30a93d_X43e.ms', 'uid_A002_x30a93d_X44e.ms']
```

```
hsd_importdata(vis=myvislist, pipelinemode='getinputs')
```

```
hsd_importdata(vis=myvislist)
```

5. Load an ASDM but check the results before accepting them into the context.
 

```
results = hsd_importdata (vis=['uid__A002_X30a93d_X43e.ms'],
                          acceptresults=False)
results.accept()
```
6. Run in dryrun mode before running for real
 

```
results = hsd_importdata (vis=['uid__A002_X30a93d_X43e.ms'], dryrun=True)
results = hsd_importdata (vis=['uid__A002_X30a93d_X43e.ms'])
```

### Parameter List

| name          | type      | default                                                                                                                    | description                                                                                                                                                                                                                                                                                                                                 |
|---------------|-----------|----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| vis           | stringVec | None                                                                                                                       | List of visibility data files. These may be ASDMs, tar files of ASDMs, MSes, or tar files of MSes, If ASDM files are specified, they will be converted to MS format. example: vis=['X227.ms', 'asdms.tar.gz']                                                                                                                               |
| session       | stringVec | None                                                                                                                       | List of sessions to which the visibility files belong. Defaults to a single session containing all the visibility files, otherwise a session must be assigned to each vis file. example: session=['Session_1', 'Sessions_2']                                                                                                                |
| hm_rasterscan | string    | time                                                                                                                       | Heuristics method for raster scan analysis. Two analysis modes, time-domain analysis ('time') and direction analysis ('direction'), are available. Default is 'time'.                                                                                                                                                                       |
| pipelinemode  | string    | automatic                                                                                                                  | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| asis          | string    | SBSummary<br>ExecBlock<br>Antenna<br>Annotation<br>Station Receiver<br>Source<br>CalAtmosphere<br>CalWVR<br>SpectralWindow | ASDM tables to convert as is Parameter is not available when pipelinemode='automatic'. example: 'Receiver', ''                                                                                                                                                                                                                              |

|                          |      |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------|------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| process_caldevice        | bool | False | Ingest the ASDM caldevice table. Parameter is not available when pipelinemode='automatic'. example: True                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| overwrite                | bool | False | Overwrite existing files on import. Can only be set in pipelinemode='interactive'. When converting ASDM to MS, if overwrite=False and the MS already exists in output directory, then this existing MS dataset will be used instead.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| nocopy                   | bool | False | Disable copying of MS to working directory<br>Parameter is not available when pipelinemode='automatic'.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| bdf flags                | bool | True  | Apply BDF flags on line. Parameter is not available when pipelinemode='automatic'.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| datacolumns              | any  | { }   | Dictionary defining the data types of existing columns. The format is: {'data': 'data type 1'} or {'data': 'data type 1', 'corrected': 'data type 2'} For ASDMs the data type can only be RAW and one can only specify it for the data column. For MSes one can define two different data types for the DATA and CORRECTED_DATA columns and they can be any of the known data types (RAW, REGCAL_CONTLINE_ALL, REGCAL_CONTLINE_SCIENCE, SELFCAL_CONTLINE_SCIENCE, REGCAL_LINE_SCIENCE, SELFCAL_LINE_SCIENCE, BASELINED, ATMCORR). The intent selection strings _ALL or _SCIENCE can be skipped. In that case the task determines this automatically by inspecting the existing intents in the dataset. Usually, a single datacolumns dictionary is used for all datasets. If necessary, one can define a list of dictionaries, one for each EB, with different setups per EB. If no type is specified, {'data': 'raw'} will be assumed. |
| lazy                     | bool | False | Use the lazy filter import                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| with_pointing_correction | bool | True  | add (ASDM::Pointing::encoder - ASDM::Pointing::pointingDirection) to the value to be written in MS::Pointing::direction                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

|               |        |       |                                                                                                                                                 |
|---------------|--------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| createmms     | string | false | Create an MMS                                                                                                                                   |
| dryrun        | bool   | False | Run the task (False) or display task command (True). Parameter is available only when pipelinemode='interactive'.                               |
| acceptresults | bool   | True  | Add the results of the task to the pipeline context (True) or reject them (False). Parameter is available only when pipelinemode='interactive'. |

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## hsd\_k2jycal

### Task Description

Derive Kelvin to Jy calibration tables

1. Compute the Kelvin to Jy calibration tables for a list of MeasurementSets:  
`hsd_k2jycal()`

### Parameter List

| name          | type      | default    | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------|-----------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| dbservice     | bool      | True       | Whether or not accessing Jy/K DB to retrieve conversion factors.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| endpoint      | string    | asdm       | Which endpoints to use for query options: 'asdm', 'model-fit', 'interpolation'                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| reffile       | string    | jyperk.csv | Path to a file containing Jy/K factors for science data, which must be provided by associating calibrator reduction or the observatory measurements. Jy/K factor must take into account all efficiencies, i.e., it must be a direct conversion factor from Ta* to Jy. The file must be in either MS-based or session-based format. The MS-based format must be in an CSV format with five fields: MS name, antenna name, spectral window id, polarization string, and Jy/K conversion factor. Example for the file is as follows: MS,Antenna,Spwid,Polarization,Factor uid__A002_X316307_X6f.ms,CM03,5,XX,10.0 uid__A002_X316307_X6f.ms,CM03,5,YY,12.0 uid__A002_X316307_X6f.ms,PM04,5,XX,2.0 uid__A002_X316307_X6f.ms,PM04,5,YY,5.0 The first line in the above example is a header which may or may not exist. Example for the session-based format is as follows: #OUSID=XXXXXX #OBJECT=Uranus #FLUXJY=yy.zz.aa #FLUXFREQ=YY.ZZ.AA #sessionID,ObservationStartDate(UTC),ObservationEndDate(UTC),Antenna,BandCenter(MHz),BandWidth(MHz),POL,Factor 1,2011-11-11 01:00:00,2011-11-11 01:30:00,CM02,86243.0,500.0,I,10.0 1,2011-11-11 01:00:00,2011-11-11 01:30:00,CM02,86243.0,1000.0,I,30.0 1,2011-11-11 01:00:00,2011-11-11 01:30:00,CM03,86243.0,500.0,I,50.0 1,2011-11-11 01:00:00,2011-11-11 01:30:00,CM03,86243.0,1000.0,I,70.0 1,2011-11-11 01:00:00,2011-11-11 01:30:00,ANONYMOUS,86243.0,500.0,I,30.0 1,2011-11-11 01:00:00,2011-11-11 01:30:00,ANONYMOUS,86243.0,1000.0,I,50.0 2,2011-11-13 01:45:00,2011-11-13 02:15:00,PM04,86243.0,500.0,I,90.0 2,2011-11-13 01:45:00,2011-11-13 02:15:00,PM04,86243.0,1000.0,I,110.0 2,2011-11-13 01:45:00,2011-11-13 02:15:00,ANONYMOUS,86243.0,500.0,I,90.0 2,2011-11-13 01:45:00,2011-11-13 02:15:00,ANONYMOUS,86243.0,1000.0,I,110.0 The line starting with '#' indicates a meta data section and header. The header must exist. The factor to apply is identified by matching the session ID, antenna name, frequency and polarization of data in each line of the file. Note the observation date is supplementary information and not used for the matching so far. The lines whose antenna name is 'ANONYMOUS' are used when there is no measurement for specific antenna in the session. In the above example, if science observation of session 1 contains the antenna PM04, Jy/K factor for ANONYMOUS antenna will be applied since there is no measurement for PM04 in session 1. If no file name is specified or specified file doesn't exist, all Jy/K factors are set to 1.0. example: reffile='', reffile='working/jyperk.csv' |
| pipelinemode  | string    | automatic  | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| infiles       | stringVec | None       | List of input MeasurementSets. example: vis='ngc5921.ms'                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| caltable      | stringVec | None       | Name of output gain calibration tables. example: caltable='ngc5921.gcal'                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| dryrun        | bool      | False      | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| acceptresults | bool      | True       | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

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## hsd\_restoredata

### Task Description

Restore flagged and calibration single dish data from a pipeline run

1. Restore the pipeline results for a single ASDM in a single session

hsd\_restoredata (vis=['uid\_\_A002\_X30a93d\_X43e'], session=['session\_1'], ocorr\_mode='ao')

### Parameter List

| name    | type      | default | description                                                                                                                                        |
|---------|-----------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| vis     | stringVec | None    | List of raw visibility data files to be restored. Assumed to be in the directory specified by rawdata_dir. example: vis=['uid__A002_X30a93d_X43e'] |
| session | stringVec | None    | List of sessions one per visibility file. example: session=['session_3']                                                                           |

|               |        |                                                                                                       |                                                                                                                                                                                                                                                                                                                                             |
|---------------|--------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| products_dir  | string | ../products                                                                                           | Name of the data products directory to copy calibration products from. The parameter is effective only when copytoraw = True. When copytoraw = False, calibration products in rawdata_dir will be used. example: products_dir='myproductspath'                                                                                              |
| copytoraw     | bool   | True                                                                                                  | Copy calibration and flagging tables from products_dir to rawdata_dir directory. example: copytoraw=False                                                                                                                                                                                                                                   |
| rawdata_dir   | string | ../rawdata                                                                                            | Name of the raw data directory. example: rawdata_dir='myrawdatapath'                                                                                                                                                                                                                                                                        |
| lazy          | bool   | False                                                                                                 | Use the lazy filler option example: lazy=True                                                                                                                                                                                                                                                                                               |
| bdfflags      | bool   | True                                                                                                  | Set the BDF flags example: bdfflags=False                                                                                                                                                                                                                                                                                                   |
| ocorr_mode    | string | ao                                                                                                    | Set ocorr_mode example: ocorr_mode='ca'                                                                                                                                                                                                                                                                                                     |
| asis          | string | SBSummary<br>ExecBlock<br>Annotation Antenna<br>Station Receiver<br>Source<br>CalAtmosphere<br>CalWVR | Set list of tables to import asis. example: asis='Source Receiver'                                                                                                                                                                                                                                                                          |
| hm_rasterscan | string | time                                                                                                  | Heuristics method for raster scan analysis. Two analysis modes, time-domain analysis ('time') and direction analysis ('direction'), are available. Default is 'time'.                                                                                                                                                                       |
| pipelinemode  | string | automatic                                                                                             | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool   | False                                                                                                 | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                      |
| acceptresults | bool   | True                                                                                                  | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                          |

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## hsd\_skycal

### Task Description

Calibrate data

1. Generate caltables for all data managed by context.

default(hsd\_skycal)

hsd\_skycal()

### Parameter List

| name      | type   | default | description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------|--------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| calmode   | string | auto    | Calibration mode. Available options are 'auto' (default), 'ps', 'otf', and 'otfraster'. When 'auto' is set, the task will use preset calibration mode that is determined by inspecting data. 'ps' mode is simple position switching using explicit reference scans. Other two modes, 'otf' and 'otfraster', will generate reference data from scans at the edge of the map. Those modes are intended for OTF observation and the former is defined for generic scanning pattern such as Lissajous, while the latter is specific use for raster scan. options: 'auto', 'ps', 'otf', 'otfraster' |
| fraction  | any    | 10%     | Sub-parameter for calmode. Edge marking parameter for 'otf' and 'otfraster' mode. It specifies a number of OFF scans as a fraction of total number of data points. options: String style like '20%', or float value less than 1.0. For 'otfraster' mode, you can also specify 'auto'.                                                                                                                                                                                                                                                                                                          |
| noff      | int    | -1      | Sub-parameter for calmode. Edge marking parameter for 'otfraster' mode. It is used to specify a number of OFF scans near edge directly instead to specify it by fractional number by 'fraction'. If it is set, the value will come before setting by 'fraction'. options: any positive integer value                                                                                                                                                                                                                                                                                           |
| width     | double | 0.5     | Sub-parameter for calmode. Edge marking parameter for 'otf' mode. It specifies pixel width with respect to a median spatial separation between neighboring two data in time. Default will be fine in most cases. options: any float value                                                                                                                                                                                                                                                                                                                                                      |
| elongated | bool   | False   | Sub-parameter for calmode. Edge marking parameter for 'otf' mode. Please set True only if observed area is elongated in one direction.                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

|               |           |           |                                                                                                                                                                                                                                                                                                                                             |
|---------------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pipelinemode  | string    | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In 'interactive' mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| infiles       | stringVec | None      | List of data files. These must be a name of MeasurementSets that are registered to context via hsd_importdata task. example: vis=['X227.ms', 'X228.ms']                                                                                                                                                                                     |
| field         | string    | None      | Data selection by field name.                                                                                                                                                                                                                                                                                                               |
| spw           | any       | None      | Data selection by spw. (default all spws) example: '3,4' (generate caltable for spw 3 and 4) ['0','2'] (spw 0 for first data, 2 for second)                                                                                                                                                                                                 |
| scan          | any       | None      | Data selection by scan number. (default all scans) example: '22,23' (use scan 22 and 23 for calibration) ['22','24'] (scan 22 for first data, 24 for second)                                                                                                                                                                                |
| dryrun        | bool      | False     | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                      |
| acceptresults | bool      | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                          |

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## hsd\_tsysflag

### Task Description

Flag deviant system temperature measurements

1. Flag Tsys measurements using currently recommended tests:

hsd\_tsysflag()

2. Flag Tsys measurements using all recommended tests apart from that using the 'fieldshape' metric:

hsd\_tsysflag(flag\_fieldshape=False)

### Parameter List

| name | type      | default | description                              |
|------|-----------|---------|------------------------------------------|
| vis  | stringVec | None    | List of input MeasurementSets (Not used) |

|                 |           |          |                                                                                                                                                       |
|-----------------|-----------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| caltable        | stringVec | None     | List of input Tsys calibration tables default: [] - Use the table currently stored in the pipeline context. example: caltable=['X132.ms.tsys.s2.tbl'] |
| flag_nmedian    | bool      | True     | True to flag Tsys spectra with high median value.                                                                                                     |
| fnm_limit       | double    | 2.0      | Flag spectra with median value higher than fnm_limit * median of this measure over all spectra.                                                       |
| fnm_byfield     | bool      | True     | Evaluate the nmedian metric separately for each field.                                                                                                |
| flag_derivative | bool      | True     | True to flag Tsys spectra with high median derivative.                                                                                                |
| fd_max_limit    | double    | 5.0      | Flag spectra with median derivative higher than fd_max_limit * median of this measure over all spectra.                                               |
| flag_edgechans  | bool      | True     | True to flag edges of Tsys spectra.                                                                                                                   |
| fe_edge_limit   | double    | 3.0      | Flag channels whose channel to channel difference > fe_edge_limit * median across spectrum.                                                           |
| flag_fieldshape | bool      | True     | True to flag Tsys spectra with a radically different shape to those of the ff_refintent.                                                              |
| ff_refintent    | string    | BANDPASS | Data intent that provides the reference shape for 'flag_fieldshape'.                                                                                  |
| ff_max_limit    | double    | 13       | Flag Tsys spectra with 'fieldshape' metric values > ff_max_limit.                                                                                     |
| flag_birdies    | bool      | True     | True to flag channels covering sharp spectral features.                                                                                               |
| fb_sharps_limit | double    | 0.15     | Flag channels bracketing a channel to channel difference > fb_sharps_limit.                                                                           |

|                |           |                                                         |                                                                                                                                                                                                                       |
|----------------|-----------|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| flag_toomany   | bool      | True                                                    | True to flag Tsys spectra for which a proportion of antennas for given timestamp and/or proportion of antennas that are entirely flagged in all timestamps exceeds their respective thresholds.                       |
| tmf1_limit     | double    | 0.666                                                   | Flag Tsys spectra for all antennas in a timestamp and spw if proportion of antennas already flagged in this timestamp and spw exceeds tmf1_limit.                                                                     |
| tmef1_limit    | double    | 0.666                                                   | Flag Tsys spectra for all antennas and all timestamps in a spw, if proportion of antennas that are already entirely flagged in all timestamps exceeds tmef1_limit.                                                    |
| metric_order   | string    | nmedian,derivative,edgechans,fieldshape,birdies,toomany | Order in which to evaluate the flagging metrics that are enables. Disabled metrics are skipped.                                                                                                                       |
| normalize_tsys | bool      | False                                                   | True to create a normalized Tsys table that is used to evaluate the Tsys flagging metrics. All newly found flags are also applied to the original Tsys caltable that continues to be used for subsequent calibration. |
| filetemplate   | stringVec | None                                                    | The name of a text file that contains the manual Tsys flagging template. If the template flags file is undefined, a name of the form 'msname.flagsystemplate.txt' is assumed.                                         |

|               |        |           |                                                                                                                                                                                                                                                                                                                                           |
|---------------|--------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pipelinemode  | string | automatic | The pipeline operating mode. In 'automatic' mode the pipeline determines the values of all context defined pipeline inputs automatically. In interactive mode the user can set the pipeline context defined parameters manually. In 'getinputs' mode the user can check the settings of all pipeline parameters without running the task. |
| dryrun        | bool   | False     | Run the commands (True) or generate the commands to be run but do not execute (False).                                                                                                                                                                                                                                                    |
| acceptresults | bool   | True      | Add the results of the task to the pipeline context (True) or reject them (False).                                                                                                                                                                                                                                                        |

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