PdBI uv-data analysis in practice

Arancha Castro-Carrizo
General Picture

Image plane

Brightness \((x,y)\)

What we want

\[ \mathcal{F} \]

UV plane

Visibility \((u,v)\)

What we obtain with an interferometer
General Picture

- Calibration
  - UV plane
  - Visibility \((u,v)^{\text{instr}}\)
  - IPB data

- Gridding
  - FFT
  - Cleaning

- Visibility \((u,v)^{\text{obs}}\)
  - UV-table

General Picture

- Image plane
  - Brightness \((x,y)\)

- UV plane
  - Visibility \((u,v)\)

- Instr.
  - Visibility \((u,v)^{\text{instr}}\)
  - Brightness \((x,y)\)

General Picture

- UV plane
  - Visibility \((u,v)^{\text{obs}}\)

General Picture

- Data not yet affected by the ‘imaging process’: assumptions, interpolations, computations, etc.
- Data raw enough to access to observational characteristics: baseline, scan, weight, etc.
- Data processed enough to have removed all instrumental contribution
1. Let’s create a uv-table, in CLIC

2. Data analysis, in MAPPING
   • Data analysis in the $uv$-plane
   • An inspection of the $uv$-data needed
Let’s create a table (“mytable”.uvt), in CLIC
Creating a *uv*-table; **CLIC**
Creating a *uv*-table; CLIC

---

Welcome to CLIC

Loaded modules

* atm
  * clic (F.Gueth, V.Pietu, R.Lucas)

This version of CLIC can process data from receivers (>2087) of the Plateau de Bure in.

CAUTION: backward compatibility with old receivers (<2087) is still under testing. Please use clic87 to reduce these data.

In charge: V.Pietu
Active developers: F.Gueth, R.Lucas

Questions? Comments? Bug reports? Mail to: gildas@iram.fr

For help, type HELP at the CLIC prompt.

CLIC>
Creating a *uv*-table; CLIC
Creating a uv-table; CLIC astro> line + plot
(clic> header)

< IF3 units

narrow 1

narrow 2
narrow Qi Qj

\[ \begin{align*}
Q1 & \quad Q2 & \quad Q3 & \quad Q4 \\
N1 & \quad H & \quad H & \quad V & \quad V \\
N2 & \quad V & \quad V & \quad H & \quad H
\end{align*} \]

Qi (N1)
Qj (N2)

100 MHz \quad \text{IF3} \quad 1100 MHz

\begin{align*}
V & \quad \text{pol} & \quad H & \quad \text{pol} \\
Q1 & \quad Q2 & \quad Q3 & \quad Q4 \\
Q1 & \quad Q2 & \quad Q3 & \quad Q4
\end{align*}

\begin{align*}
4200 \text{ MHz} & \quad \text{IF1} & \quad 7800 \text{ MHz} \\
W2 (L10) & \quad W4 (L12) \\
W1 (L09) & \quad W3 (L11)
\end{align*}

\text{Wide Band Correlator} \quad \text{FIXED}

\text{Narrow Band Correlator} \quad \text{CONFIG}
Creating a \textit{uv-table}; CLIC
Creating a UV-table; CLIC

Phases are Degrees Jumpy
Amplitudes are relative to calibrator amplitude
Amplitude Calibration is antenna-based
Amplitudes are expressed in jansky's
RF Passband Calibration is applied
RF Passband Calibration is frequency dependent
RF Passband Calibration is antenna-based
RF Passband Calibration from input file
RF Passband Calibration is applied
RF Passband Calibration is frequency dependent
RF Passband Calibration is antenna-based
RF Passband Calibration from input file
Phases are relative to calibrator phase
Phase Calibration is antenna-based
Phase reference is internal (same receiver)

Using real-time atmospheric phase correction, antennas 1 2 3 4 5 6
(according to validation by STORE CORRECTION)
Using no off-line atmospheric phase correction, antennas 1 2 3 4 5 6

Phases are Degrees Jumpy
Amplitudes are relative to calibrator amplitude
Amplitude Calibration is antenna-based
Amplitudes are expressed in jansky's
Offset range : 0.0 to 0.0 and 0.0 to 0.0
Selected data quality is 4 (Average)
I-CLIC_SET,[6868] SWITCHING ON SET AVERAGE SCAN METHOD
Phases are Degrees Jumpy
Amplitudes are relative to calibrator amplitude
Amplitude Calibration is antenna-based
Amplitudes are expressed in jansky's
RF Passband Calibration is applied
RF Passband Calibration is frequency dependent
RF Passband Calibration is antenna-based
RF Passband Calibration from input file
Selection is LINE, LSB, LSB
All frequencies selected.
I-CLIC, Primary beam size 58.76925
W-TABLE,[7537] Spectrum resampling is needed, obs. # 844 Scan 7537
W-TABLE,[7537] Frequency resolutions : 2.50000000000000 -0.858185138199841
W-TABLE,[7537] Reference channels : 13.9744529724121 15.0000000000000
W-TABLE,[7537] Number of channels : 116 39
I-TABLE,[6957] Table parameters for afgl-sio.uvt:
I-TABLE,[6957] X_LINE = sio X_FREQ = 85759.144 X_VAL1 = 85743.342
I-TABLE,[6957] X_FRES = -0.858 X_VRES = 3.000 X_VOFF = 99.000
I-TABLE,[6957] NCHAN = 30 X_REF1 = 15.0000
I-TABLE,[6957] 5665 visibilities written (out of 5850 possible)
I-TABLE,[6957] Old size 5850 New 5665
CLIC>
Creating a UV-table; CLIC

Using real-time atmospheric phase correction, antennas 1 2 3 4 5 6
(according to validation by STORE CORRECTION)
Using no off-line atmospheric phase correction, antennas 1 2 3 4 5 6

Phases are Degrees Jumpy
Amplitudes are relative to calibrator amplitude
Amplitude Calibration is antenna-based
Amplitudes are expressed in janskys

Offset range : 0.0 to 0.0 and 0.0 to 0.0
Selected data quality is 4 (Average)
I-CLIC_SET,[6868] SWITCHING ON SET AVERAGE SCAN METHOD

Phases are Degrees Jumpy
Amplitudes are relative to calibrator amplitude
Amplitude Calibration is antenna-based
Amplitudes are expressed in janskys
RF Passband Calibration is applied
RF Passband Calibration is frequency dependent
RF Passband Calibration is antenna-based
RF Passband Calibration from input file
Selections is LINE, LSB, L7
All frequencies selected.
I-CLIC, Primary beam size 58.76925
W-TABLE,[7537] Spectrum resampling is needed, obs. # 844 Scan
W-TABLE,[7537] Frequency resolutions : 2.5600000000000000
W-TABLE,[7537] Reference channels : 13.974529724121 15
W-TABLE,[7537] Number of channels : 116 30
I-TABLE,[6957] Table parameters for afgl-sio.uvt:
I-TABLE,[6957] X_LINE = sio X_FREQ = 85759.144 X.VAL1 = 85743.642
I-TABLE,[6957] X_FRE = -0.858 X.VRES = 3.000 X.YOFF = 00.000
I-TABLE,[6957] NCHAN = 30 X.REF1 = 15.0000
I-TABLE,[6957] 5865 visibilities written (out of 5850 possible)
I-TABLE,[6957] Old size 5850 New 5665

CLIC> sys
You are logged in on host iralx0.
Tue Oct 5 21:17:51 CEST 2010

Selecting GILDAS version: 27sep (27sep10 02:05 cest), executable tree, x86_64-fedora6-i686

SIC# lrt *clic
-rw-r--r-- 1 ogdr project 534 Oct 5 21:14 afgl-sio.uvt-table.clic
SIC# []
isj8-co21-table.clic

file in 08-oct-2008-isj8.hp

set default
set scan 0 10000
set offset 0 0
set receiver 3
set quality AVERAGE
set weight tsys on
set weight calibration on
set phase antenna atmosphere internal relative
set amplitude antenna absolute jansky relative
set rf_passband antenna frequency file on

set selection LINE LSB L01 and L05
find /proc corrr /sou MFS-22

!table ~/maps/isj8-co21.uvt new /frequency CO21 230538 /res 40 20 -30 2 /velo
Use atm. phase correction? [Yes]
Input Data File Name? /home/ccarrizo/24-dec-2008-isi8.hpl
Output UV Table Name? /home/isi8-co1
Now Table? [No]
Source Name? MFS-22
R.A. & Dec. Offsets (for Mosaics)? [0 0]
First and last scan? [0 0 0 0]
Min. Data quality? AVERAGE
Receiver number? [3]
Line or Continuum? LINE
Band Used? LSB
Use L01? [Yes]
Use L02? [No]
Use L03? [No]
Use L04? [No]
Use L05? [Yes]
Use L06? [No]
Use L07? [No]
Use L08? [No]
Change line parameter? [No]
Resample spectral data? [Yes]
Line parameters
Resampling parameters
File in 08-oct-2008-isj8.hpb

set default
set scan 0 10000
set offset 0 0
set receiver 3
set quality AVERAGE
set weight tsys on
set weight calibration on
set phase antenna atmospher internal relative
set amplitude antenna absolute jansky relative
set rf_passband antenna frequency file on

set selection LINE LSB L01 and L05
find /proc corr /sou MFS-22

/imap/isj8-co21.uvt neu /frequency CO21 230538 /res 40 20 -30 2 velo

File in 24-dec-2008-isj8.hpb

set default
set scan 0 10000
set offset 0 0
set receiver 3
set quality AVERAGE
set weight tsys on
set weight calibration on
set phase antenna atmospher internal relative
set amplitude antenna absolute jansky relative
set rf_passband antenna frequency file on

set selection LINE LSB L01 and L05
find /proc corr /sou MFS-22

/imap/isj8-co21.uvt old /frequency CO21 230538 /res 40 20 -30 2 velo

2nd data set
isj8-co21-table.clic

file in 08-oct-2008-isj8.hp8

set default
set scan 0 10000
set offset 0 0
set receiver 3
set quality AVERAGE
set weight tags on
set weight calibration on
set phase antenna atmosphere internal relative
set amplitude antenna absolute jansky relative
set rf_passband antenna frequency file on

set selection LINE LSB L01 and L05
find /proc ccorr /sou MFS-22

table ~/maps/isj8-co21.uvt new /frequency C021 230538 /res 40 20 -30 2 velo

file in 24-dec-2008-isj8.hp8

set phase noalm
set scan 20 350
find /proc ccorr /sou MFS-22

table

-0: -- isj8-co21-table.clic (Fundamental) -- L28 -- All --------------------------
Wrote /home/ccarrizo/isj8-co21-table.clic
help table

Table /RESAMPLE can redefine the rest frequency (in MHz) and line name for the output table. The velocity scale is computed accordingly. This rest frequency will correspond to the reference channel in option RESAMPLE.

Table /NOCHECK [SOURCE[POINTER]PHASE|EPOCH]

When processing each scan, CLIC checks whether a number of position parameters are consistent with those defined in the table header. Option /NOCHECK allows to switch off this checking. Arguments can be given to switch off only part of the parameters (SOURCE name, POINTER direction, PHASE center, EPOCH of coordinates). This option is intended for building tables with inconsistent parameters (typical example is a different source name...). It is potentially dangerous and is to be used with caution.

Table /DROP n1 n2 --- THIS OPTION IS OBSOLETE

Option /DROP enables to drop the first 'n1' and last 'n2' channels in each subband of the OLD spectral correlator. For the NEW spectral correlator (data taken since summer 1992), it is replaced by the commands SET GIBBS and SET DROP.

Table /COMPRESS tmax uvmax

Option /COMPRESS is used to compress the data before writing the table. This works like the COMPRESS command, but no intermediate file is written. Very seldom used.

Help available:

- Table /RESAMPLE can redefine the rest frequency (in MHz) and line name for the output table. The velocity scale is computed accordingly. This rest frequency will correspond to the reference channel in option RESAMPLE.

- Option /NOCHECK [SOURCE[POINTER]PHASE|EPOCH] allows to switch off the checking of position parameters.

- Table /DROP n1 n2 enables to drop the first 'n1' and last 'n2' channels in each subband.

- Table /COMPRESS tmax uvmax is used to compress the data before writing the table.
continuum
remove line contribution

continuum
Mosaic

! isj8-co21-table.clic
!
! File in 08-oct-2008-isj8.hpb
!
set default
set scan 0 10000
set receiver 3
set quality AVERAGE
set weight tsys on
set weight calibration on
set phase antenna atmosphere internal relative
set amplitude antenna absolute jansky relative
set rf_phaseband antenna frequency file on
!
set selection LINE LSB L01 to L08
!
set offset -8 0
find /proc corr /sou MFS-22
table "~/maps/isj8-co21-1.uvt new /resa 40 20 -30 2 velo
!
set offset 0 0
find /proc corr /sou MFS-22
table "~/maps/isj8-co21-2.uvt new /resa 40 20 -30 2 velo
!
set offset +8 0
find /proc corr /sou MFS-22
table "~/maps/isj8-co21-3.uvt new /resa 40 20 -30 2 velo

a table for each offset
“tablename”- “i”.uvt
Mosaic

2nd data set

```bash
isj8-co21-table.clic

File in 06-oct-2008-isj8.hp
set default
cet scan 0 10000
set receiver 3
cet quality AVERAGE
cet weight tsys on
cet weight calibration on
cet phase antenna atmosphere internal relative
cet amplitude antenna absolute jansky relative
cet rf_passband antenna frequency file on
set selection LINE LSB L01 to L08
set offset -8 0
find /proc corr /sou MFS-22
table `~/maps/isj8-co21-1.uvt new /resa 40 20 -30 2 velo
set offset 0 0
find /proc corr /sou MFS-22
table `~/maps/isj8-co21-2.uvt new /resa 40 20 -30 2 velo
set offset +8 0
find /proc corr /sou MFS-22
table `~/maps/isj8-co21-3.uvt new /resa 40 20 -30 2 velo

File in 24-dec-2008-isj8.hp
set offset -8 0
find /proc corr /sou MFS-22
table `~/maps/isj8-co21-1.uvt old /resa 40 20 -30 2 velo
set offset 0 0
find /proc corr /sou MFS-22
table `~/maps/isj8-co21-2.uvt old /resa 40 20 -30 2 velo
set offset +8 0
find /proc corr /sou MFS-22
table `~/maps/isj8-co21-3.uvt old /resa 40 20 -30 2 velo
```
Created “mytable”.uvt, in CLIC

Analyze the data, in MAPPING
1. Data analysis in the $uv$-plane
Data analysis in the $uv$-plane; **MAPPING**
Data analysis in the $uv$-plane
Data analysis in the \textit{uv}-plane
Data analysis in the $uv$-plane
Data analysis in the $uv$-plane

UVSHOW
Data analysis in the $uv$-plane
Data analysis in the $uv$-plane
Data analysis in the $uv$-plane

---

ring_tuv
Source: GG TAU
Line: 1$3^{10}$CO(21)
Frequency: 221.943008 GHz
All Channels
real vs. radius
Box marking: VELOCITY

carrizo
01–OCT–2008 17:58:15
Data analysis in the $uv$-plane

Source: GG TAU
Line: 1300(21)
Frequency: 221.943008 GHz
All Channels
weight vs. radius
Box marking: VELOCITY

ccarrizo
01-OCT-2008 18:00:21
Data analysis in the uv-plane

With commands:

MAPPING> let first 12
MAPPING> let last 12
MAPPING> let ytype weight
MAPPING> let xtype radius
MAPPING> let error_bars yes
MAPPING> go uvshow
MAPPING> input uvshow
Data analysis in the uv-plane
Data analysis in the **uv**-plane

---

**ccarrizo@pctcp33:-**

<table>
<thead>
<tr>
<th>File</th>
<th>Edit</th>
<th>View</th>
<th>Terminal</th>
<th>Tabs</th>
<th>Help</th>
</tr>
</thead>
</table>

**Recommended**
- Map size: 512 x 512 pixels
- Map cell: 0.14 x 0.14 arcsec
- Imaged Area: 71.7 x 71.7 arcsec

**Used**
- Map size: 512 x 512 pixels
- Map cell: 0.14 x 0.14 arcsec

Still to be imaged
Still to be cleaned
I-GDF_RIH, Image file is [EEEI to IEEE]
U-GDF_RIH, UV order : UV-DATA RANDOM
W-GDF_RHSEC, Absent section NOISE
W-GDF_RHSEC, Absent section PROPERMOTION
I-GDF_DAMS, Patching old UV data weights
I-UVSHOW, Finding limits
I-UVSHOW, Number of found tracks: 4

**MAPING>** run uv_shift
Waiting ...
Data analysis in the $uv$-plane
Data analysis in the uv-plane

---

**uvfit /param**

---

often needed
Data analysis in the $uv$-plane

---

PLOTFIT parameters

- Generic name: ring
- Number of fitted functions to be plotted: 1
- Order in which fitted functions are plotted: 1 2
- Number of parameters plotted along x axis: 1
- Parameter #1: velo * $\xi$
- Parameter #2: freq * $\xi$
- Parameter #3: channel * $\xi$
- Parameter #4: ra * $\xi$
- Parameter #5: dec * $\xi$
- Parameter #6: flux * $\xi$
- Number of parameters plotted along y axis: 3
- Parameter #1: ra * $\xi$
- Parameter #2: dec * $\xi$
- Parameter #3: flux * $\xi$
- Parameter #4: major * $\xi$
- Parameter #5: minor * $\xi$
- Parameter #6: angle * $\xi$

Plot error bars: Yes

---

mapping GUI

GO  ABORT

Generic name: ring

UV Clip
UV Coverage
UV Plot
UV SHIFT
UV fit
Plotting UV fits

ccarrizo

Loaded modules
- sic (J.Pety, S.Bardeau, S.Guilloteau)
- greg (J.Pety, S.Bardeau, S.Guilloteau)
- mapping (J.Pety, N.Rodriguez-Fernandez)

In charge: J.Pety
Active developers: N.Rodriguez-Fernandez
Main past contributors: K.Bouyoucos

MAPPING is an interactive program for (sub)mm interferometric data

Questions? Comments? Bug reports?

For help, type HELP, INPUT and/or
Data analysis in the **uv-plane**

**Point model:**
3 parameters
Data analysis in the \textit{uv}-plane

Circular Gaussian: 4 parameters
Data analysis in the *uv*-plane

Elliptical Gaussian: 5 parameters
Data analysis in the uv-plane
Data analysis in the **uv**-plane

- **UV actions control**
  - Generic name: ring-d
  - UV Clip: UV_CLIP
  - UV Coverage: UVCOV
  - UV Plots: UVSHOW
  - UV SHIFT: UV_SHIFT

- **UVSHOW parameters**
  - Generic name: ring-d
  - X data radius
  - Y data char
  - First channel: 1
  - Last channel: 1
  - Plot limits: [ ]
  - Plot model fit: Yes
  - Display zero level: Yes
  - Use one color per track: Yes

- **Graph**
  - Amplitude [uJ]
  - UV radius [m]
  - Source: G5 TAU
  - Line: l200(21)
  - Frequency: 221.8-13008 GHz
  - All Channels
  - amp vs. radius
  - Box marking: VELOCITY

- **Textual data**
  - Typical time separating 2 tracks [hrs]: 12
  - Marker definition as in the SET MARKER command: 4 1 .1
MAPPING procedures / tasks

MAPPING> go ...
MAPPING> input ...

also

MAPPING> run ...
MAPPING> help ...

Data analysis in the uv-plane
Data analysis in the **uv-plane**

<table>
<thead>
<tr>
<th>Command</th>
<th>Command</th>
<th>Command</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>uv_applyphase</code></td>
<td><code>uv_dft</code></td>
<td><code>uv_merge</code></td>
<td><code>uv_solve</code></td>
</tr>
<tr>
<td><code>uv_ascal</code></td>
<td><code>uv_extract</code></td>
<td><code>uv_mflag</code></td>
<td><code>uv_sort</code></td>
</tr>
<tr>
<td><code>uv_atm</code></td>
<td><code>uv_fidelity</code></td>
<td><code>uv_model</code></td>
<td><code>uv_splitfield</code></td>
</tr>
<tr>
<td><code>uv_average</code></td>
<td><code>uv_fit-s</code></td>
<td><code>uv_mult</code></td>
<td><code>uv_stat</code></td>
</tr>
<tr>
<td><code>uv_cal</code></td>
<td><code>uv_flag</code></td>
<td><code>uv_noise</code></td>
<td><code>uv_substruct</code></td>
</tr>
<tr>
<td><code>uv_ccmodel</code></td>
<td><code>uv_fmodel</code></td>
<td><code>uv_observe</code></td>
<td><code>uv_table</code></td>
</tr>
<tr>
<td><code>uv_cct</code></td>
<td><code>uv_gain</code></td>
<td><code>uv_pointing</code></td>
<td><code>uv_timeaverage</code></td>
</tr>
<tr>
<td><code>uv_center</code></td>
<td><code>uv_hanning</code></td>
<td><code>uv_selfcal</code></td>
<td><code>uv_timebase</code></td>
</tr>
<tr>
<td><code>uv_circle</code></td>
<td><code>uv_hybrid</code></td>
<td><code>uv_shift</code></td>
<td><code>uv_track</code></td>
</tr>
<tr>
<td><code>uv_clip</code></td>
<td><code>uv_list</code></td>
<td><code>uv_short</code></td>
<td><code>uv_track_phase</code></td>
</tr>
<tr>
<td><strong>uv_compress</strong></td>
<td><code>uv_map</code></td>
<td><code>uv_single</code></td>
<td><code>uv_zero</code></td>
</tr>
<tr>
<td><code>uv_cuts</code></td>
<td><code>uv_mcal</code></td>
<td><code>uv_sinusphase</code></td>
<td></td>
</tr>
</tbody>
</table>

[Terminal output]

```
MAPPING> go ... or run ...
MAPPING> input ... or help ...
```
Data analysis in the $uv$-plane

Still to be imaged
Still to be cleaned
W-GDF RHSEC, Absent section NOISE
W-GDF RHSEC, Absent section PROPER
I-UVSHOW, Finding limits
I-UVSHOW, Number of found tracks: 3

ccarrizo@loc

5-Oct-2008 19:09:53
Data analysis in the uv-plane

--- uvcircle

Still to be imaged
Still to be cleaned
I-GDF_RIH, Image file is
U-GDF_RIH, UVT order : UV
W-GDF_RHSEC, Absent section
I-GDF_RHSEC, Absent section
I-GDF_DAMS, Patching old
I-UVSHOW, Finding limits
I-UVSHOW, Number of found
MAPPING> run uv_circle
Waiting ...

---

uv_applyphase
uv_ascal
uv_atm
uv_average
uv_cal
uv_ccmodel
uv_cct
uv_center
uv_circle
uv_clip
uv_compress
uv_cuts
uv_dft
uv_extract
uv_fidelity
uv_fit-s
uv_flag
uv_fmodel
uv_gain
uv_hanning
uv_hybrid
uv_list
uv_map
uv_mcal
uv_merge
uv_mflag
uv_model
uv_mult
uv_noise
uv_observe
uv_pointing
uv_selfcal
uv_shift
uv_short
uv_single
uv_sinusphase
uv_solve
uv_sort
uv_splitfield
uv_stat
uv_substract
uv_table
uv_timeaverage
uv_timebase
uv_track
uv_track_phase
uv_zero
Data analysis in the uv-plane

--- uvmodel

To create a uv table from an image, e.g. a model

uv_applyphase  uv_dft  uv_merge  uv_solve
uv_ascal  uv_extract  uv_mflag  uv_sort
uv_atm  uv_fidelity  uv_model  uv_splitfield
uv_average
uv_cal
uv_ccmodel
uv_cct
uv_center
uv_circle
uv_clip
uv_compress  uv_map  uv_single  uv_zero
uv_cuts  uv_mcal  uv_sinusphase
Data analysis in the *uv*-plane

To subtract a time-averaged continuum *uv* table

- `uv_cal`
- `uv_ccmodel`
- `uv_cct`
- `uv_center`
- `uv_circle`
- `uv_clip`
- `uv_compress`
- `uv_cuts`
- `uv_dft`
- `uv_extract`
- `uv_fidelity`
- `uv_fit-s`
- `uv_flag`
- `uv_fmodel`
- `uv_gain`
- `uv_hanning`
- `uv_hybrid`
- `uv_list`
- `uv_map`
- `uv_mcal`
- `uv_merge`
- `uv_mflag`
- `uv_model`
- `uv_mult`
- `uv_noise`
- `uv_observe`
- `uv_pointing`
- `uv_selfcal`
- `uv_shift`
- `uv_short`
- `uv_single`
- `uv_sinusphase`
- `uv_solve`
- `uv_sort`
- `uv_splitfield`
- `uv_stat`
- `uv_subtract`
- `uv_table`
- `uv_timeaverage`
- `uv_timebase`
- `uv_track`
- `uv_track_phase`
- `uv_zero`
Data analysis in the uv-plane

MAPPING> go ... or run ...
MAPPING> input ... or help ...

To add a single-dish zero-spacing spectrum

uv_clip    uv_list    uv_short
uv_compress uv_map    uv_single
uv_cuts    uv_mcal    uv_sinuphase

uv_zero
Each visibility contains:

- $u$ in meters
- $v$ in meters
- scan number
- observation date (CLASS number)
- time in seconds (since date above)
- start antenna in the baseline
- end antenna in the baseline

- real part for 1\textsuperscript{st} channel
- imaginary part 1\textsuperscript{st} channel
- weight

- real part for 2\textsuperscript{nd} channel
- imaginary part 2\textsuperscript{nd} channel
- ...

$uv$ tables are fully editable

$uv$ table $[\text{visib dimension, \# visibilities}]$

visib dimension $= 7 + 3 \times (\# \text{channels})$

7 visib. characteristics

Data analysis in the $uv$-plane

---

```plaintext
mapping> define table aa mytable.uvt write
mapping> let aa[8,2380] 6000
mapping> delete /variable aa
```
3. An inspection of the data in the $uv$-plane is recommended
(1) Passing directly from hpb → mapping

It may happen...
(1) Passing directly from hpb → mapping

It may happen…
(1) Passing directly from hpb → mapping

It may happen... that there remain some wrong visibilities

CLIC> find /proc corr /sou Betel /rece 2 /scans 1245 1255
CLIC> store quality 9
When short-spacing data, check that the relative calibration is ok

--- added shortspac
(3) Passing directly from hpb $\rightarrow$ mapping

Good practice: When cleaning (extended sources)…
Good practice: When cleaning (extended sources) verify that the flux obtained in the image plane coincides with that at the zero-spacing.
(3) Passing directly from hpb $\rightarrow$ mapping

If not, it may happen...
(3) Passing directly from hpβ → mapping

It may happen...

When cleaning (extended sources)
verify that the flux obtained in the image plane coincides with that at the zero-spacing
To conclude:

• An inspection of data in the $uv$-plane is recommended for all the projects

• A detailed analysis in the $uv$-plane: detection, modeling of simple shapes, to check relative calibration, etc…