

Introduction to AIPS

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What is AIPS?

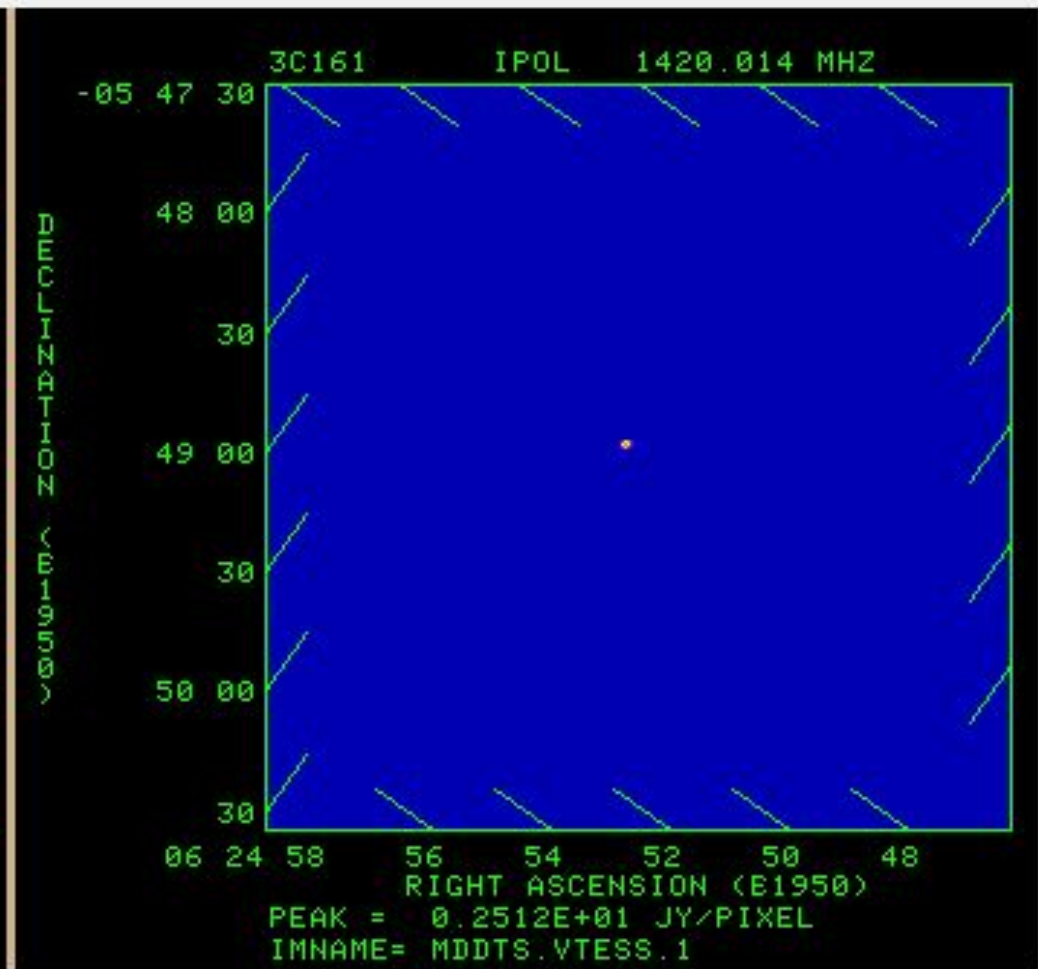
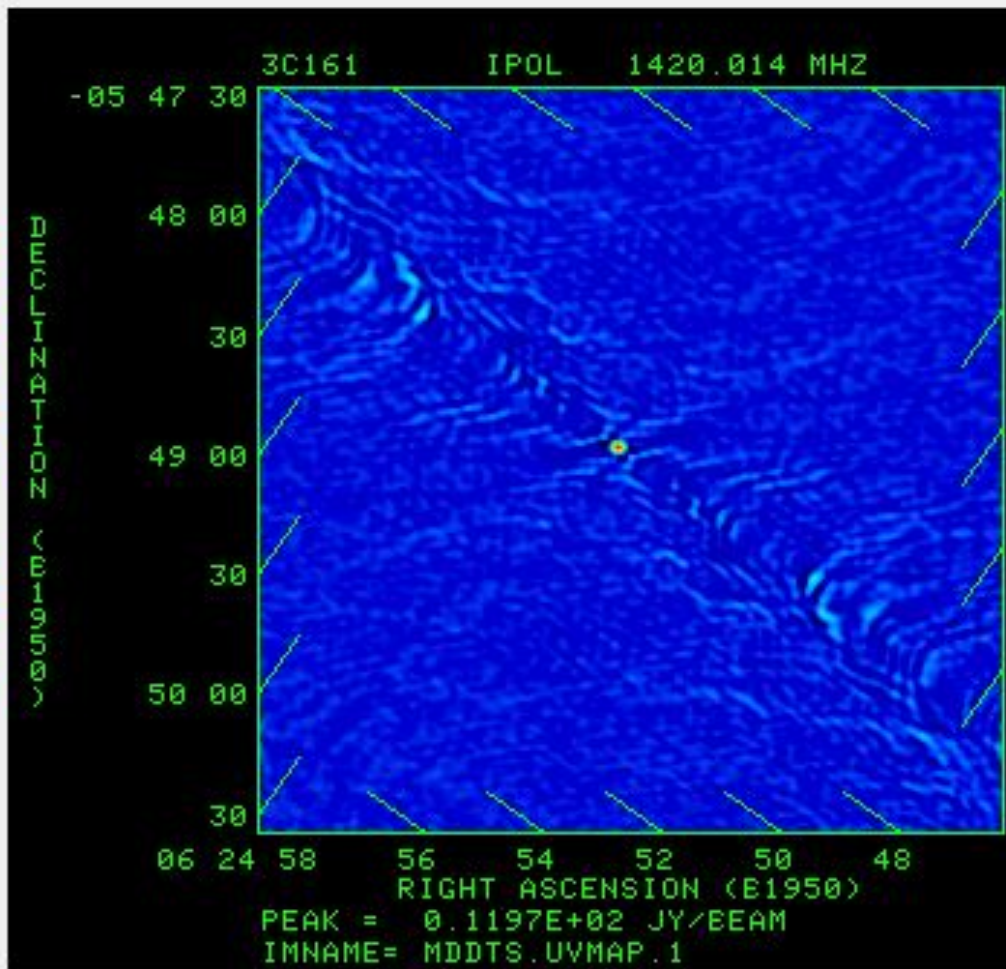
Astronomical Image Processing System

- developed by NRAO.
- a software package for visualization, editing (flagging), calibration and Imaging of Radio interferometric data.

Radio interferometric data

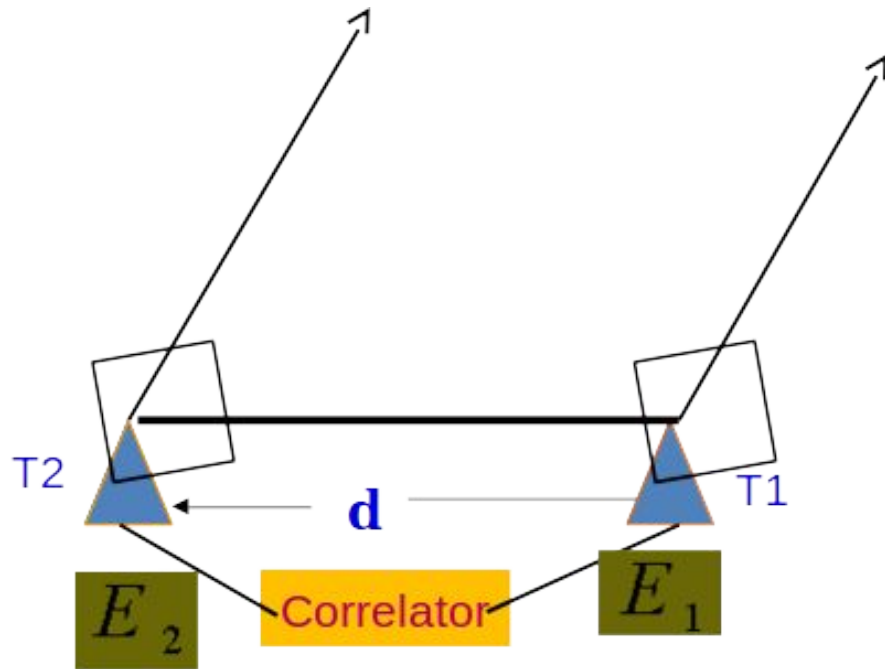
---Fourier transform of the sky

for example,



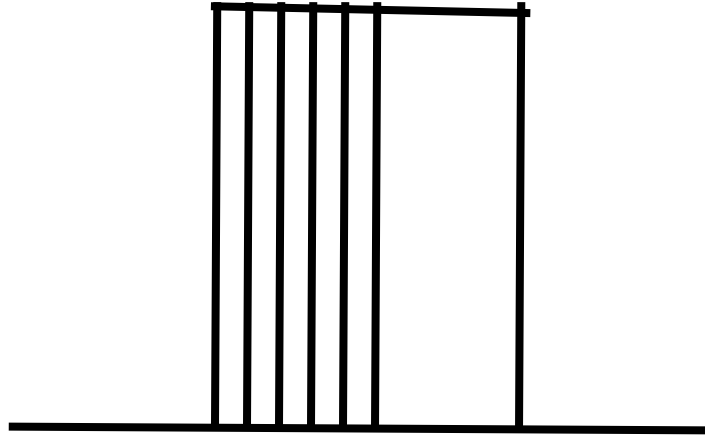
<http://www.aips.nrao.edu/whatisaips.html>

Radio Interferometers: Visibilities



$$V(U, \nu) = \iint A_\nu(\theta) I_\nu(\theta) e^{-2\pi i U \cdot \theta} d^2 \theta$$

Radio Interferometric Data



For example, 610 MHz central frequency
32 MHz Band width, 128 Channels

Different Axis of the data

Baseline

Polarization (RR,LL,....)

Channel

Time

FITS format

Data are saved in Flexible Image Transport System (FITS) format.

command:

```
$ more DATA.FITS
```

to see the header of the FITS file.

Also,

imh

within AIPS

task 'UVPRT' output

Source 1602+334 (0) RA = 16 02 7.26 DEC = 33 26 53.1
Source= 1602+334 Freq= 0.608032552 Sort= TB 1 RR 1 LL 2 RR 2 LL
Time Ant U(Kilo) V(Kilo) W(Kilo) Amp Phas Wt Amp Phas Wt Amp Phas Wt Amp Phas Wt

1/12:16:14.9	1-2	-0.32	0.33	-0.57	652.302	24	1.0000	1347.326	117	1.0000	3.263	57	1.0000	0.399	5	1.0000
1/12:16:14.9	1-3	-0.57	0.74	-1.04	762.333	-43	1.0000	961.372	-41	1.0000	2.768	126	1.0000	2.822	140	1.0000
1/12:16:14.9	1-4	-0.79	1.36	-1.50	307.039	101	1.0000	1289.569	-96	1.0000	4.042	97	1.0000	6.083	164	1.0000
1/12:16:14.9	1-5	-0.96	1.54	-1.81	62.458	164	1.0000	451.531	17	1.0000	3.836	150	1.0000	7.136	92	1.0000
1/12:16:14.9	1-6	-0.66	0.21	-1.15	849.312	109	1.0000	785.167	107	1.0000	4.681	72	1.0000	6.972	106	1.0000
1/12:16:14.9	1-7	-0.73	0.36	-1.28	1080.797	-25	1.0000	1315.054	-22	1.0000	2.933	-144	1.0000	2.904	96	1.0000
1/12:16:14.9	1-8	-0.57	-0.29	-0.96	384.624	62	1.0000	857.792	34	1.0000	2.239	-167	1.0000	12.150	-22	1.0000
1/12:16:14.9	1-9	-0.63	0.41	-1.11	535.462	-90	1.0000	909.793	76	1.0000	2.390	-51	1.0000	8.209	144	1.0000
1/12:16:14.9	1-10	-1.07	-0.18	-1.81	161.776	-161	1.0000	31.025	98	1.0000	4.245	-45	1.0000	5.831	88	1.0000
1/12:16:14.9	1-11	-1.27	0.76	-2.25	259.951	128	1.0000	454.225	-46	1.0000	2.335	54	1.0000	8.503	-30	1.0000

Different operation using different AIPS task.
Each task has different inputs (Adverbs).

For example:

Load data: FITLD

Visualization: UVPLT, VPLOT

Flagging: TVFLG, UVFLG

Calibration: CALIB, CLCAL

Imaging: CLEAN

Data are saved in AIPS internal directory.

Flagging, calibration saved in different extension tables.

Apply the table in original data to see the changes

-original data intact within AIPS internal directory.

```
export AIPSDIR=/home/samir
```

```
source /home/samir/aips/LOGIN.SH
```

```
aips tv=local
```

Now, aips command prompt, AIPSTV, message server

```
>
>
>task 'fitld'
>default
>inp
AIPS 1: FITLD: Task to store an image or UV data from a FITS tape
AIPS 1: Adverbs      Values      Comments
AIPS 1: -----
AIPS 1: INTAPE       1      Input tape drive # (0 => 1)
AIPS 1: NFILES       0      # of files to advance on tape
AIPS 1: DATAIN      *all ' '  Disk file name
AIPS 1: OUTNAME      ' '    File name (name)
AIPS 1: OUTCLASS    ' '    File name (class)
AIPS 1: OUTSEQ       0      File name (seq. #)
AIPS 1:              0 => highest unique number
AIPS 1:              => matching (on VLBA)
AIPS 1:              -1 => FITS tape value
AIPS 1: OUTDISK     1      Disk drive # (0 => any)
AIPS 1: OPTYPE      ' '    Type of data to load,
AIPS 1:              ' ' => all types
AIPS 1:              'UV' => UV data
AIPS 1:              'IM' => images
AIPS 1: NCOUNT      0      Number of files to load.
AIPS 1: DOTABLE      1      True (1.0) means load tables
AIPS 1:              for images.
AIPS 1: DOUVCOMP     -1     >0 => compressed data (FITS)
AIPS 1: ** press RETURN for more, enter Q or next line to quit print **
```

DATAIN 'AIPSDIR:1543+480.FITS

go fitld

kleenex to exit

MSGSRV output:

```
-----
LOCALH> FITLD1: Task FITLD (release of 31DEC18) begins
LOCALH> FITLD1: Found MULTI      observed on 28-JUN-2014
LOCALH> FITLD1: Create MULTI      ,UVDATA,  1 (UV) on disk  1  cno  1
LOCALH> FITLD1: NXCHK: Building new index table
LOCALH> FITLD1: Image=MULTI      (UV)      Filename=MULTI      ,UVDATA,  1
LOCALH> FITLD1: Telescope=GMRT      Receiver=GMRT
LOCALH> FITLD1: Observer=      User#=  91
LOCALH> FITLD1: Observ. date=28-JUN-2014      Map date=18-AUG-2019
LOCALH> FITLD1: # visibilities  119190      Sort order  TB
LOCALH> FITLD1: Rand axes: UU-L-SIN  VV-L-SIN  WW-L-SIN  SUBARRAY  TIME1
LOCALH> FITLD1:      SOURCE  FREQSEL  ANTENNA1  ANTENNA2
LOCALH> FITLD1: -----
LOCALH> FITLD1: Type      Pixels  Coord value      at Pixel      Coord incr      Rotat
LOCALH> FITLD1: COMPLEX      3      1.0000000E+00      1.00  1.0000000E+00      0.00
LOCALH> FITLD1: STOKES      2      -1.0000000E+00      1.00 -1.0000000E+00      0.00
LOCALH> FITLD1: FREQ      512      6.0800000E+08      0.50  6.5104168E+04      0.00
LOCALH> FITLD1: IF      1      1.0000000E+00      1.00  1.0000000E+00      0.00
LOCALH> FITLD1: RA      1      00 00 00.000      1.00      3600.000      0.00
LOCALH> FITLD1: DEC      1      00 00 00.000      1.00      3600.000      0.00
LOCALH> FITLD1: -----
LOCALH> FITLD1: Coordinate equinox 2000.00
LOCALH> FITLD1: Maximum version number of extension files of type HI is  1
LOCALH> FITLD1: Maximum version number of extension files of type AN is  1
LOCALH> FITLD1: Maximum version number of extension files of type FQ is  1
LOCALH> FITLD1: Maximum version number of extension files of type SU is  1
LOCALH> FITLD1: Maximum version number of extension files of type NX is  1
LOCALH> FITLD1: Appears to have ended successfully
LOCALH> FITLD1: localhos 31DEC18 TST: Cpu=  14.1 Real=  63 IO=  2802
```

AIPS help

1. AIPS cookbook:

<http://www.aips.nrao.edu/cook.html>

2.

http://www3.mpifr-bonn.mpg.de/staff/hrk/AIPS_TUTORIAL/HRK_AIPS_1.html

3. Google search “Taskname aips” e.g. fitld aips

4. NRAO help desk

<https://help.nrao.edu/>

Today's Plan

1. Loading Data
2. Visualization
3. Finding Bad Antenna