平成 22 年度基礎天文学観測「電波干渉計」実習メモ vol. 2

2010 年 5 月 4 日　河野孝太郎

（改訂：2010 年 5 月 4 日）

★ 分点表示の修正 【PUTHEAD】

```
>getn 50
AIPS 1: Got(1)  disk= 1  user=   1  type=MA  D12CLN.ICLN.1
>imh
AIPS 1: Image=D2USB-OB  (MA)          Filename=D12CLN       .ICLN  .   1
AIPS 1: Telescope=
AIPS 1: Observer=okada                User #=     1
AIPS 1: Observ. date=03-MAY-2010      Map date=03-MAY-2010
AIPS 1: Minimum=-7.52689064e-01       Maximum= 1.31163955e+00 JY/BEAM
AIPS 1: ------------------------------------------------------------
AIPS 1: Type     Pixels    Coord value      at Pixel      Coord incr    Rotat
AIPS 1: RA---SIN   128     02 41 55.090        64.00          -1.000     0.00
AIPS 1: DEC--SIN   128     59 36 14.699        65.00           1.000     0.00
AIPS 1: VELO-LSR    64   -2.8600000e+04        34.00 -2.0806061e+04     0.00
AIPS 1: STOKES       1    1.0000000e+00         1.00  1.0000000e+00     0.00
AIPS 1: ------------------------------------------------------------
AIPS 1: Coordinate equinox 1950.00
AIPS 1: Map type=NORMAL               Number of iterations=      165
AIPS 1: Conv size=   5.86 X   4.58    Position angle= -64.14
AIPS 1: Rest freq 115271.204          Vel type: RADIO    wrt LSR
AIPS 1: Alt ref. value  1.15015e+11  wrt pixel     0.62
AIPS 1: Maximum version number of extension files of type CC is   64
AIPS 1: Maximum version number of extension files of type HI is    1
AIPS 1: Maximum version number of extension files of type ST is    1
AIPS 1: Maximum version number of extension files of type PL is   14
>keyw 'epoch'
>keyv 2000 0
>inp puthead
AIPS 1: PUTHEAD:  Verb to modify image header parameters.
AIPS 1: Adverbs           Values              Comments
AIPS 1: ------------------------------------------------------------
AIPS 1: USERID            0                   User ID.  0=>current user
AIPS 1:                                       32000=>all users
AIPS 1: INNAME        'D12CLN       '         Image name(name).
```

```
AIPS 1: INCLASS      'ICLN   '                  Image name(class).
AIPS 1: INSEQ          1                       Image name(seq. #). 0=>high
AIPS 1: INDISK         0                       Disk drive #. 0=>any
AIPS 1: KEYWORD      'EPOCH    '                 Name of header parameter.
AIPS 1:                                        See EXPLAIN PUTHEAD for list.
AIPS 1: KEYVALUE     2000              0        Value given to numeric parm.
AIPS 1:                                        = KEYVALUE(1) + KEYVALUE(2).
AIPS 1: KEYSTRNG     '                 '       Value given to a character-
AIPS 1:                                        valued parameter.
AIPS 1: KEYTYPE      '     '                    Data type for new keyword
>puthead
>imh
AIPS 1: Image=D2USB-OB   (MA)          Filename=D12CLN        .ICLN   .    1
AIPS 1: Telescope=
AIPS 1: Observer=okada                 User #=      1
AIPS 1: Observ. date=03-MAY-2010       Map date=03-MAY-2010
AIPS 1: Minimum=-7.52689064e-01        Maximum= 1.31163955e+00 JY/BEAM
AIPS 1: ------------------------------------------------------------
AIPS 1: Type      Pixels    Coord value       at Pixel       Coord incr     Rotat
AIPS 1: RA---SIN    128      02 41 55.090        64.00            -1.000      0.00
AIPS 1: DEC--SIN    128      59 36 14.699        65.00             1.000      0.00
AIPS 1: VELO-LSR     64   -2.8600000e+04        34.00 -2.0806061e+04      0.00
AIPS 1: STOKES        1    1.0000000e+00         1.00   1.0000000e+00      0.00
AIPS 1: ------------------------------------------------------------
AIPS 1: Coordinate equinox 2000.00
AIPS 1: Map type=NORMAL                Number of iterations=       165
AIPS 1: Conv size=    5.86 X    4.58    Position angle= -64.14
AIPS 1: Rest freq 115271.204           Vel type: RADIO    wrt LSR
AIPS 1: Alt ref. value   1.15015e+11   wrt pixel      0.62
AIPS 1: Maximum version number of extension files of type CC is   64
AIPS 1: Maximum version number of extension files of type HI is    1
AIPS 1: Maximum version number of extension files of type ST is    1
AIPS 1: Maximum version number of extension files of type PL is   14
>keyw 'object'
>keys 'Maffei2'
>puthead
>imh
AIPS 1: Image=MAFFEI2    (MA)          Filename=D12CLN        .ICLN   .    1
AIPS 1: Telescope=
```

```
AIPS 1: Observer=okada                  User #=      1
AIPS 1: Observ. date=03-MAY-2010        Map date=03-MAY-2010
AIPS 1: Minimum=-7.52689064e-01         Maximum= 1.31163955e+00 JY/BEAM
AIPS 1: ------------------------------------------------------------
AIPS 1: Type      Pixels    Coord value       at Pixel       Coord incr     Rotat
AIPS 1: RA---SIN    128     02 41 55.090         64.00            -1.000      0.00
AIPS 1: DEC--SIN    128     59 36 14.699         65.00             1.000      0.00
AIPS 1: VELO-LSR     64   -2.8600000e+04         34.00 -2.0806061e+04      0.00
AIPS 1: STOKES        1    1.0000000e+00          1.00  1.0000000e+00      0.00
AIPS 1: ------------------------------------------------------------
AIPS 1: Coordinate equinox 2000.00
AIPS 1: Map type=NORMAL                 Number of iterations=       165
AIPS 1: Conv size=    5.86 X    4.58    Position angle= -64.14
AIPS 1: Rest freq 115271.204            Vel type: RADIO    wrt LSR
AIPS 1: Alt ref. value   1.15015e+11   wrt pixel      0.62
AIPS 1: Maximum version number of extension files of type CC is   64
AIPS 1: Maximum version number of extension files of type HI is    1
AIPS 1: Maximum version number of extension files of type ST is    1
AIPS 1: Maximum version number of extension files of type PL is   14
>keyw 'telescop'
>keys 'NMA'
>puthead
>imh
AIPS 1: Image=MAFFEI2    (MA)           Filename=D12CLN        .ICLN   .    1
AIPS 1: Telescope=NMA                   Receiver=
AIPS 1: Observer=okada                  User #=      1
AIPS 1: Observ. date=03-MAY-2010        Map date=03-MAY-2010
AIPS 1: Minimum=-7.52689064e-01         Maximum= 1.31163955e+00 JY/BEAM
AIPS 1: ------------------------------------------------------------
AIPS 1: Type      Pixels    Coord value       at Pixel       Coord incr     Rotat
AIPS 1: RA---SIN    128     02 41 55.090         64.00            -1.000      0.00
AIPS 1: DEC--SIN    128     59 36 14.699         65.00             1.000      0.00
AIPS 1: VELO-LSR     64   -2.8600000e+04         34.00 -2.0806061e+04      0.00
AIPS 1: STOKES        1    1.0000000e+00          1.00  1.0000000e+00      0.00
AIPS 1: ------------------------------------------------------------
AIPS 1: Coordinate equinox 2000.00
AIPS 1: Map type=NORMAL                 Number of iterations=       165
AIPS 1: Conv size=    5.86 X    4.58    Position angle= -64.14
AIPS 1: Rest freq 115271.204            Vel type: RADIO    wrt LSR
```

```
AIPS 1: Alt ref. value   1.15015e+11   wrt pixel      0.62
AIPS 1: Maximum version number of extension files of type CC is   64
AIPS 1: Maximum version number of extension files of type HI is    1
AIPS 1: Maximum version number of extension files of type ST is    1
AIPS 1: Maximum version number of extension files of type PL is   14
>
```

★第 3 軸を周波数から速度へ変換【ALTDEF, ALTSW】

```
>getn 50
AIPS 1: Got(1)    disk= 1   user=    1    type=MA    D12CLN.ICLN.1
>imh
AIPS 1: Image=D2USB-OB  (MA)            Filename=D12CLN         .ICLN   .    1
AIPS 1: Telescope=
AIPS 1: Observer=okada                  User #=      1
AIPS 1: Observ. date=03-MAY-2010        Map date=03-MAY-2010
AIPS 1: Minimum=-7.52689064e-01         Maximum= 1.31163955e+00 JY/BEAM
AIPS 1: ------------------------------------------------------------
AIPS 1: Type      Pixels    Coord value       at Pixel       Coord incr     Rotat
AIPS 1: RA---SIN    128      02 41 55.090         64.00            -1.000      0.00
AIPS 1: DEC--SIN    128      59 36 14.699         65.00             1.000      0.00
AIPS 1: FREQ         64    1.1501520e+11          0.62   8.0000000e+06      0.00
AIPS 1: STOKES        1    1.0000000e+00          1.00   1.0000000e+00      0.00
AIPS 1: ------------------------------------------------------------
AIPS 1: Coordinate equinox 1950.00
AIPS 1: Map type=NORMAL                 Number of iterations=       165
AIPS 1: Conv size=    5.86 X    4.58    Position angle= -64.14
AIPS 1: Maximum version number of extension files of type CC is   64
AIPS 1: Maximum version number of extension files of type HI is    1
AIPS 1: Maximum version number of extension files of type ST is    1
AIPS 1: Maximum version number of extension files of type PL is    1
>inp altdef
AIPS 1: ALTDEF:  Verb to modify velocity vs frequency relationship
AIPS 1: Adverbs             Values                 Comments
AIPS 1: ------------------------------------------------------------
AIPS 1: USERID           0                         User ID.   0 => current user
AIPS 1:                                            32000 => any user.
AIPS 1: INNAME       'D12CLN         '             Image name(name).
AIPS 1: INCLASS      'ICLN   '                     Image name(class).
```

```
AIPS 1: INSEQ             1                        Image name(seq. #). 0=>high
AIPS 1: INDISK            0                        Disk drive #. 0=>any
AIPS 1: AXTYPE        '           '                'OPT' or 'RAD' plus 'LSR',
AIPS 1:                                           'HEL', or 'OBS'
AIPS 1: AXVAL             0              0          Velocity at (new) ref. pixel=
AIPS 1:                                           AXVAL(1) + AXVAL(2).
AIPS 1: AXREF             1                        Reference pixel location
AIPS 1: RESTFREQ          0              0          Rest frequency in HZ =
AIPS 1:                                           RESTFREQ(1) + RESTFREQ(2)
>axtype 'rad lsr'
>axval -28.6e3 0
>axref 34
>restf 115.2e9 0.071204e9
>inp altdef
AIPS 1: ALTDEF:  Verb to modify velocity vs frequency relationship
AIPS 1: Adverbs             Values                Comments
AIPS 1: ------------------------------------------------------------
AIPS 1: USERID            0                        User ID.   0 => current user
AIPS 1:                                            32000 => any user.
AIPS 1: INNAME       'D12CLN         '             Image name(name).
AIPS 1: INCLASS      'ICLN   '                     Image name(class).
AIPS 1: INSEQ             1                        Image name(seq. #). 0=>high
AIPS 1: INDISK            0                        Disk drive #. 0=>any
AIPS 1: AXTYPE       'RAD LSR '                    'OPT' or 'RAD' plus 'LSR',
AIPS 1:                                           'HEL', or 'OBS'
AIPS 1: AXVAL         -28600             0          Velocity at (new) ref. pixel=
AIPS 1:                                           AXVAL(1) + AXVAL(2).
AIPS 1: AXREF             34                       Reference pixel location
AIPS 1: RESTFREQ     1.152e+11     71204000       Rest frequency in HZ =
AIPS 1:                                           RESTFREQ(1) + RESTFREQ(2)
>altdef
>altsw
>imh
AIPS 1: Image=D2USB-OB   (MA)             Filename=D12CLN         .ICLN   .    1
AIPS 1: Telescope=
AIPS 1: Observer=okada                    User #=       1
AIPS 1: Observ. date=03-MAY-2010        Map date=03-MAY-2010
AIPS 1: Minimum=-7.52689064e-01          Maximum= 1.31163955e+00 JY/BEAM
AIPS 1: ------------------------------------------------------------
```

```
AIPS 1: Type       Pixels     Coord value        at Pixel        Coord incr     Rotat
AIPS 1: RA---SIN     128      02 41 55.090         64.00             -1.000      0.00
AIPS 1: DEC--SIN     128      59 36 14.699         65.00              1.000      0.00
AIPS 1: VELO-LSR      64   -2.8600000e+04         34.00 -2.0806061e+04      0.00
AIPS 1: STOKES         1    1.0000000e+00          1.00  1.0000000e+00      0.00
AIPS 1: ------------------------------------------------------------------
AIPS 1: Coordinate equinox 1950.00
AIPS 1: Map type=NORMAL                    Number of iterations=        165
AIPS 1: Conv size=     5.86 X     4.58     Position angle= -64.14
AIPS 1: Rest freq 115271.204               Vel type: RADIO     wrt LSR
AIPS 1: Alt ref. value   1.15015e+11   wrt pixel      0.62
AIPS 1: Maximum version number of extension files of type CC is   64
AIPS 1: Maximum version number of extension files of type HI is    1
AIPS 1: Maximum version number of extension files of type ST is    1
AIPS 1: Maximum version number of extension files of type PL is    1
>
```

★座標や視野の円に関する情報を入れる【STARS】

```
mt24u{f0546kk}188: pwd
/home/f0546kk/h22g/DA01X
mt24u{f0546kk}189: more MAF2.ST
02 41 55.090 59 36 14.699 5 5 0 0
02 41 55.090 59 36 14.699 60 60 0 1
mt24u{f0546kk}190:

>tget stars
>getn 50
AIPS 1: Got(1)     disk= 1   user=     1     type=MA     D12CLN.ICLN.1
>inp stars
AIPS 1: STARS:   Task to generate an ST ext. file with star positions *
AIPS 1: Adverbs              Values                  Comments
AIPS 1: ------------------------------------------------------------------
AIPS 1: USERID               0                       User ID. 0 => current user
AIPS 1:                                              32000 => any user.
AIPS 1: INNAME        'D12CLN          '             Image name(name).
AIPS 1: INCLASS       'ICLN    '                     Image name(class).
AIPS 1: INSEQ                1                       Image name(seq. #). 0=>high
AIPS 1: INDISK               0                       Disk drive #. 0=>any
```

```
AIPS 1: OUTVERS           1                          STar file version number.
AIPS 1: INFILE        'DA01:MAF2.ST                  File with star positions
AIPS 1:
AIPS 1:                   '
AIPS 1: X                 0                      Input   Star Coordinate epoch
AIPS 1:                                          1: 1900; 2: B1950; 3: J2000
AIPS 1:                                          4: Galactic; 5: OHLSSON Gal.
AIPS 1:                                          6: VAN TULDER Galactic
AIPS 1:                                          7: Super Galactic; 0=> 3
AIPS 1: Y                 0                      Output Star Coordinate epoch
>tget stars
>getn 50
AIPS 1: Got(1)    disk= 1   user=    1    type=MA    D12CLN.ICLN.1
>inf 'da01:maf2.st'
>inp stars
AIPS 1: STARS:   Task to generate an ST ext. file with star positions *
AIPS 1: Adverbs             Values                 Comments
AIPS 1: ------------------------------------------------------------
AIPS 1: USERID            0                        User ID. 0 => current user
AIPS 1:                                            32000 => any user.
AIPS 1: INNAME        'D12CLN         '            Image name(name).
AIPS 1: INCLASS       'ICLN   '                    Image name(class).
AIPS 1: INSEQ             1                        Image name(seq. #). 0=>high
AIPS 1: INDISK            0                        Disk drive #. 0=>any
AIPS 1: OUTVERS           1                        STar file version number.
AIPS 1: INFILE        'DA01:MAF2.ST                File with star positions
AIPS 1:
AIPS 1:                   '
AIPS 1: X                 0                      Input   Star Coordinate epoch
AIPS 1:                                          1: 1900; 2: B1950; 3: J2000
AIPS 1:                                          4: Galactic; 5: OHLSSON Gal.
AIPS 1:                                          6: VAN TULDER Galactic
AIPS 1:                                          7: Super Galactic; 0=> 3
AIPS 1: Y                 0                      Output Star Coordinate epoch
>go stars
STARS1: Task STARS   (release of 15APR99) begins
STARS1: ZTXOP2: using translated file name =
STARS1: ZTXOP2: /home/f0546kk/h22g/DA01X/MAF2.ST
STARS1: Wrote        2 lines in ST file version     1
```

STARS1: Appears to have ended successfully
STARS1: mpu5m 15APR99 NEW: Cpu= 0.0 Real= 0
AIPS 1: Resumes

★速度表示にしてチャンネルマップを描画【KNTR】

```
>tget kntr
>getn 50
AIPS 1: Got(1)  disk= 1  user=  1  type=MA  D12CLN.ICLN.1
>blc 34,35,25
>trc 94,95,44
>plev 0
>clev 0.025
>levs -5,5,10,15,20,25,30,35,40
>stf 1
>label 1
> inp
AIPS 1: KNTR:  Task to generate a plot file for a contour & grey plot
AIPS 1: Adverbs  Values  Comments
AIPS 1: ------------------------------------------------------------
AIPS 1: DOCONT  1  > 0 => do contours
AIPS 1:  (1 or 2 => which name)
AIPS 1: DOGREY  -1  > 0 => do grey scale
AIPS 1:  (1 or 2 => which name)
AIPS 1: INNAME  'D12CLN  '  First image name (cube?)
AIPS 1: INCLASS  'ICLN  '  First image class
AIPS 1: INSEQ  1  First image seq. #
AIPS 1: INDISK  0  First image disk drive #
AIPS 1: IN2NAME  '  '  Second image name
AIPS 1: IN2CLASS  '  '  Second image class
AIPS 1: IN2SEQ  0  Second image seq. #
AIPS 1: IN2DISK  0  Second disk drive #
AIPS 1: BLC  34  35  Bottom left corner of first
AIPS 1:  25  *rest 0  image.  0 => 1
AIPS 1: TRC  94  95  Top right corner of first
AIPS 1:  44  *rest 0  image;  0=>entire image
AIPS 1:  Multiple planes of a cube
AIPS 1:  will be plotted in panels.
AIPS 1: ZINC  1  Increment on 3rd axis of
```

```
AIPS 1:                                          1st and possibly 2nd image
AIPS 1: NY              0                         Number of planes along
AIPS 1:                                          vertical side of plot
AIPS 1: XYRATIO         0                          X to Y axis plot ratio. 0=>
AIPS 1:                                          header inc or window ratio
AIPS 1: PIXRANGE        0          0               Min,Max of image intensity
AIPS 1:                                           0 => entire range.
AIPS 1: LTYPE           3                        Type of labeling: 1 border,
AIPS 1:                                          2 no ticks, 3 standard, 4 rel
AIPS 1:                                          to center, 5 rel to subim cen
AIPS 1:                                          6 pixels, 7-10 as 3-6 with
AIPS 1:                                          only tick labels
AIPS 1:                                          <0 -> no date/time
AIPS 1: DOALIGN         1                         > 0 => images must line up
AIPS 1:                                           (see HELP DOALIGN)
AIPS 1: PLEV            0                       Percent of peak for levs.
AIPS 1: CLEV            0.025                   Absolute value for levs
AIPS 1:                                           (used only if PLEV = 0).
AIPS 1: LEVS           -5          5            Contour levels (up to 30).
AIPS 1:                10          15             20          25
AIPS 1:                30          35             40          *rest 0
AIPS 1: DOBLANK         1                         Draw boundary between blanked
AIPS 1:                                          areas and good areas?
AIPS 1: DOWEDGE         1                         > 0 => plot a wedge also.
AIPS 1:                                          = 2 => put on the right edge.
AIPS 1:                                          = 3 => put on top using full
AIPS 1:                                                 range of image values
AIPS 1:                                          = 4 => put on right w full
AIPS 1:                                                 range of image values
AIPS 1: DOCIRCLE       -1                         > 0 => extend ticks to form
AIPS 1:                                          coordinate grid
AIPS 1: INVERS          0                       STar file version number.
AIPS 1: STFACTOR        1                        Scale star sizes: 0 => none.
AIPS 1:                                          > 0 crosses with no labels
AIPS 1:                                          < 0 crosses with labels
AIPS 1: CBPLOT          1                       Position for beam plot:
AIPS 1:                                          -1: don't plot beam
AIPS 1:                                           1: lower left (default)
AIPS 1:                                           2: lower right
```

```
AIPS 1:                                  3: upper right
AIPS 1:                                  4: upper left
AIPS 1:                                  5: plot in separate pane
AIPS 1:                                  6-10 as 1-5 but filled in
AIPS 1:                                 11-15 as 1-5 more filled
AIPS 1:                                 16-20 as 1-5 scribbled on
AIPS 1: LABEL          1                 0->label each pane with the
AIPS 1:                                    pane number
AIPS 1:                                 1->label each with coordinate
AIPS 1:                                 2->label each with coordinate
AIPS 1:                                    relative to reference
AIPS 1:                                 -1->do not label each pane
AIPS 1: DOTV           -1                 > 0 Do plot on the TV, else
AIPS 1:                                 make a plot file
AIPS 1: TVCHAN          1                  TV channel for grey plots
AIPS 1: GRCHAN          0                  Graphics channel 0 => 1.
AIPS 1: TVCORN          0        0         TV pixel location of bottom
AIPS 1:                                 left corner of image 0=> self
AIPS 1:                                 scale, non 0 => pixel scale.
>
>go kntr
KNTR 1: Task KNTR     (release of 15APR99) begins
KNTR 1: PLOTTED      2 POSITIONS FROM ST TABLE VERSION     1
KNTR 1: Start contouring at plane     25
KNTR 1: PLOTTED      2 POSITIONS FROM ST TABLE VERSION     1
KNTR 1: Start contouring at plane     26
KNTR 1: PLOTTED      2 POSITIONS FROM ST TABLE VERSION     1
KNTR 1: Start contouring at plane     27
KNTR 1: PLOTTED      2 POSITIONS FROM ST TABLE VERSION     1
KNTR 1: Start contouring at plane     28
KNTR 1: PLOTTED      2 POSITIONS FROM ST TABLE VERSION     1
KNTR 1: Start contouring at plane     29
KNTR 1: PLOTTED      2 POSITIONS FROM ST TABLE VERSION     1
KNTR 1: Start contouring at plane     30
KNTR 1: PLOTTED      2 POSITIONS FROM ST TABLE VERSION     1
KNTR 1: Start contouring at plane     31
KNTR 1: PLOTTED      2 POSITIONS FROM ST TABLE VERSION     1
KNTR 1: Start contouring at plane     32
KNTR 1: PLOTTED      2 POSITIONS FROM ST TABLE VERSION     1
```

KNTR 1: Start contouring at plane 33
KNTR 1: PLOTTED 2 POSITIONS FROM ST TABLE VERSION 1
KNTR 1: Start contouring at plane 34
KNTR 1: PLOTTED 2 POSITIONS FROM ST TABLE VERSION 1
KNTR 1: Start contouring at plane 35
KNTR 1: PLOTTED 2 POSITIONS FROM ST TABLE VERSION 1
KNTR 1: Start contouring at plane 36
KNTR 1: PLOTTED 2 POSITIONS FROM ST TABLE VERSION 1
KNTR 1: Start contouring at plane 37
KNTR 1: PLOTTED 2 POSITIONS FROM ST TABLE VERSION 1
KNTR 1: Start contouring at plane 38
KNTR 1: PLOTTED 2 POSITIONS FROM ST TABLE VERSION 1
KNTR 1: Start contouring at plane 39
KNTR 1: PLOTTED 2 POSITIONS FROM ST TABLE VERSION 1
KNTR 1: Start contouring at plane 40
KNTR 1: PLOTTED 2 POSITIONS FROM ST TABLE VERSION 1
KNTR 1: Start contouring at plane 41
KNTR 1: PLOTTED 2 POSITIONS FROM ST TABLE VERSION 1
KNTR 1: Start contouring at plane 42
KNTR 1: PLOTTED 2 POSITIONS FROM ST TABLE VERSION 1
KNTR 1: Start contouring at plane 43
KNTR 1: PLOTTED 2 POSITIONS FROM ST TABLE VERSION 1
KNTR 1: Start contouring at plane 44
KNTR 1: GFINIS: number records used 349
KNTR 1: Successful PLot file version 16 created.
KNTR 1: Appears to have ended successfully
KNTR 1: mpu5m 15APR99 NEW: Cpu= 0.2 Real= 1
AIPS 1: Resumes
>go tkpl
TKPL 1: Task TKPL (release of 15APR99) begins
AIPS 1: Resumes
>TKPL 1: Appears to have ended successfully
TKPL 1: mpu5m 15APR99 NEW: Cpu= 0.0 Real= 2

★ある 1 点でのスペクトルを表示【ISPEC】

>tget ispec
>getn 50
AIPS 1: Got(1) disk= 1 user= 1 type=MA D12CLN.ICLN.1

```
>imh
AIPS 1: Image=MAFFEI2    (MA)          Filename=D12CLN        .ICLN  .    1
AIPS 1: Telescope=NMA                  Receiver=
AIPS 1: Observer=okada                 User #=      1
AIPS 1: Observ. date=03-MAY-2010       Map date=03-MAY-2010
AIPS 1: Minimum=-7.52689064e-01        Maximum= 1.31163955e+00 JY/BEAM
AIPS 1: ------------------------------------------------------------
AIPS 1: Type      Pixels    Coord value       at Pixel       Coord incr     Rotat
AIPS 1: RA---SIN    128     02 41 55.090         64.00            -1.000      0.00
AIPS 1: DEC--SIN    128     59 36 14.699         65.00             1.000      0.00
AIPS 1: VELO-LSR     64   -2.8600000e+04         34.00 -2.0806061e+04      0.00
AIPS 1: STOKES        1    1.0000000e+00          1.00  1.0000000e+00      0.00
AIPS 1: ------------------------------------------------------------
AIPS 1: Coordinate equinox 2000.00
AIPS 1: Map type=NORMAL                Number of iterations=       165
AIPS 1: Conv size=    5.86 X    4.58    Position angle= -64.14
AIPS 1: Rest freq 115271.204           Vel type: RADIO    wrt LSR
AIPS 1: Alt ref. value   1.15015e+11   wrt pixel      0.62
AIPS 1: Maximum version number of extension files of type CC is   64
AIPS 1: Maximum version number of extension files of type HI is    1
AIPS 1: Maximum version number of extension files of type ST is    1
AIPS 1: Maximum version number of extension files of type PL is   14
>blc 64,65 ← ここではマップの中心 1 点でのスペクトルを見るという例
>trc blc ← blc と trc を組み合わせてマップの中心 1 点（x,y）= (64,65)を指定
>inp
AIPS 1: ISPEC : Task to plot spectrum of a specified portion of an image
AIPS 1: Adverbs            Values              Comments
AIPS 1: ------------------------------------------------------------
AIPS 1: USERID              0                   User ID.   0=>current user
AIPS 1:                                         32000=>all users
AIPS 1: INNAME        'D12CLN        '          Image name (name)
AIPS 1: INCLASS       'ICLN  '                  Image name (class)
AIPS 1: INSEQ               1                   Image name (seq. #)
AIPS 1: INDISK              0                   Disk drive #
AIPS 1: BLC                64          65       Bottom left corner of image
AIPS 1:                 *rest 0                 0=>entire image
AIPS 1: TRC                64          65       Top right corner of image
AIPS 1:                 *rest 0                 0=>entire image
AIPS 1: OPTYPE         '    '                   'FLUX', else average
```

```
AIPS 1: PIXRANGE        0              0          Range of intensities to plot
AIPS 1: ZINC            1                         Increment on freq axis.
AIPS 1: SMOOTH       *all 0                       Frequency smoothing function
AIPS 1: LTYPE           3                         Type of labeling: 1 border,
AIPS 1:                                           2 no ticks, 3 standard, 4 rel
AIPS 1:                                           to center, 5 rel to subim cen
AIPS 1:                                           6 pixels, 7-10 as 3-6 with
AIPS 1:                                           only tick labels
AIPS 1:                                           <0 -> no date/time
AIPS 1: DOCENTER        1                          > 0 => plot with box-like
AIPS 1:                                           lines, else plot line to
AIPS 1:                                           points
AIPS 1: DOTV           -1                          > 0 Do plot on the TV, else
AIPS 1:                                           make a plot file
AIPS 1: GRCHAN          0                         Graphics channel 0 => 1.
AIPS 1: DOCRT         132                         > 0 => use the terminal, 0 =>
AIPS 1:                                           no output, < 0 => printer or
AIPS 1:                                           file, > 72 => terminal width
AIPS 1: OUTPRINT    '                                                        '
AIPS 1:                                           Printer disk file to save
>go ispec
ISPEC1: Task ISPEC  (release of 15APR99) begins
ISPEC1: Created plot file version    15
ISPEC1: GFINIS: number records used         5
ISPEC1: Appears to have ended successfully
ISPEC1: mpu5m          15APR99 NEW: Cpu=          0.0   Real=          0
AIPS 1: Resumes
>go tkpl
TKPL 1: Task TKPL   (release of 15APR99) begins
AIPS 1: Resumes
>TKPL 1: Appears to have ended successfully
TKPL 1: mpu5m          15APR99 NEW: Cpu=          0.0   Real=          1
>
```

縦軸は flux density になっている。これを輝度温度に変換するには？

ノート： flux density S と brightness temperature Tb（輝度温度）の関係
観測波長をλとすると、

$$T_b = \frac{\lambda^2}{2k_B\,\Omega_{\rm beam}} \cdot S \qquad (14)$$

$$= 15.4 \times \left(\frac{\lambda}{\rm mm}\right)^2 \left(\frac{\Omega_{\rm beam}}{\square''}\right)^{-1} \left(\frac{S}{\rm mJy}\right) [\rm mK] \qquad (15)$$

$$= 13.6 \times \left(\frac{\lambda}{\rm mm}\right)^2 \left(\frac{\theta_{\rm maj} \times \theta_{\rm min}}{1'' \times 1''}\right)^{-1} \left(\frac{S}{\rm mJy}\right) [\rm mK] \qquad (16)$$

ここで、Ωbeam は、観測ビームの立体角。ビーム長軸、短軸の半値幅（FWHM）が θ maj, θ min の場合、以下のような関係になる。

$$\Omega_{\rm beam} = \frac{\pi\theta_{\rm maj} \times \theta_{\rm min}}{4\ln 2} = 1.133 \left(\frac{\theta_{\rm maj} \times \theta_{\rm min}}{1'' \times 1''}\right) \qquad (17)$$

★ ある領域でのスペクトルの 2 次元分布を表示【PLCUB, TRANS】

PLCUB を使用するが、この PLCUB では、軸の順番が

```
>tget trans
>
>getn 50
AIPS 1: Got(1)  disk= 1  user=  1  type=MA  D12CLN.ICLN.1
>imh
AIPS 1: Image=D2USB-OB  (MA)          Filename=D12CLN       .ICLN  .  1
AIPS 1: Telescope=
AIPS 1: Observer=okada                User #=     1
AIPS 1: Observ. date=03-MAY-2010      Map date=03-MAY-2010
AIPS 1: Minimum=-7.52689064e-01       Maximum= 1.31163955e+00 JY/BEAM
AIPS 1: ------------------------------------------------------------
AIPS 1: Type     Pixels   Coord value      at Pixel      Coord incr    Rotat
AIPS 1: RA---SIN   128    02 41 55.090        64.00          -1.000      0.00
AIPS 1: DEC--SIN   128    59 36 14.699        65.00           1.000      0.00
AIPS 1: VELO-LSR    64  -2.8600000e+04        34.00 -2.0806061e+04      0.00
AIPS 1: STOKES       1   1.0000000e+00         1.00  1.0000000e+00      0.00
AIPS 1: ------------------------------------------------------------
AIPS 1: Coordinate equinox 1950.00
AIPS 1: Map type=NORMAL               Number of iterations=      165
AIPS 1: Conv size=   5.86 X   4.58   Position angle= -64.14
AIPS 1: Rest freq 115271.204          Vel type: RADIO   wrt LSR
AIPS 1: Alt ref. value  1.15015e+11  wrt pixel     0.62
```

AIPS 1: Maximum version number of extension files of type CC is 64
AIPS 1: Maximum version number of extension files of type HI is 1
AIPS 1: Maximum version number of extension files of type ST is 1
AIPS 1: Maximum version number of extension files of type PL is 14
>
>outn inn
>outc 'vad'
>transcod '312' ← (α, δ ,velocity)という cube の軸を、(velocity, α, δ)に入替（123）➔ (312)
>inp
AIPS 1: TRANS: Task to transpose a subimage of an up to 7-dim. image
AIPS 1: Adverbs Values Comments
AIPS 1: --
AIPS 1: USERID 0 User ID. 0 => current user,
AIPS 1: 32000 => any user.
AIPS 1: INNAME 'D12CLN ' Input name(name).
AIPS 1: INCLASS 'ICLN ' Input name(class).
AIPS 1: INSEQ 1 Input name(seq. #). 0=>high
AIPS 1: INDISK 0 Input disk drive #. 0=>any
AIPS 1: OUTNAME 'D12CLN ' Output name(name).
AIPS 1: OUTCLASS 'VAD ' Output name(class).
AIPS 1: OUTSEQ 0 Output name(seq. #).
AIPS 1: 0 => highest unique
AIPS 1: OUTDISK 1 Output image disk drive #
AIPS 1: 0 => highest with room
AIPS 1: BLC *all 0 Bottom left corner of image
AIPS 1: 0 => entire image
AIPS 1: TRC *all 0 Top right corner of image
AIPS 1: 0 => entire image
AIPS 1: TRANSCOD '312 ' New axis order in terms of
AIPS 1: input axis numbers
AIPS 1: BADDISK *all 0 Disks to avoid for scratch
>go
TRANS1: Task TRANS (release of 15APR99) begins
TRANS1: Create D12CLN .VAD . 2 (MA) on disk 1 cno 65
AIPS 1: Resumes
>TRANS1: Begin row swap
TRANS1: Begin in-core x-y transpose
TRANS1: Appears to have ended successfully
TRANS1: mpu5m 15APR99 NEW: Cpu= 0.5 Real= 1

```
>getn 65
AIPS 1: Got(1)  disk= 1  user=  1  type=MA  D12CLN.VAD.2
>imh
AIPS 1: Image=D2USB-OB  (MA)  Filename=D12CLN  .VAD  .  2
AIPS 1: Telescope=
AIPS 1: Observer=okada  User #=  1
AIPS 1: Observ. date=03-MAY-2010  Map date=04-MAY-2010
AIPS 1: Minimum=-7.52689064e-01  Maximum= 1.31163955e+00 JY/BEAM
AIPS 1: ------------------------------------------------------------
AIPS 1: Type  Pixels  Coord value  at Pixel  Coord incr  Rotat
AIPS 1: VELO-LSR  64  -2.8600000e+04  34.00 -2.0806061e+04  0.00
AIPS 1: RA---SIN  128  02 41 55.090  64.00  -1.000  0.00
AIPS 1: DEC--SIN  128  59 36 14.699  65.00  1.000  0.00
AIPS 1: STOKES  1  1.0000000e+00  1.00  1.0000000e+00  0.00
AIPS 1: ------------------------------------------------------------
AIPS 1: Coordinate equinox 1950.00
AIPS 1: Map type=NORMAL  Number of iterations=  165
AIPS 1: Conv size=  5.86 X  4.58  Position angle= -64.14
AIPS 1: Rest freq 115271.204  Vel type: RADIO  wrt LSR
AIPS 1: Alt ref. value  1.15015e+11  wrt pixel  0.62
AIPS 1: Maximum version number of extension files of type HI is  1
>

>tget plcub
>getn 65
AIPS 1: Got(1)  disk= 1  user=  1  type=MA  D12CLN.VAD.2
>imh
AIPS 1: Image=D2USB-OB  (MA)  Filename=D12CLN  .VAD  .  2
AIPS 1: Telescope=
AIPS 1: Observer=okada  User #=  1
AIPS 1: Observ. date=03-MAY-2010  Map date=04-MAY-2010
AIPS 1: Minimum=-7.52689064e-01  Maximum= 1.31163955e+00 JY/BEAM
AIPS 1: ------------------------------------------------------------
AIPS 1: Type  Pixels  Coord value  at Pixel  Coord incr  Rotat
AIPS 1: VELO-LSR  64  -2.8600000e+04  34.00 -2.0806061e+04  0.00
AIPS 1: RA---SIN  128  02 41 55.090  64.00  -1.000  0.00
AIPS 1: DEC--SIN  128  59 36 14.699  65.00  1.000  0.00
AIPS 1: STOKES  1  1.0000000e+00  1.00  1.0000000e+00  0.00
AIPS 1: ------------------------------------------------------------
```

```
AIPS 1: Coordinate equinox 1950.00
AIPS 1: Map type=NORMAL                    Number of iterations=        165
AIPS 1: Conv size=     5.86 X     4.58     Position angle= -64.14
AIPS 1: Rest freq 115271.204               Vel type: RADIO     wrt LSR
AIPS 1: Alt ref. value    1.15015e+11    wrt pixel       0.62
AIPS 1: Maximum version number of extension files of type HI is     1
AIPS 1: Maximum version number of extension files of type PL is    63
>
>blc 24 50 42
>trc 45 85 85
>yinc 4
>zinc 4
>aparm 20 30 0 0 200
>inp
AIPS 1: PLCUB : Task to plot intensity vs x panels on grid of y,z pixels
AIPS 1: Adverbs              Values                  Comments
AIPS 1: ------------------------------------------------------------
AIPS 1: USERID             0                        User ID.   0=>current user
AIPS 1:                                             32000=>all users
AIPS 1: INNAME         'D12CLN          '           Image name (name)
AIPS 1: INCLASS        'VAD     '                   Image name (class)
AIPS 1: INSEQ              2                        Image name (seq. #)
AIPS 1: INDISK             0                        Disk drive #
AIPS 1: BLC               24              50        Bottom left corner of image
AIPS 1:                   42            *rest 0     0=>entire image
AIPS 1: TRC               45              85        Top right corner of image
AIPS 1:                   85            *rest 0     0=>entire image
AIPS 1: YINC               4                        Increment on 2nd axis to plot
AIPS 1: ZINC               4                        Increment on 3rd axis to plot
AIPS 1: PIXRANGE           0               0        Range of intensities to plot
AIPS 1: LTYPE              3                        Type of labeling: 1 border,
AIPS 1:                                            2 no ticks, 3 standard, 4 rel
AIPS 1:                                            to center, 5 rel to subim cen
AIPS 1:                                            6 pixels, 7-10 as 3-6 with
AIPS 1:                                            only tick labels
AIPS 1:                                            <0 -> no date/time
AIPS 1: APARM             20              30        1: panels/page in x-direction
AIPS 1:                    0               0        0=> MIN (TRC(2)-BLC(2+1,5)
AIPS 1:                  200            *rest 0     2: panels/page in y-direction
```

```
AIPS 1:                                    0=> final value of APARM(1)
AIPS 1:                                  3: LTYPE for panels 0=>LTYPE
AIPS 1:                                  4: y-value x-axis: no default
AIPS 1:                                  5: x-value y-axis: no default
AIPS 1:                                  6: x-axis Hanning smooth
AIPS 1:                                     length (odd integer >=3)
AIPS 1: DOTV              -1              > 0 Do plot on the TV, else
AIPS 1:                                  make a plot file
AIPS 1: GRCHAN             0               Graphics channel 0 => 1.
>
>go plcub

>go tkpl
```