NANTEN2 schedule files

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NANTEN2 – the Platonic ideal

- Observations are carried out automatically by a schedule file
- The schedule file is automatically updated
- Project scientists place their schedule files in standard locations
- The observer just picks a target
  - And then goes for pisco sour...

How does observing work?

- Check that everything is working
  - Tuning (bias voltage, magnet current, diplexer)
  - Pointing
    - continuum total power pointing on a planet
    - Spectral line pointing possible but requires the right kind of source
  - Spectral line standard
- Observe your source for a few hours
- Recheck pointing
- Observe some more

Observing on source

- Go to the directory for the project in question
- Run `tiling.sh`
  - That's it
  - Well, not quite...
    - How many footprints do you want?
    - They usually take about quarter of an hour, so you want to do a few
    - `tiling.sh -n <how many pointings?>`
    - `tiling.sh` does 1 by default

Plumbing

- `tiling.sh` is a script that is in `observer`'s path, so can be called from anywhere
- It reads and interprets `in_par`
  - Assumed to be in the current working directory
  - Gives names of source and sky position as in telescope source list
  - Gives basic mapping parameters
- Reads, interprets, updates `tiling.txt`
  - Gives details of array footprint positions, orientations
  - Keeps track of progress
- Call `tiling.sh` to observe a given number of footprints

Know your schedule files: `in_par`

```
source      = carina_source     # source name
lam         = 0           #[arcsec] map center offset in longitude
bet         = 0           #[arcsec] map center offset in latitude
cormap      = GALACTIC        # map cood. system

# OFF related parameters

refname     = carina_OFF # ref name, set it as "NAN" if you will use relative
refoffl     = 0         #[arcsec] reference position relative to on in l (only valid when
refname is NAN)
refoffb     = 0           #[arcsec] reference position relative to on in b (only valid when
refname is NAN)
corref      = GALACTIC       # ref cood. system (in beam switch it is always setted
HORIZON)

# observing modes

mode        = otfl         # observing mode; otfl or otfb
```

```
# integration time

ton         = 3           #[s] on time

# mapping parameters

step        = 8.5         #[arcsec] step size; should be fixed to 8.5 aresec
mapsizel    = 340           #[arcsec] size of map in longitude; should be fixed to 340
mapsizeb    = 170           #[arcsec] size of map in latitude; should be fixed to 170
mapangle    = 0           #[degree] position angle of array (counter-clock)
reverseflg  = 0           # if 1, OTF goes -l and -b direction

# freqency of OFF and load

lineperoff  = 1           #define how many otf scan lines for one off measurement
offperload  = 1           #define how many off for one load measurment

# array related parameters

flip        = 0           # array flipping flag (0/1)
ftcenter    = -2            # footprint center (-1: first, -2: second subarray center)

# others

interactive = 0           # activate interactive confirmation of parameters
```

Know your schedule files: `tiling.txt`

```
# see separate figures for the definition of x and y in various angles and with
flip (+x is +l scan and +y is +b scan when angle=0)
# IMPORTANT: use "." not "," for fractions on ubuntu system as awk only supports
 this syntax
#
# ------------------------------------------------------------------------
# x / y / (otfl/otfb) / flip / STATUS
#
# ------------------------------------------------------------------------
#level 1
1 / -6 / otfl / 0 /
1 / -5 / otfl / 0 /
1 / -4 / otfl / 0 /
1 / -3 / otfl / 0 /
1 / -2 / otfl / 0 /
1 / -1 / otfl / 0 /
1 / 0 / otfl / 0 /
1 / 1 / otfl / 0 /
0 / -6 / otfl / 0 /
0 / -5 / otfl / 0 /
```

Know your schedule files: sourcelist

`/net/KOSMA_file_io/share/sources`

```
!--------------------------------------------------
!    COMPACT HII REGIONS - CANDIDATE CI/CO LINE STANDARDS
!
!   SBAS = -1 FOR J2000.0
COMMON: SBAS=-1
SNAM= G265D14P1D45; SLAM= 08 59 26.6s; SBET= -43 45 20.0; VLSR= 6.0;
SNAM= G291D28M0D72; SLAM= 11 11 52.9s; SBET= -61 18 56; VLSR= -24.0;
SNAM= G305D36P0D19; SLAM= 13 12 33.0s; SBET= -62 34 43; VLSR= -37.0;
SNAM= G316D80M0D06; SLAM= 14 45 19.4s; SBET= -59 49 32; VLSR= -39.0;
SNAM= G322D16P0D63; SLAM= 15 18 39.1s; SBET= -56 38 49; VLSR= -56.0;
SNAM= G326D65P0D58; SLAM= 15 44 45.8s; SBET= -54 06 37; VLSR= -41.0;
SNAM= G327D30M0D55; SLAM= 15 53 05.1s; SBET= -54 35 24; VLSR= -47.0;
SNAM= G328D31P0D43; SLAM= 15 54 07.2s; SBET= -53 11 21; VLSR= -94.0;
SNAM= G331D53M0D08; SLAM= 16 12 09.8s; SBET= -51 27 06; VLSR= -89.0;
SNAM= G333D29M0D38; SLAM= 16 21 31.8s; SBET= -50 26 23; VLSR= -52.0;
SNAM= G333D61M0D22; SLAM= 16 22 12.0s; SBET= -50 05 56; VLSR= -48.0;
SNAM= G337D12M0D17; SLAM= 16 36 42.8s; SBET= -47 31 22; VLSR= -75.0;
SNAM= G337D92M0D46; SLAM= 16 41 08.3s; SBET= -47 07 22; VLSR= -41.0;
SNAM= G340D79M1D01; SLAM= 16 54 17.4s; SBET= -45 17 03; VLSR= -29.0;
SNAM= G345D21P1D02; SLAM= 17 00 37.9s; SBET= -40 33 42; VLSR= -16.0;
SNAM= G345D39P1D40; SLAM= 16 59 38.1s; SBET= -40 11 28; VLSR= -14.0;
SNAM= G348D72M1D04; SLAM= 17 20 05.9s; SBET= -38 57 37; VLSR= -13.0;
SNAM= G353D19P0D89; SLAM= 17 24 48.4s; SBET= -34 10 58; VLSR= -5.0;
```

! OFF-POSITIONS
COMMON: SBAS=-1
SNAM= G265D14-OFF; SLAM= 09 01 31.0s; SBET= -43 25 35; VLSR= 6.0;
SNAM= G291D28-OFF; SLAM= 11 10 17.6s; SBET= -61 46 42; VLSR= -24.0;
SNAM= G305D36-OFF; SLAM= 13 12 11.5s; SBET= -62 04 48; VLSR= -37.0;
SNAM= G316D80-OFF; SLAM= 14 47 02.2s; SBET= -60 16 39; VLSR= -39.0;
SNAM= G322D16-OFF; SLAM= 15 16 44.2s; SBET= -56 13 22; VLSR= -56.0;
SNAM= G326D65-OFF; SLAM= 15 42 42.1s; SBET= -53 42 49; VLSR= -41.0;
SNAM= G327D30-OFF; SLAM= 15 55 17.7s; SBET= -54 58 34; VLSR= -47.0;
SNAM= G328D31-OFF; SLAM= 15 52 00.9s; SBET= -52 48 10; VLSR= -94.0;
SNAM= G331D53-OFF; SLAM= 16 14 22.6s; SBET= -51 48 56; VLSR= -89.0;
SNAM= G333D29-OFF; SLAM= 16 23 46.0s; SBET= -50 47 33; VLSR= -52.0;
SNAM= G333D61-OFF; SLAM= 16 24 25.7s; SBET= -50 27 03; VLSR= -48.0;
SNAM= G337D12-OFF; SLAM= 16 38 55.1s; SBET= -47 51 26; VLSR= -75.0;
SNAM= G337D92-OFF; SLAM= 16 43 21.2s; SBET= -47 27 07; VLSR= -41.0;
SNAM= G340D79-OFF; SLAM= 16 56 30.4s; SBET= -45 35 53; VLSR= -29.0;
SNAM= G345D21-OFF; SLAM= 16 58 33.9s; SBET= -40 15 11; VLSR= -16.0;
SNAM= G345D39-OFF; SLAM= 16 57 35.1s; SBET= -39 52 52; VLSR= -14.0;
SNAM= G348D72-OFF; SLAM= 17 22 13.0s; SBET= -39 14 43; VLSR= -13.0;
SNAM= G353D19-OFF; SLAM= 17 22 48.8s; SBET= -33 54 03; VLSR= -5.0;

NANTEN2 observing cookbook

- Get onto the skype chats:
  - NANTEN2 (low-freq – high-freq, telescope, transport,...)
  - Colonia chat (internal SMART stuff)
- Watch the Skies!
  - `Apex-telescope.org`
  - PWV < ~1mm
  - On the NANTEN2 chat, ask for SMART time and wait for Nagoya to respond (usually very quick)

NANTEN2 observing cookbook

- VNC into `smartrx`, `smartobs`, and `control`
  - `smartrx`, `control` don't get used much; `smartxffts hardly at all`
  - You'll do all this stuff on `smartobs`
  - Chicken of the VNC ok-ish
- Log in as `observer`
- `cd ~/sources`
- `cd AWESOME_NANTEN_PROJECT`
- ...technical stuff if necessary...
  - If you're lucky, someone else has done it all for you!
  - Get someone to walk you through it
- `tiling.sh -n 4` (or whatever)
- Hand back to Nagoya on skype

NANTEN2 project cookbook

- Have an idea, and figure out your tiling, integration times etc
  - Advice: use a standard set of parameters and just keep doing tiles until you have enough S/N
- Grab an `in_par` and `tiling.txt` that are known-good;
- edit them
  - dump them into a new project directory;
- write a sourcelist (inc off-positions if necessary)
  - append to telescope sourcelist

Sidenote: SMART mapping

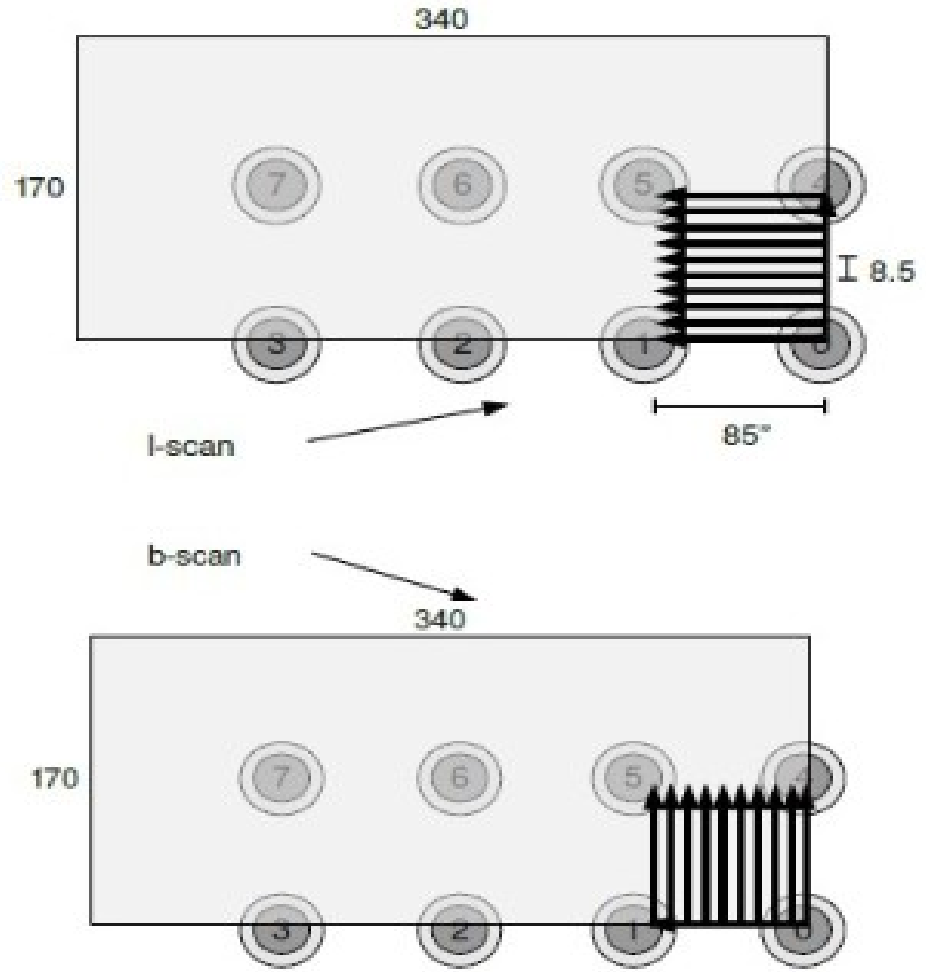

Figure grabbed from Ronan's old talk

That's the easy bit done

- Write instructions to observers into the wiki
  - Give as much detail as possible
- Have a chat with Koln (Robert, Ronan...) and get them to add your sources into the Big Plot of Source Availabilities
  - Observers tend to consult this a lot
- Nag the observers
  - Feedback into the wiki

PS: Old in_par files

```
mode        = otfl    #mode: otfl,otfb,cont
source      = carina_source        #source name
refname     = carina_OFF    #ref name, set it as "NAN" if you will use relative
                          #below,i.e., (refoffl,refoffb)
lam         = 0       #[arcsec] map center or desired position (for tiling as we
ll as psw)
bet         = 0       #[arcsec] map center or desired position (s.a.)
ton         = 3       #[s] on time
refoffl     = 0    #[arcsec] reference position relative to on in l (only valid
when refname is NAN)
refoffb     = 0       #[arcsec] reference position relative to on in b (only val
id when refname is NAN)
cormap      = GALACTIC   #map coord. system (in beam switch it is always set to
HORIZON) J2000
corref      = GALACTIC   #ref coord. system (in beam switch it is always set to
HORIZON)

step        = 8.5     #[arcsec] step size; fixed to be 8.5 arcsec
lineperoff  = 1       #define how may otf scan lines for one off measurement
angle       = 0      #[degree] position angle of array
flip        = 0       # array flipping flag (0/1)
ftcenter    = -2      # footprint center (-1: first, -2: second subarray center)
```

PPS: old wiki stuff

- There's lots of stuff on the wiki that has not had the detailed cleaned up
  - Eg smartaos may mean smartobs – or may not be valid any more

PPPS: other observing scripts

- From the wiki:
  - OTF mapping (otf_totalpower_map.sh)
  - single pointed (singlepoint_totalpower.sh)
  - raster mapping (raster_totalpower_map.sh)
  - OTF cross (otf_totalpower_cross.sh)
- You pretty much never use these...