Effelsberg Tutorial 2

Electric Boogaloo

Overview

1. Before the Observation
   a. Is the source detectable?
   b. Setting up the observation step by step

2. During the Observation
   a. PFP
   b. Loading the schedule/objects
   c. Checking if everything is ok

~~3. After the observation~~
   ~~a. Where is my data?~~
   ~~b. How to reduce my data?~~

First presentation

Find more info here:

https://fpra.mpifr-bonn.mpg.de/doku.php?id=talksposters:2025_tutorials:effelsberg_tutorial_2025

Repo with some example schedules:

https://github.com/Jellymancer/Observing_With_Effelsberg

2. Before the observation

During the proposal

- Is my source detectable with effelsberg?
  - Is it flux high enough?
  - Is it up on the sky?

$$S_{min} = S_{1400} = \alpha\beta \frac{T_{sys}}{G\sqrt{(n_p \Delta f t_i)}} \left(\frac{W}{P-W} \right)$$

$$\alpha = SNR = S_{1400} \frac{G}{T_{sys}} \sqrt{(2\Delta f t_i)}$$

https://eff100mwiki.mpifr-bonn.mpg.de/doku.php

Is my source on the sky?

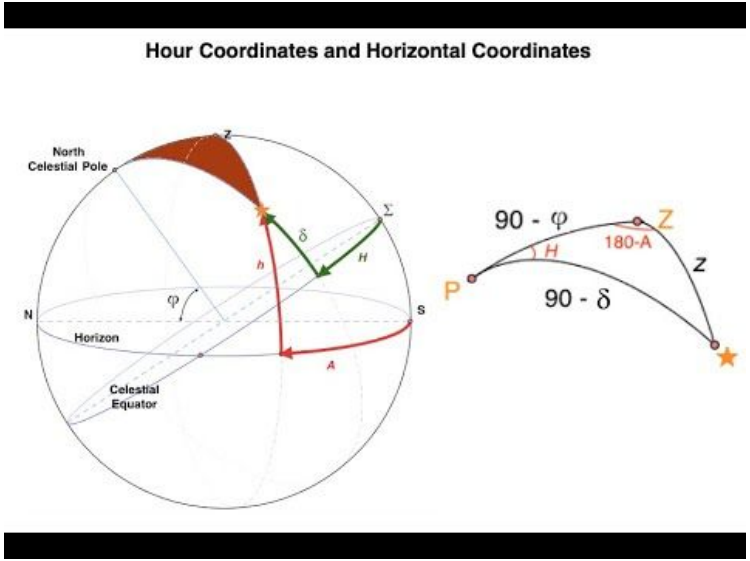
Use astropy or pyriseset (or be old school)

Calculation of the local horizontal coordinates:

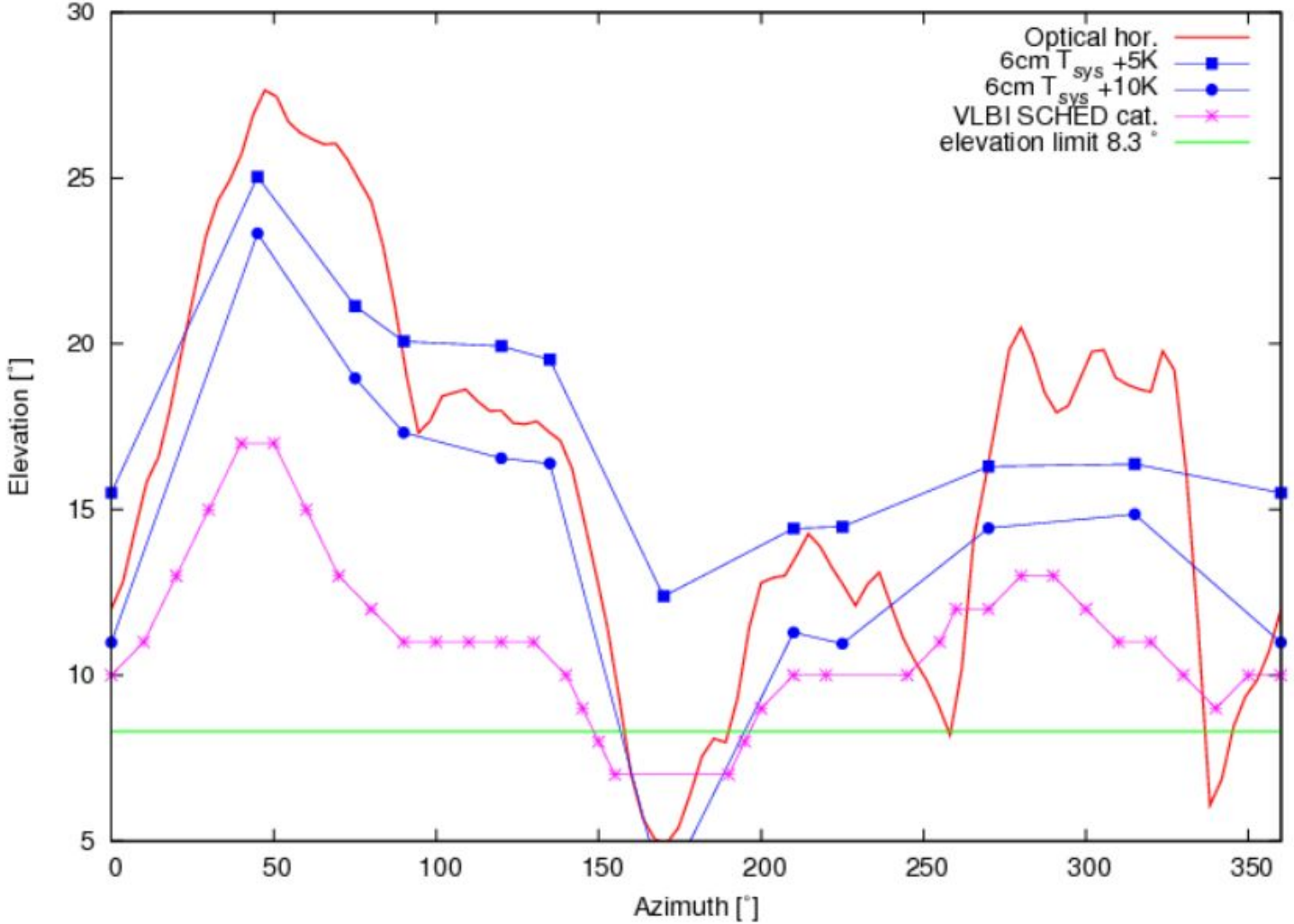
$$\tan A = \frac{\sin H}{\cos H \sin \varphi - \tan \delta \cos \varphi} \qquad (13.5)$$

$$\sin h = \sin \varphi \sin \delta + \cos \varphi \cos \delta \cos H \qquad (13.6)$$

If one wishes to reckon the azimuth from the North instead of the South, add 180° to the value of A given by formula (13.5).



Remember that the true horizon is not flat!


Optical hor.
6cm T_{sys} +5K
6cm T_{sys} +10K
VLBI SCHED cat.
elevation limit 8.3 °
Elevation [°]
Azimuth [°]
30
25
20
15
10
5
0
50
100
150
200
250
300
350

Making a schedule

Why make a schedule? - It automates the telescope operation.
Can I avoid making one? - Yes! However, be aware that it’s hard to control everything manually (EDD commands)

I use pyriseset3: https://gitlab1.mpifr-bonn.mpg.de/jjawor/pyriseset3

For this session, we are doing pulsar timing observations with:

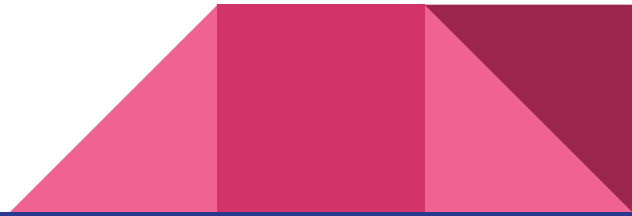
- B2021+51 - Test pulsar
- 3C048 - Flux Cal
- J0613-0200

1. Order sources

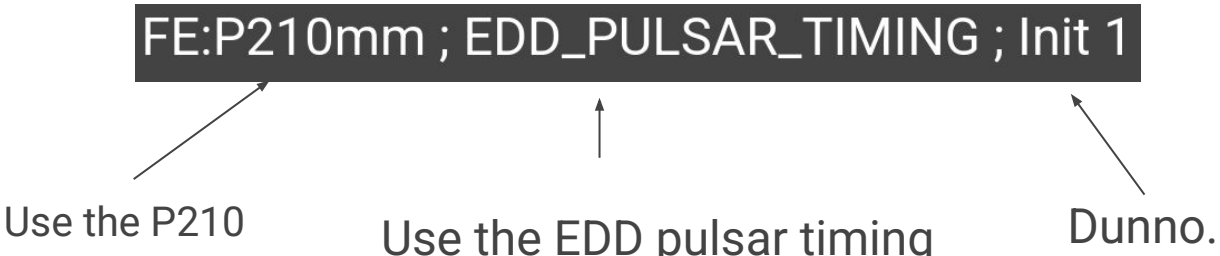
(optional) Create a txt schedule for use in pyriseset3 and check if your sources are visible. Order them to minimize slew time.

Decide if you need polarization and flux calibration.

Check the repo for examples:
https://github.com/Jellymancer/Observing_With_Effelsberg



2. EDD: Set your mode (backend + receiver)



2. EDD commands

EDD commands: Decide on your time resolution, no. of channels, zapped channels (only for live view), and a variety of other things.
Check this repo for the commands:
https://gitlab.mpcdf.mpg.de/mpifr-bdg/edd_provisioning_effelsberg

```
SENDTO EDD JSON MEASUREMENTPREPARE
{"search1":{"active":1,"npol":1,"cdd_dm":58,"filterbank_nchannels":512,"tsamp":0.
0000512},"timing1":{"active":1,"nbins":1024,"nchannels":512},"baseband1":{"activ
e":0}}
```

3. OBSNIP commands

OBSNIP commands are used for steering the telescope and setting the observation length.

```
B0355+54 ; CoordinateSystem Equatorial ; Equinox J2000 ; ObjectLongitude 03h 58m 53.7s ; ObjectLatitude 54d 13' 13.8" ; LatOff 0.0 ; LonOff 0.0 ; SCANTime 120 ; PMODE Search
```

FE:P217mm ; EDD_PULSAR_EPTA

B2021+51_R ; CoordinateSystem Equatorial ; Equinox J2000 ; ObjectLongitude 20h 22m 50.00s ; ObjectLatitude +51d 54' 50.00" ; LatOff 0.5 ; LonOff 0.0 ; PMODE CalFE ; SCANTime 120
B2021+51 ; CoordinateSystem Equatorial ; Equinox J2000 ; ObjectLongitude 20h 22m 50.00s ; ObjectLatitude +51d 54' 50.00" ; LatOff 0.0 ; LonOff 0.0 ; PMODE Search ; SCANTime 180

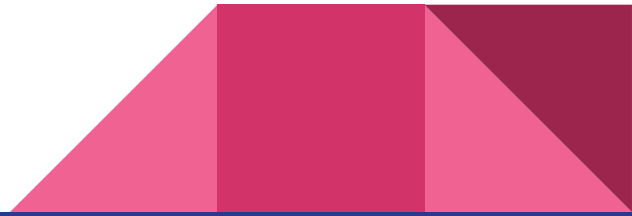
3C048_N_R ; CoordinateSystem Equatorial ; Equinox J2000 ; ObjectLongitude 01h 37m 41.00s ; ObjectLatitude +33d 09' 35.00" ; LatOff 1.0 ; LonOff 0.0 ; PMODE CalFE ; SCANTime 120
3C048_O_R ; CoordinateSystem Equatorial ; Equinox J2000 ; ObjectLongitude 01h 37m 41.00s ; ObjectLatitude +33d 09' 35.00" ; LatOff 0.0 ; LonOff 0.0 ; PMODE CalFE ;

...

Upload the schedule

Upload the schedule to the Scripts directory:

a. Ask the operator for the obseff password
b. $ scp <your schedule> obseff@observer8:/home/obseff/pulsar/Scripts/
c. Check if the schedule is there (usefull for… uhh. borrowing other people's schedules)
   $ ssh obseff@observer8
   $ cd /home/obseff/pulsar/Scripts/
   $ ls <your schedule>



Establish a VNC

1. Download a VNC viewerv (https://www.realvnc.com/en/connect/download/viewer/)
2. Ask the operator for the VNC password
3. Forward ports for VNC connection:

   $ ssh -XfNL 5931:observer8:5931 username@portal.mpifr-bonn.mpg.de

   $ ssh -XfNL 5921:observer8:5921 username@portal.mpifr-bonn.mpg.de

   $ ssh -XfNL 3000:eddinfra0:3000 username@portal.mpifr-bonn.mpg.de

4. Connect to the VNC

3. During the observation

PFP

PFP = Pointing-Focusing-Pointing

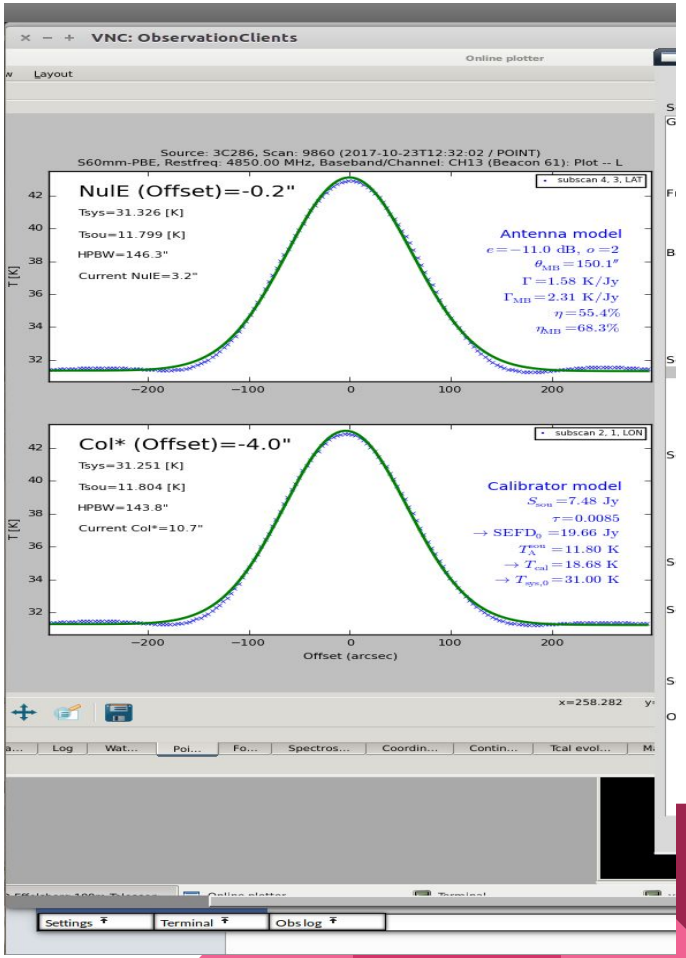
This test allows us create a pointing model.

This is used to ensure that the telescope:

a. Points to the correct spot on the sky
b. Correctly tracks the source on the sky

The operator can do this for you. Just ask!

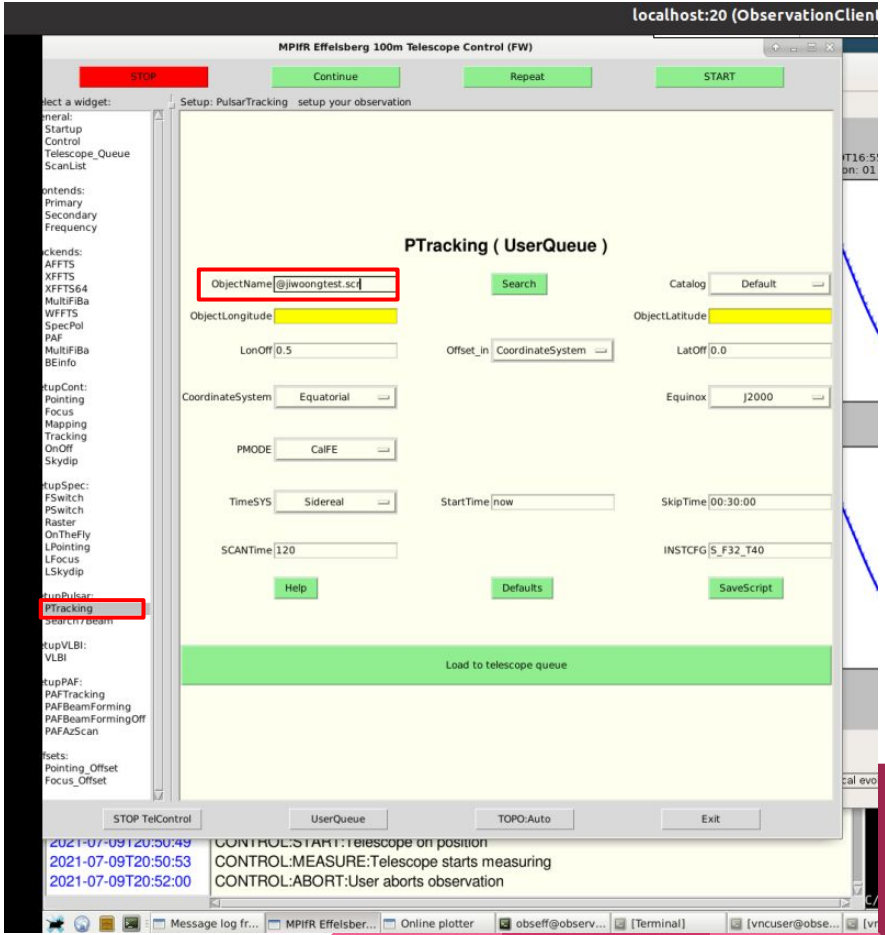
<u>Always start with a PFP</u>



Upload the schedule

1. Your schedule needs to be in this directory:
   /home/obseff/pulsar/Scripts/my_schedule.sch

2. Go to the ptracking tab
3. Set @my_schedule.sch as the ObjectName
4. Load to telescope queue



Grafana Dashboard

Use this to track the progress of the observation

1. Port forward:
   $ ssh -XfNL 3000:eddinfra0:3000 username@portal.mpifr-bonn.mpg.de
2. Connect via your browser

   http://localhost:3000

Current Provision

provision name

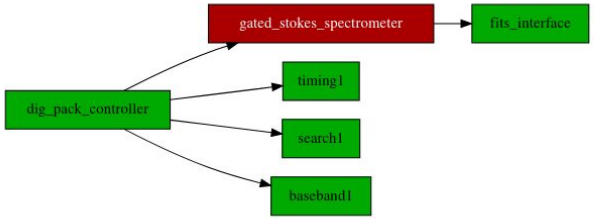
provison_descriptions/P217_PULSAR.yml

Current Status

ready

Messages

Current Configuration Graph



Data reduction pipe visualization

Provisioned EDD Components

- baseband1
- dig_pack_controller
- fits_interface
- gated_stokes_spectrometer
- search1
- TelescopeMeta
- timing1

Dashboard selection

Switch Hardware

Search

Switch Metrics

Version of provision repository used by Master Controller

Master Controller Log

Grafana - Timing

General info

Pipeline processing logs. Heap losses indicate that you are leaking memory!

Live-Folding