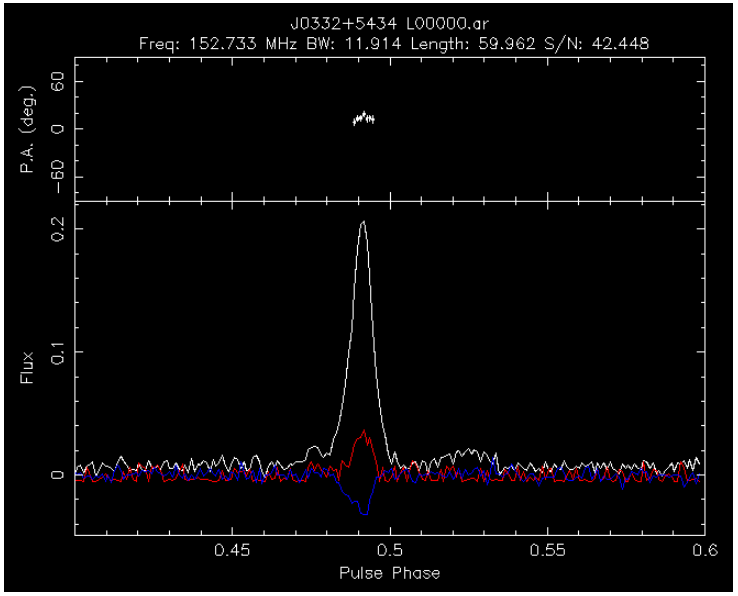
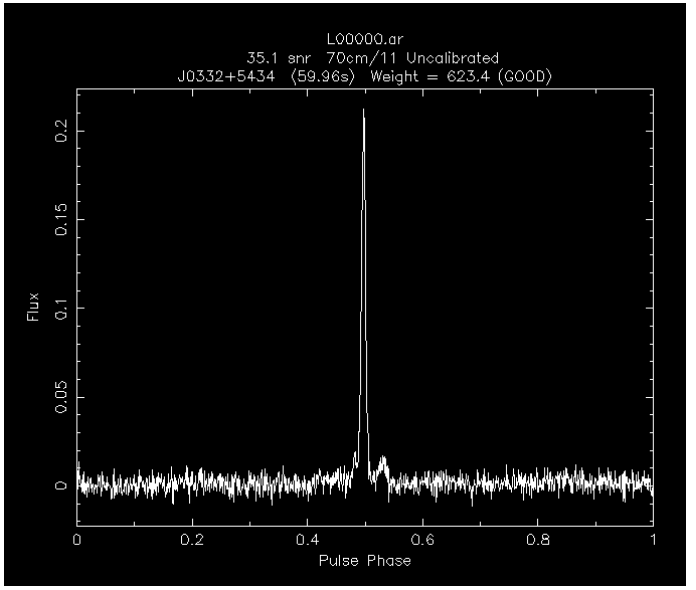
The raw-voltage pipeline and the Jones calibration of baseband data

(Part II:pulsar data calibration in standalone)





Masaya Kuniyoshi, Aris Noutsos , James Anderson[MPIfR]
Ger van Diepen, Joris van Zwieten, Johan Hamaker [ASTRON]
on behalf of the LOFAR collaboration

LOFAR

Max-Planck-Institut für Radioastronomie

MAX-PLANCK-GESELLSCHAFT

Road map for the BF calibrated pulsar profile

(Bonn stand alone mode)

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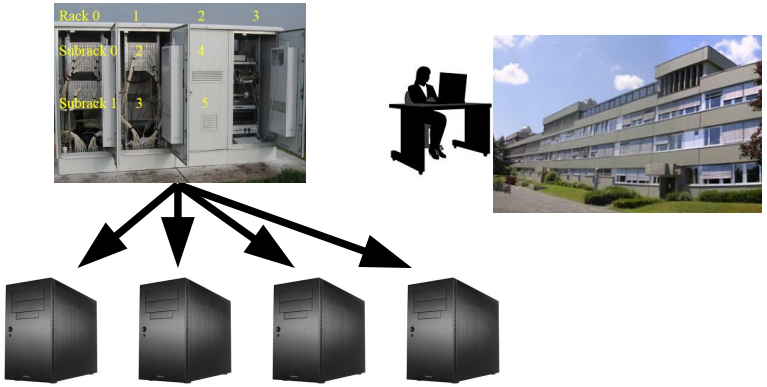
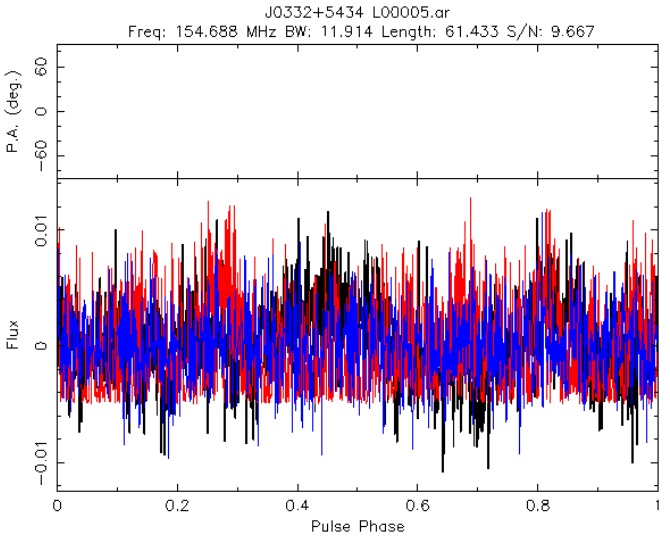
8. Calibrated pulsar profiles

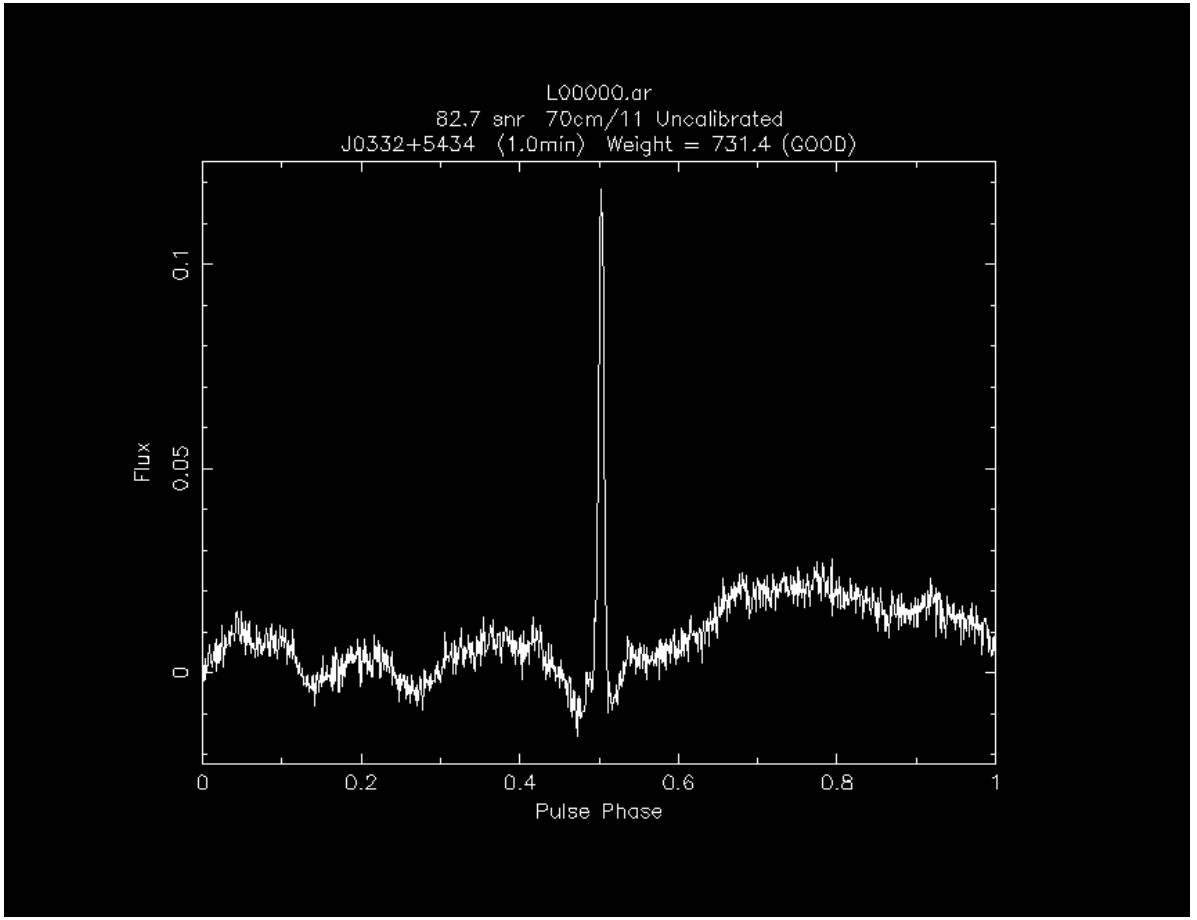




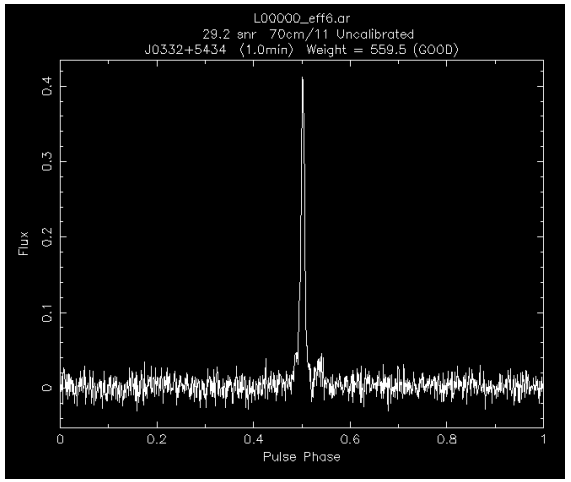
psr0329+54

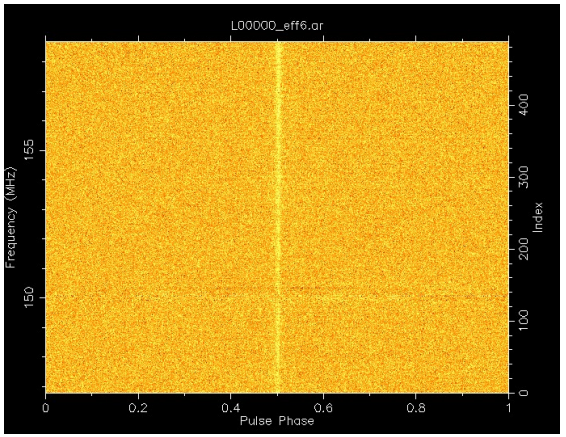
(Bonn standalone)

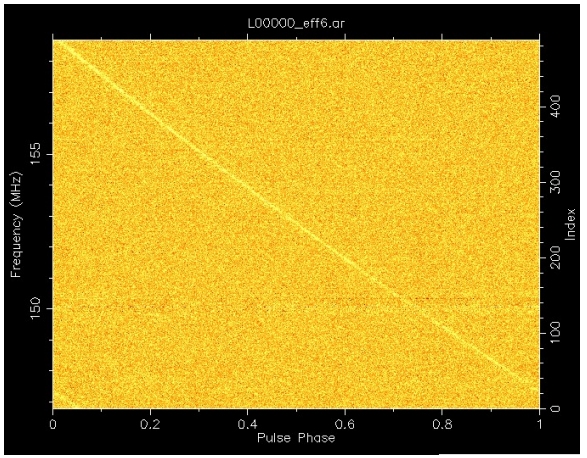
Bf2puma2_eff5 [8bit]
(re-sampling from 16 to 8 bits)



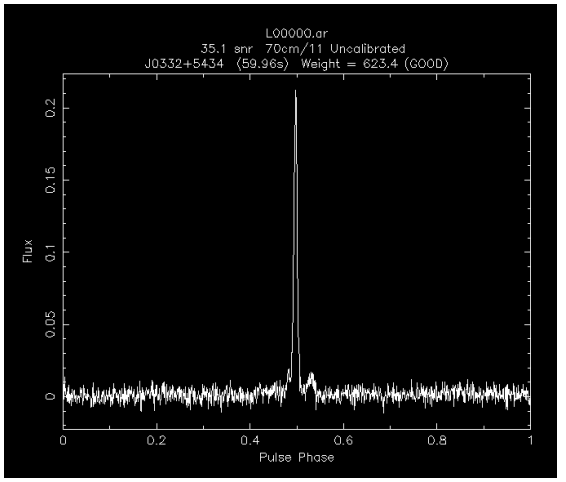
bf2puma2_eff6

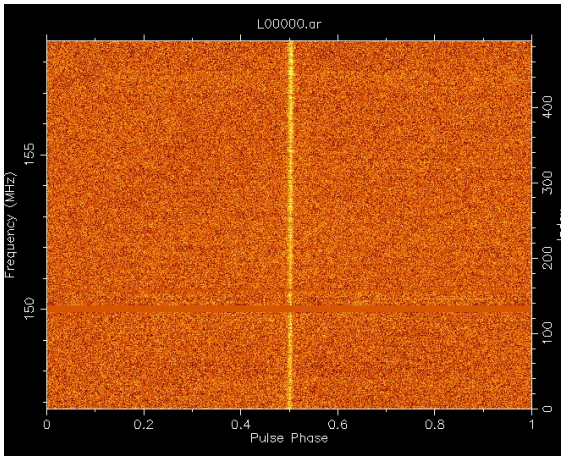


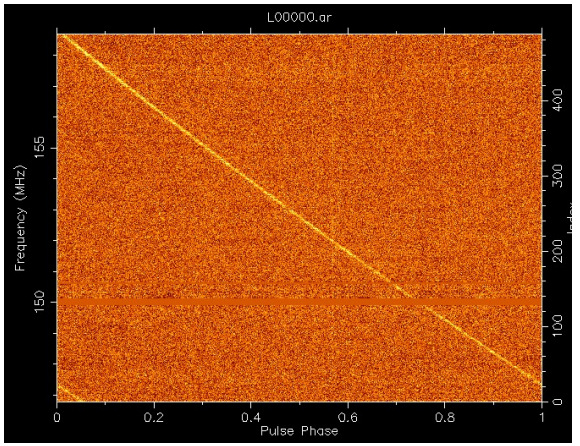




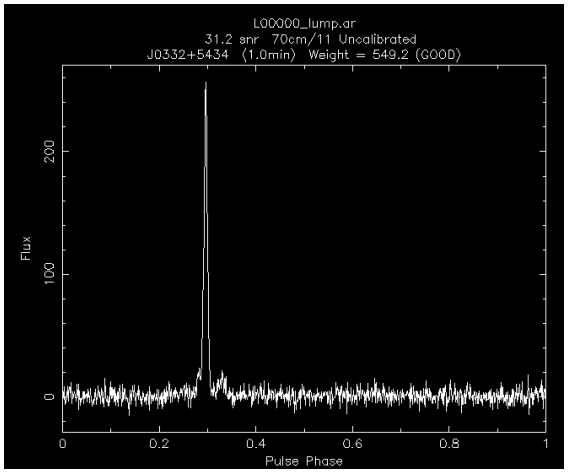
Bf2puma2wcal

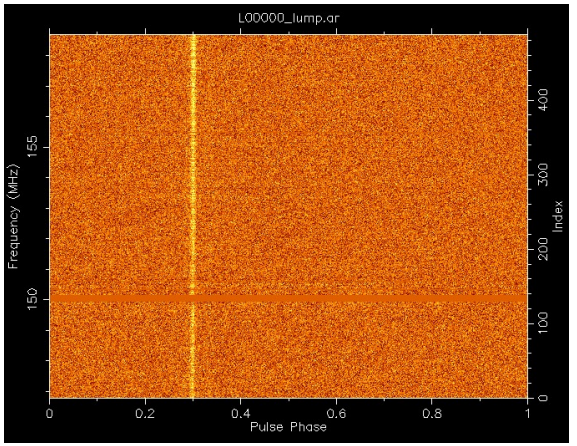


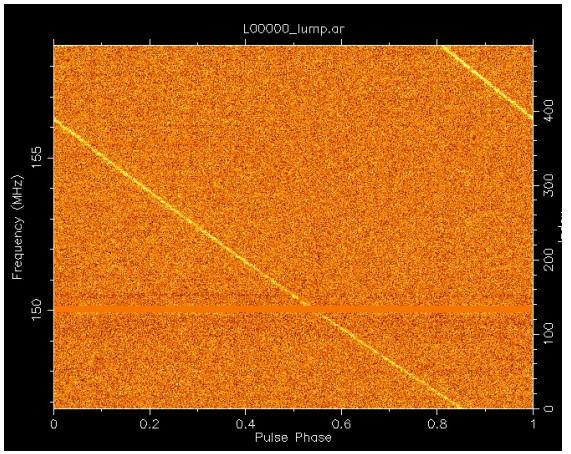




bf2lump







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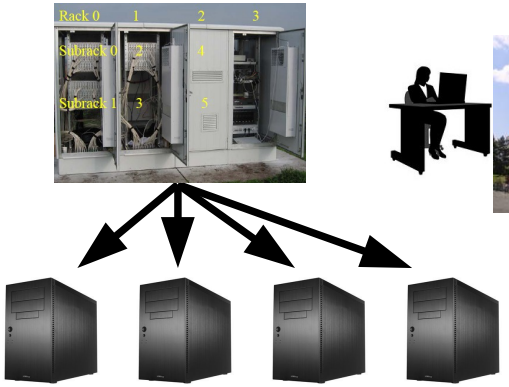
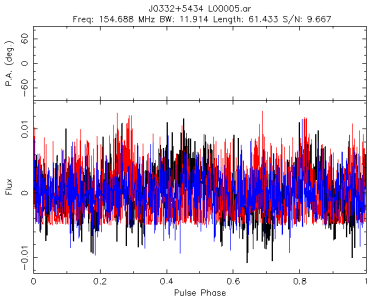
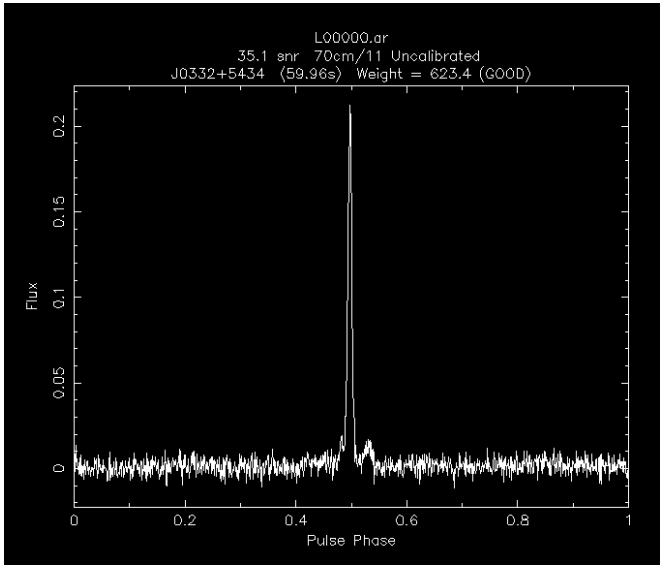






Calibration of BF data with Jones matrices $\mathbf{J}_{(f,t)}$

makems

makems.cfg

makebeamtable

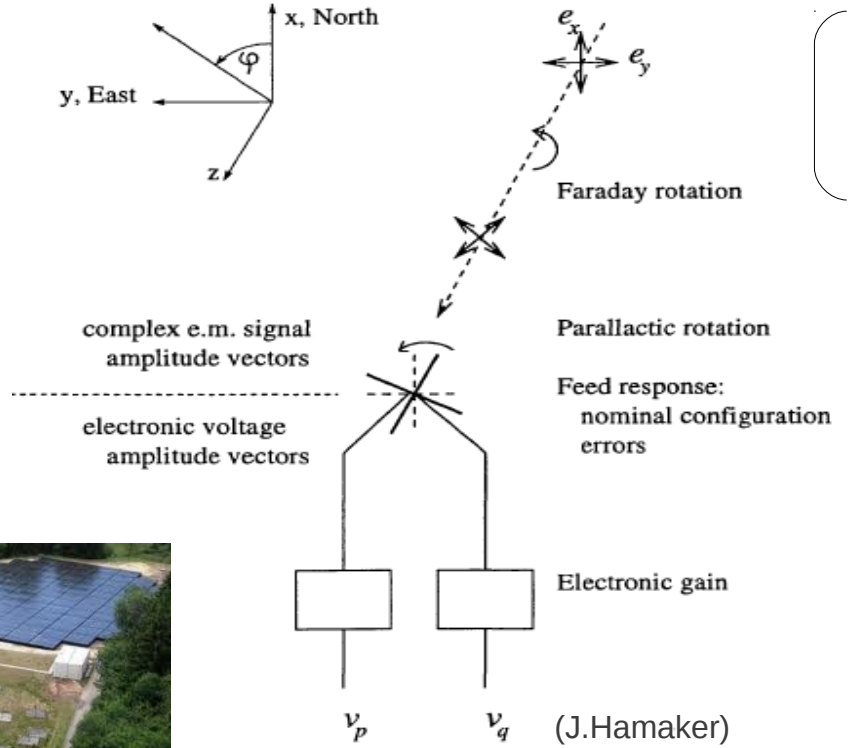
AntennaSets.conf

StaticMetaData

⋮

Fake Measurement Set (FMS) → Stationresponse class

Beam pointing, time
Observing frequency
Station info....



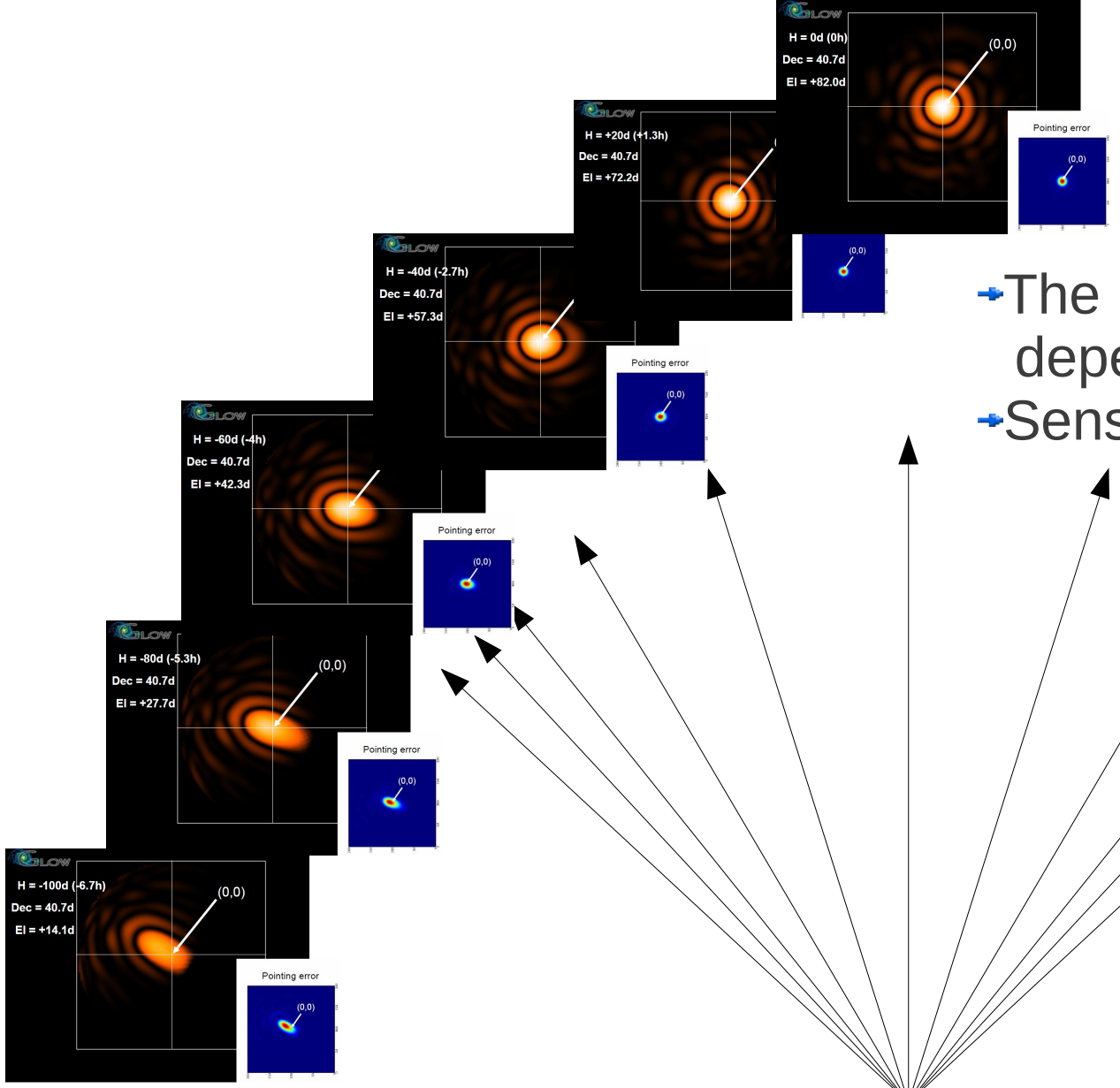
(J.Hamaker)

E-Jones

$$\begin{pmatrix} J_{(f,t)}_{00} & J_{(f,t)}_{01} \\ J_{(f,t)}_{10} & J_{(f,t)}_{11} \end{pmatrix}$$

$$\boldsymbol{e}_{\text{out}}(t) = \boldsymbol{J}\boldsymbol{e}_{\text{in}}(t)$$

$$\boldsymbol{e} = \begin{pmatrix} e_x \\ e_y \end{pmatrix}$$



- The rate of change of the beam depends on the EL and AZ.
- Sensitivity changes.

E-Jones

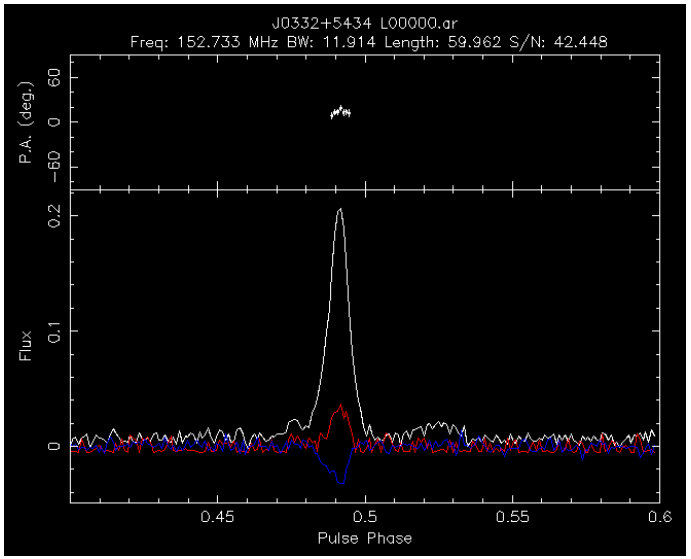
$$\begin{pmatrix} J_{(f,t)}^{00} & J_{(f,t)}^{01} \\ J_{(f,t)}^{10} & J_{(f,t)}^{11} \end{pmatrix}$$

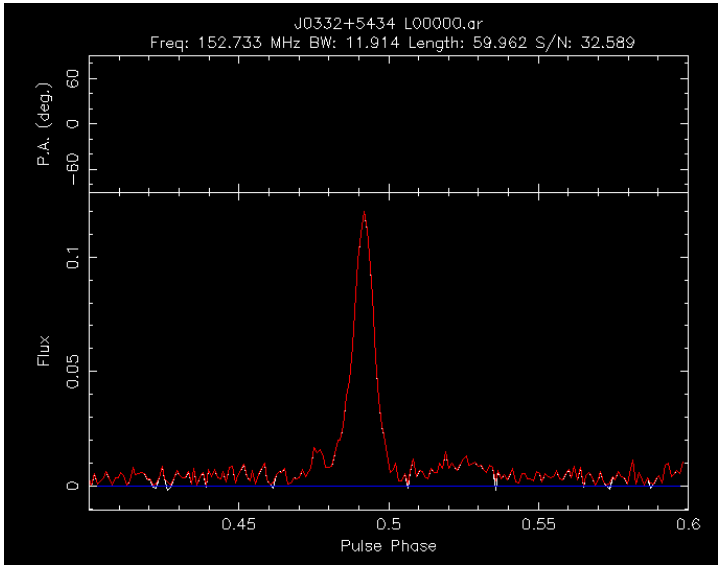
East

West

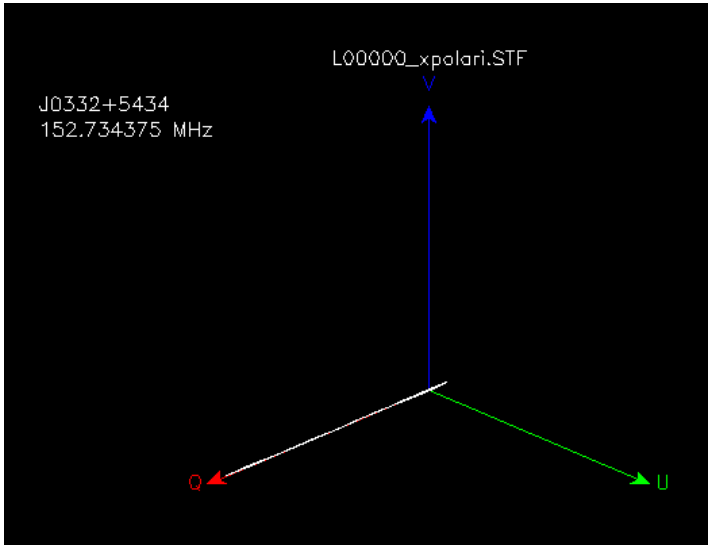
Pipeline test is successful

$$J=\begin{pmatrix} 1 & 0 \\ 0 & 0 \end{pmatrix}$$

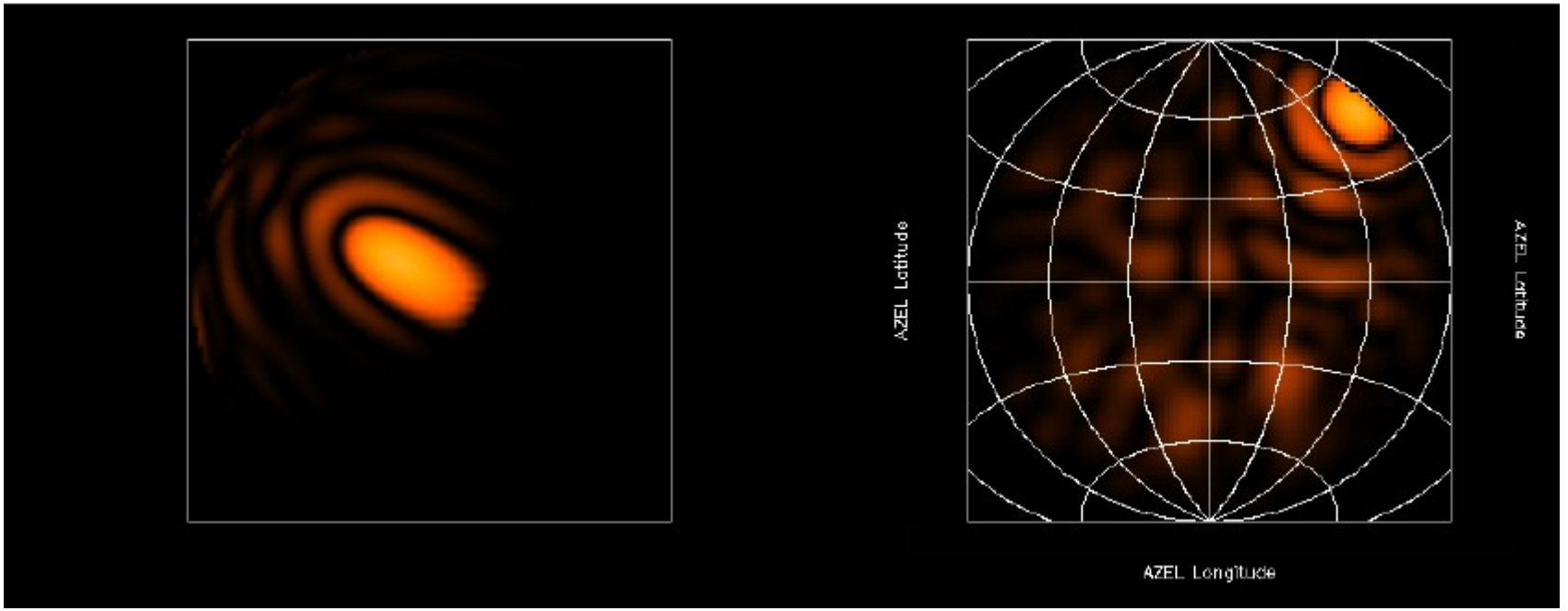




$$J=\begin{pmatrix} 1 & 0 \\ 0 & 0 \end{pmatrix}$$



Difference between sky and ground frame



Sky frame

Ground frame

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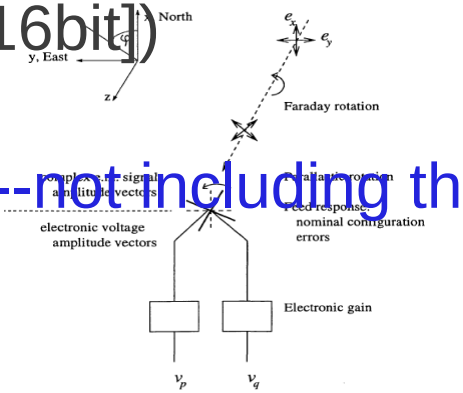

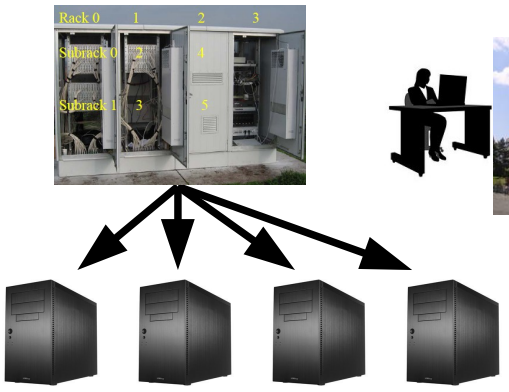

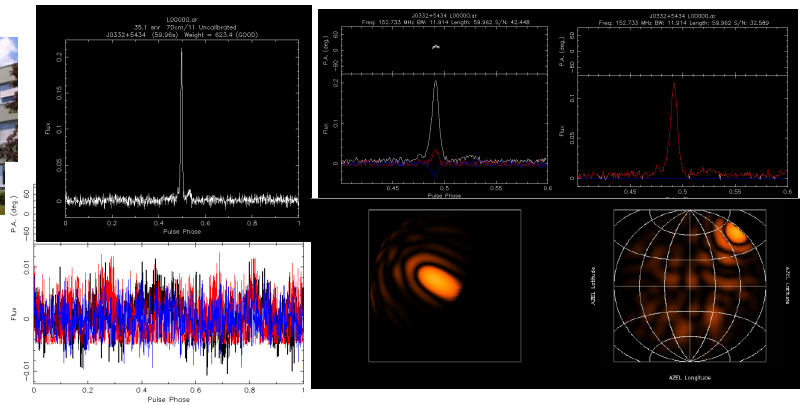

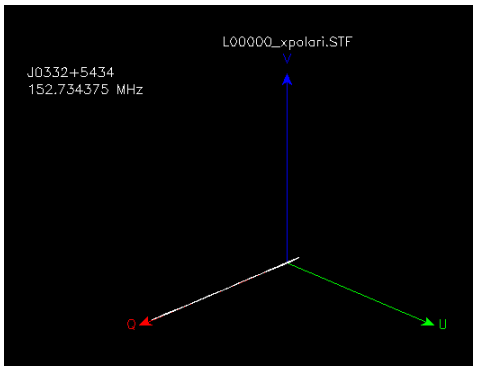

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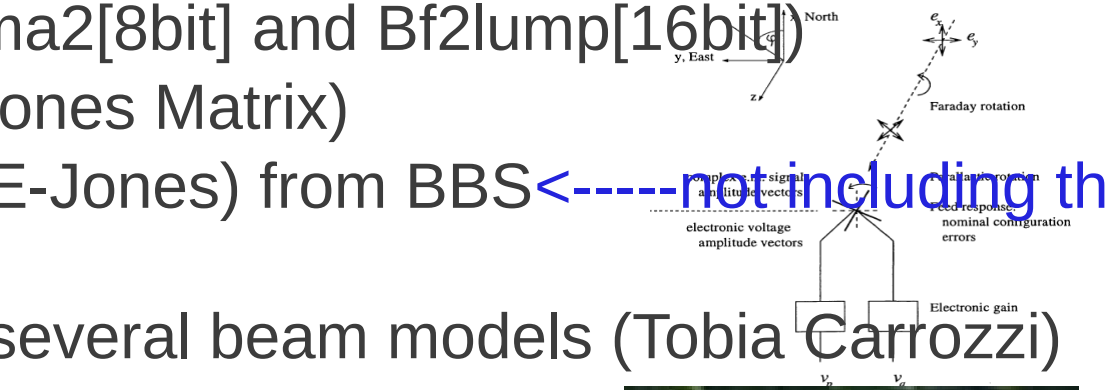

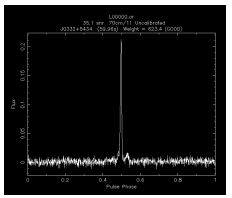

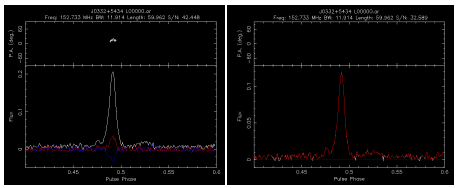

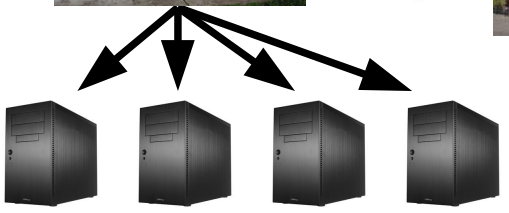

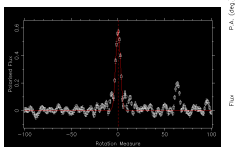

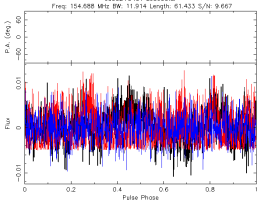

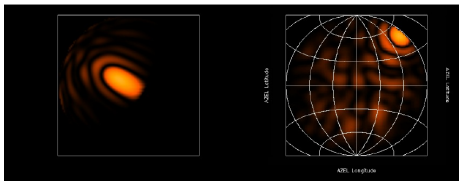

Thank you