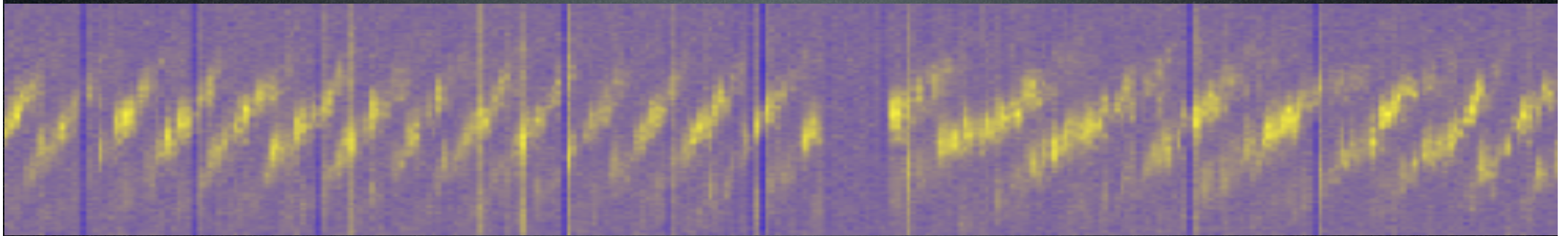


Summary of Pulsar Busy Week 4

Observing with multiple LOFAR stations

See also: “Pulsar Busy Week 4
Mid-Week Progress Report” (LSM 090923)



Jason Hessels

on behalf of

LOFAR Pulsar Working Group (Asgekar, Alexov,
Hassall, Noutsos, Stappers, van Leeuwen)

ASTRON HPC Group (de Jong, Mol)



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Pulsar Busy Week 4: Goals

- LBA pulsar observations - Done (prior to PBW4)
- Effelsberg pulsar observations - Done (prior to PBW4)
- bf2h5 (HDF5 write) devel./tests - Done (prior to PBW4)
- Incoherent station summation - Done
- Simultaneous pulsar/imaging observations - Done/In Prog.
- Full Stokes pulsar observations - Done
- Simultaneous LBA/HBA observations
- Simultaneous Coh./Inc. observations - Done
- Multiple stations recorded separately - Done
- Fly's Eye observation
- Blank sky observation - Done
- All-weekend observation - Done
- 10-min. obs of 12+ pulsars
- Test various beam shapes - Done



PBW4: Worked with 5 Dutch Stations

Station/Item	Cabinet	LBA	HBA	Fibre	CEP connection	Validated
CS302						
RS307						
RS503						
RS106						
RS208						
CS030						
CS401						
CS021						
CS032						
RS306						
CS301						
CS501						
RS509						
CS103						
CS001						
CS002						
CS003						
CS004						
CS005						
CS006						
CS007						
CS024						
CS201						
CS101						
CS026						
RS205						
CS017						
RS104						
RS205						
Effelsberg						
Tautenburg						
Garching						
Totals	26	26	14	10	10	6

Tied-array
Beams

Roughly speaking,
beam-formed
modes trade spatial
resolution for time
resolution.

Station Beam

Element Beam

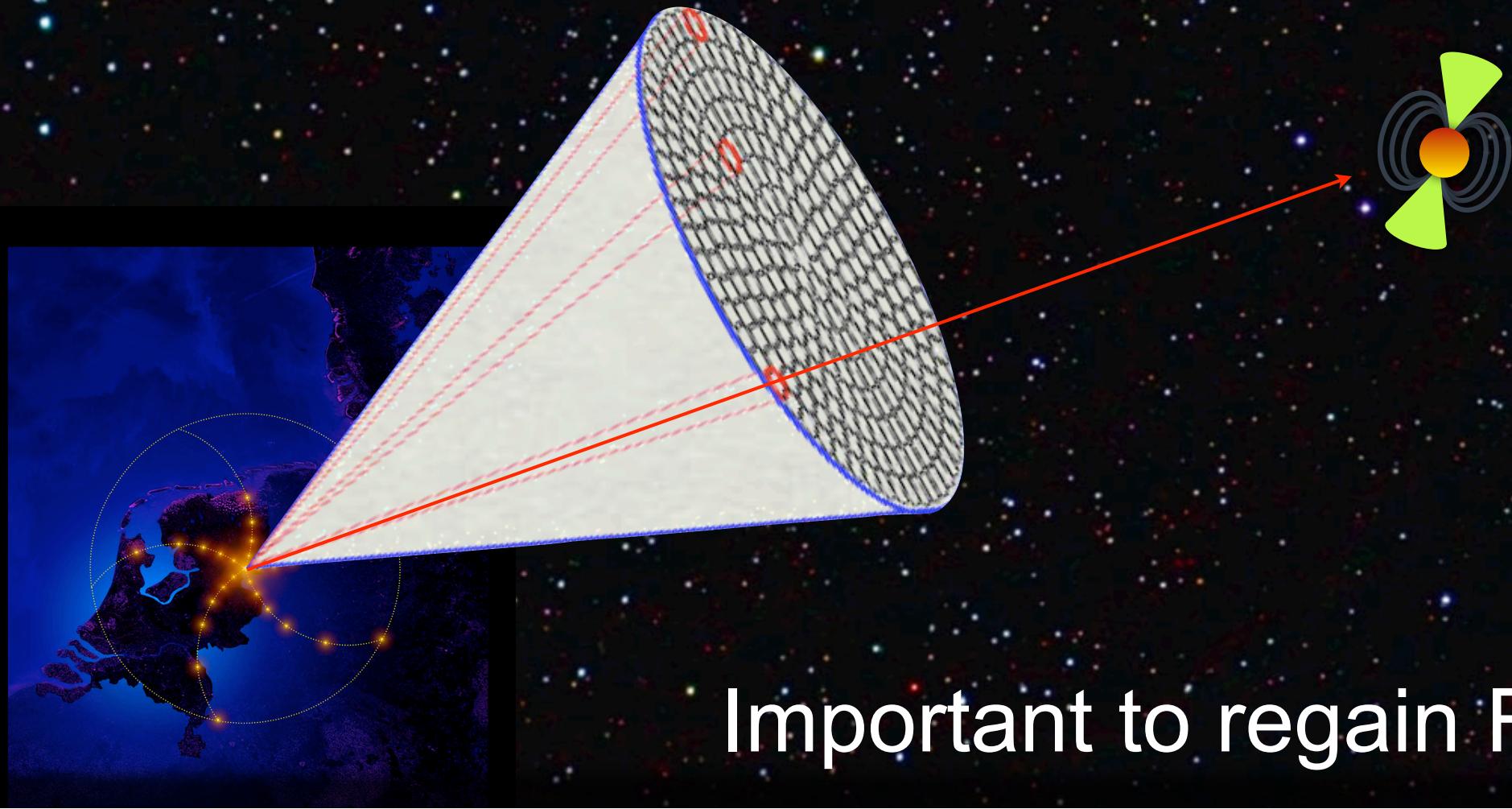


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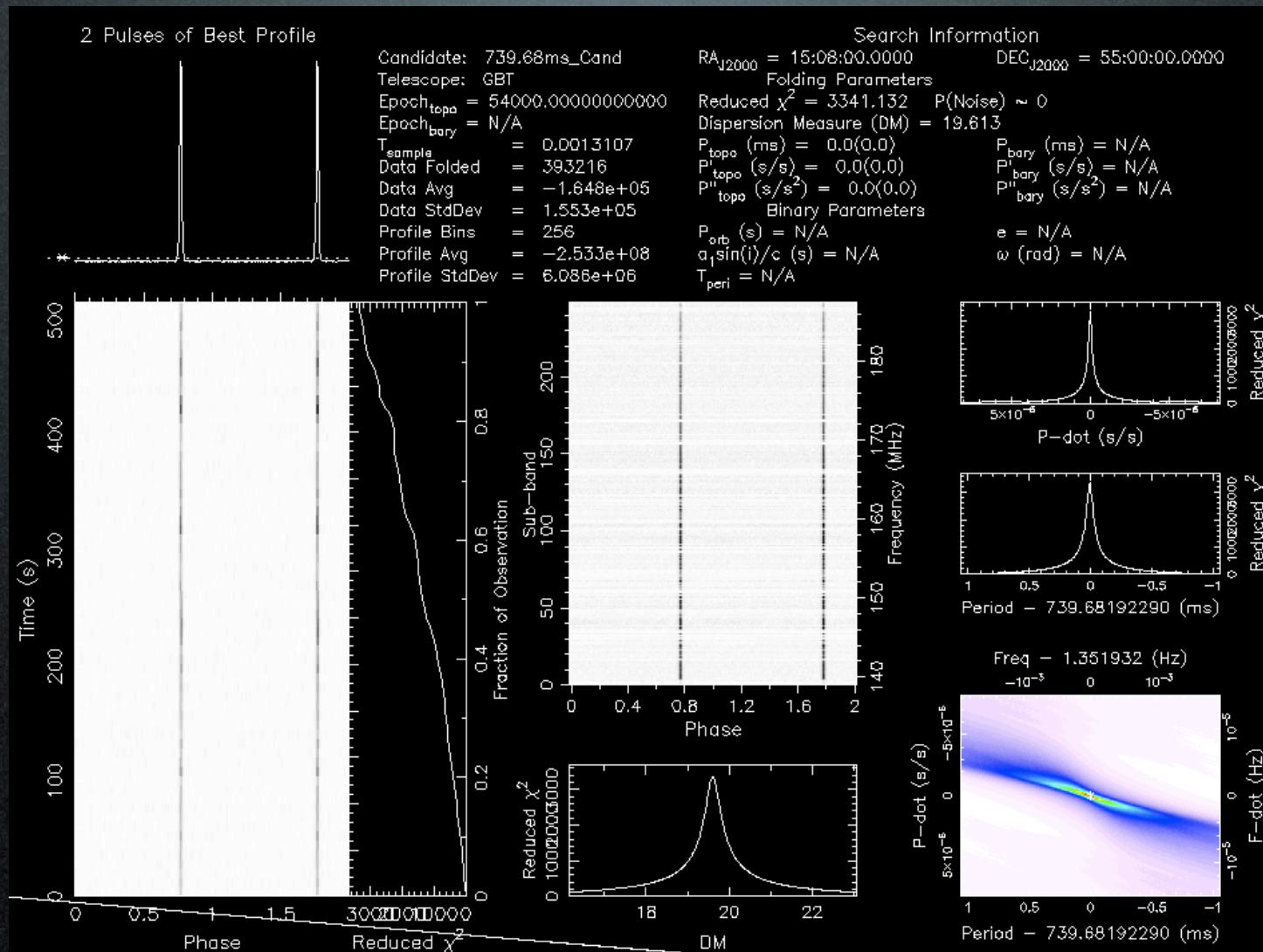
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Tile-out Primary Beam with Many “Tied-Array” Beams

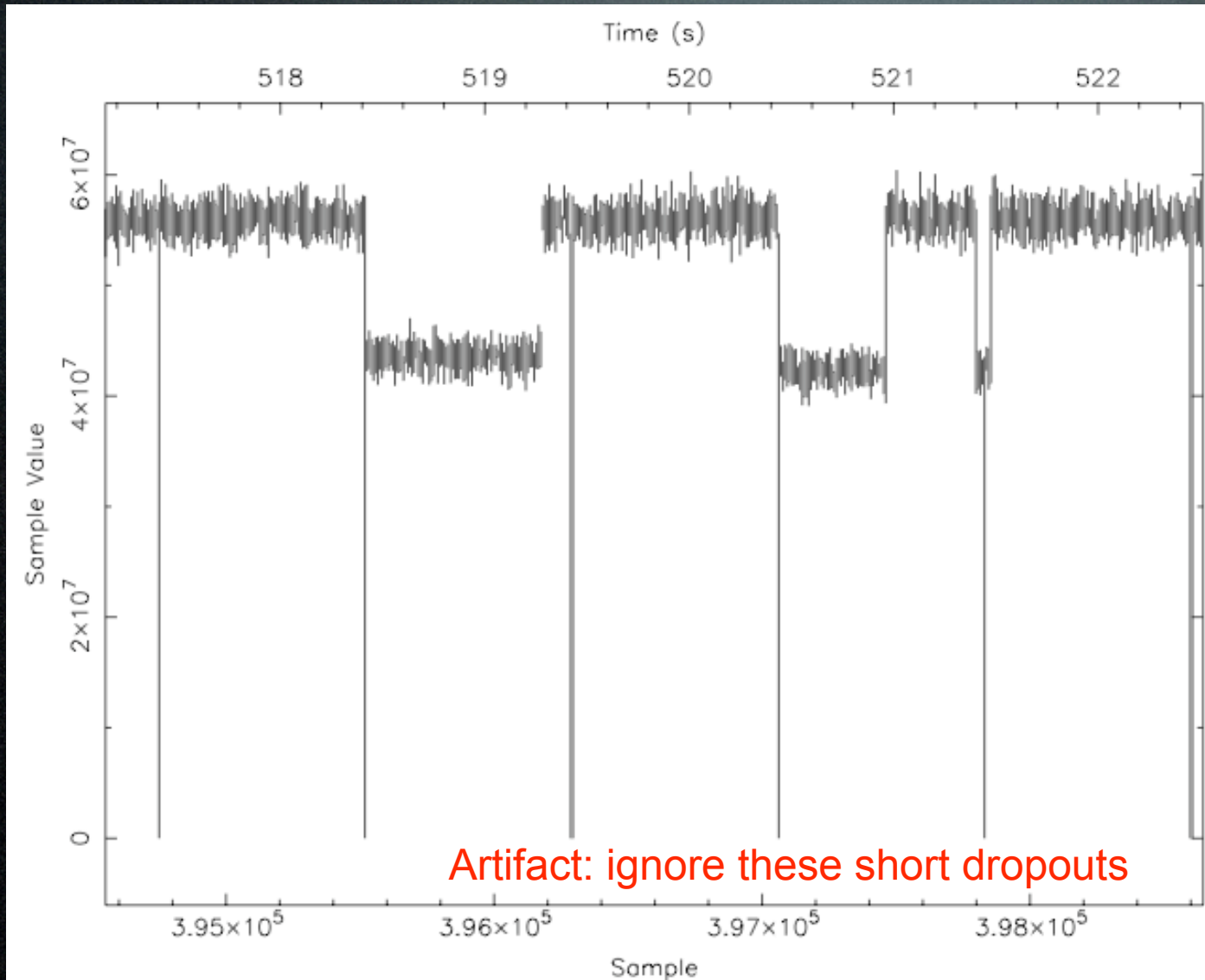


Important to regain FoV

PSR B1508+55: RS106+RS208+CS302+RS307+RS503 Summed Incoherently - Corrected for station dropouts



PSR B0950+08: RS106+RS208+CS302+RS307 Summed Incoherently - Station Dropouts

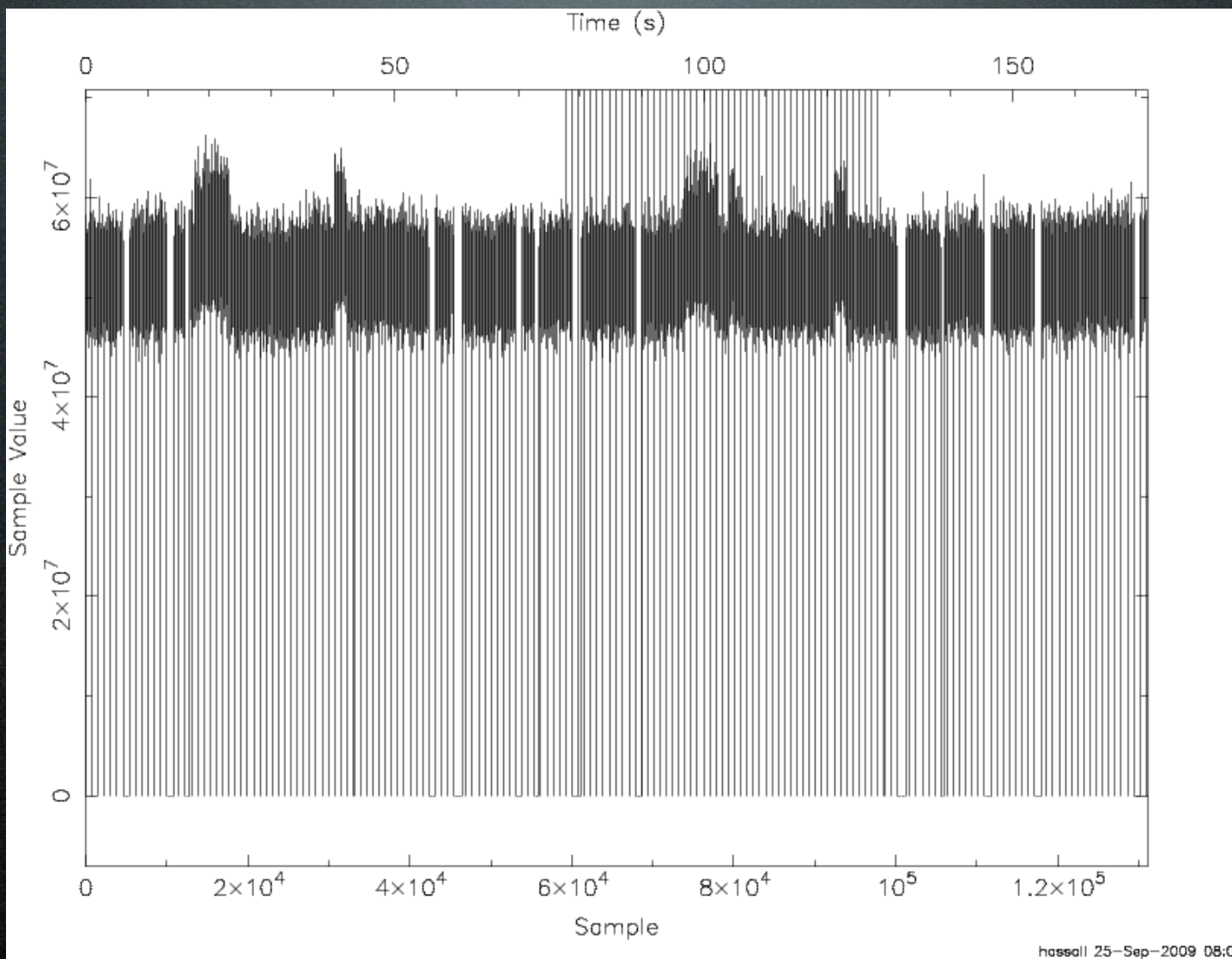


4 Stations

3 Stations

Other Strange Steps in the Data

L2009_14511 CS302 1 subband



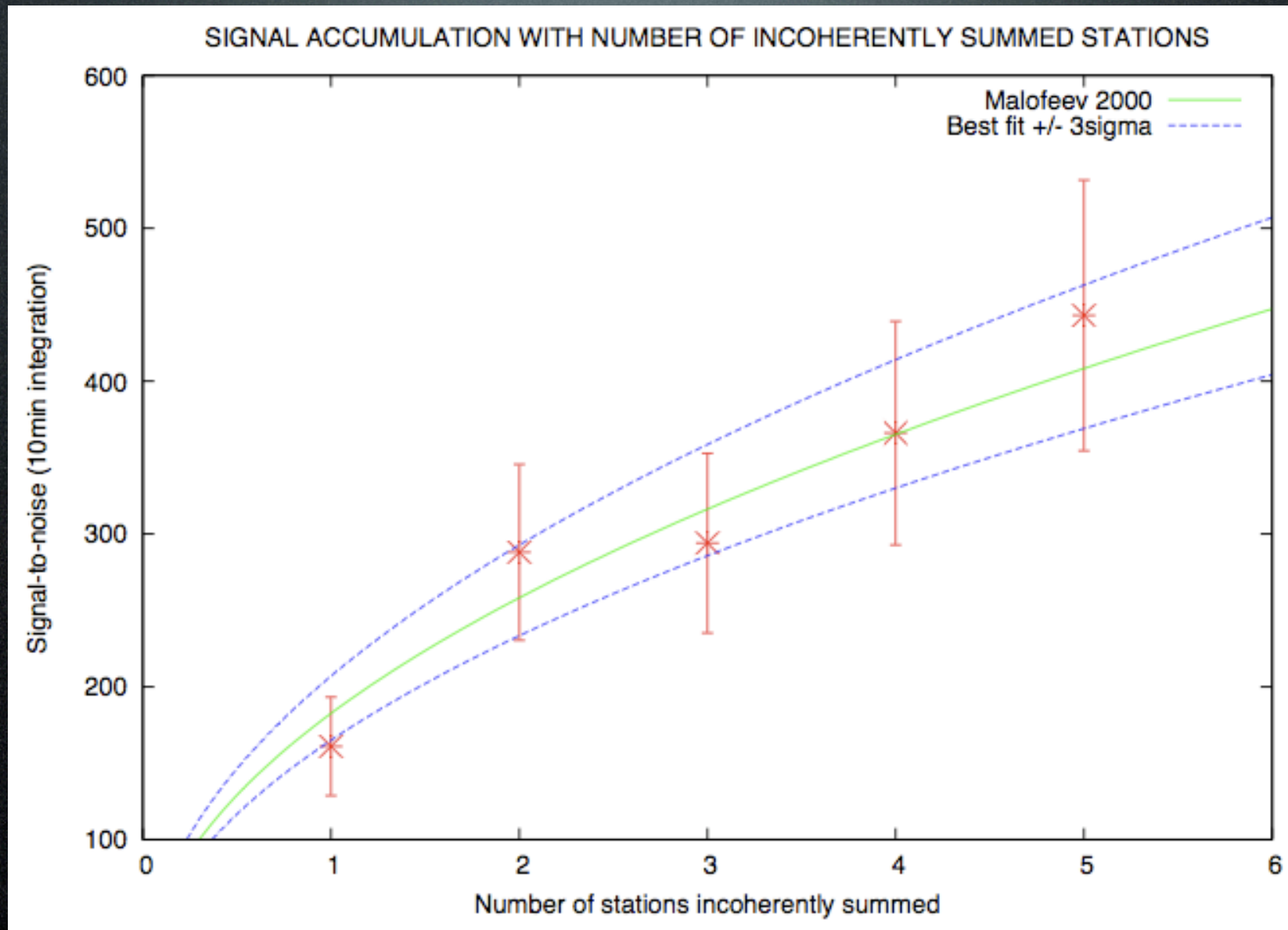
Other Strange Steps in the Data

L2009_14511 CS302 1 subband



Saw with Stefan Wijnholds that this appears even in single tiles and single subbands. i.e. this isn't happening on BG/P

Scaling of SNR for an Incoherent Sum

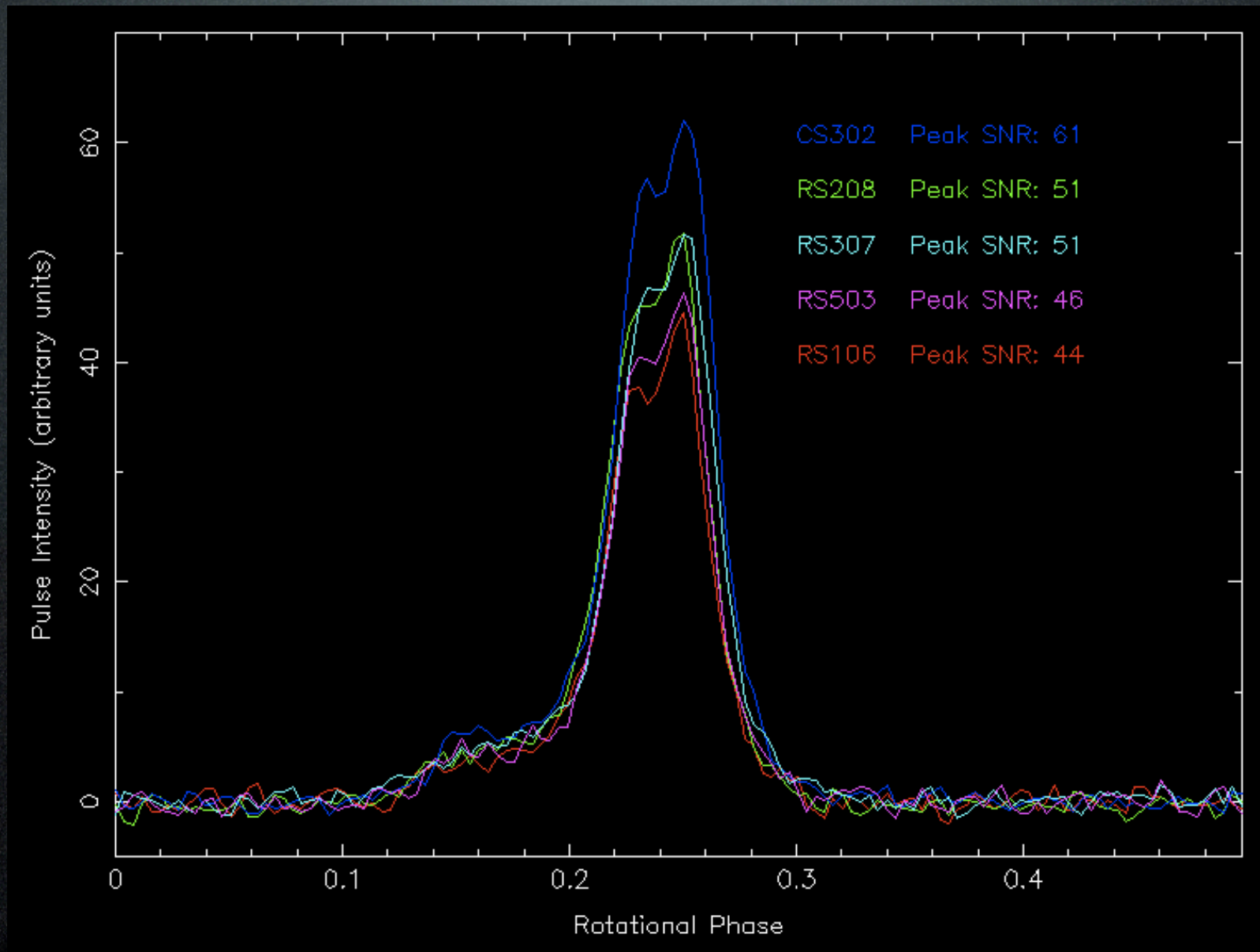


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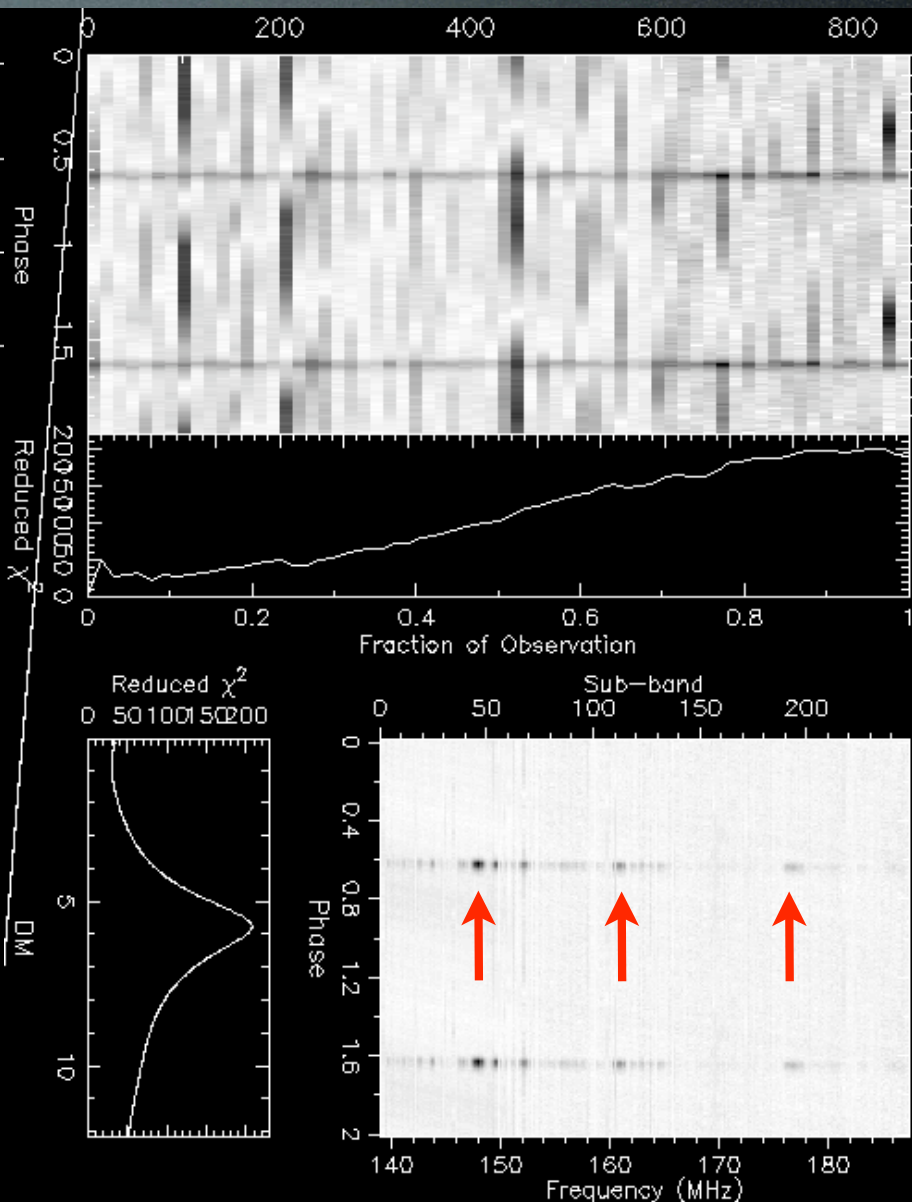
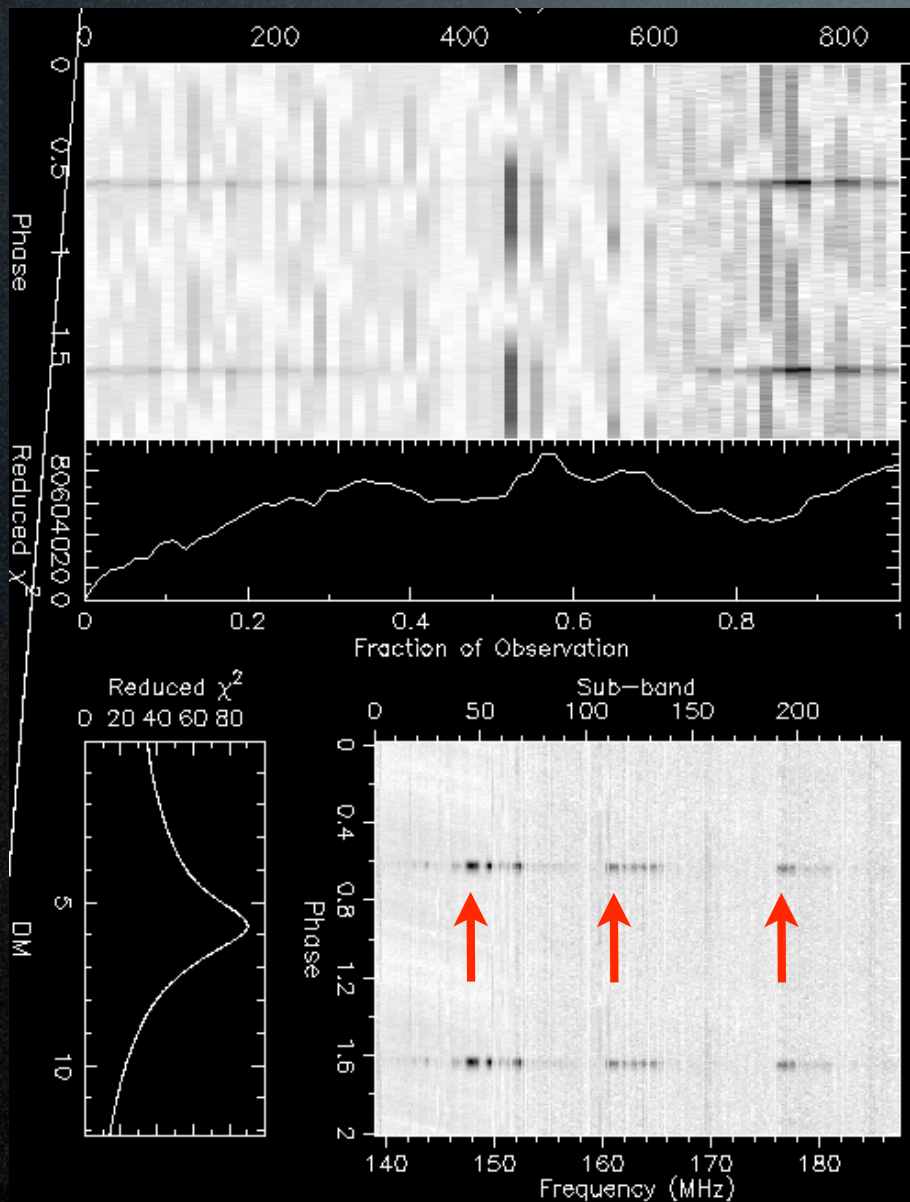
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5 Stations Simultaneously, Unsummed



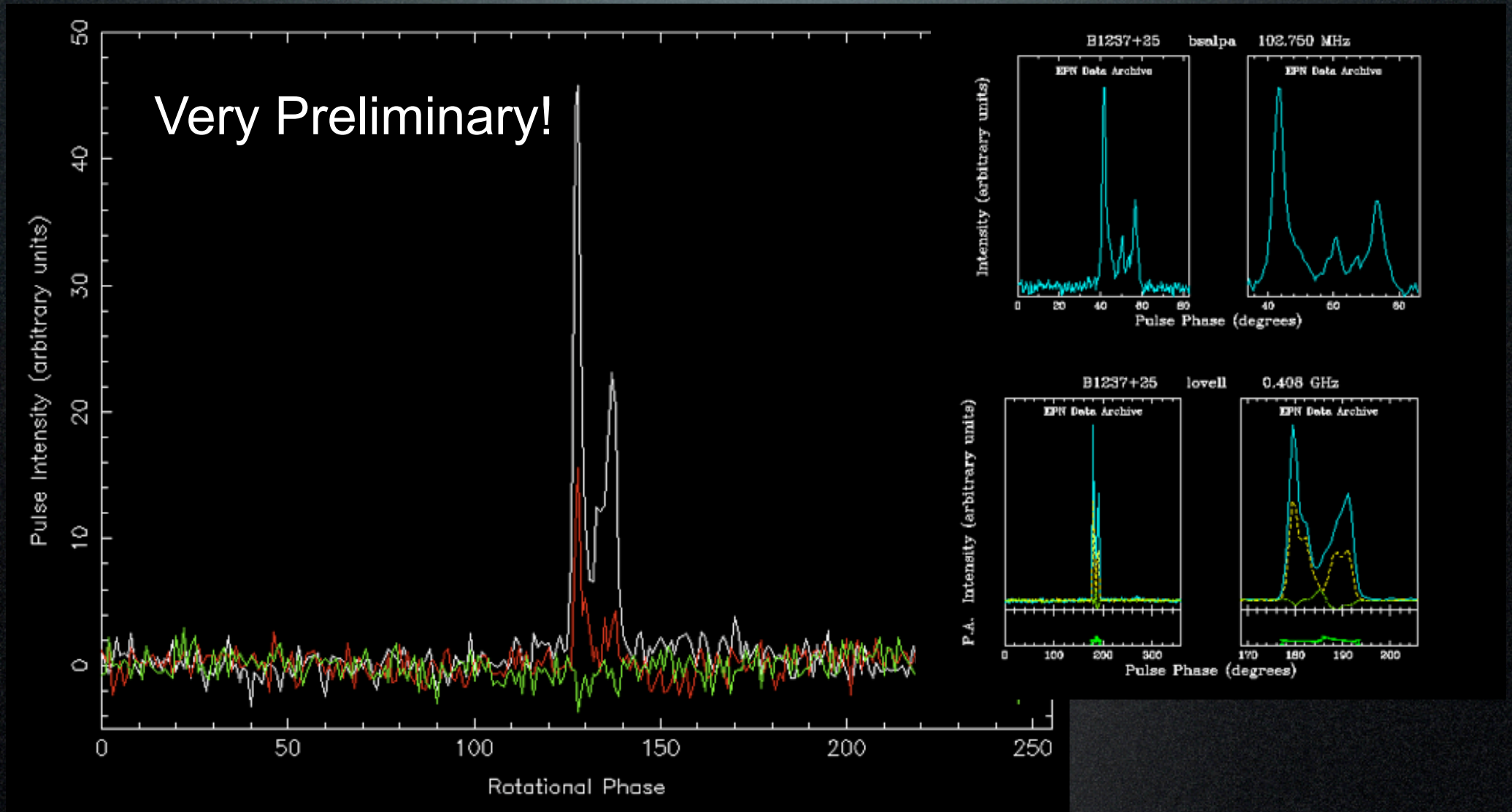
Coherent vs. Incoherent Addition (Simul.)

Uncalibrated Coherent Addition

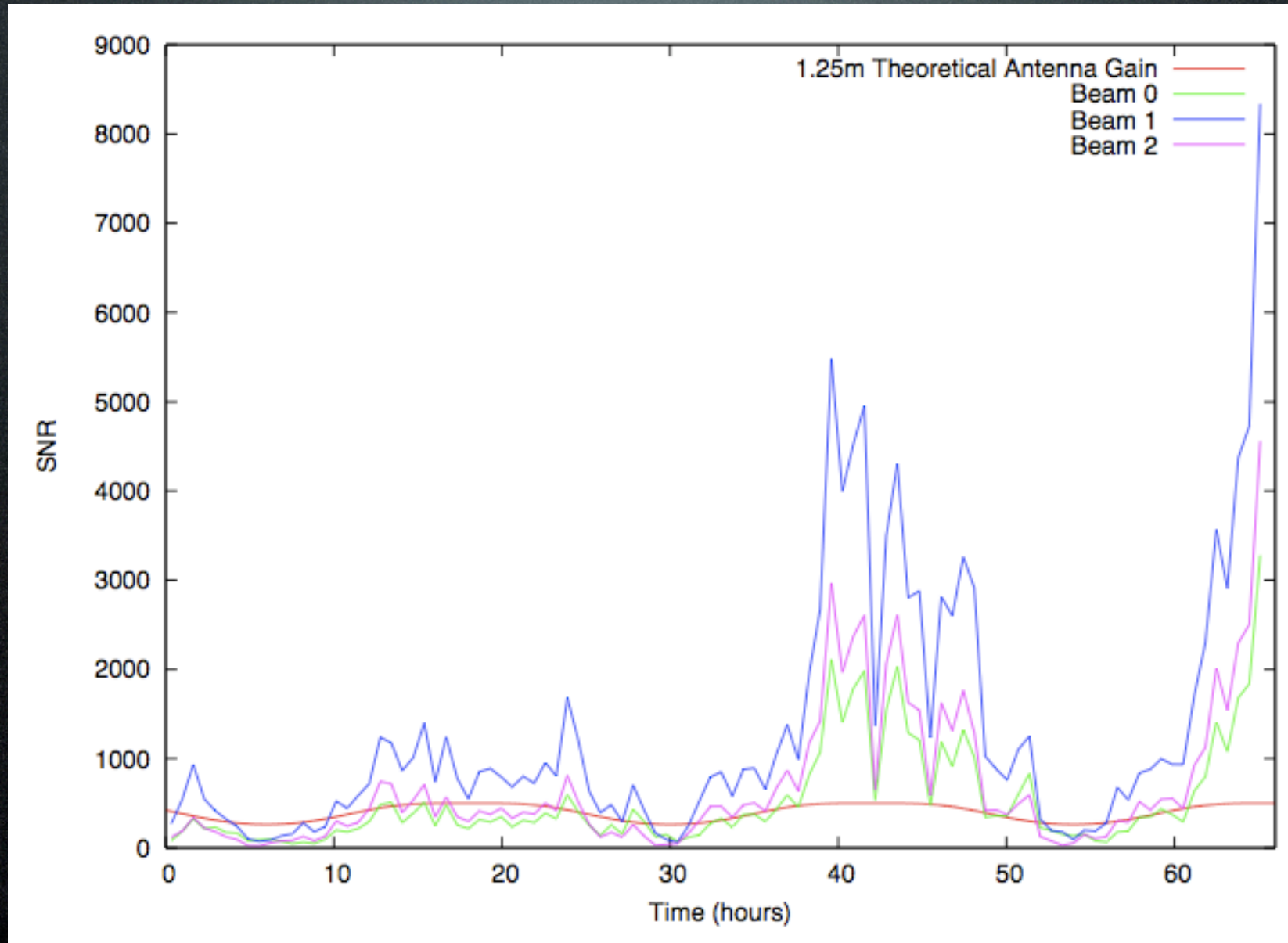


Uncalibrated Incoherent Addition

First Steps Towards a Polarimetric Mode



64-hrs on B0809+74 (3 stations separate)



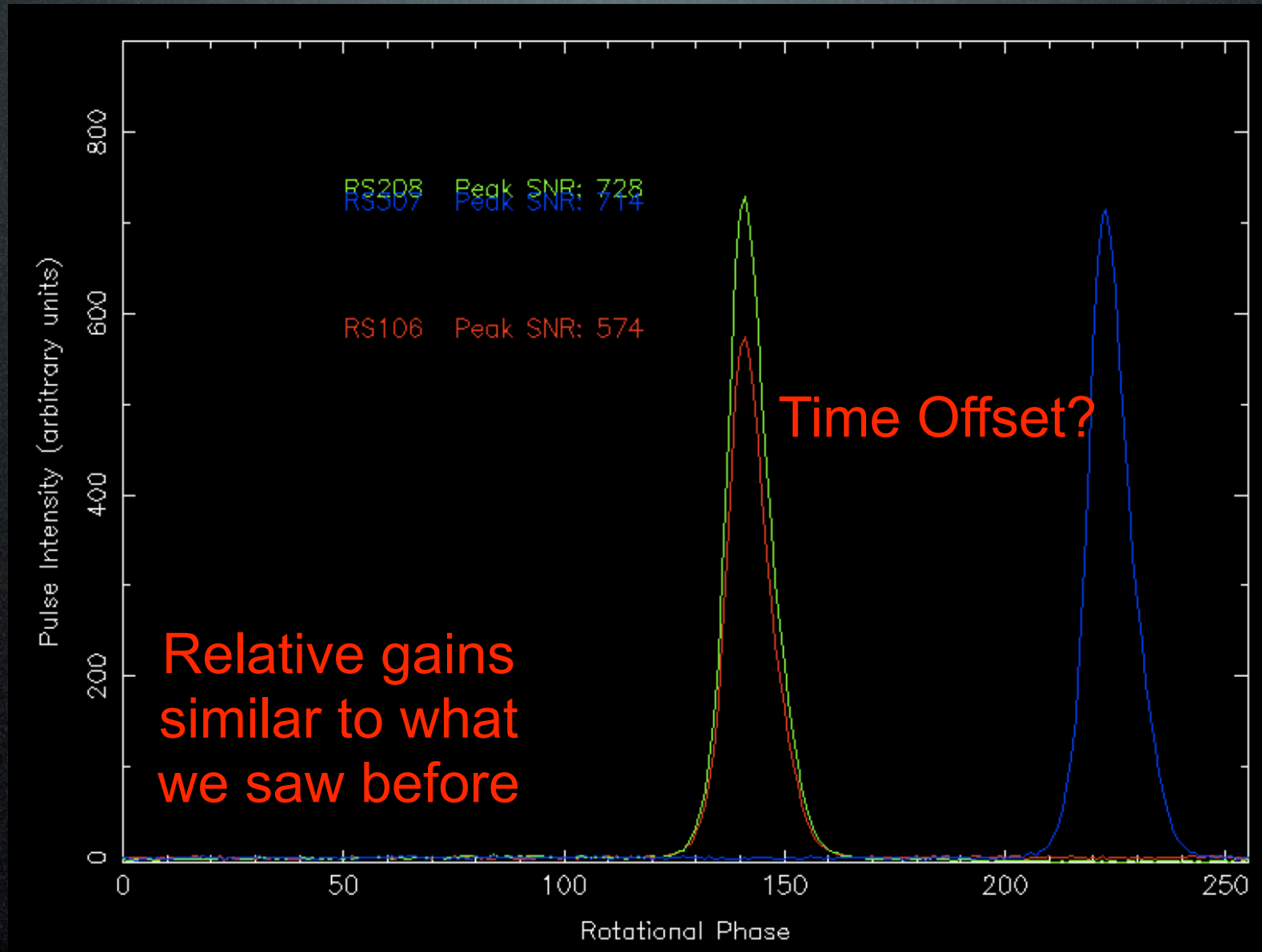
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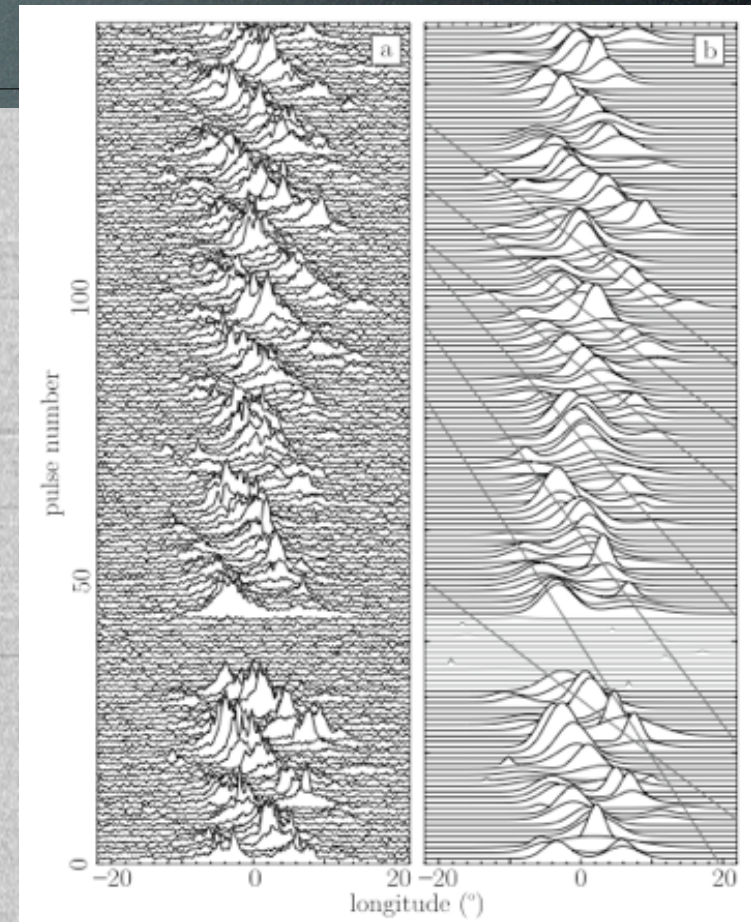
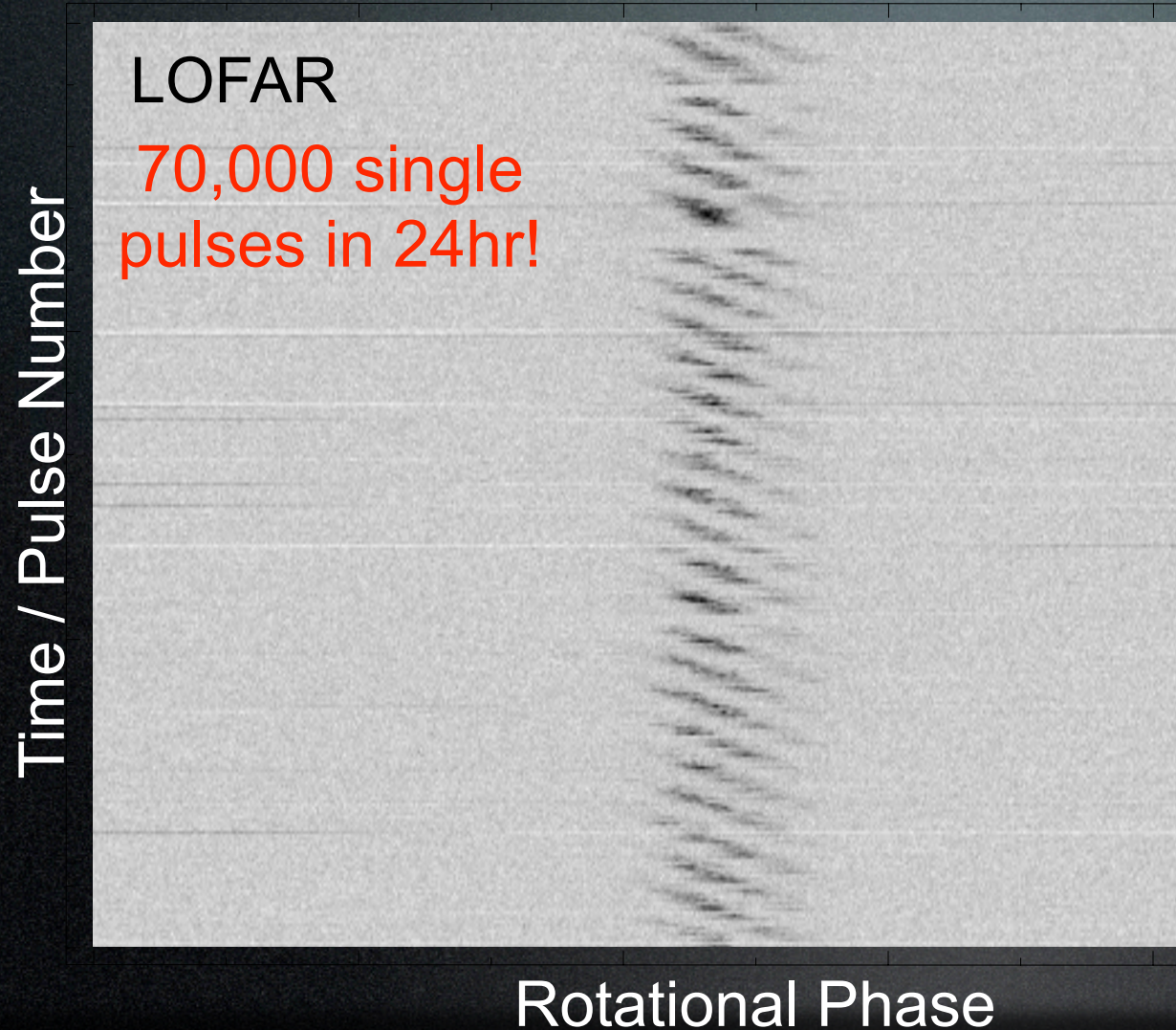
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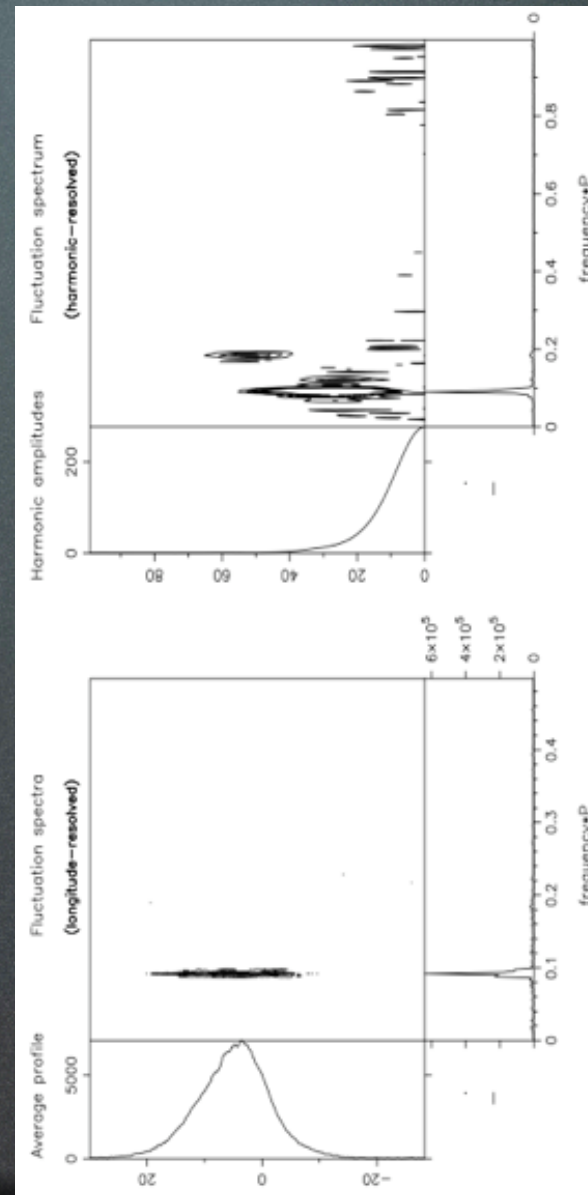
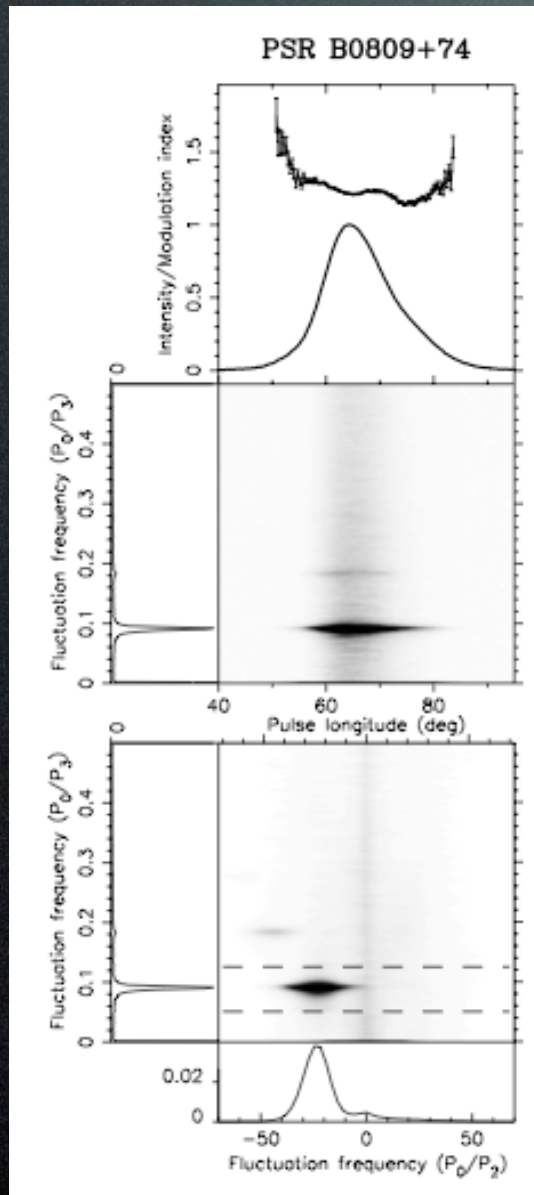
64-hrs on B0809+74 (3 stations separate)



Drifting Subpulses of B0809+74



Drifting Subpulses of B0809+74



LOFAR

Rankin et al. 2006
with WSRT

Summary

- First successful observations with an incoherent summation of stations.
- Sensitivity appears to follow the expected square-root-number-of-stations scaling.
- Simultaneous pulsar/imaging observation: debugging still needed.
- First attempts at polarization observations.
- Comparison of coh./inc. summation.
- PBW5 from Nov. 30th - Dec. 4th: use Superterp, hopefully coherently added.