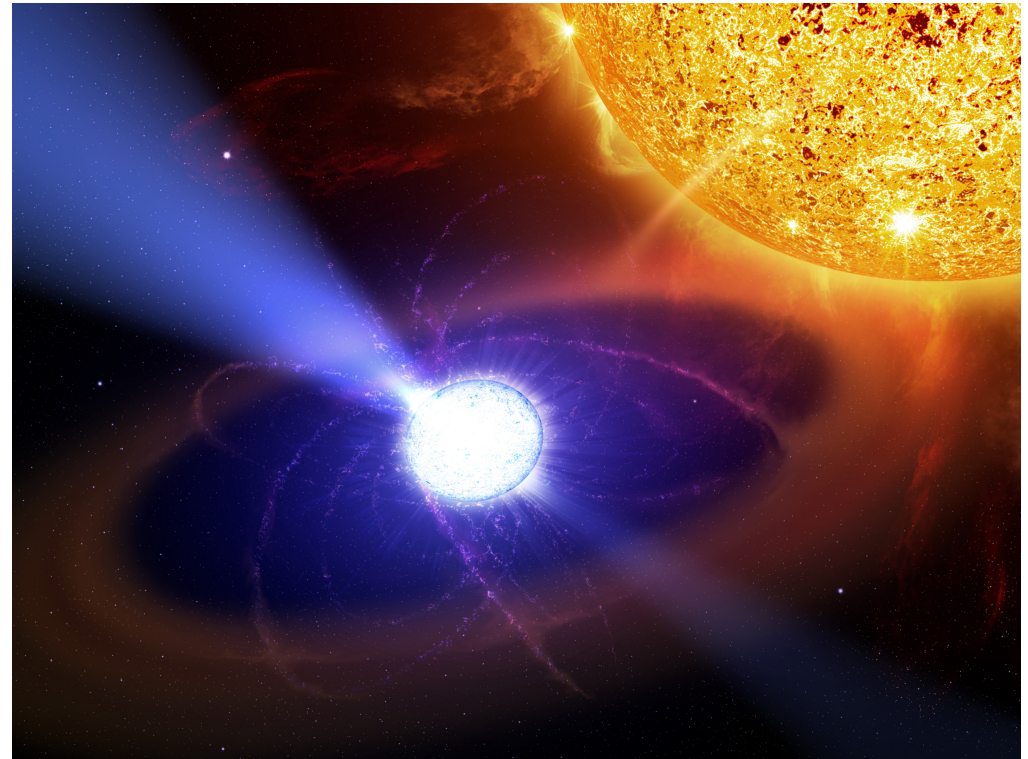


Single Station LOFAR Processing

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David Mulcahy
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Philippe-A. Bourdin



Tutors: Aris Noutsos, James Anderson, Masaya Kuniyoshi

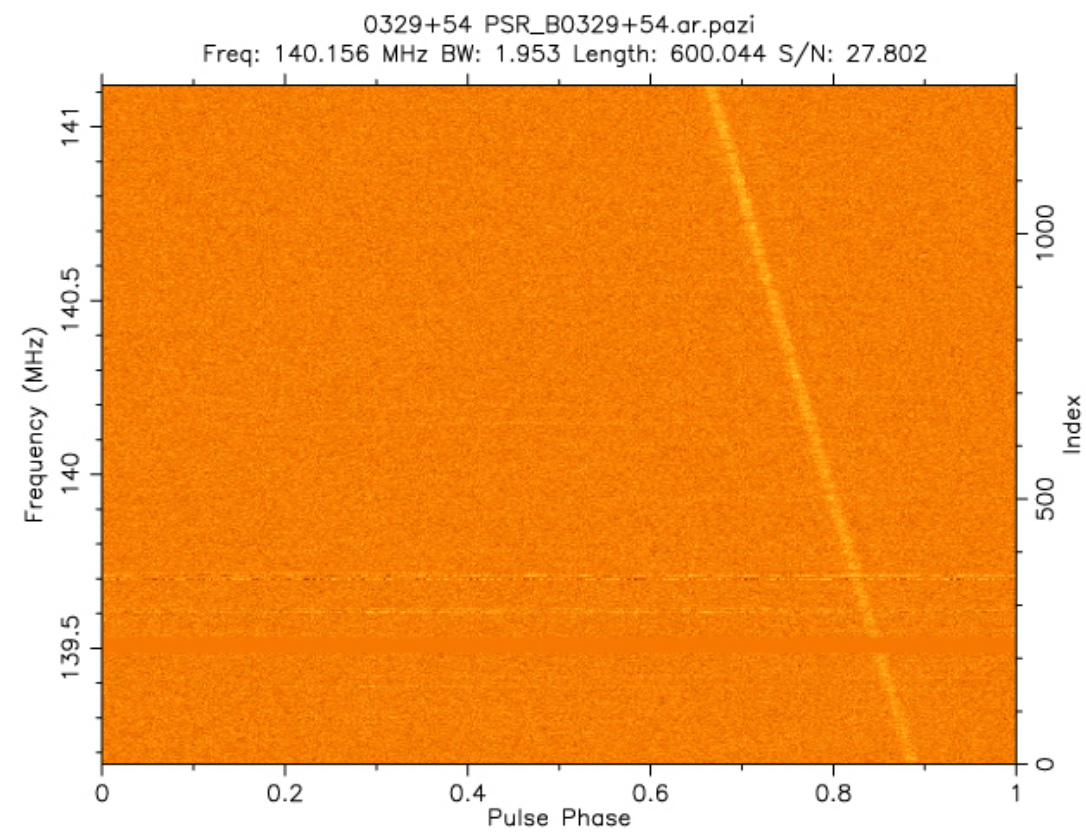
Outline

- 1) Dedispersion
- 2) Observing with LOFAR
- 3) Rotation Measures
- 4) Comparision with Literature

B0329+54

B0329+54

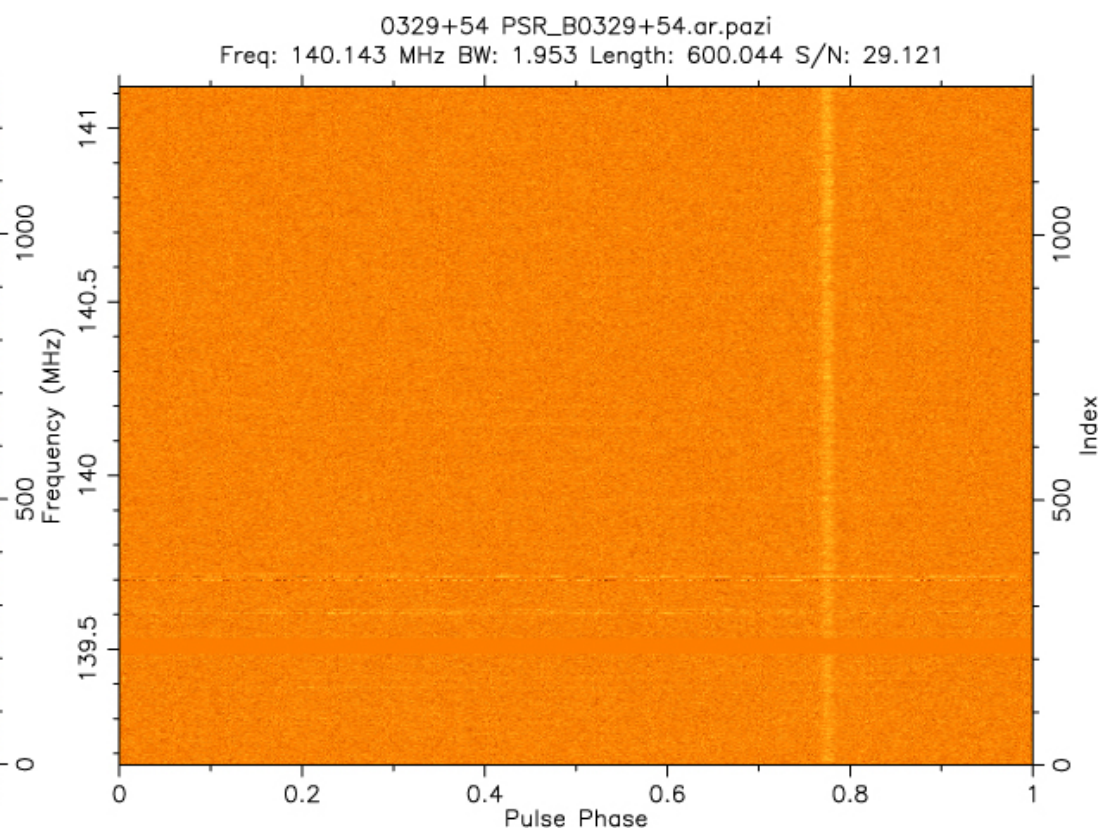
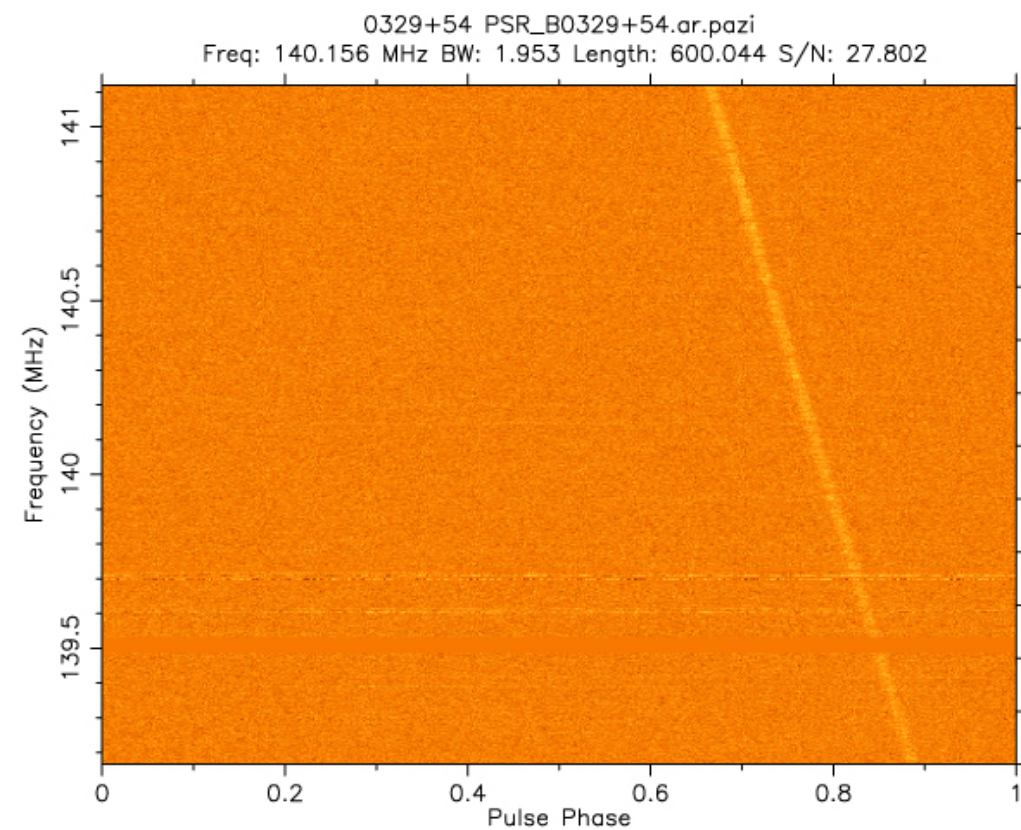
Dispersed:



B0329+54

Dispersed:

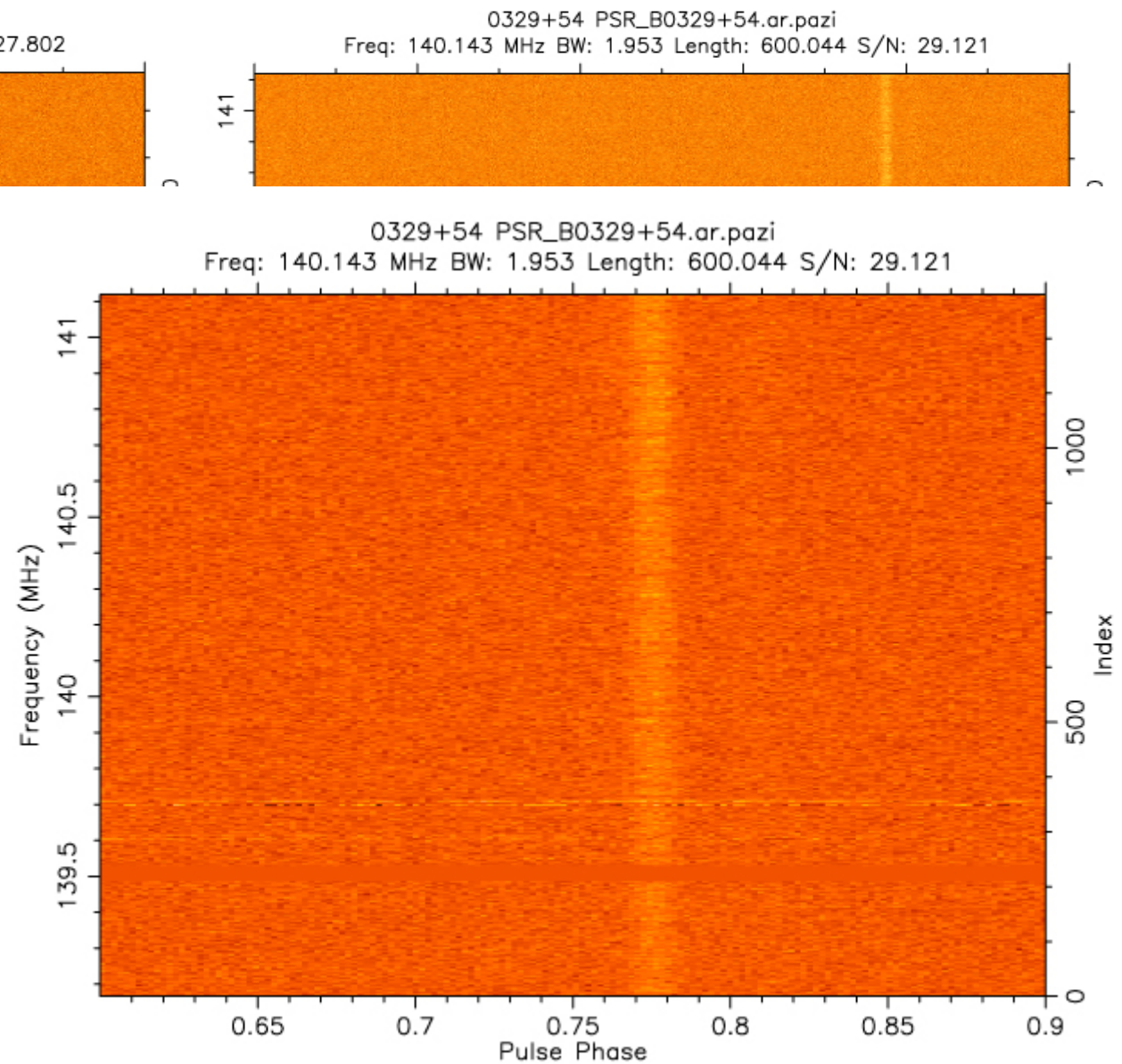
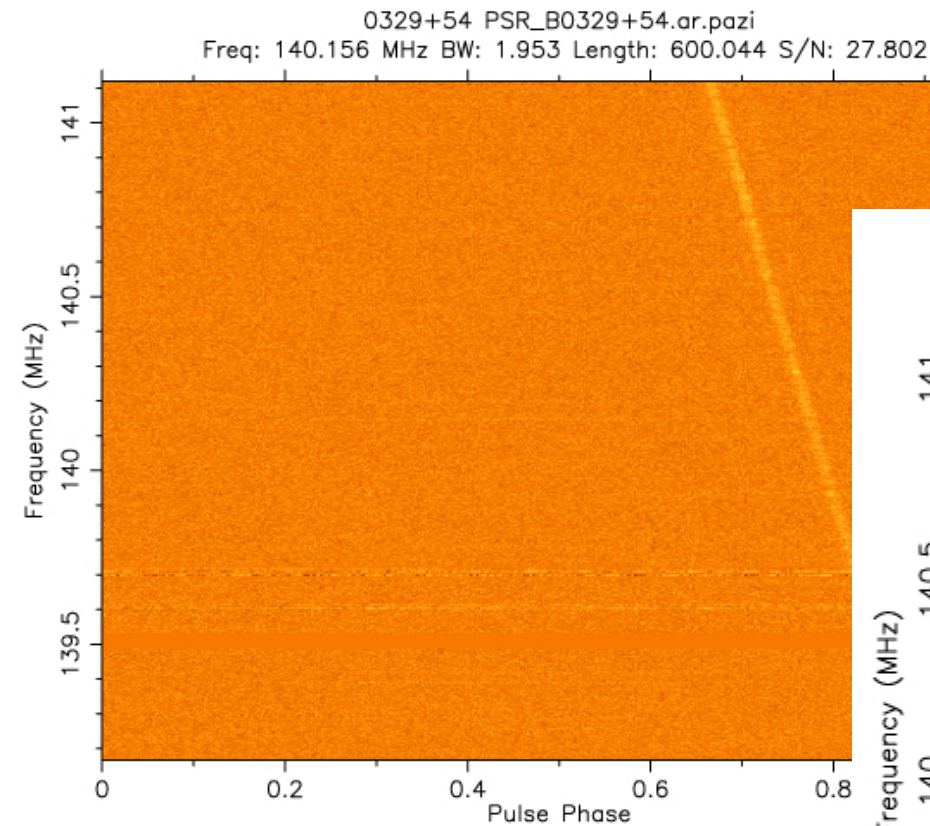
De-dispersed:



B0329+54

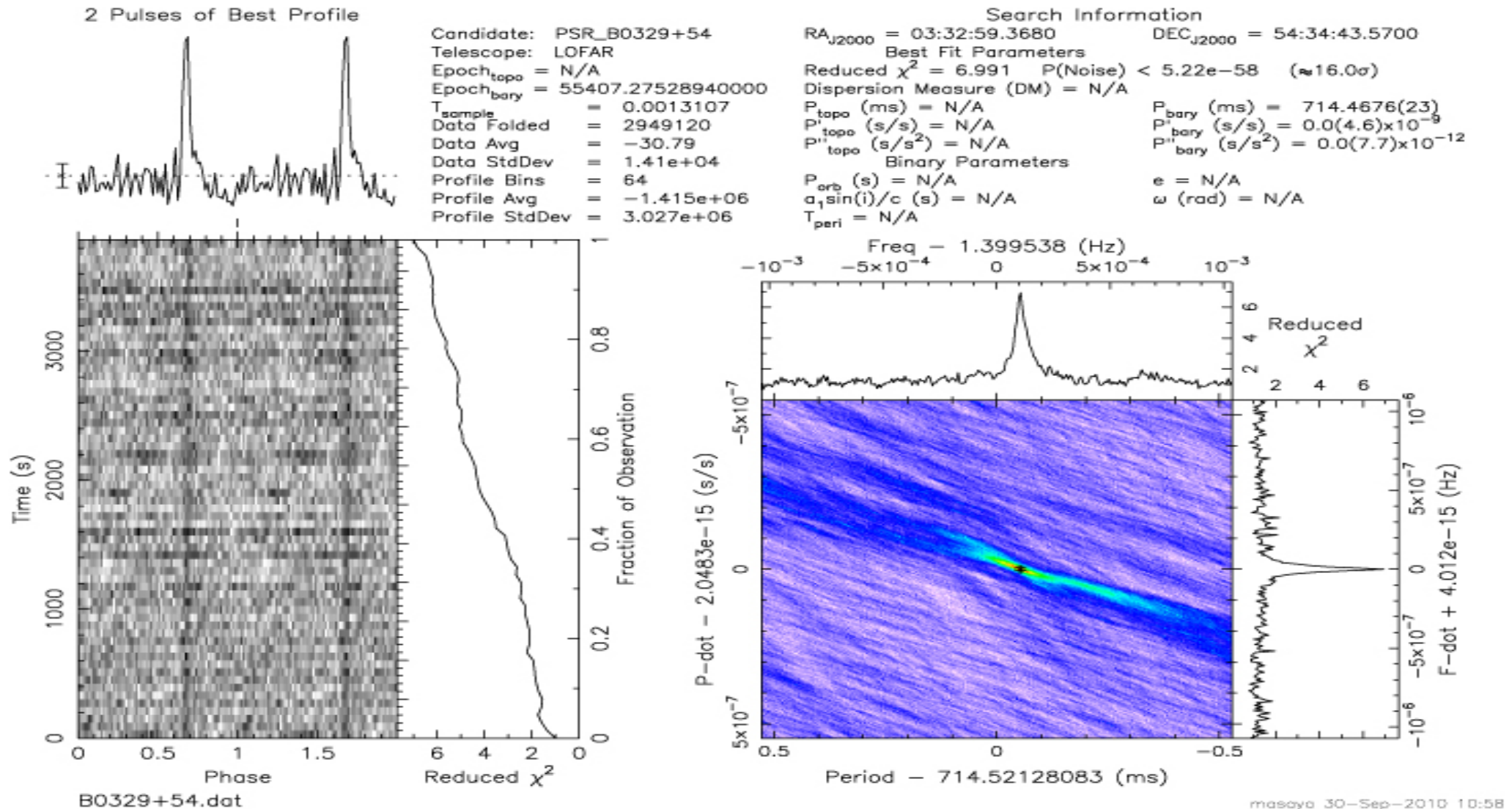
Dispersed:

De-dispersed:



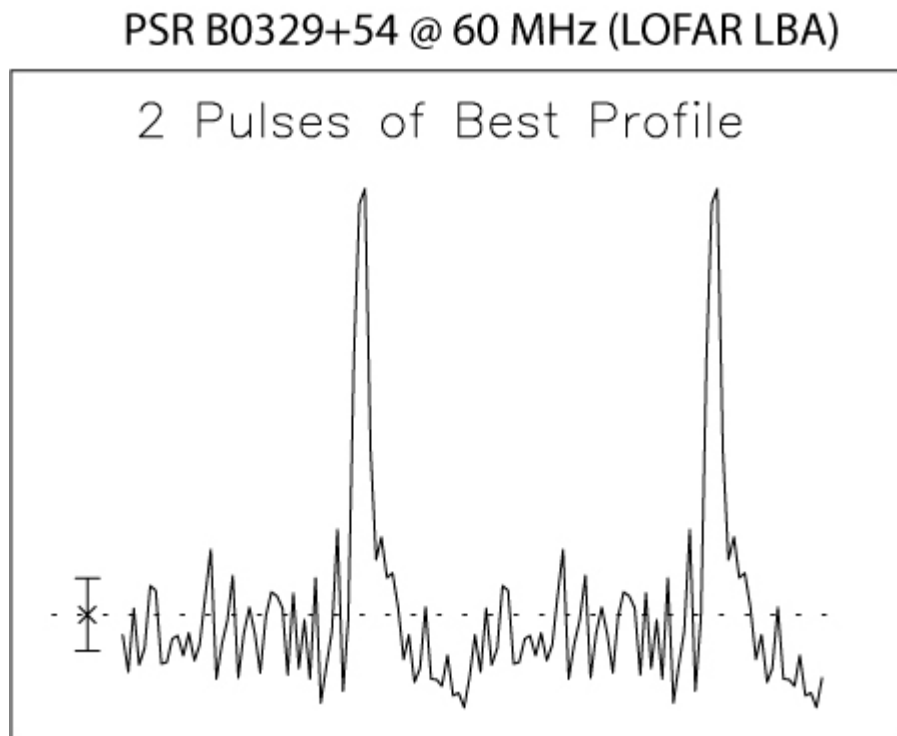
Observed data from B0329+54:

Observed data from B0329+54:

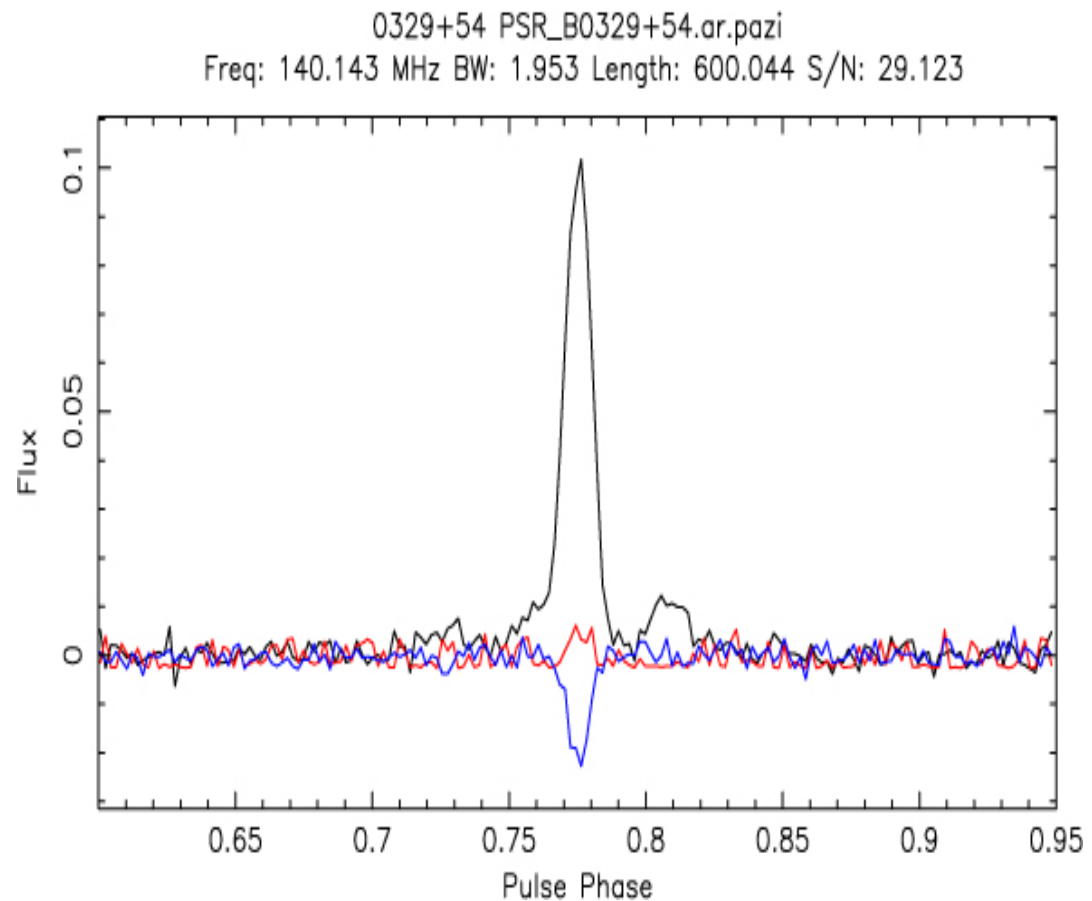


Observed data from B0329+54:

60 MHz (LBA, time series):



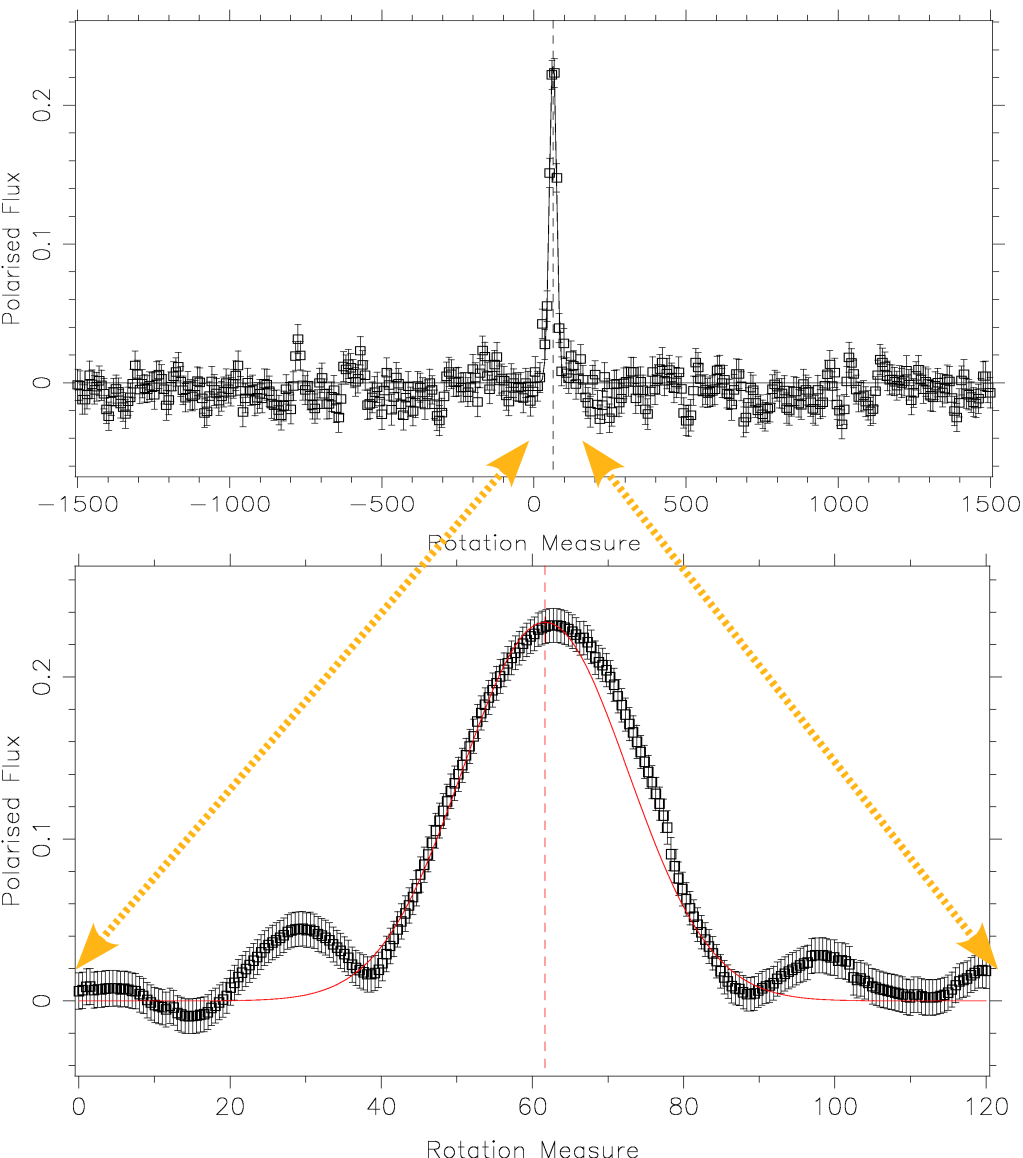
140 MHz (HBA, folded):



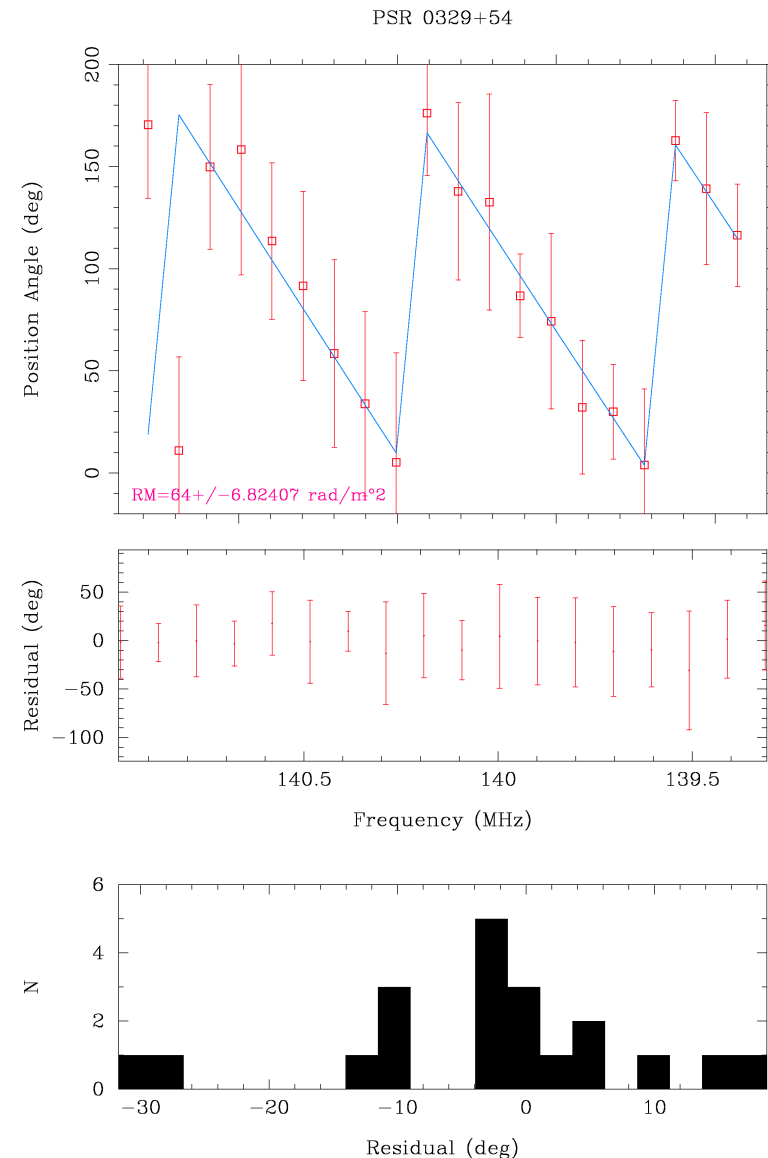
(black: flux, red: linear polarization, blue: circular polarization)

Observed data from B0329+54:

Trial and error
using linear polarization:

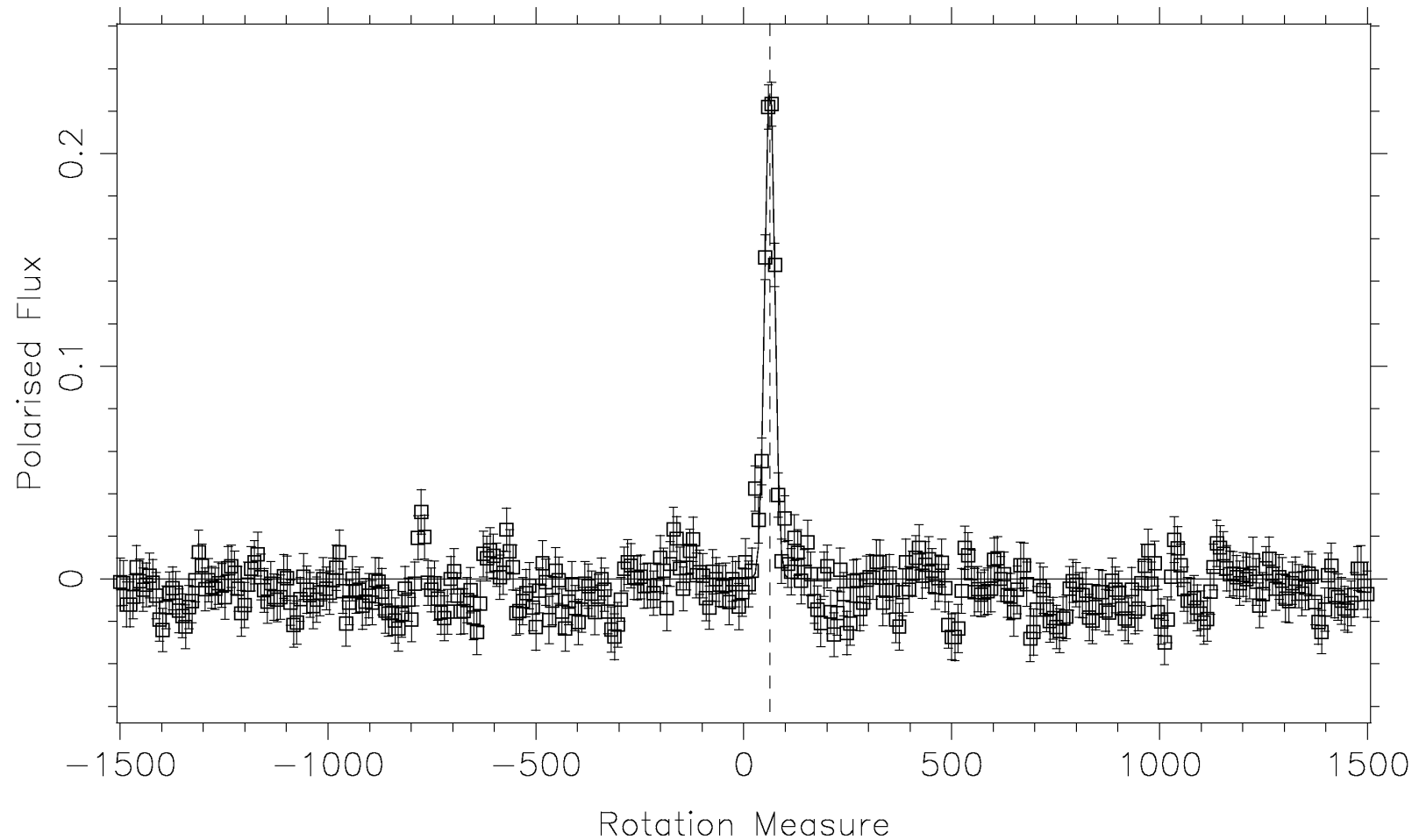


χ^2 fitting
using Polarization Angle:



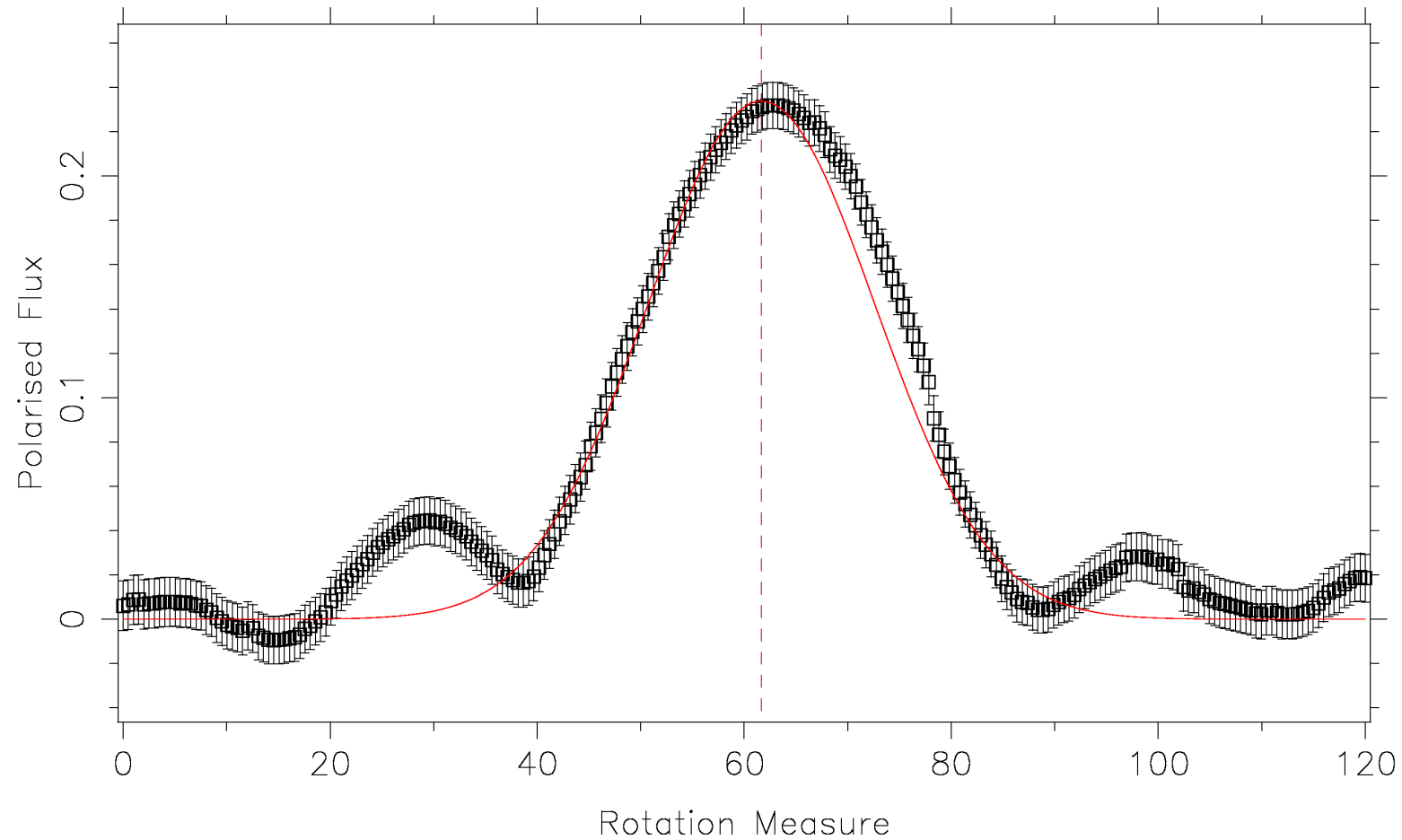
Observed data from B0329+54:

140 MHz (HBA, folded):



Observed data from B0329+54:

140 MHz (HBA, folded):



Rotation Measure of B0329+54:

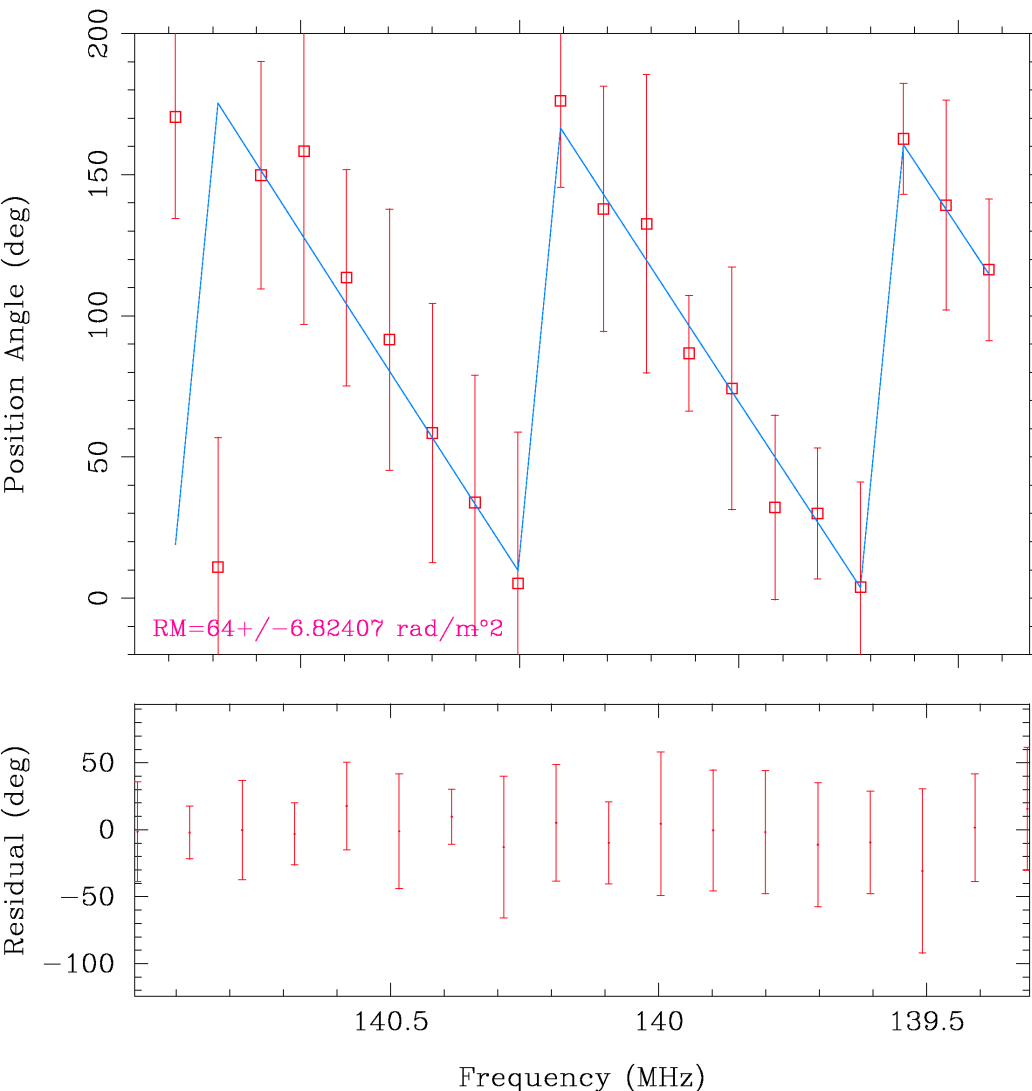
Rotation Measure of B0329+54:

χ^2 fitting using Polarization Angle:

[0.75 , 0.82]

=> RM = 64 ± 6.8 rad/m²

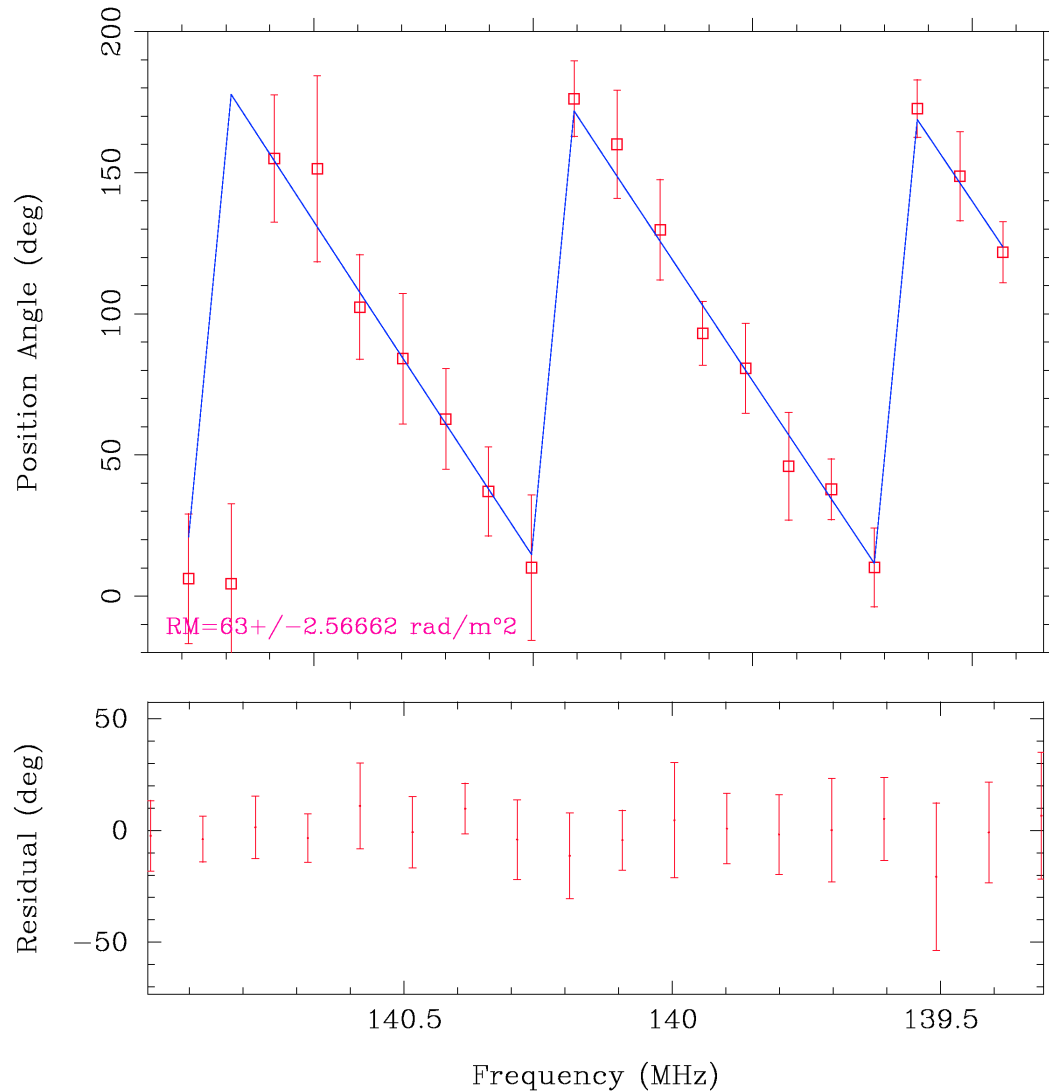
PSR 0329+54



[0.76 , 0.785]

=> RM = 63 ± 2.6 rad/m²

PSR 0329+54



Rotation Measure of B0329+54:

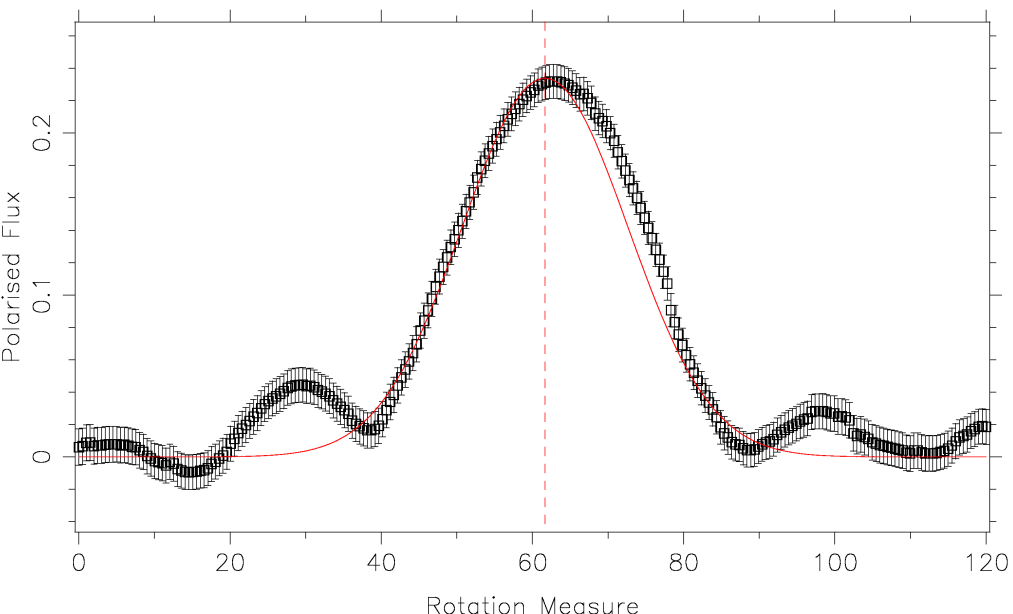
Trial and error
using linear polarization:

Centre = 62.8

Width = 28.1

Height = 0.23

=> $RM = 61.7 \pm 3.1 \text{ rad/m}^2$



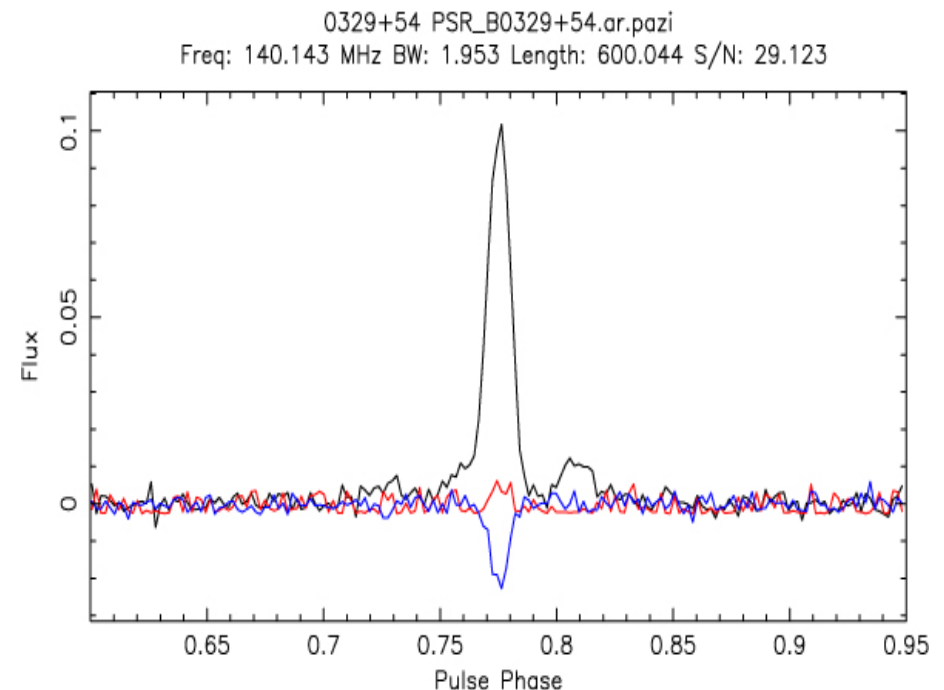
χ^2 fitting
using Polarization Angle:

[0.75 , 0.82]

=> $RM = 64 \pm 6.8 \text{ rad/m}^2$

[0.76 , 0.785]

=> $RM = 63 \pm 2.6 \text{ rad/m}^2$



Rotation Measure of B0329+54:

Trial and error
using linear polarization:

Centre = 62.8

Width = 28.1

Height = 0.23

=> RM = 61.7 ± 3.1 rad/m²

χ^2 fitting
using Polarization Angle:

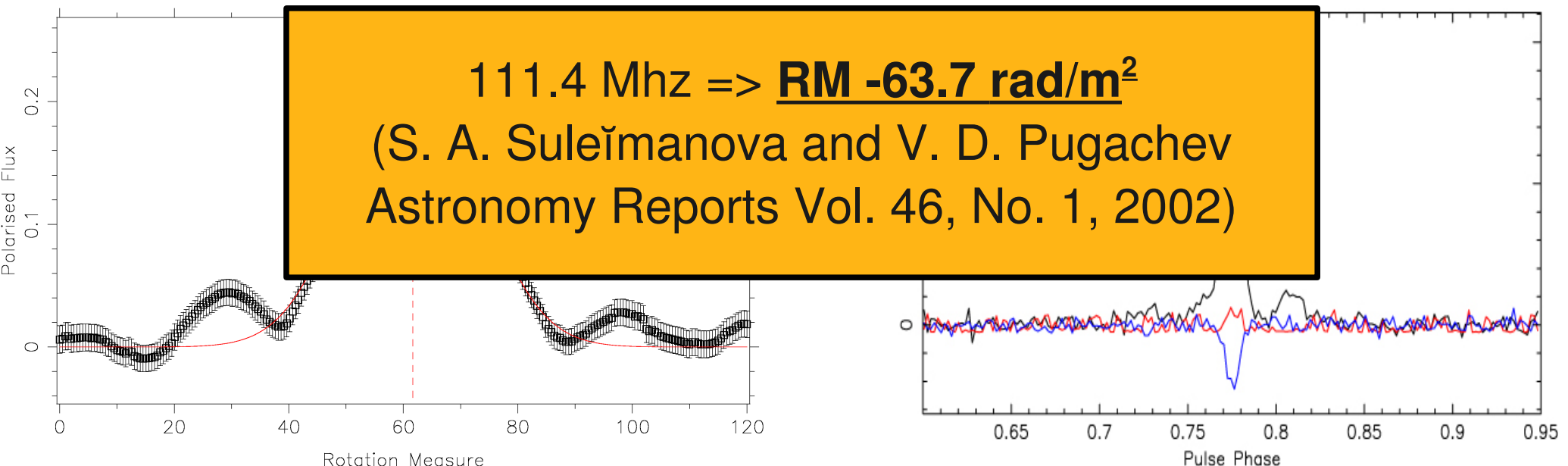
[0.75 , 0.82]

=> RM = 64 ± 6.8 rad/m²

[0.76 , 0.785]

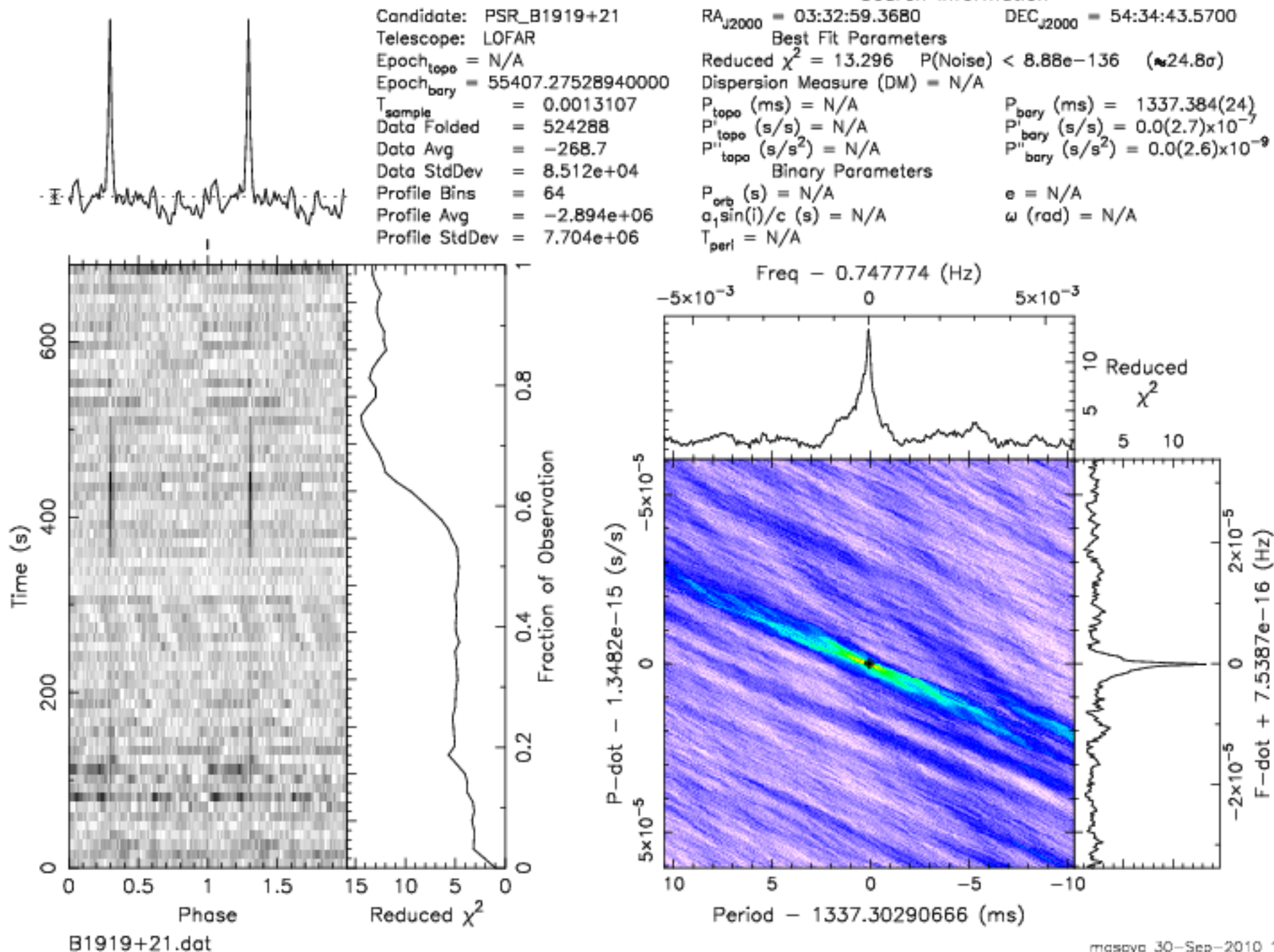
=> RM = 63 ± 2.6 rad/m²

0329+54 PSR_B0329+54.ar.pazi
Freq: 140.143 MHz BW: 1.953 Length: 600.044 S/N: 29.123

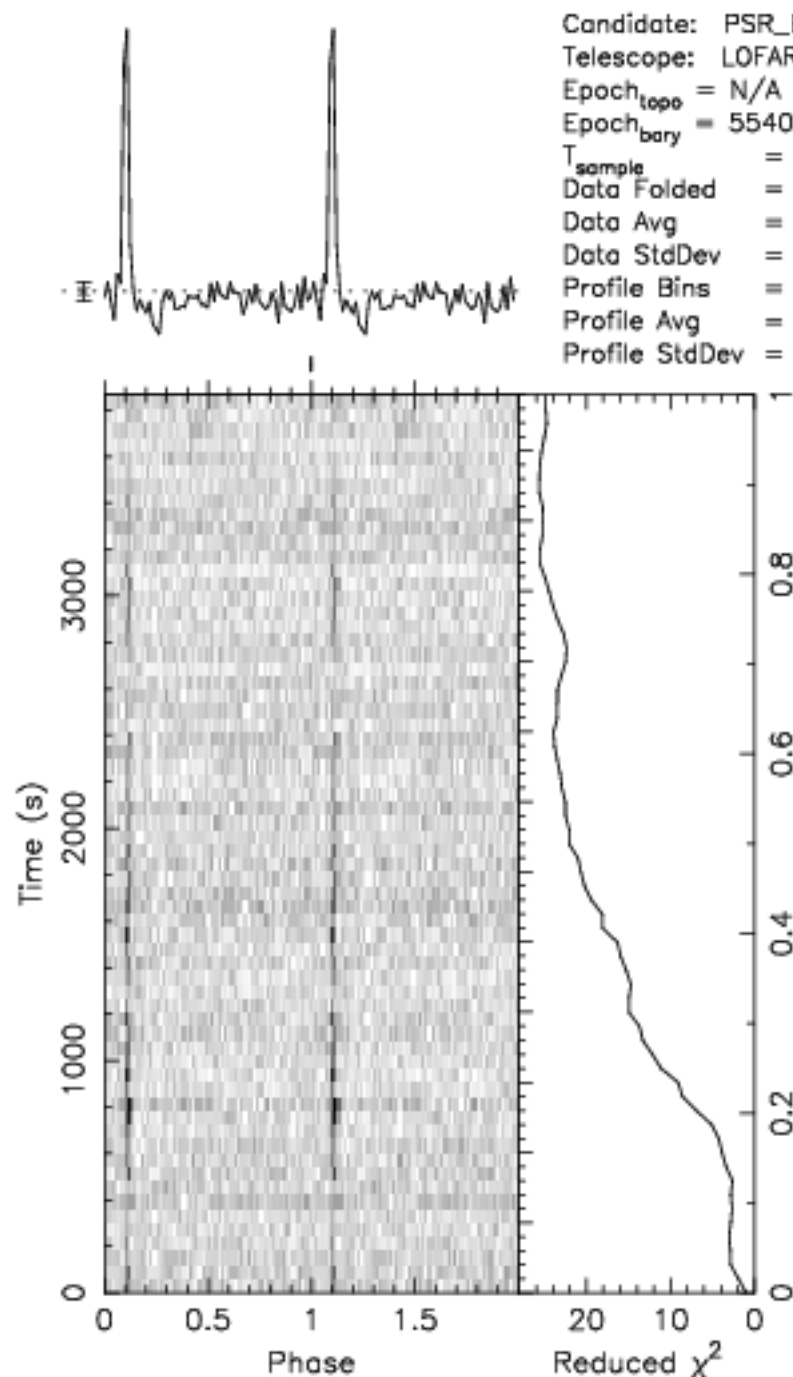


B1919+21 in low frequencies

60-66 MHz band:



70-76 MHz band:

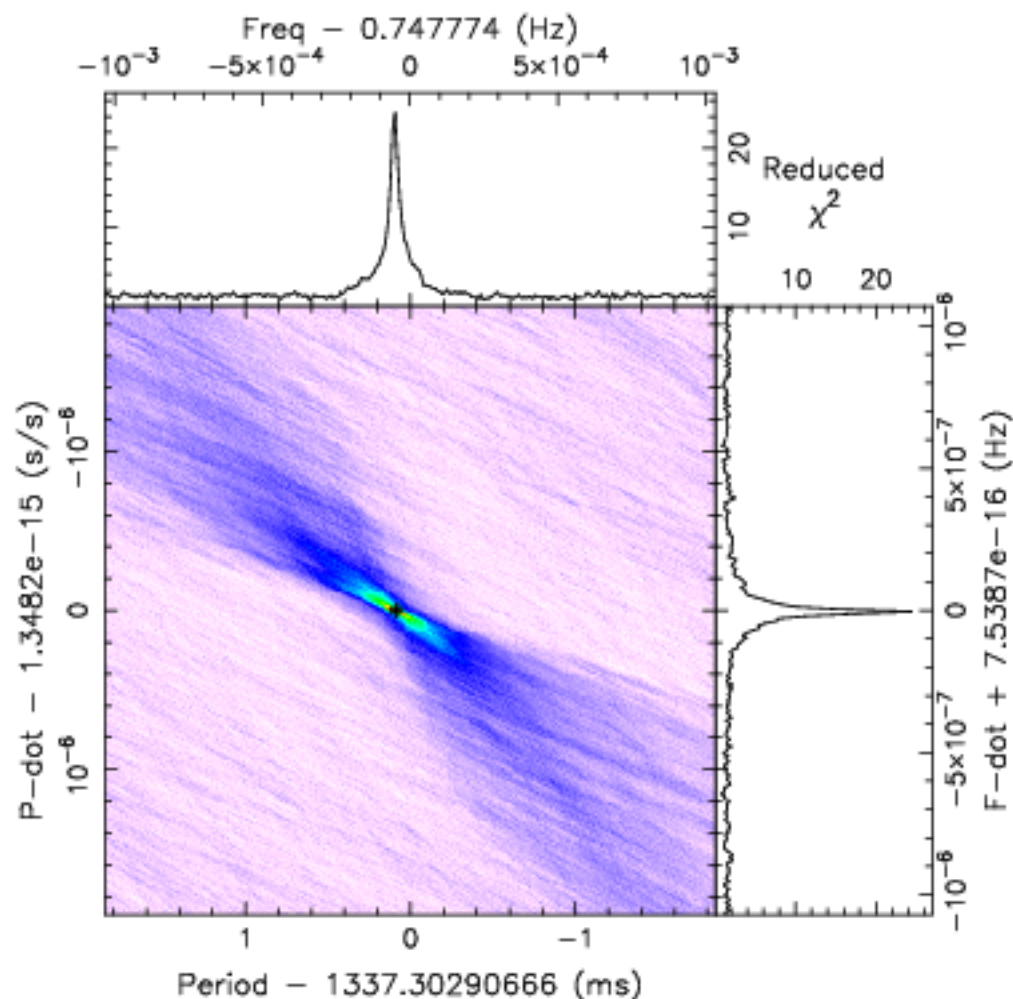


B1919+21.dat

Candidate: PSR_B1919+21
 Telescope: LOFAR
 Epoch_{topo} = N/A
 Epoch_{bary} = 55407.27528940000
 T_{sample} = 0.0013107
 Data Folded = 2949120
 Data Avg = -67.29
 Data StdDev = 6425
 Profile Bins = 64
 Profile Avg = -3.122e+06
 Profile StdDev = 1.379e+06

Search Information

RA_{J2000} = 03:32:59.3680 DEC_{J2000} = 54:34:43.5700
 Best Fit Parameters
 Reduced χ^2 = 24.827 P(Noise) < 2.87e-285 ($\approx 36.1\sigma$)
 Dispersion Measure (DM) = N/A
 P_{topo} (ms) = N/A P_{bary} (ms) = 1337.3897(34)
 P'_{topo} (s/s) = N/A P'_{bary} (s/s) = 0.0(6.7)x10⁻⁹
 P''_{topo} (s/s²) = N/A P''_{bary} (s/s²) = 0.0(1.1)x10⁻¹¹
 Binary Parameters
 P_{orb} (s) = N/A e = N/A
 a₁sin(i)/c (s) = N/A ω (rad) = N/A
 T_{peri} = N/A



Conclusions

- Pulsars have been observed
- Found rotation measures
- Errors reduced by intelligent data selection
- Solar observation possible (in principle)
- FUN!!! (but also frustration == sometimes pure noise)