Supplementary material for the paper Polarized quasiperiodic structures in pulsar radio emission reflect temporal modulations of non-stationary plasma flow

Dipanjan Mitra

National Centre for Radio Astrophysics, TIFR, Pune 411007, India; email: dmitra@ncra.tifr.res.in

and

Mihir Arjunwadkar

Centre for Modeling and Simulation, University of Pune, Pune 411007, India; email: mihir@cms.unipune.ac.in

and

Joanna M. Rankin

University of Vermont, Burlington, VT 05405 USA; email: Joanna.Rankin@uvm.edu

1. Results of pulsar microstructure analysis

The results of our pulsar microstructure timescale analysis pipeline (as described in Sec. 3 and appendix of the main paper) are available for download as a tarball with the URL

`http://www.ncra.tifr.res.in:8081/~dmitra/hires_analysis_pdf.tar.gz.`

Untarring this tarball creates the directory `hires_analysis_pdf/`. This directory contains two pdf files for each pulsar data set analyzed, with names of the form

`<dataset>-<envelope_smoothing_bandwidth>-pulses3.pdf`

containing pulsewise fit, envelope, microstructure, and ACF plots (where rejected pulses are indicated using gray shading overlaid on plots), and

`<dataset>-<envelope_smoothing_bandwidth>-hist3.pdf`

containing microstructure timescale histograms. For example, the file `B0301+19LC-0p05-pulses3.pdf` and `B0301+19LC-0p05-hist3.pdf` respectively contain pulsewise plots and microstructure timescale histograms for the data set B0301+19LC when analyzed using envelope smoothing bandwidth $h = 0.05$.

2. Ascii Profiles

The average profiles obtained for our microstructure observations can be downloaded as ascii profiles from `http://www.ncra.tifr.res.in:8081/~dmitra/hires_ascprof.tar.gz`

Table 1. Additional details on the data sets analyzed (compare with Table 2, main paper). Column 7 is the pulse selection threshold on the fit degrees of freedom (see Sec. 3, main paper).

No.	Dataset	Longitude Range (°)	# of Pulses in the Dataset	NPT	Outliers Curated?	Percentile Cut-Off
1.	B0301+19	-2.2 — 2.5	120	301	N	10
2.	B0301+19LC	-11.8 — -5.2	129	427	N	10
3.	J0546+2441	-2.13 — 1.81	105	504	N	10
4.	B0525+21	-2.85 — 2.86	300	1001	Y	25
5.	B0525+21LC	-14.3 — -10.9	300	1201	Y	25
6.	B0656+14	-0.61 — 4.95	155	101	N	5
7.	B0751+32	-2.24 — 2.43	84	304	N	10
8.	B0823+26	-1.65 — 1.41	226	264	N	10
9.	B0834+06LC	-1.32 — 1.46	100	167	N	10
10.	B0834+06C2	3.7 — 7.2	100	210	N	10
11.	B0919+06	-7.5 — 4.74	104	249	N	10
12.	B0950+08	-12.77 — 10.84	102	279	N	10
13.	B1133+16LC	-1.47 — 3.39	210	271	N	10
14.	B1133+16T	3.39 — 8.8	210	301	N	25
15.	B1237+25	-2.07 — 4.3	108	401	N	10
16.	B1237+25TC	8.77 — 11.87	108	201	N	10
17.	B1737+13	-7.94 — 5.41	93	501	N	10
18.	J1740+1000	-4.87 — 10.7	116	113	N	10
19.	B1910+20	-1.21 — 6.46	341	801	N	10
20.	J1910+0714	-1.41 — 3.91	102	675	N	10
21.	B1919+21LC	-2.45 — 3.10	85	348	N	10
22.	B1919+21TC	5.28 — 8.48	68	201	N	10
23.	B1929+10	-11.1 — 7.84	529	201	N	10
24.	B1944+17	-9.67 — 4.91	136	301	N	10
25.	B2002+31	-2.48 — 2.01	105	445	N	10
26.	B2016+28	-5.34 — 4.45	341	256	N	10
27.	B2020+28LC	-11.27 — -5.03	348	101	N	10
28.	B2020+28	-3.78 — 1.21	580	98	N	10
29.	B2034+19	-5.25 — -1.49	134	361	N	10
30.	B2110+27	-1.3 — 2.26	108	201	N	10
31.	B2315+21	-1.79 — 1.17	74	201	N	10

as a tarball. Untarring the tarball creates a directory "asc_profiles" which has the ascii files for each pulsar. A README file describes the contents of the files.

3. Plots for average profiles

The average profiles and polarization position angle (PPA) histograms for the pulsars which were not used for microstructure analysis given as non-boldface pulsars in Table. 1 are presented.

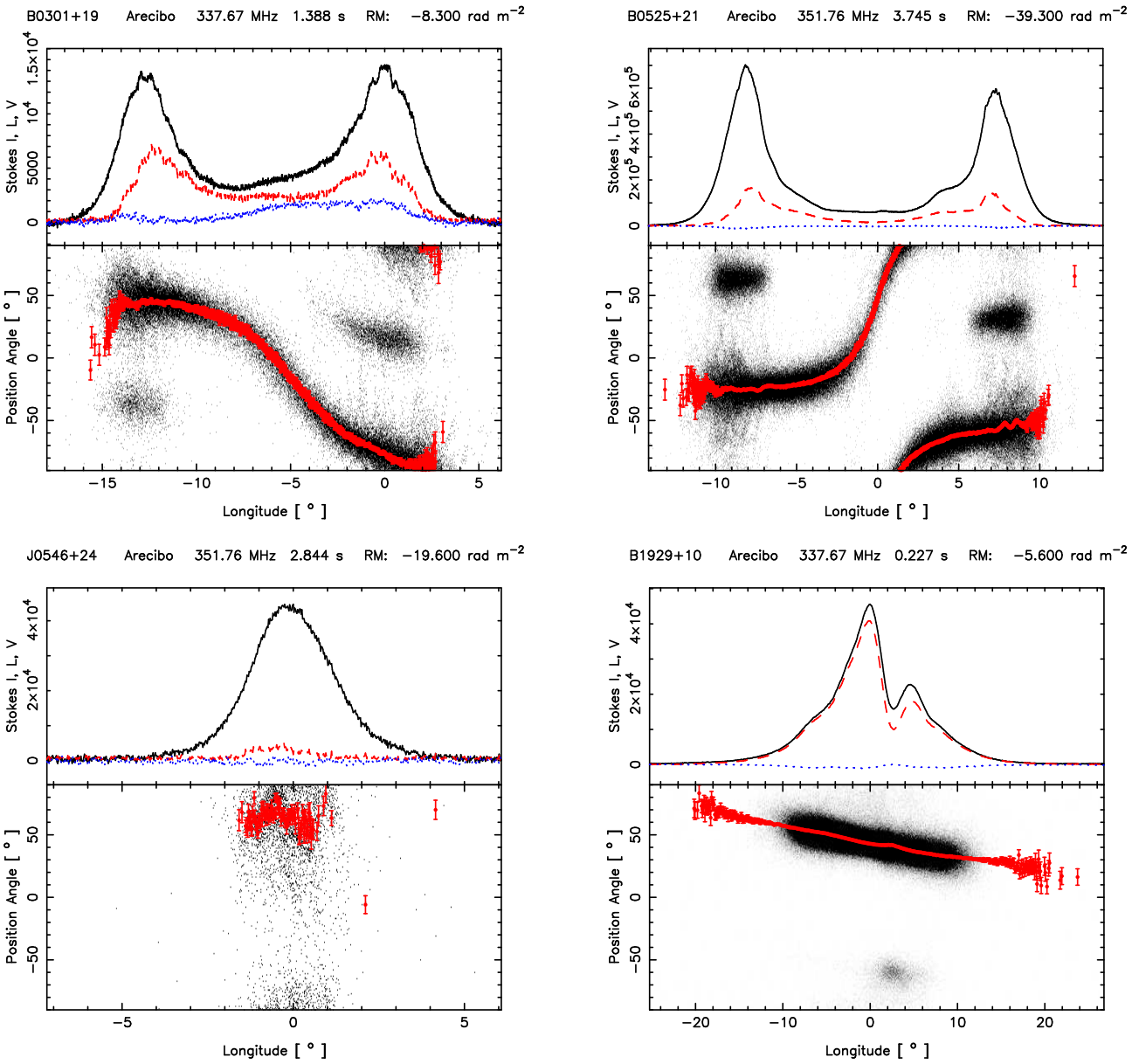

Fig. 1.— PPA histograms for pulsars PSR B0301+19, B0525+21, J0546+2441 and B1929+10 observed with time resolution of 59.5 μsec, where the instrument and band is indicated above each plot. The respective upper panels give the total power (black), total linear (red) and circular polarization LH-RH (blue). The lower panels give the polarization-angle density as black dots and the average PPA is plotted as red points.

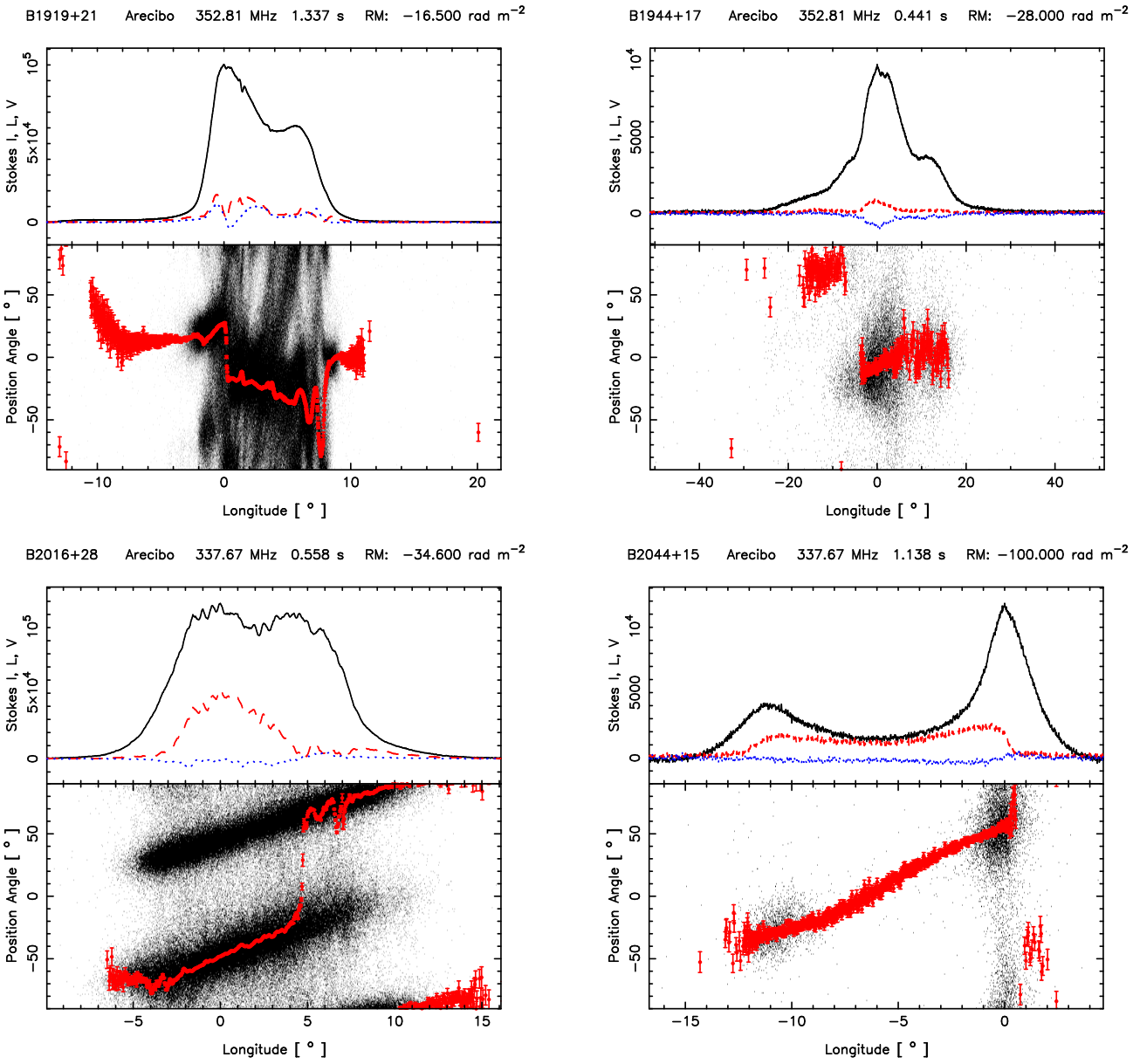

Fig. 2.— PPA histograms as in Fig. 1 for pulsars B1919+21, B1944+17, B2016+28 and B2044+15 observed with time resolutions of 59.5μsec.

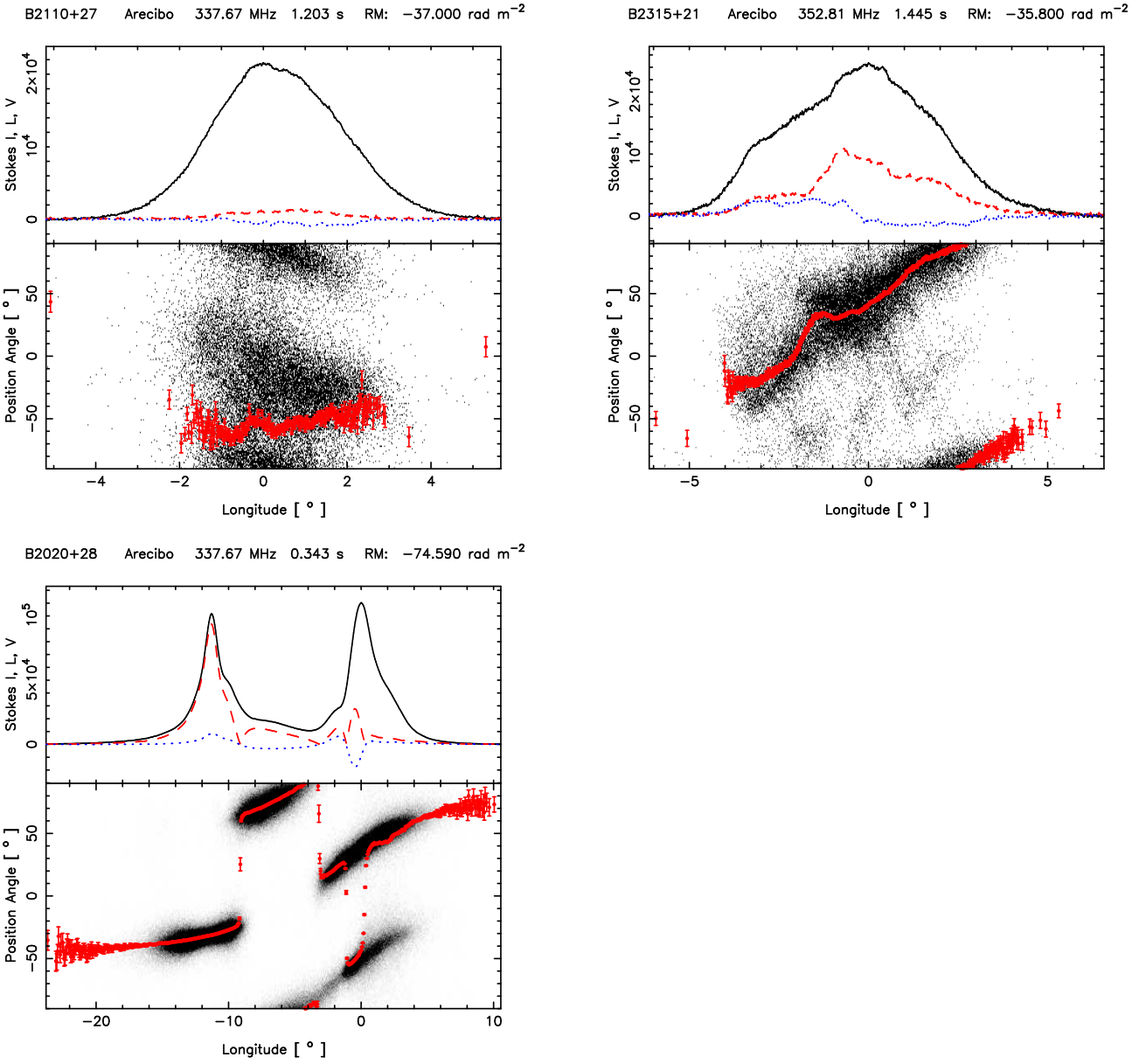

Fig. 3.— PPA histograms as in Fig. 1 for pulsars B2110+27, B2315+21 and B2020+28 observed with time resolutions of 59.5μsec.

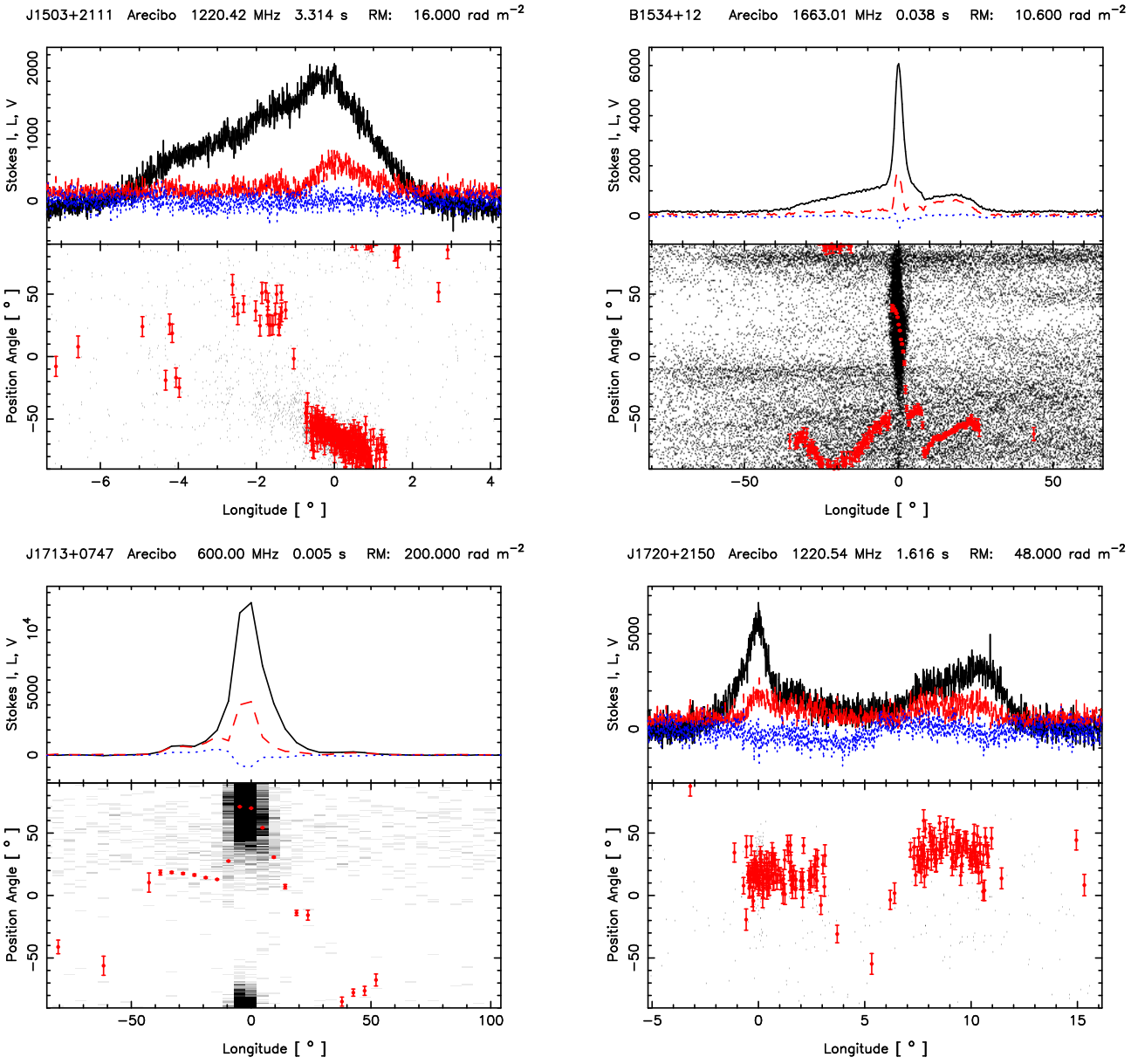

Fig. 4.— PPA histograms as in Fig. 1 for pulsars J1503+2111, B1534+12, J1713+0747 and J1720+2150 observed with time resolutions of 59.5μsec.

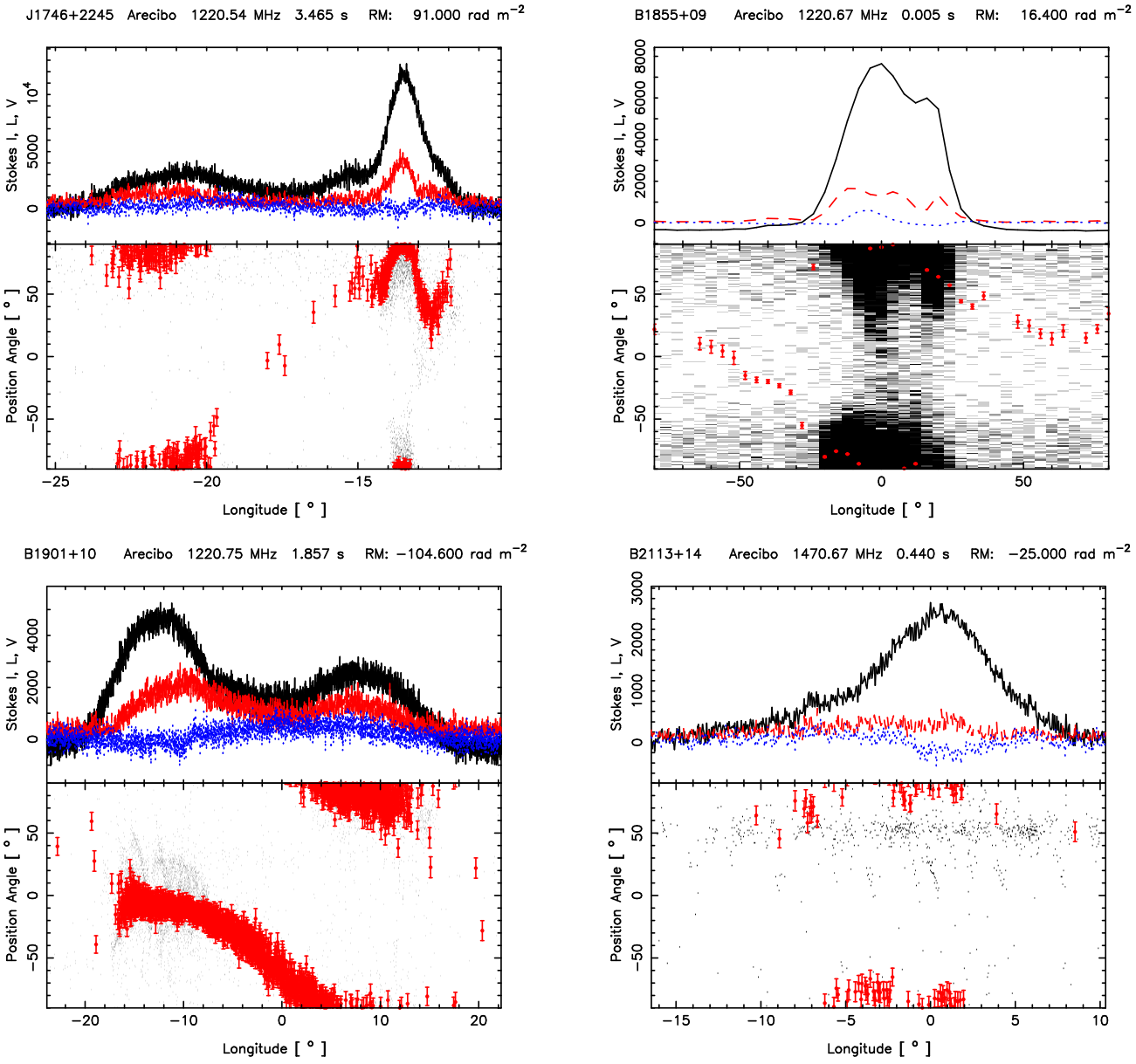

Fig. 5.— PPA histograms as in Fig. 1 for pulsars J1746+2245, B1855+09, B1901+10 and B2113+14 observed with time resolutions of 59.5μsec.