Radio Emission from AXP and XDINS

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			AXP		
1	1E1048.1-5937	6.45	12.2×10^{-11}	34.30	33.51
2	1E2259+586	6.98	7.3×10^{-13}	34.90	31.93
3	4U0142+61	8.69	3×10^{-12}	34.90	32.26
4	RXSJ170849-4009	11.00	3×10^{-11}	35.95	32.95
5	1E1841-045	11.77	4.7×10^{-11}	35.48	33.06
6	AXJ1845.0-0258	6.97		34.70	
7	0720-3125	8.39		31.48	
8	XTEJ1810-197	5.54	1×10^{-11}	~36	33.6
			XDINS		
1	RX 1856	-			
2	RX 0720	8.39			
3	1RXSJ130848.6+2127	10.31	$(0.7-2.0) \times 10^{-11}$	32.61	33.30- 33.7
4	RBS 1556	-			
5	RX 0806	11.37			
6	RX 0420	3.45			
7	1 RXS J214303.7+0654	9.44		(28- 31)	(31.0)

Observations

- **LPA**: 111.5 ± 1.5 MHz,

  $3.3^{\,m} / \cos\delta$, $A_{ef} \approx 20\,000\ m^2$

- **Cross Type Radio Telescope**: 87 MHz, 62 MHz, 42 MHz

  $15^{\,m} / \cos\delta$, $A_{ef} \approx 5 - 8 \times 10^3\ m^2$

- **Receivers**: 64 × 20 kHz, Δt = 25.6 ms, 51.1 ms, 61.9 ms

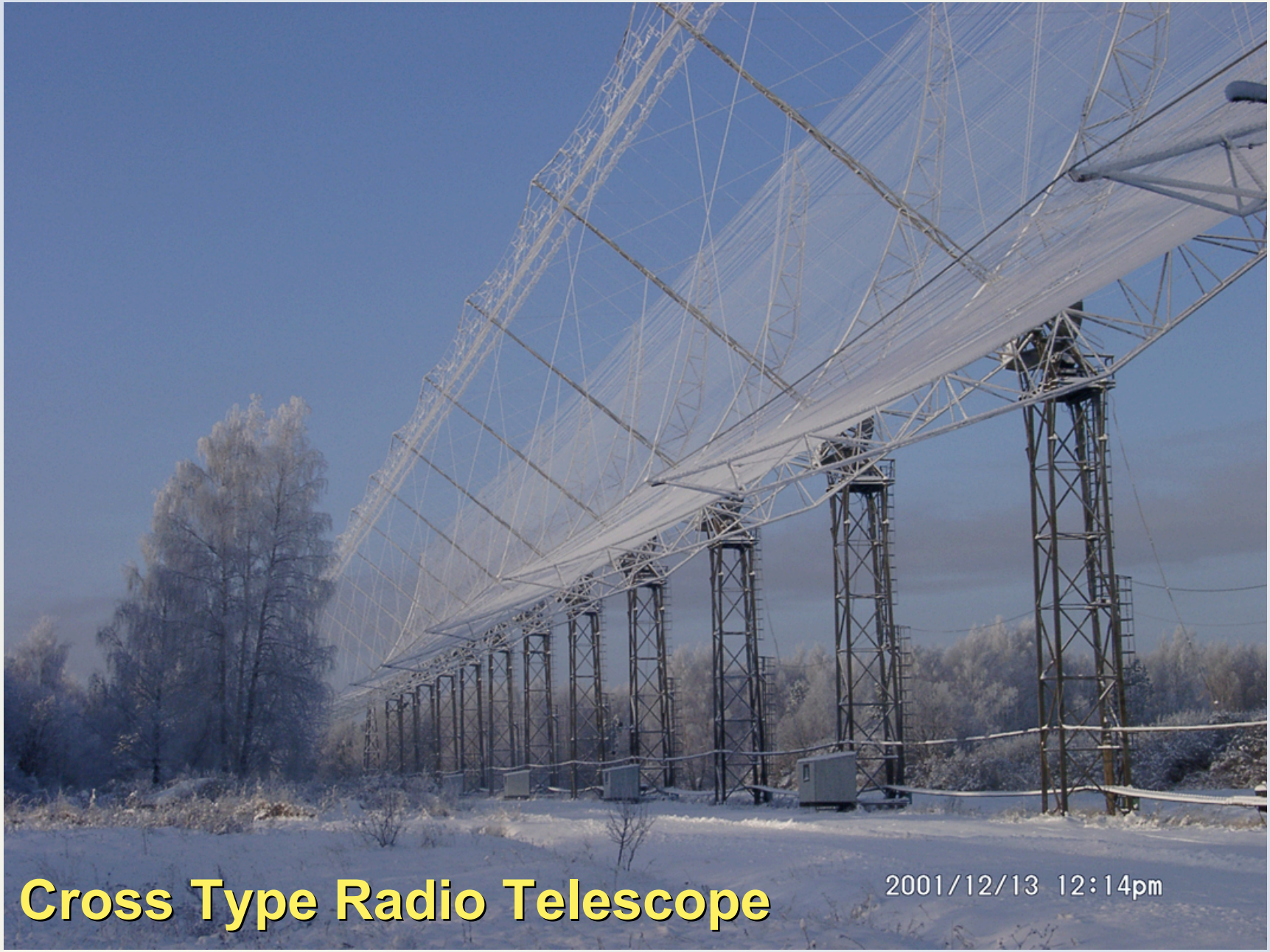
1E 2259+586

Recording of 53 periods or 26 double periods

J1308+21 and J2143+06

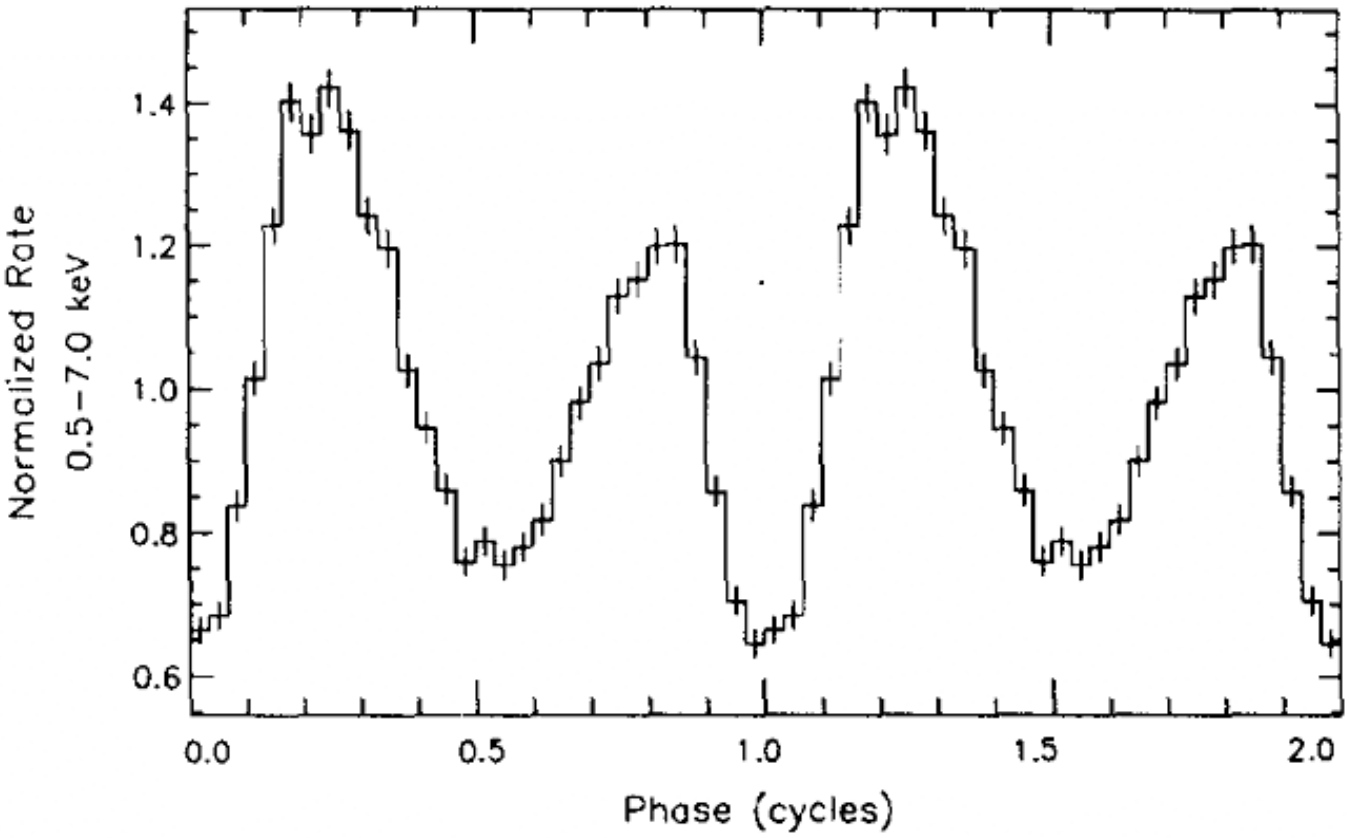
Recording of 20 periods or 10 double periods


Large Phased Array


Cross Type Radio Telescope
2001/12/13 12:14pm

1E2259+586

Patel et al. 2001



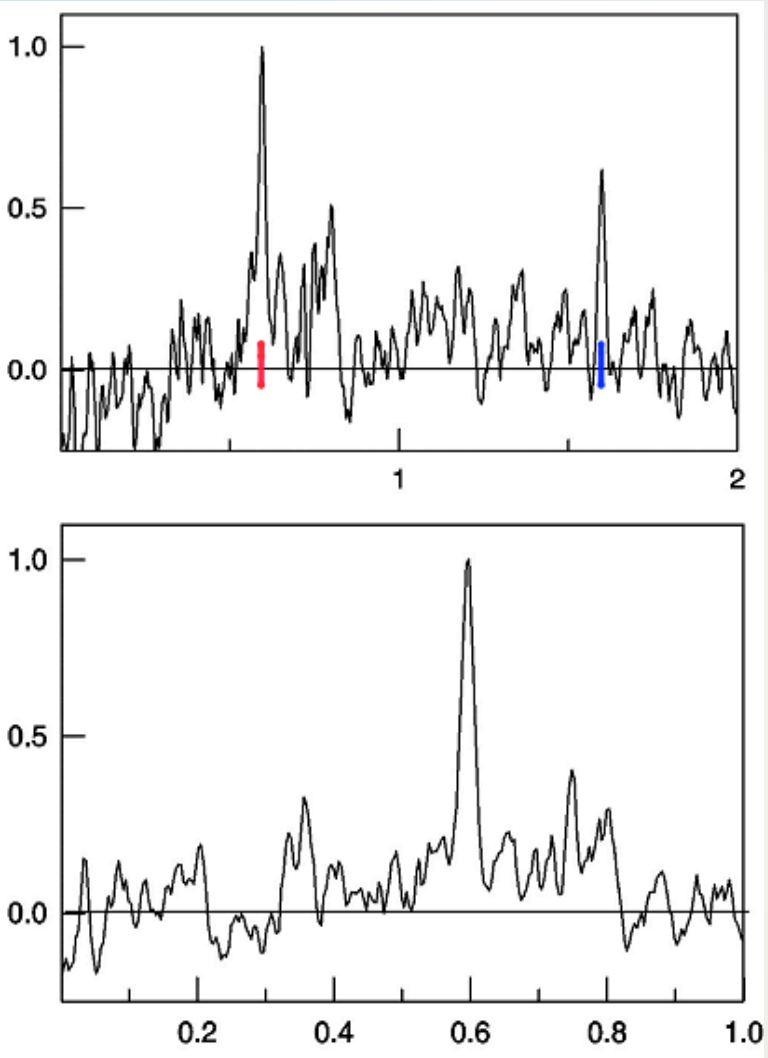
The pulse profile (0.5–7.0 keV).

Fahlman and Gregory 1981

1E2259+586

111.23 MHz

Malofeev et al 2004,2005



Sum of 12 days

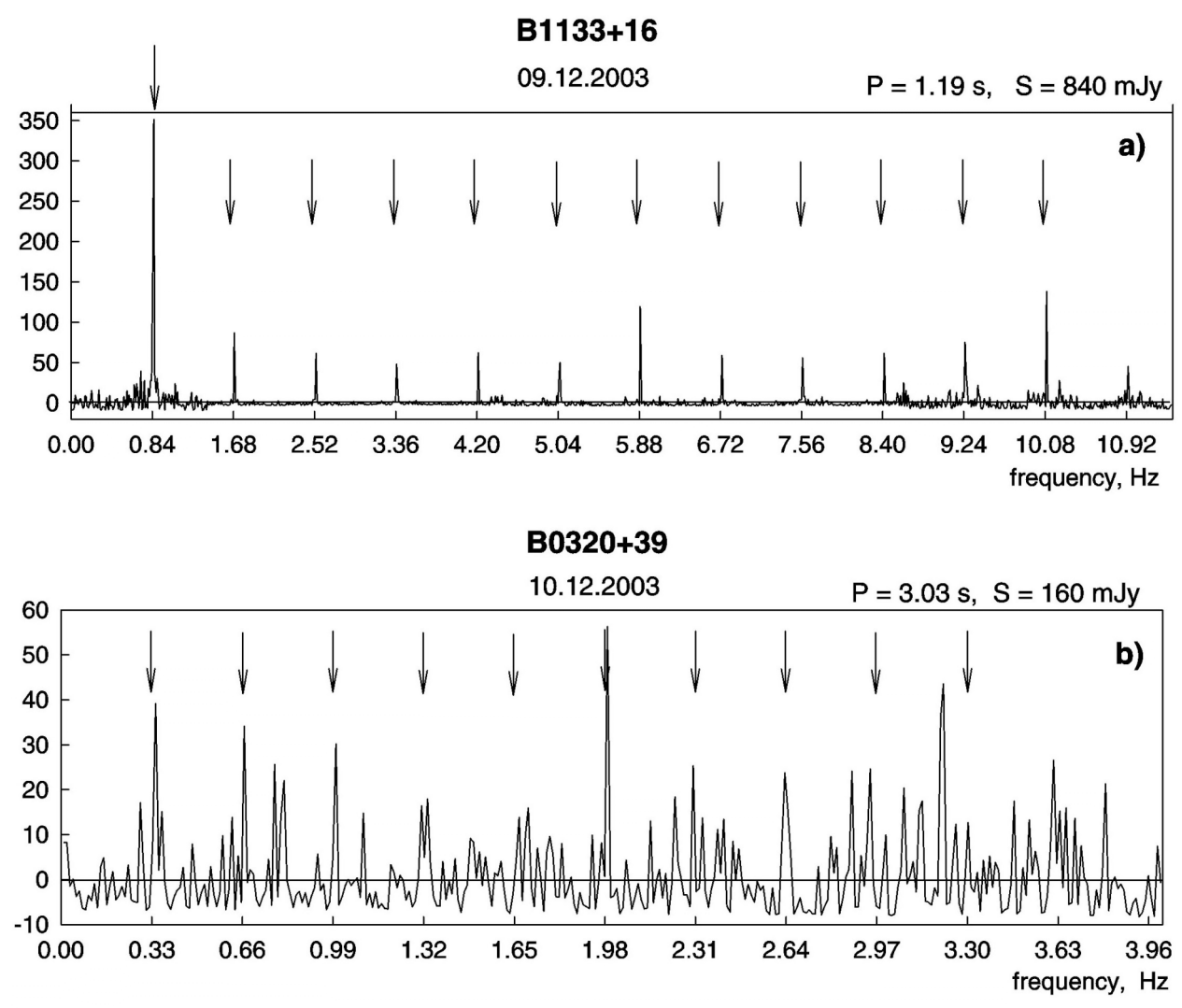
312 periods

624 periods

S/n = 10

- Pulse profile obtained when the observing window equals twice the apparent period (p = 6.978 s). The summing of 12 days was made with the superposition of visible pulses at the phase ~ 0.58 (red arrow). Second pulse shows up at the phase 1.58 (blue arrow). The mean profile for one period obtained by the folding of data (lower).

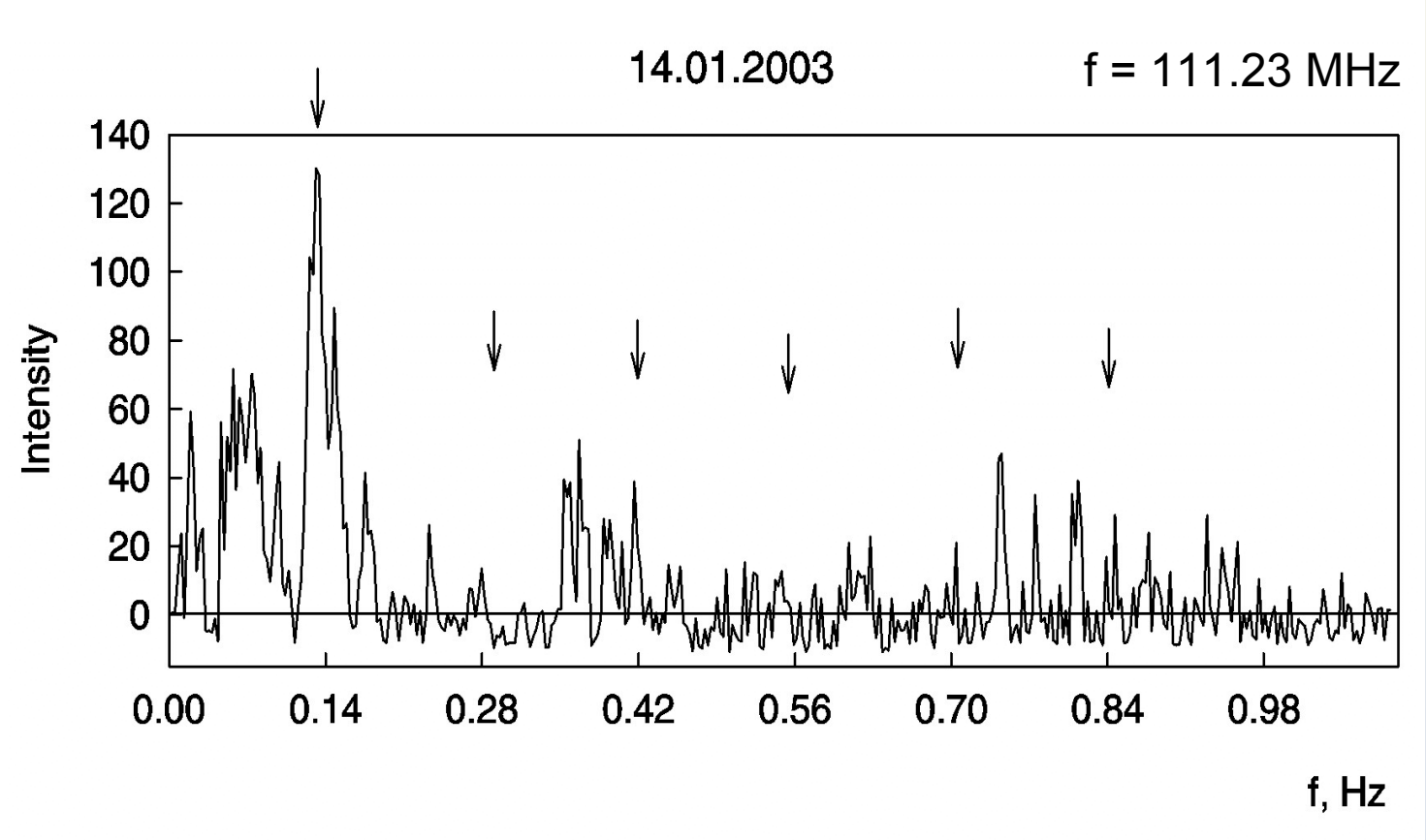
Examples of power Fourier spectrums of two pulsars at frequency 111.5 MHz



a) Strong pulsar B1133+16

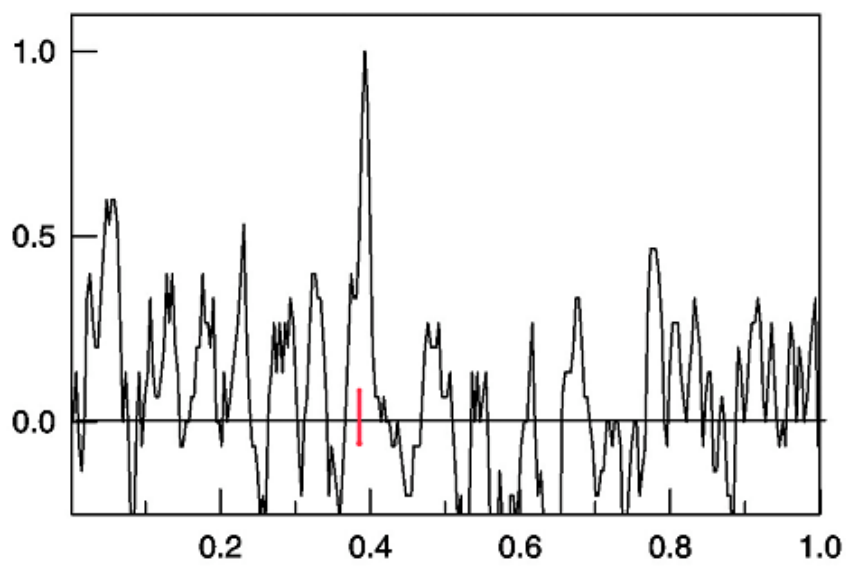
b) Pulsar B0320+39

Amplitude Spectrum 1E2259+586



1E2259+586

87.54 MHz

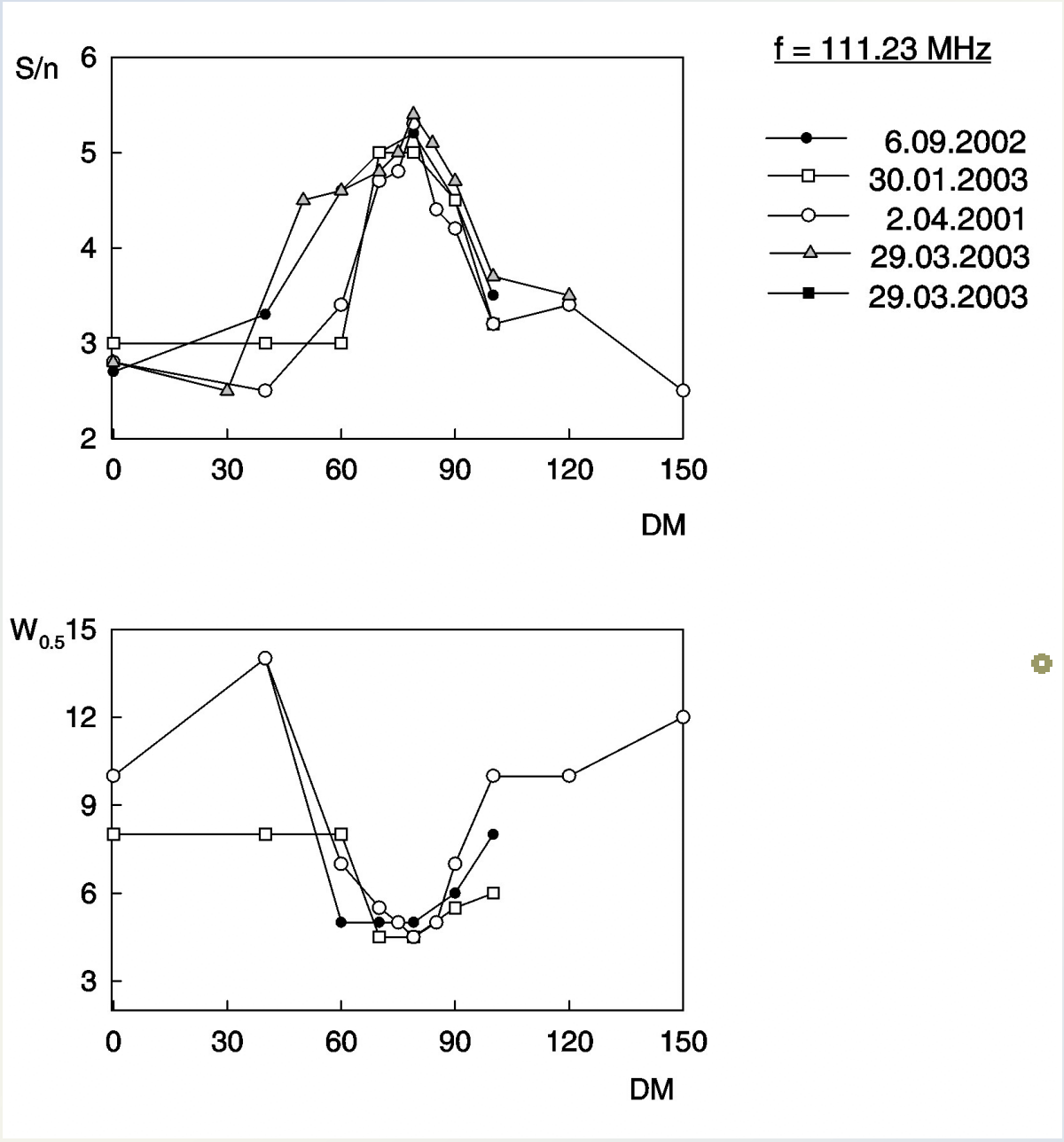


05.10.2002

80 periods

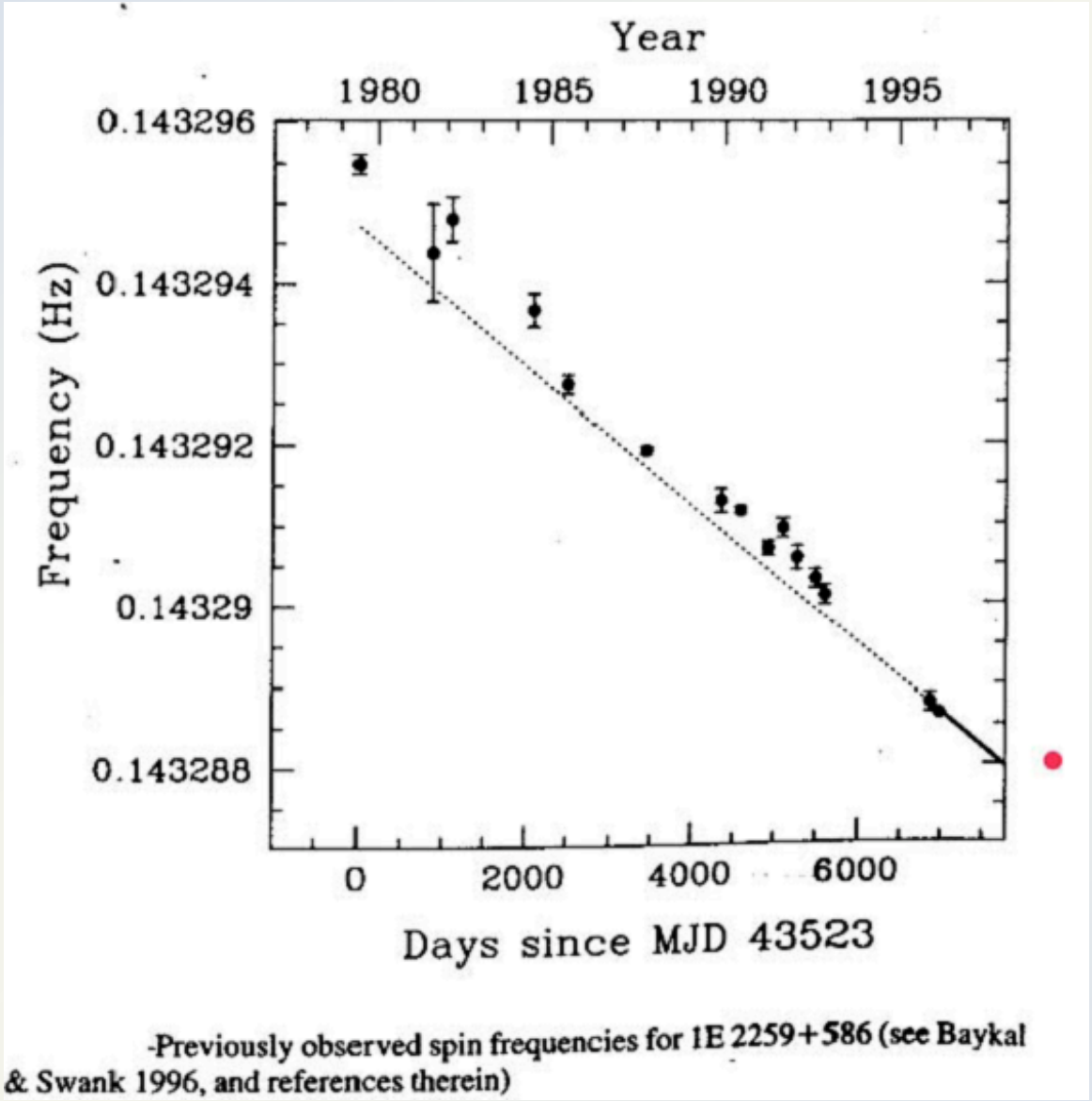
32 ch x 20 kHz

- Pulse profile at 87.5 MHz



- The search signal – to – noise ratio (upper) and pulse width (lower) as a function of dispersion measure at 111.23 MHz

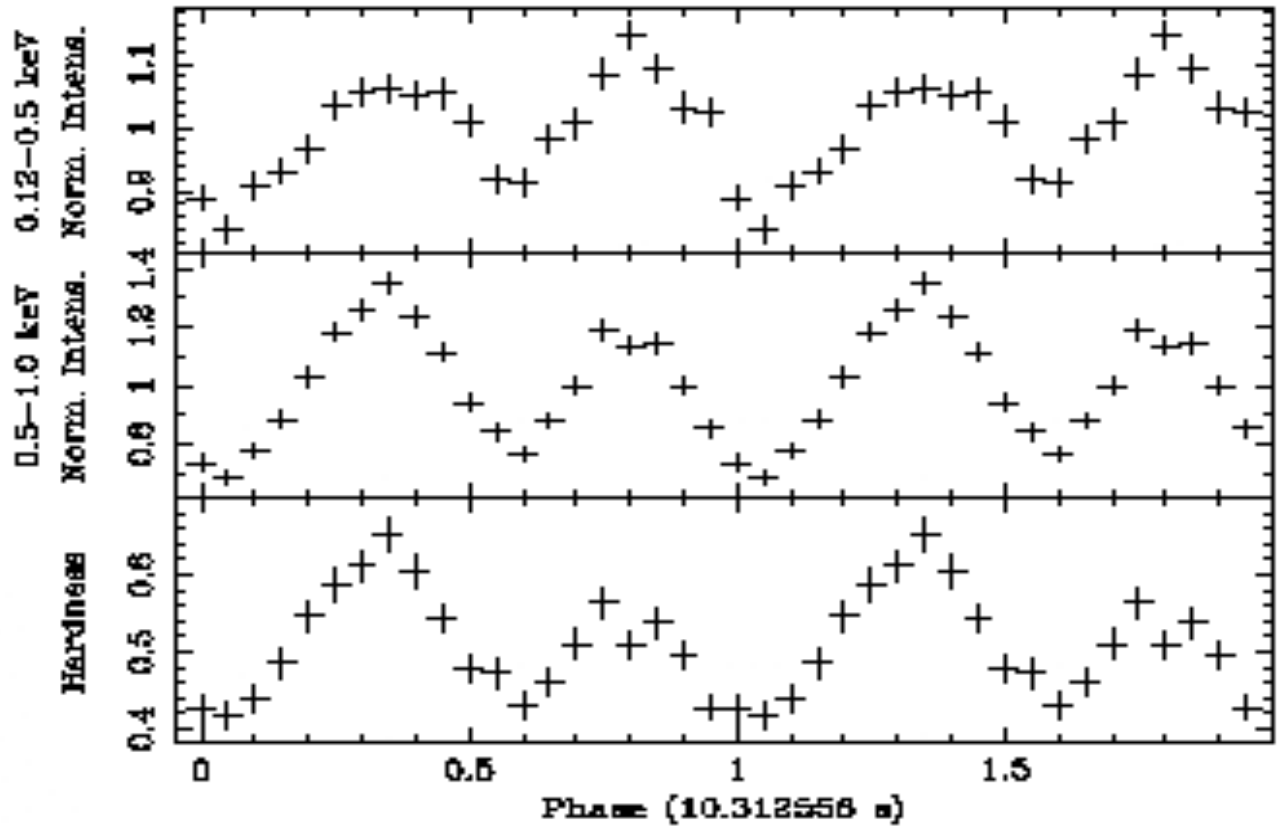
Kaspi et al. 1999



-Previously observed spin frequencies for 1E 2259+586 (see Baykal & Swank 1996, and references therein)

1 RXS J130848.6+212708

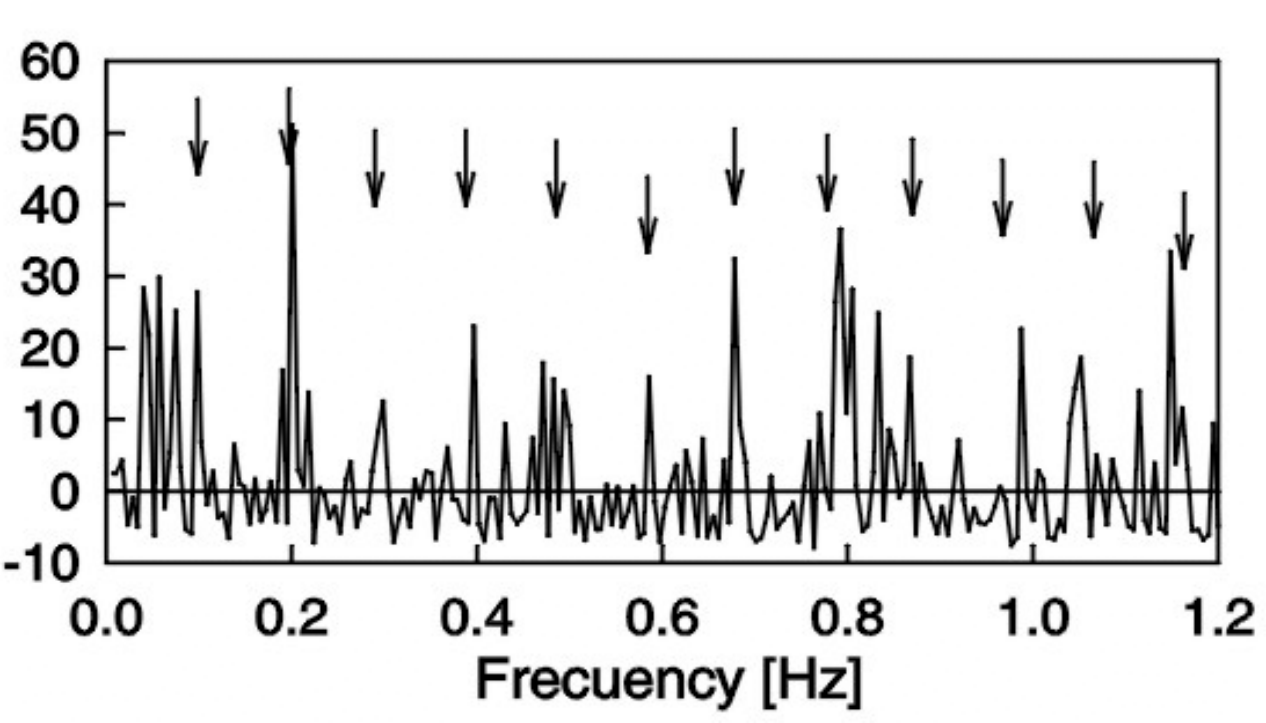
Haberl et al. A&A (2003); astro-ph/0304088 v1 4 Apr 2003



Pulse profile of RBS1223 in the 0.12–0.5 keV (soft) and 0.5–1.0 keV (hard) energy bands, together with the ratio hard/soft, obtained from the EPIC-pn data of the Jan. 2003 observation.

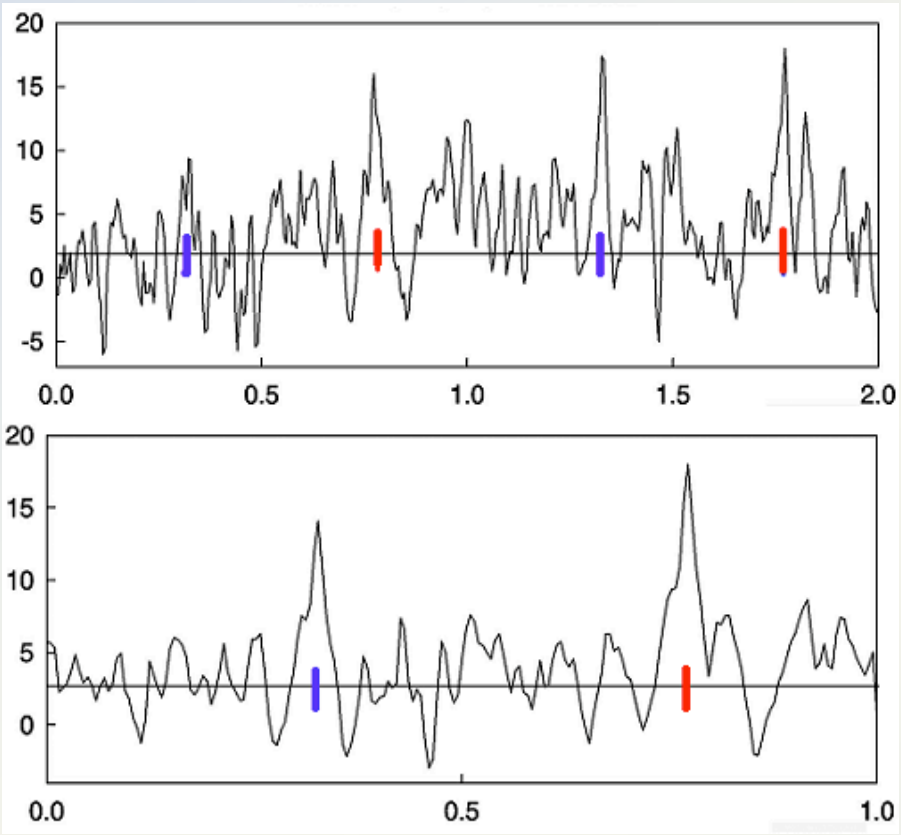
Amplitude Spectrum of J1308+21

6. 05. 2003



J1308+21

111.23 MHz



Sum of 4 days
(18, 20, 21, 23 January 2004)

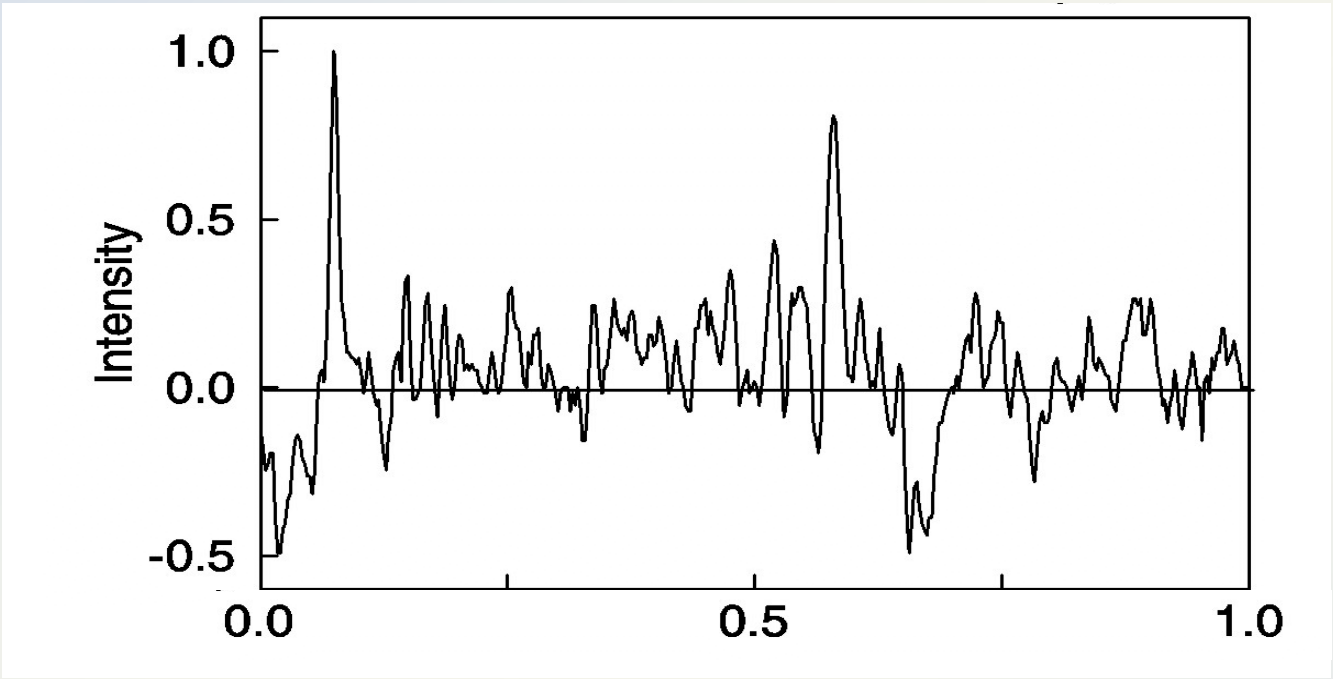
25 periods

50 periods

- Pulse profile obtained when the observing window equals twice the apparent pulsar period (p = 10.32 s). This profile was obtained by the integration of 25 independent individual pulses only (upper) and the mean profile for one period (lower) obtained by the folding of data.

J1308+21

87.70 MHz



April 2002

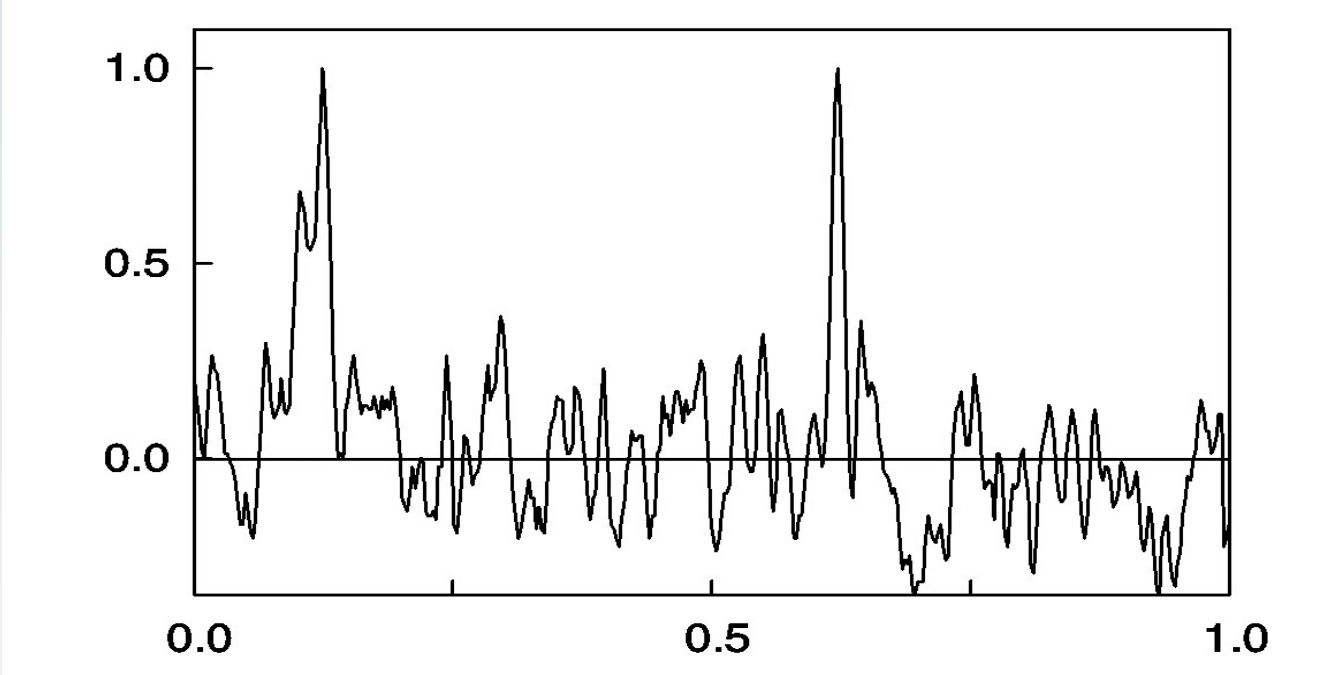
sum of 2 days

N = 28

S/n = 6

J1308+21

61.80 MHz



April 2003

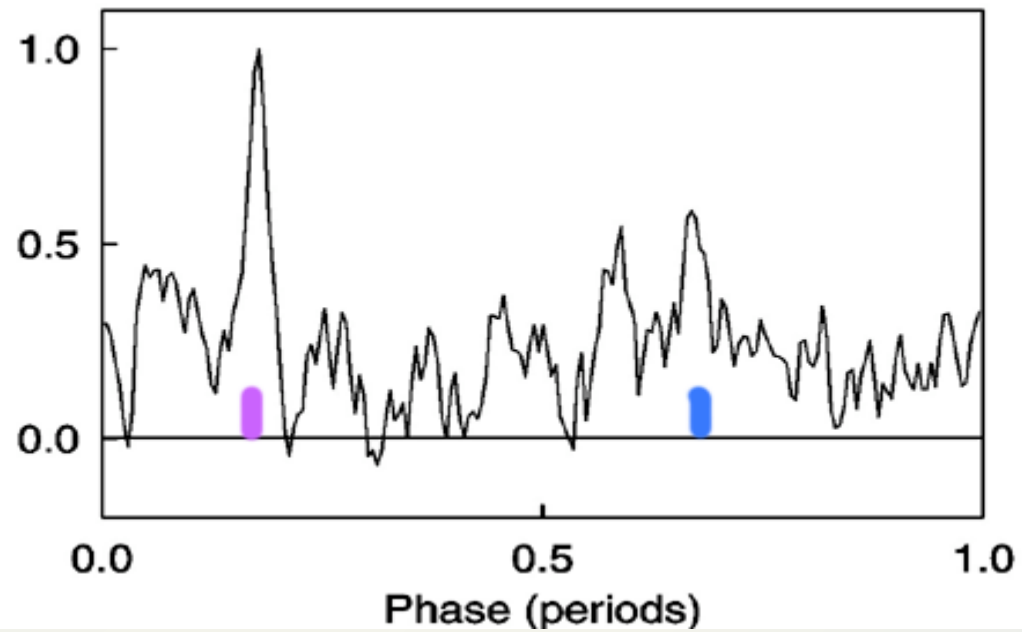
sum of 3 days

N = 100

S/n = 8

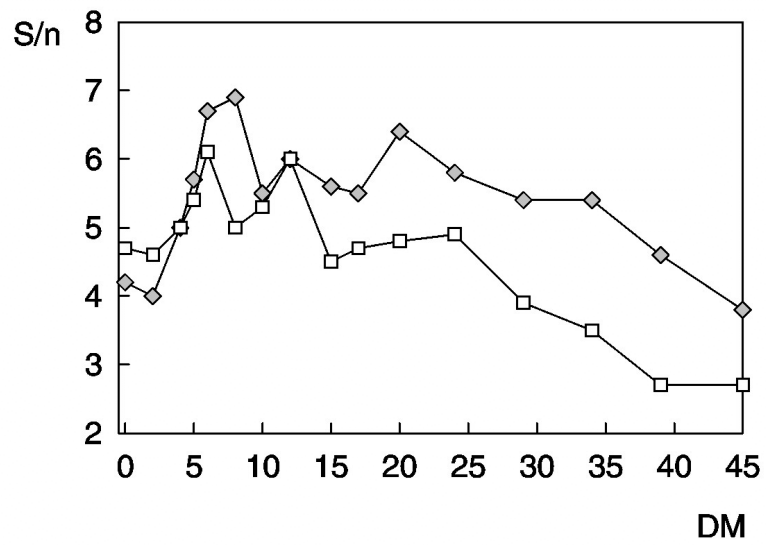
J1308+21

42.31 MHz



March 2003

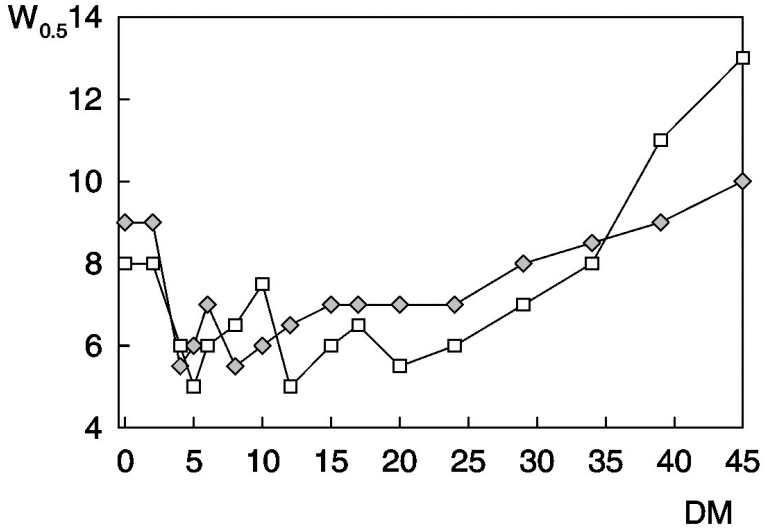
sum of 4 days
32 x 20 kHz
N = 206
S/n = 7



f = 111.23 MHz

10.08.2002

4.10.2002

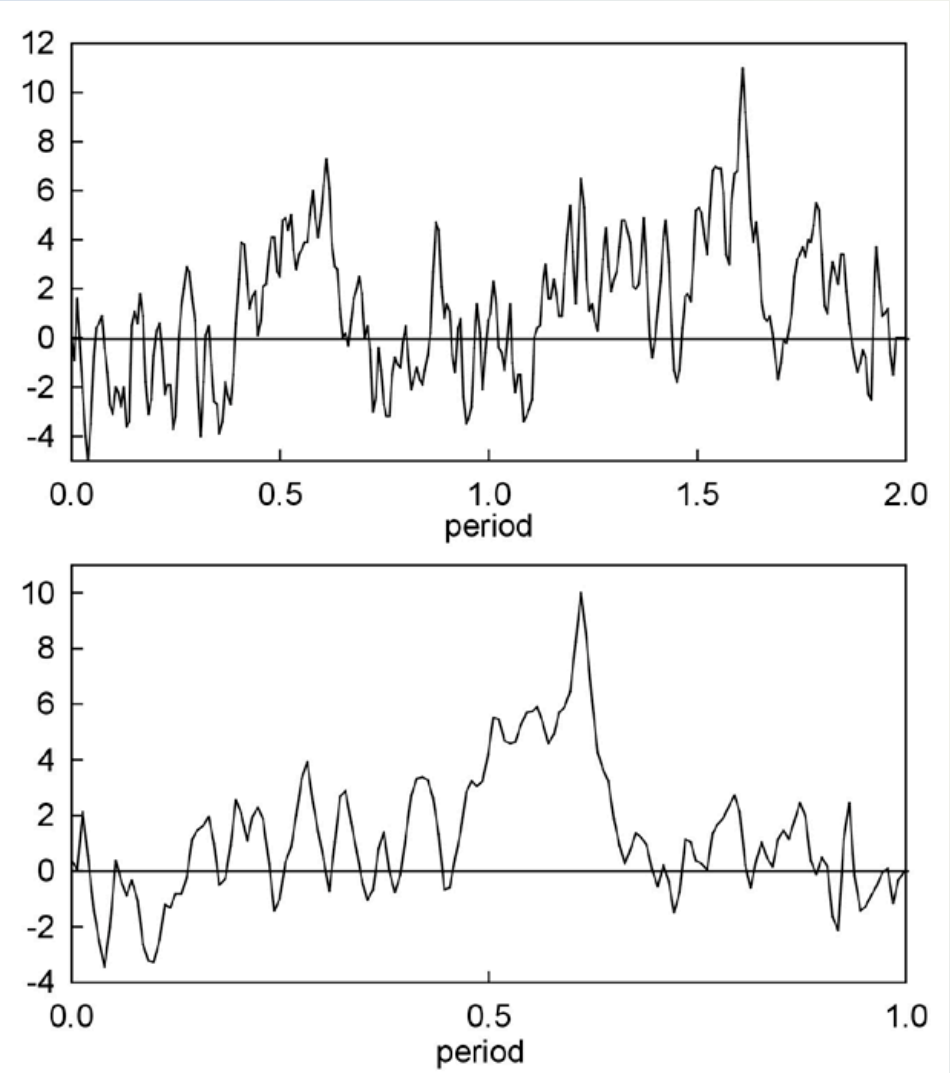


The search signal – to – noise ratio (upper) and pulse width (lower) as a function of dispersion measure at 111.23 MHz

1RXS J2143.7+065419

111.23 MHz

Malofeev et al, Atel #798, 2006



16.02.2006

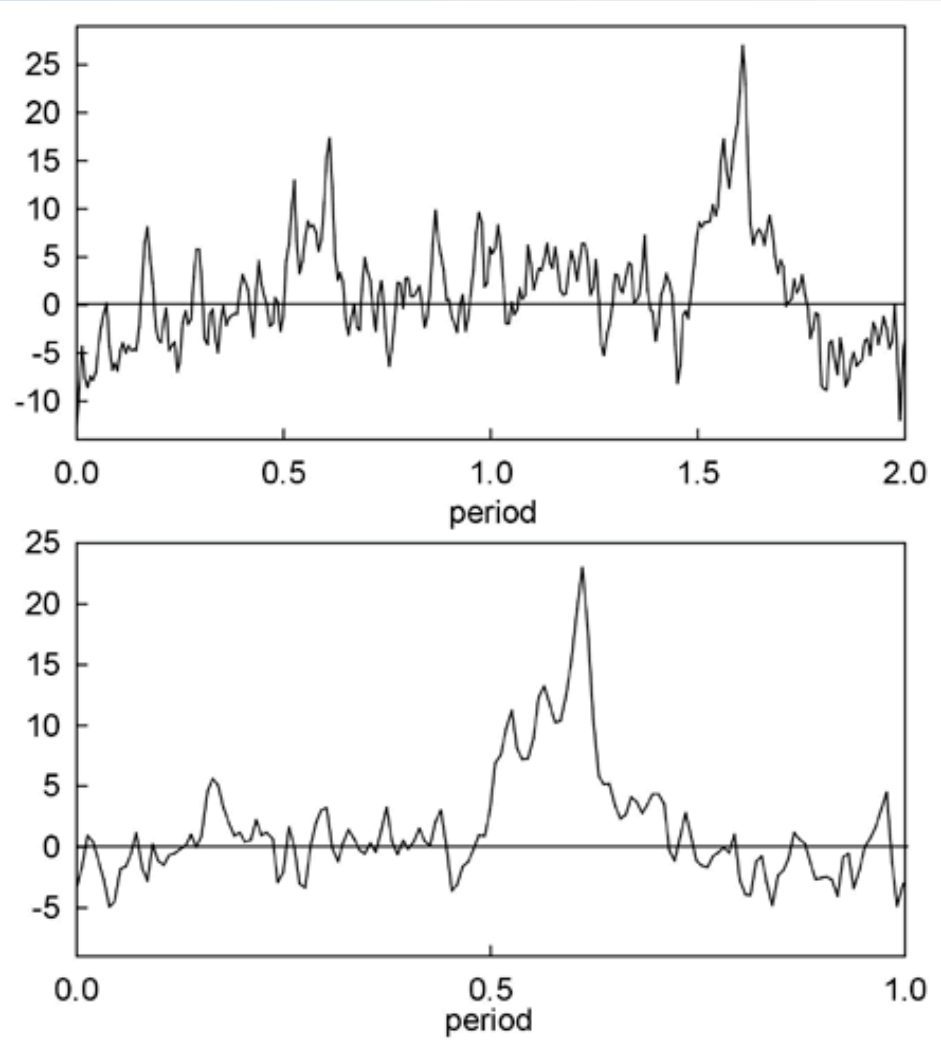
10 periods

S/n = 7

Pulse profile obtained by the integration of 20 periods

J2143+06

111.23 MHz



Sum of 4 days

(14,16,21,24 Feb.2006)

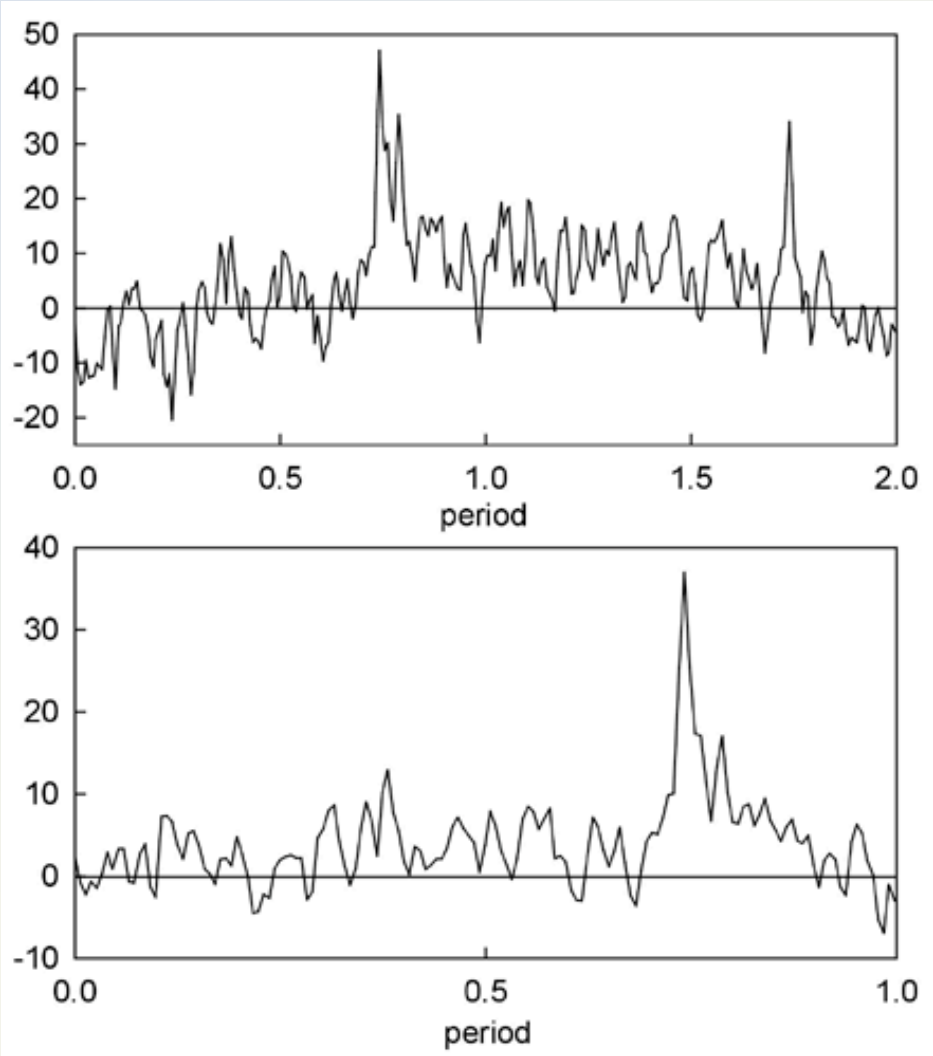
38 periods

76 periods

S/n = 10

J2143+06

111.23 MHz



Sum of 7 days

(7,8,9,11 Nov., 2,4,7 Dec. 2005)

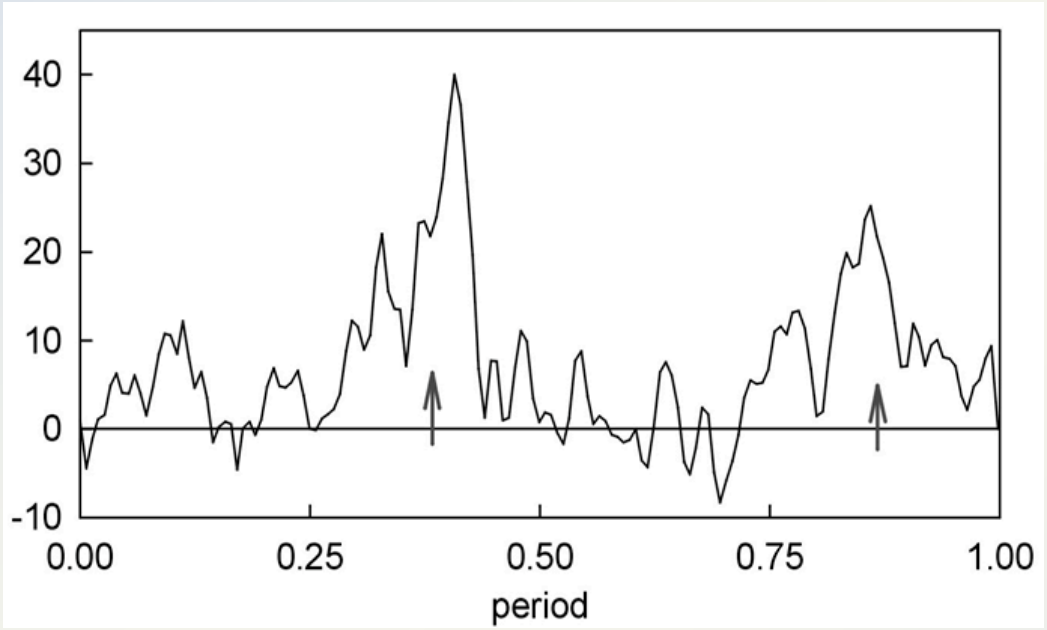
68 periods

136 periods

S/n = 10

J2143+06

111.23 MHz



Interpulse

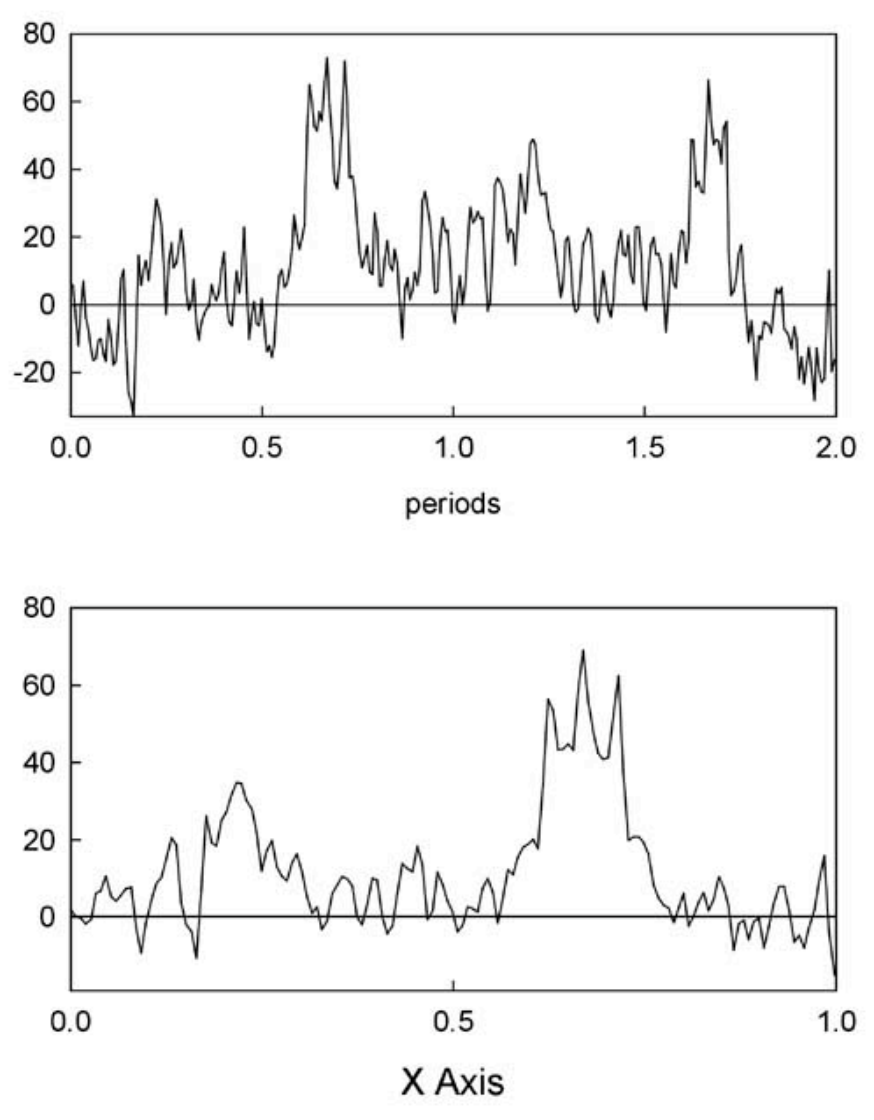
Sum of 4 days

(16,17,22,27 Nov.2005)

40 periods

J2143+06

111.23 MHz



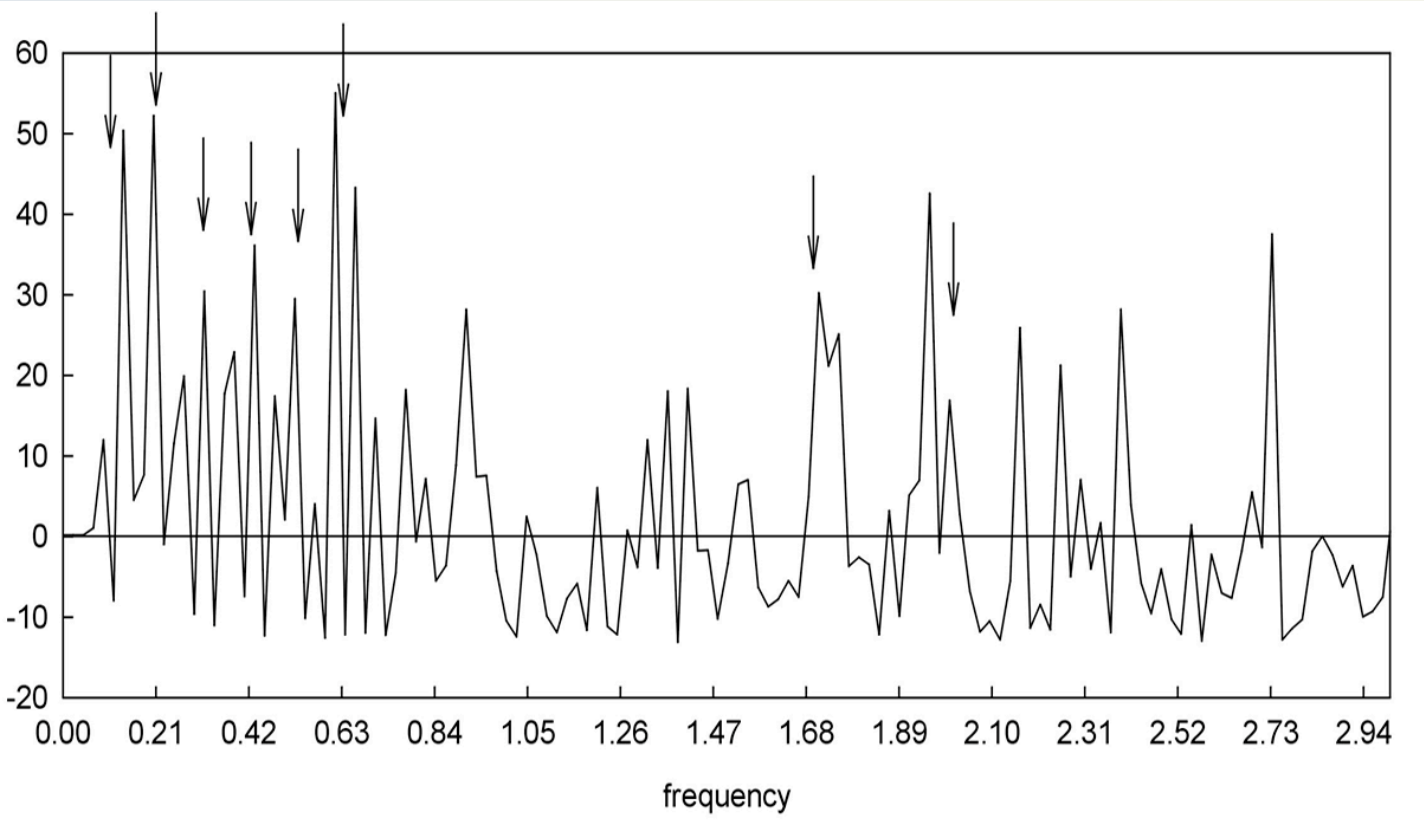
Sum of 23 days

450 periods

S/n = 11

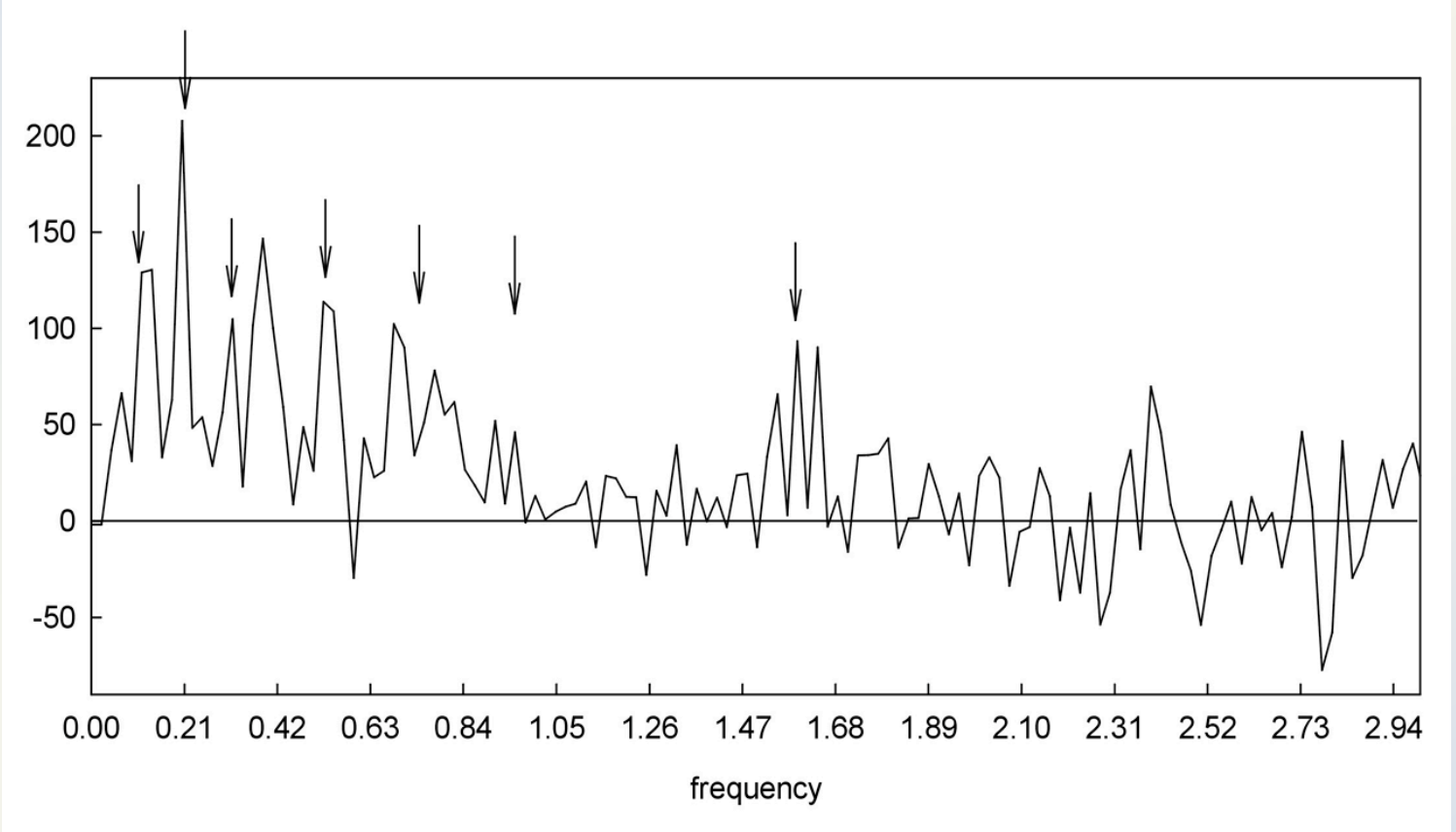
Amplitude spectrum of J2143+06

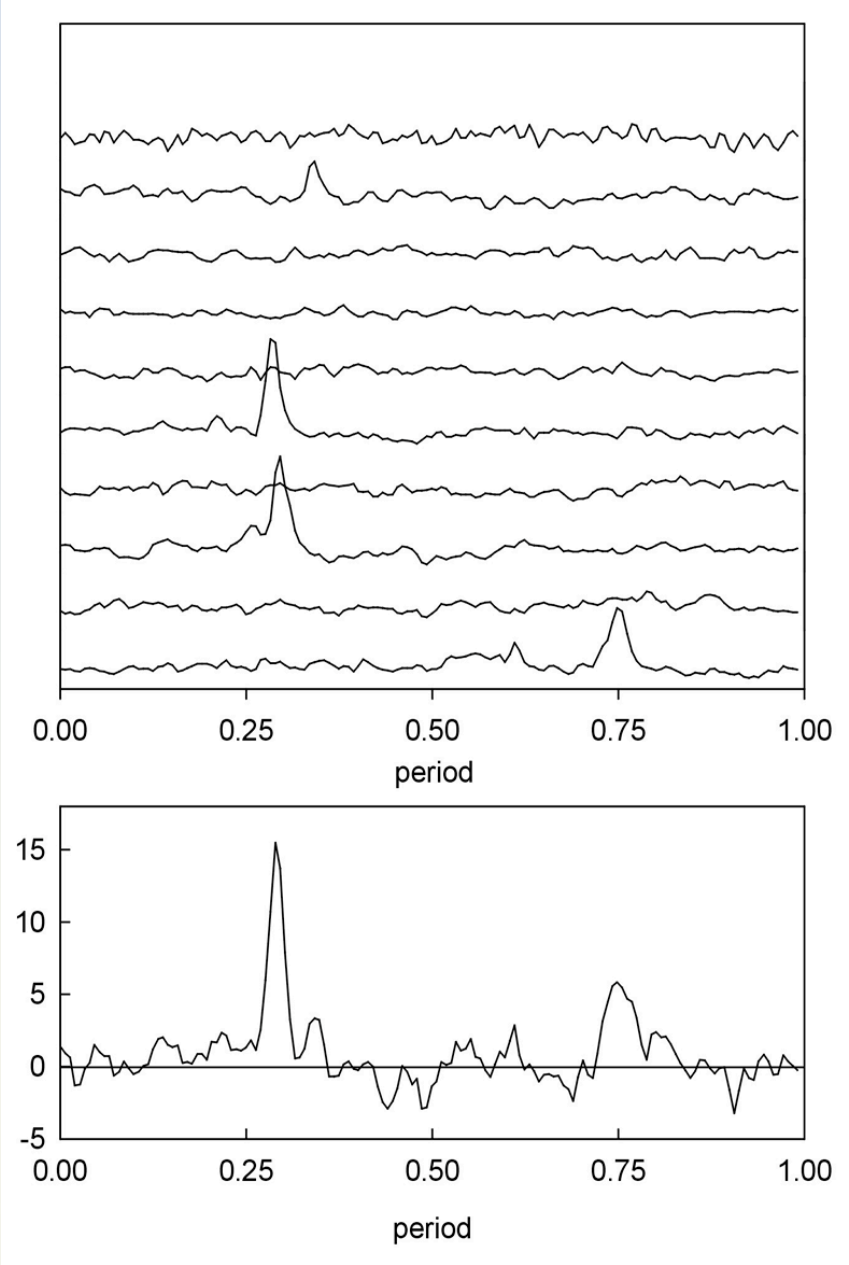
3.05.2003



Amplitude spectrum of J2143+06

Sum of 11 days





J2143+06

111.23 MHz

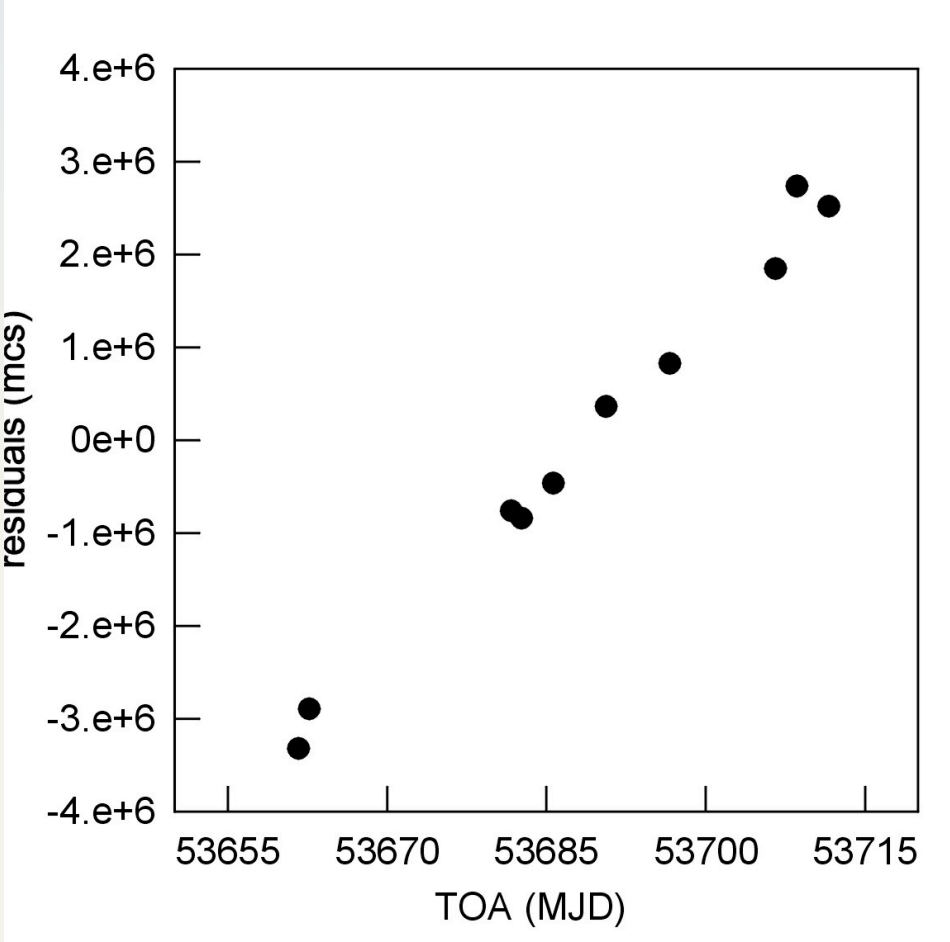
Outbursts

18.10.2005

10 periods x 2

Sum of 20 periods

Arrival time residuals for 1RXS J2143.7+065419



Parameters of pulsars at 111 MHz

	1E 2259+586 (Fahlman, Gregory 1981)	*1 RXS J130848.6+* (Hambaryan et al. 2002)	*1 RXS J214303.7+0* (Zane et al. 2005)
MJD Range	51 244 - 52 749 *Gavriil and Kaspi, 2002* (50 356 - 52 016)	52 300 - 52 743 *Hambaryan et al. 2002* (50 824 - 51 719)	53657.7-53799.3 *(Zane et al. 2005)*
N TOA	89 (67)	21 (2?)	13
p (s)	6.97894846 (6) (6.978948446 (4))	10.31433994(2) (10.314232 (14))	9.43707(10) (9.437)
p' (10^{13} s/s)	4.87(2) (4.8430 (8))	129 (1) (70 - 200)	- 15 (22)
Epoch MJD	51995.5827 (51995.5827)	51719.5 (51719.949…)	53657.7
DM ($cm^{-3}pc$)	79 (4)	5.7(5)	8(5)
D (kpc)	3.6 (3.5 - 4.5)	0.25 (0.1 - 1.5)	0.4 (0,28)
S (mJy)	35 á = 25	50 á = 20	60 á = 25
L (erg/s)	$3 \cdot 10^{28}$ (α = 2.5) α>2 (S_{600}<2.3 mJy, Lorimer et al.1998)	$3 \cdot 10^{26}$ (α = 2.5)	$9 \cdot 10^{26}$ (α = 2.5)
$W_{1/2}$(ms)	120 (20) ~ 1.7% ~27%	140 (20) ~ 1.4% ~25%	990 (60) ~ 10% ~ 50%
B (G)	$1.2 \cdot 10^{14}$	$5.2 \cdot 10^{14}$ ($3.5 - 6.5 \cdot 10^{14}$)	10^{11}, 10^{14}
T (year)	$2.2 \cdot 10^{5}$	$6.3 \cdot 10^{3}$ ($6 – 12 \cdot 10^{3}$)	

Conclusions

- There is radio emission from AXP and XDINS at low radio frequencies.
- The discovery of new radio pulsar with p = 6.7 s and $\dot{p} = 1.3 \cdot 10^{-12}$ s/s (McLaughlin et al. 2003) together with the detection of radio emission from AXP, SGR *(Shitov et al. 2000)* and XDINS gives a reason to revise either the radio emission mechanisms in the “magnetar” model or the “magnetar” model itself.