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Observations of millisecond pulsars at 102 MHz

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Abstract. Millisecond pulsars are differ to "normal" ones in much weaker frequency dependence of the width of integrated profiles and the absence of the low-frequency turn-over in pulsar spectra.

We have performed the measurements of integrated profiles and flux densities of millisecond pulsars at 102 MHz. Combining our observations with data at higher frequencies, we performed the comparative analysis of the frequency dependence of the profile widths and spectra of millisecond and normal pulsars.

The observations were performed at 102 MHz between 1961 and 1997 with the Large Phased Array BSA radio telescope in Pushchino Radio Astronomical Observatory. Linear polarisation was received. A filter bank of 32 x 5 kHz filters was used for collecting data. Signal was cleaned from radio interference. All observations were time referenced to the Observatory rubidium master clock, with in turn was monitored against National Time Standard. Each integrated profile was formed by synchronous integration of individual pulses with the topocentric pulsar period. Several sessions were added together based on timing to increase the signal to noise ratio and to reduce the influence of a polarisation and scintillation of pulsar radio emission. In-order to reduce the interstellar scattering broading we have employed a descattering compensation (Kuzmin & Izvekova 1993). Measurements of the pulsars flux densities were performed by reference to discrete sources with known flux densities using the signal to noise ratio.

Our main result is that millisecond pulsars are differ to "normal" ones in two aspects:

1. Frequency dependence of the width of integrated profiles of millisecond pulsars is much weaker than for normal pulsars. This result is illustrated in Fig.2 of Kuzmin (1999).

2. Spectra of millisecond pulsars differ from those of normal pulsars that they have no low-frequency turn-over typical to normal pulsars (See Fig.1).

We suggest that both these findings may be interpreted in a frame of the same conception that the divergence of the magnetic field lines in the emission region of MSK pulsars is much less than in normal ones.

More detailes one can find in Kuzmin & Losovski (1999a,b, 2000).

References

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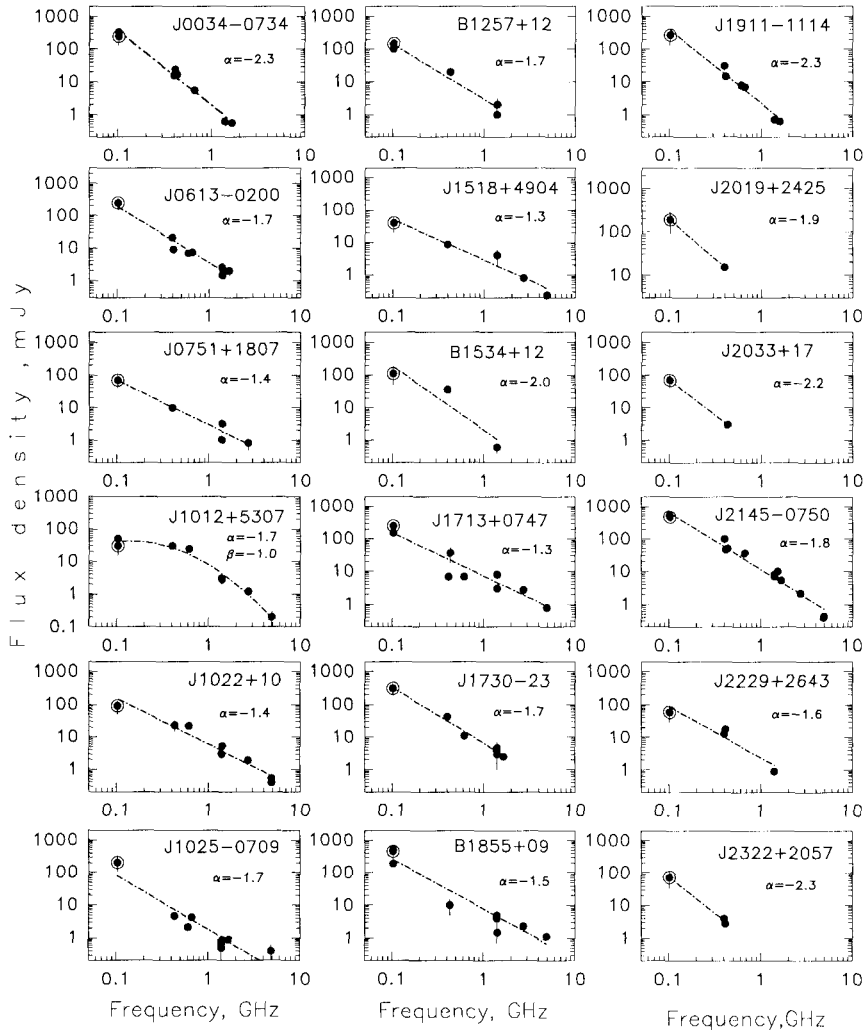

Figure 1. Spectra of millisecond pulsars. Circuled points are our measurements at frequency 102 MHz, dots are literature data, dash-dote lines denote power low regression $F \propto \nu^{\alpha}$. For pulsar PSR J1012+5307 we used second power-low regression

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