

High-frequency Turnover in Pulsar Spectra

J. Kijak

Institute of Astronomy, University of Zielona Góra, Poland

O. Maron

Institute of Astronomy, University of Zielona Góra, Poland

Max-Planck-Institut für Radioastronomie, Bonn, Germany

Abstract. Spectra of several pulsars with turnover at unusually high frequencies ~ 1 GHz are presented. These are relatively young pulsars with DM typically larger than for pulsars showing a low-frequency turnover.

1. Introduction

In general, pulsar spectra should represent intrinsic characteristics of pulsars and tell us about the emission mechanism. A typical pulsar spectrum is steep compared with spectra of other radio objects and can be described by a simple power law. However, some pulsars show an unusual spectral behavior: the low-frequency turnover (~ 100 MHz) and the high-frequency break (> 1 GHz) in the power law spectrum (Malofeev et al. 1994; Maron et al. 2000). It is still an open question whether the cause of the turnover is some kind of absorption in the magnetosphere, loss of efficiency of the emission mechanism (Sieber 1973) or an interstellar effect (Sieber 2002). Here we present several pulsars with a turnover at unusually high frequencies ~ 1 GHz (type T_H).

2. Turnover at High Frequency

In Maron et al. (2000) we presented a large number of pulsar spectra in a wide frequency range and found two young pulsars (B1823–13 and B1838–04) that indicate turnover at ~ 1 GHz. The collected pulsar spectra were analyzed again adding new flux measurements at high frequencies (> 1.4 GHz) made with the Effelsberg radio telescope and published in recent papers. As a result, another four pulsars of type T_H were found (see Fig. 1). In addition, five pulsars were selected as T_H candidates because their spectra indicate a possible turnover. Several objects show cut-off in spectra around 1 GHz (meaning, no detection at low frequencies) as a result of a high value of dispersion measure DM. However, one cannot exclude existence of T_H in these pulsars, so we treat them as candidates for T_H as well (see Table 1).

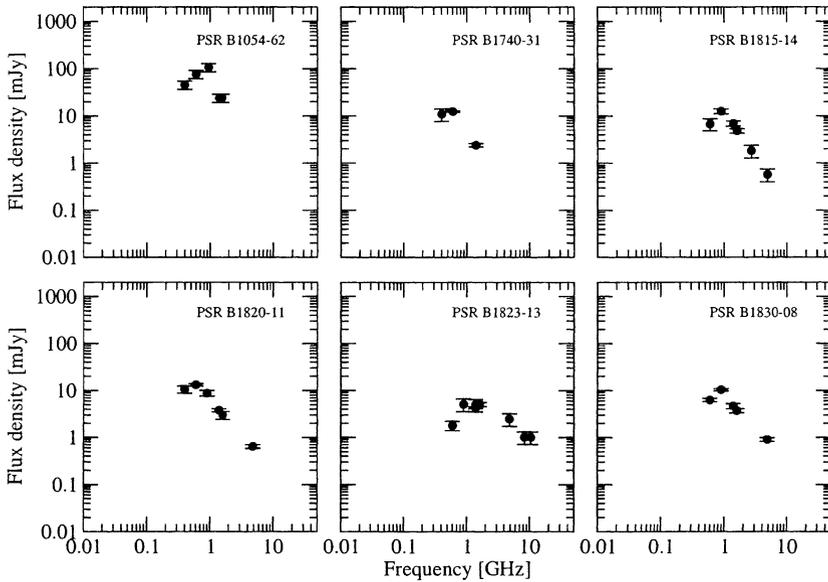


Figure 1. Pulsars with high-frequency turnover.

Pulsars with high-frequency turnover are relatively young compared to others with a low-frequency turnover and they also have large values of DM.

Table 1. List of candidates for turnover at high frequency. Objects with cut-off in spectra are marked with stars.

B1240-64	B1557-50*	B1641-45	B1714-34*	B1736-31*
B1740-31	B1750-24	B1758-23*	B1820-14*	B1822-14*
B1823-11	B1832-06*	B1849+00*		

Acknowledgments. This work was supported in part by the Polish State Committee for Scientific Research Grant 2 P03D 008 19. JK acknowledges partial support from the IAU.

References

- Malofeev, V. M., Gil, J. A., Jessner, A., Malov, I. F., Seiradakis, J. H., Sieber, W., & Wielebinski, R. 1994, *A&A*, 285, 201
- Maron, O., Kijak, J., Kramer, M., & Wielebinski, R. 2000, *A&AS*, 147, 195
- Sieber, W. 1973, *A&A*, 28, 237
- 2002, in *MPE Rep. 278, Neutron Stars, Pulsars and Supernova Remnants*, eds. W. Becker, H. Lesch, & J. Trümper, (Garching: MPE), p. 171