

Profile Frequency Evolution of PSR J0828-3417 and PSR J1057-5226 with Parkes's Ultra-Wideband Low Receiver (UWL)

Frequency evolution of the pulsar's emission contains information of the emission region and the pulsar's magnetosphere. The ultra-wideband low receiver (UWL) covering 704 to 4032 MHz recently installed on the 64-m Parkes radio telescope allows us to investigate this topic, which normally requires multiple radio telescopes at different observing bands operating simultaneously. The filterbank data of PSR J0828-3417 and PSR J1057-5226, observed on February 18 and March 3, 2019 for ~ 3.3 and ~ 1.5 hours respectively with the UWL, were obtained through the Parkes Pulsar Data archive on the CSIRO Data Access Portal. The data have been processed using the pulsar software package PSRCHIVE. For PSR J0828-3417, a mode-switching pulsar, we analysed single pulse data generated with sub-integration time of ~ 1.8 seconds equivalent to its spin period. However, in the case of PSR J1057-5226, an orthogonal pulsar with spin period of ~ 197 milliseconds, we ignored single pulse analysis and processed with sub-integration time of 1 second.

In this study, we aimed to investigate the frequency evolution of the pulse profiles of these two pulsars simultaneously observed in a wide frequency range which excludes the effect of time evolution. To investigate the frequency evolution, the 3328-MHz bandwidth data were divided into 13 256-MHz sub-bands, which were then compared to identify prominent frequency-varying components. We also measured the power spectra and spectral indices of those pulsars.

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Track Classification: Astronomy, Astrophysics and Cosmology