

Authors: T. Chanapote<sup>\*1</sup>, P. Jaroenjittichai<sup>1</sup>, S. Johnston<sup>2</sup>, M. Kramer<sup>3</sup>, C. Sobey<sup>4</sup> and T. Chairin<sup>1</sup>

<sup>1</sup>National Astronomical Research Institute of Thailand 260 Moo 4, T. Donkaew, A. Maerim, Chiangmai, 50180, Thailand

<sup>2</sup>Australia Telescope National Facility, CSIRO, Epping NSW 1710, Australia

<sup>3</sup>MPI für Radioastronomie, Auf dem Hügel 69, 53121 Bonn, Germany

<sup>4</sup>CSIRO Astronomy and Space Science, 26 Dick Perry Avenue, Kensington, WA 6151, Australia

\*Corresponding author. E-mail: thanapol@narit.or.th

Title:

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

Abstract:

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.

Keywords: pulsar, UWL, pulse profile, power spectrum, spectral index