Contribution ID: **17**   Type: **not specified**

The curious case of subpulse drifting and nulling in PSR J0026-1955

Wednesday, April 5, 2023 9:55 AM (15 minutes)

PSR J0026-1955 was recently independently discovered by the Murchison Widefield Array (MWA) and was quickly found to show both subpulse drifting and nulling. We have observed this pulsar with the upgraded Giant Metrewave Radio Telescope (uGMRT), covering a frequency range of 300-500 MHz. Our analysis shows that the pulsar exhibits two distinct subpulse drifting modes, with various evolutionary behaviour within the modes. With a nulling fraction of over 70%, the pulsar J0026-1955 is a welcoming addition to the subset of pulsars, which show subpulse drifting, nulling, and mode changing. The pulsar shows both rapid changes between modes and systematic evolution of drift rates within a mode. Further analysis revealed cases where within a mode, an evolution towards faster or slower drift rates was observed, a phenomenon which is exhibited by only a handful of known pulsars. We have also found compelling evidence of memory across nulls and a strong association between specific drift rate behaviour and nulling. We have studied the drift rate evolution of J0026-1955 in great detail and found that a carousel model with a variable carousel rotation rate would explain the drifting behaviour. With all these intriguing properties, J0026-1955 is an ideal and unique test bed for carousel models to uncover the intricacies of pulsar emission physics.

Presentation Type

Oral

Primary author: JANAGAL, Parul (Indian Institute of Technology Indore)

Co-authors: CHAKRABORTY, Manoneeta (Indian Institute of Technology Indore);   Dr BHAT, N. D. Ramesh (Curtin University);   Dr J. MCSWEENEY, Samuel (Curtin University)

Presenter: JANAGAL, Parul (Indian Institute of Technology Indore)

Session Classification: Neutron Stars

Track Classification: Neutron Stars