

Title

Continued Long-term Monitoring of the Compact Persistent Counterpart to the Repeating FRB 20121102A

Abstract

Fast Radio Bursts (FRBs) are micro to millisecond duration coherent radio pulses occurring at both Galactic and cosmological distances. As more FRBs are being localised, we are learning that some fraction have compact persistent radio sources (PRSs). The presence of PRSs provides a unique insight into the nature of the counterparts, their evolution, energetics and relationship to the progenitors of FRBs. As the origin of FRBs is still unknown, their nature may be revealed from studying their local environments. As a follow-up to a previous open-time call proposal, we propose to monitor the bursts and the compact PRS associated with the repeating FRB 20121102A over 12 months.

Our primary objective is to track variations in dispersion measure (DM) and rotation measure (RM), following our observation from previous MeerKAT data between 2019 and 2023, which indicated a consistent daily decrease in DM of 0.01 pc cm^{-3} . These variations suggest significant changes in the magneto-ionic environment surrounding FRB 20121102A, which we aim to investigate further. Key scientific goals include correlating flux density variations in the PRS with burst activity, monitoring DM decrements, studying scintillation effects on PRS flux density, and correlating RM variations with flux density changes to explore their dynamic evolution and their relation to progenitor environments of FRB 20121102A.