

A Search for Pulsars Around Sgr A* through Rotation Measure

Abstract

The lack of pulsars around the central few parsecs of SgrA* is an open problem. The usual searches for these pulsars in total intensity suffer from two issues (i) At low frequencies the temporal smearing of the pulses is very large due to the hyper-strong interstellar scattering in the vicinity of SgrA* and (ii) higher frequency observations are less sensitive to pulsar emission (typically steep spectrum, $\alpha \sim -1.8$).

We propose a new method to hunt for these pulsars by identifying sources with exceptionally large rotation measure (RM). The three pulsars with the highest known RM all lie within 0.15 deg of SgrA*. Further, SgrA* is very weak in linear polarization allowing us to reach thermal sensitivities in Stokes Q and U allowing for an extremely sensitive search for these high RM pulsars. Assuming a spectral index of -1.8 and a modest fractional polarization of 20%, a single 9 hour track with MeerKAT will allow us to detect the top 20-25% of all known pulsars if they were to be located at the Galactic Centre.

Therefore we are requesting a full synthesis (9 hour) track using the 32K correlator mode in full Stokes, with an integration time of 8s.