

Title

Understanding the Origin of Interstellar Scintillation

Abstract

We propose the continuation of a scintillation monitoring campaign with MeerKAT, with the goals of elucidating the origin of pulsar scintillation - from our local environment, the interstellar medium, and the pulsar's local environment. Parabolic scintillation arcs are regularly seen in the 2D power spectra of scintillation, revealing thin scattering layers or screens, and encoding the relative distance and velocity of the pulsar, screen, and Earth. Sources with multiple arcs can provide a tomography of plasma structures in the Interstellar Medium (ISM), and are a valuable probe of pulsar bow shocks, the Local Bubble boundary, and other astrophysical associations. However, a single observation does not suffice; annual variations of the arc curvatures are needed to uniquely determine the distance, geometry, and velocities of these screens. Moreover, observations of pulsars with multiple arcs are rare, requiring high instantaneous S/N and large bandwidths, making MeerKAT the ideal telescope for these science goals.

We propose the continuation of a scintillation monitoring campaign for 2 southern pulsars, to obtain full annual coverage needed to map their scattering layers. Both sources have been observed to have multiple arcs at MeerKAT, and require the high S/N and UHF band. We propose 12 separate monthly observations spread throughout the year: 1 hour per source, for a total of 24 hours of observations.