

FAST Proposal Coverpage

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Project Name:

Lighting up the Interstellar Beacons: A pilot pulsar scintillation study

Project Summary:

Pulsars shine through the Galaxy like beacons and they scintillate due to the relative motion between the pulsar, the scattering medium and the observer. A small sample (~30) of bright pulsars are known to show interstellar scintillation (ISS) arcs, from which we can measure the scale, location and velocity for the scattering medium and velocity for the pulsar. We propose to find scintillation arcs in 19 pulsars with no previous arc detection using 9- to 15-hour of FAST time. If we successfully detect arcs from all of them, this campaign would increase the sample size by >50% from all previous efforts. We have already successfully found new scintillation arcs from four pulsars using FAST and the same source selection criteria used in this proposal, proving that FAST's comparative strength in pursuing this project and our methods are reliable. Besides detecting scintillation arcs, the proposed observations will allow us to study the position and structure of the Galactic spiral arms, measure the boundary of the local bubble (LB), and open the doors to plasma lensing study for interesting pulsar systems, such as double neutron stars, and millisecond pulsar binaries in the proposed sample. For binary systems, scintillation observation can put constraint on the inclination angle that enable us to measure the masses precisely.