

Proposal Abstract:

PSR B1257+12 was the first pulsar discovered to host three planets in orbit around it. Considering the extreme conditions of pulsars, such pulsar planetary systems are indeed rare compared to those found around main-sequence stars. The study of interstellar scintillation (ISS) of the PSR B1257+12 planetary system provides a valuable tool for investigating the ionized circumstellar environment surrounding it, as well as the ionized interstellar medium along its line of sight. From FAST archive data, we have observed variations in dispersion measure (DM) and detected two ISS arcs, namely the inner and outer arcs, for PSR B1257+12. We propose to use 41 hours of FAST observations to detect an ISS arc emanating from a scattering screen that is potentially centered around planets C and D, and co-orbiting with them around PSR B1257+12. Furthermore, we will investigate the origin of curvature variations in the inner arc and determine the scattering properties of these screens. The proposed observations aim to uncover the structure of ionized clouds near this system and determine the impact of the pulsar wind on both planetary atmospheres and the asteroid belt, thereby enhancing our understanding of this system's uniqueness.