

FAST Proposal Coverpage

Project Justification

(This should be at most two single-column pages long in a font of size no smaller than 11pts. Note that the source table should be in separate pages. the following sections are required.)

Project Name:

Hunting Super Pulsars in Binaries using Scintillation Velocity Measurements

Project Summary:

Like moving a flashlight behind a curtain, we could tell how fast the flashlight was moving through the shadow it casts. The scintillation pattern of binary pulsars shows how fast the pulsar is revolving around its companion and center of mass. This can be used to constrain the inclination and masses of the binary. This powerful method is only ever applied to three pulsar binary systems, because it requires highly scintillated bright pulsar in close binary. The hardest condition to meet is that the telescope must resolve the pulsar's signal in fine frequency and time resolution. We propose to use FAST's superior sensitivity to measure the masses for three close binaries systems through scintillation patterns, some of them were predicted to harbor "super" pulsars heavier than 2 Msun. If these super pulsars were confirmed, the FAST telescope would be breaking new grounds in the physics of super-nuclear-density matter.