Proposal Abstract:

We propose to utilize FAST to measure the scintillation effect of the binary pulsar PSR J2222-0137. PSR J2222-0137 is one of the best laboratories to test gravity theories. FAST has been instrumental in determining the three-dimensional spin geometry of the pulsar in this system (Guo et al.). Using FAST to study the change of scintillation arcs caused by the orbital motion of the pulsar can provide an unmatched and exclusive method to measure the three-dimensional orbital geometry, and this method can help us to improve the timing precision of PSR J2222−0137, and then improve the ability of testing gravity. By using a longer integration time and a good orbital phase coverage, we plan to conduct dedicated scintillation observation that will significantly improve the orbital geometry constraints and enable a much better test of gravity. It also can be used to study the properties of the screen which is between the Earth and the pulsar and get information on the distance to the screen and the physical size of the screen.