PID:PT2022_0006

Abstract:

The double neutron star system is the best laboratory for observing geodetic precession -- an effect caused by the curvature of spacetime. We plan to use FAST to conduct some of the most precise observations on DNS's geodetic precession. We request 44.6~hours' FAST observation for two pulsars: PSR~J1946+2052 and PSR~B1913+16. PSR~J1946+2052 is a millisecond pulsar in the shortest double neutron star system. In previous observations, we find significant profile change and polarization for the first time. We derive the geodetic precession of the pulsar's spin vector and its misalignment with the orbit vector, albeit with considerable uncertainty. Our simulation shows that one more year of observations would reduce the error by 63\% and more in the following years. For PSR~B1913+16, we have detected a marginal signal of aberration effect, a tiny effect only observable by FAST. However, the lack of orbital coverage and the scatter in the measurement of ionosphere rotation measure prevent us from deriving the full information of geodetic precession. With future observations, we can combine aberration and geodetic precession to perform a test on general relativity.