Proposal Abstract:

Since the discovery of the first double neutron star system (DNS) PSR B1913+16 by Hulse & Taylor (1975), only 30 DNS systems have been discovered so far, with 22 confirmed. DNS systems originate from two high-mass stars, where the more massive star undergoes a supernova explosion, resulting in the formation of a neutron star and a binary system with the remaining high-mass companion. Subsequently, before the high-mass companion star undergoes a supernova explosion, the neutron star accretes mass and angular momentum from the companion star, accelerating its rotation to a few tens of milliseconds. DNS systems are rare and valuable for precise testing of gravitational theories. Constraints on post-Keplerian parameters, orbital inclination, or masses in DNS systems are invaluable for understanding their evolution. In addition, precise neutron star mass measurements are crucial for constraining the equation of state of high-density nuclear matter. The proposal requests the use of FAST to conduct follow-up timing observations of a confirmed DNS and two DNS candidates. The goal is to measure their post-Keplerian parameters to estimate the system's masses and to test general relativity.