Proposal Abstract:

Radio millisecond pulsars (MSPs) are very stable rotators which are characterised by short spin periods (P < 20 ms) and very small spin-down rate. MSPs are believed to formed in binary system in which the pulsars gain mass and angular momentum from the companion during the accretion process. They are thus recycled and spun-up to milliseconds, and exhibit high rotational stability, manifested as Galactic precise clocks. As most MSPs reside in binary systems, they have been proved to be outstanding cosmic laboratories for fundamental physics. Their clock-like periodic pulses from binary pulsars can be used to determine their orbital dynamics with high precision. MSPs have been applied in tests of general relativity with binary systems, to measure neutron star mass in binary to constrain the equation of state of ultra-dense matter, to detect nano Hz gravitational waves in Pulsar Timing Arrays (PTA). This proposal requests the use of FAST for follow-up timing analysis of 14 millisecond pulsars that lack detailed timing solutions published. The goal is to obtain high-precision timing solutions for potential inclusion in the PTA. The proposal is also significant for the study of the formation and evolution of millisecond pulsars.