Proposal Abstract:

Millisecond pulsars (MSPs) are highly stable, manifests as stable pulse profiles and long-term timing stability, therefore they are widely applied in fundamental physics studies. So far, only three millisecond pulsars, PSR B1957+20, PSR J0621+1002 and PSR J1909-3744, have been reported of mode changing. However, we found several new MSPs also exhibit such behavior. Due to the importance of these MSPs in PTAs, we propose using FAST to investigate them in the single-pulse level with relatively higher temporal resolution, in order to 1) study how the internal dynamics of pulsar interacts with radiation process in the magnetosphere and shed light on pulsar radiation mechanism; 2) analyzing how this phenomenon affect the long-term timing stability of MPSs. These studies will have important significances for PTAs, gravity theory tests, and establishing pulsar-based time standards.