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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. However we found that one of the best timed pulsar timing array (PTA) millisecond pulsars (MSPs), PSR J1713+0747 had underwent a profile changing event, which associated with DM events and a glitch, and such event is quite rare in pulsar astronomy. This event is followed by a slowly recovery of the pulse profiles. Due to the importance of this MSP in PTAs, we propose using FAST to long-term monitor J1713+0747, 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) evaluate the usability of timing data for gravitational wave detection after the profile event; 3) analyzing how this event 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.