

Proposal Abstract:

We proposed FAST observations to precisely time all five pulsars in the globular cluster (GC) M53, which is the most distant GC with known pulsars. With 22 FAST observations from 2019.11 to 2022.04, We have obtained the phase-connected timing solutions of M53B, M53C, M53D, and M53E (hereafter M53B to E), except M53A. The new FAST observations for M53 will help to get the unique timing solutions of M53A and refine the timing solutions of M53B to E. Then, The precise positions of the pulsars will allow optical and X-ray follow-up of these systems. This will be made easier by the lower-than-usual stellar density of M53. In addition, the long-term timing observations will contribute to deriving more precise orbital and astrometric parameters, such as the proper motion, and the orbital period derivative caused by the acceleration of the system in the globular cluster. This will be very useful to explore cluster dynamics and fundamental physics (e.g., testing general relativity).