

19 Years of high precision timing of the millisecond pulsar J1713+0747

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Abstract. We report the analysis of a 19-year span of timing data on PSR J1713+0747 taken by the Arecibo and Green Bank telescopes. PSR J1713+0747 is one of the best high-timing-precision pulsars monitored by the NANOGrav project for the purpose of detecting gravitational waves. The timing precision of this pulsar can be regarded as the benchmark of NANOGrav timing instruments. We show the precision improvement achieved by multi-generation instruments including the Green Bank Ultimate Pulsar Processing Instrument (GUPPI) and its counterpart in Arecibo. The new timing solution we found improves the measurement of the pulsars mass, its orbital and geometric parameters, sets new limits on alternative gravitational theories, and may provide a high-quality single pulsar gravitational wave upper limit.
