

Tick-Tock: a supermassive black hole binary?

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Recently, Pulsar Timing Array (PTA) collaborations around the world have found evidence for a stochastic gravitational waves (GWs) background at the nanohertz frequencies. One of the possible sources for these low-frequency GWs are the supermassive black hole binaries (SMBHBs). Despite having several hundreds of SMBHB candidates, none of them are confirmed till date. In 2022, Ning Jiang et. al. proposed the Tick-Tock (SDSSJ143016.05+230344.4) galaxy to host a highly eccentric SMBHB based on the variability in its optical lightcurve and postulated that the binary will merge in the next few years. In this work, we use an accurate post-Keplarian model and Bayesian inference to authenticate the presence of a binary in this galaxy and determine its orbital parameters. High eccentricity of this source indicates that this galaxy has undergone a recent major merger and we are using high-resolution uGMRT HI observations to probe its merger history. If this galaxy is found to host an SMBHB as proposed, it can have major implications for PTA to search for the GW memory effect.

Track type

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