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J1048+7143: Signatures of a Supermassive Binary Black Hole Close to Merger?

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The blazar J1048+7143 (a.k.a. J1044+71) is a promising candidate for harboring a supermassive binary black hole (SMBBH) inspiral on the verge of merging. Its gamma-ray, optical, infrared and radio light curves show consistent quasi-periodic oscillations (QPOs) with a period of years. The flares in gamma rays, optical and infrared consist each of two subflares, while in radio, the emission follows a Gaussian-like structure.

Here, we show that the spin-orbit coupling of the leading jet in a SMBBH at the center leads to jet precession, which produces the observed flaring signatures. Using our jet precession model, we successfully predicted the timing of the last flare observed between 2022 and 2024, whereas a spine-sheath model of the jet explains the different signature in radio compared to the other wavelengths. In this contribution we present the complete multi-wavelength dataset in context of our model that we use to constrain the mass ratio on the SMBBH, allowing a prediction of the merger time, which will happen in 20-40 years. In addition, we model the characteristic strain of its expected gravitational wave emission until the time of the merger.

Collaboration(s)

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