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Wet Eccentric Extreme-Mass-Ratio Inspirals

Thursday 19 December 2024 17:15 (15 minutes)

In this talk, we discuss the evolution of eccentric, equatorial extreme-mass-ratio inspirals (EMRIs) immersed in the accretion disks of active galactic nuclei. We will see how single gravitational-wave observations from these systems could provide measurements with ˜ 10% relative precision of, simultaneously, the disk viscosity and mass accretion rate of the central supermassive black hole. This is possible when the EMRI transitions, within the observation time, from supersonic to subsonic motion relative to the disk gas, for eccentricities e >˜ 0.025-0.1. The estimate of the accretion rate would assist in the identification of the EMRI's host galaxy, or the observation of a direct electromagnetic counterpart, improving the chances of using these sources as cosmological sirens. Our work highlights the rich phenomenology of binary evolution in astrophysical environments and the need to improve the modelling and analysis of these systems for future gravitational-wave astronomy.

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