

Astrophysics of Extreme Mass Ratio Inspirals

Tuesday 24 June 2025 10:00 (30 minutes)

Extreme Mass Ratio Inspirals (EMRIs) are compact binary systems characterized by very small mass ratios (between 10^{-9} and 10^{-4}), and they represent one of the primary gravitational wave (GW) sources for the forthcoming Laser Interferometer Space Antenna (LISA).

In the standard formation scenario, EMRIs originate in dense nuclear star clusters when a compact object is captured by a central massive black hole (MBH) due to frequent two-body interactions among orbiting bodies. Alongside this widely studied mechanism, several alternative formation channels have been proposed—such as evolution within active galactic nucleus (AGN) disks, tidal separation of binaries, or perturbations from massive bodies.

In this talk, I will review the leading formation scenarios, with a focus on their predicted orbital features and the significant astrophysical uncertainties that affect them. I will then focus on specific aspects of the two-body capture

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