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Star Cluster Disruption by a Super-massive Black Hole Binary

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Super-massive black hole binaries (BHBs) are expected to be one of the most powerful sources of low-frequency gravitational waves (GWs) accessible to the forthcoming LISA mission. BHBs are believed to form in the late stages of galaxy mergers, then harden by close encounters with interacting stars, until GWs lead the BHBs to coalescence. In this talk, I will discuss how the encounter between a BHB and a star cluster (SC) in a galactic nucleus influences the BHB shrinking rate. I will present the results of highly-accurate, GPU-accelerated N-body simulations exploring the effect of different orbits for the SC infall onto the BHB; in particular, I will show that SCs reaching the BHB on non-zero angular momentum orbits (with eccentricity ~ 0.7) do not enhance the binary shrinking, while SCs approaching the BHB on nearly radial orbits considerably contribute to its shrinking, and may efficiently shorten the BHB path towards GWs.

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