

Black Hole Superradiance and Gravitational Wave Beats

Ultralight bosons can extract energy and angular momentum from a Kerr black hole (BH) due to superradiant instability, resulting in the formation of a BH-condensate system. We carefully investigate the evolution of this system numerically with multiple superradiant modes. We find the BH still evolves along the Regge trajectory of the $n = 0$ modes even with the presence of the $n > 0$ modes. On the other hand, the BH-condensate system emits monochromatic gravitational waves (GWs) with a unique beat signature, which could be directly observed by GW detectors.

Primary author: GUO, Yinda (Shandong University)

Co-authors: ZHANG, Hong (Shandong University); JIA, Nayun (Southern University of Science and Technology, Northeastern University); BAO, Shoushan (Shandong University); ZHANG, Xin (Northeastern University)

Presenter: GUO, Yinda (Shandong University)

Session Classification: 分会场四

Track Classification: 中微子物理、粒子天体物理与宇宙学