

DEPARTMENT OF PHYSICS & ASTRONOMY

Fall 2026 Colloquium



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3:30 - 4:30 p.m. | Tuesday, October 20
Science Building 234

Black holes in star clusters: Gravitational waves, dormant binaries, and black hole growth

Star clusters pack up to a million stars into a region only a few light-years across. Their dense cores host a population of black holes, remnants of massive stars, that move on chaotic orbits and repeatedly undergo close interactions. These encounters make clusters natural factories for some of the most extreme objects in the Universe. Here, I will introduce, from a modeling perspective, what effects cluster dynamics have on the population of black holes. First, I will explain how close encounters pair black holes into tight binaries that spiral in and merge, producing the gravitational waves observed by LIGO. Then, I will characterize the formation of dormant black holes: wide black hole-star binaries that emit no radiation as they are not significantly accreting mass from their companion star. These are detected by the wobbling motion of the star by e.g., Gaia, a space telescope that has mapped the positions and motions of billions of stars in our Galaxy. Finally, I will show how black holes in clusters can repeatedly merge, building intermediate-mass black holes, the missing link between the black holes born from stars and the supermassive giants at the centers of galaxies.

Refreshments at 3 p.m. | SC 103



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