

BLACK HOLES IN DENSE STAR CLUSTERS
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TITLE: Parameter Distribution and Evolution of Eccentric Binary Black Holes

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We predicted the distributions of physical parameters of eccentric binary black holes (EBBHs) at various stages of their evolution and in various host environments. We also calculated (numerically) EBBH formation rates as a function of component masses. Our results show that distributions of initial orbital parameters in galactic nuclei hosts depend on the mass of the central supermassive black hole, and on the masses of stellar black holes forming an EBBH. For EBBHs forming in globular clusters, distributions of initial orbital parameters are sensitive to parameters of the host and to EBBH component masses. Distributions of total and reduced masses only depend on parameters of the black hole mass function in both host environments. We show that a significant number of EBBHs in galactic nuclei remain eccentric at the time their gravitational-wave signals enter the Advanced LIGO band. As EBBHs in galactic nuclei dominate the expected formation rates, we warn that algorithms using circular binary templates will be ineffective in searching for gravitational-wave signals of EBBHs.