Title:	Simulation Studies of Massive Compact objects such As Black Holes (BH) Originating in Globular Clusters
Authors:	Singh, Shiv Shankar
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Abstract:	Globular clusters, dense spherical assemblies of stars orbiting the outskirts of galaxies, provide invaluable insights into galaxy formation, evolution, and the nature of dark mat- ter. With high-density cores, these clusters are thought to harbor a significant number of black holes (BHs). However, the dynamics and time evolution of these systems remain largely unexplored. In this work, we develop a simple model to investigate the dynamics of massive objects, such as BHs, moving through a globular cluster, employing both N-body simulations and analytical methods. Previous studies have suggested that globular clusters may eject some of their BHs through various encounter mechanisms. However, there has been no evidence to support this idea. We explore how the dynamics of massive compact objects (BH) would evolve if the BHs had significant kick velocities (v > v escape) upon formation. Using the Plummer sphere model and the Barnes-Hut algorithm, we conducted N-body simulations for an initial population of 1 × 10 5 stars and massive compact objects (BHs) with masses ranging from 10 2 to 10 3 solar masses. Our results provide insights into the implications of introducing BHs with significant kick velocities and how this affects their dynamics within the globular cluster.
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