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Effects of Dark Matter on Quasinormal Modes and Tails of Black Holes

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In 1915, Einstein formulated the general theory of relativity, which describes how massive objects bend and curve the fabric of spacetime. One of the main predictions of general relativity is the existence of black holes, which are dense regions of spacetime in which not even light can escape. Several detections and observations confirm the existence of black holes, including the trajectory of stars in the center of the Milky Way galaxy, the observation by the Event Horizon Telescope, and the direct detection of gravitational waves released from the merger of binary black holes. These gravitational wave detections were made possible through the simulations conducted in numerical relativity. However, recently it has been discovered that 95 percent of the energy in the universe is dominated by dark energy and dark matter, and in my thesis, I study the possible effects dark matter can have on the emission of gravitational waves. These effects are explored by solving the Regge-Wheeler equation in a Schwarzschild background with a dark matter halo. The results show that the dominant effect occurs when the compactness of the halo is around $\mathcal{C} = 0.1$.

Field of study

Astrophysics

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Session Classification: Poster session: Enjoy the posters!