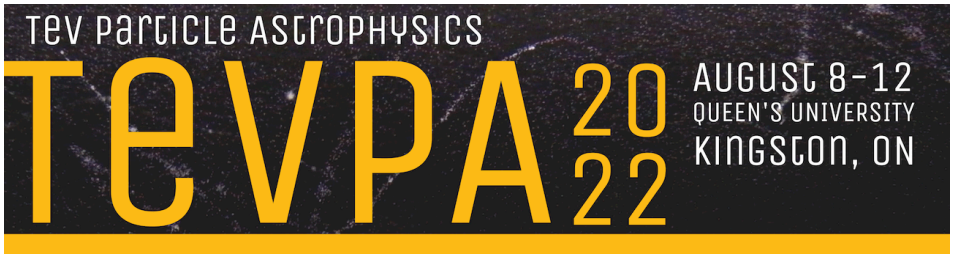

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Primordial Black Hole Dark Matter in the Context of Extra Dimensions

Monday, August 8, 2022 2:40 PM (20 minutes)

The addition of spatial dimensions compactified to submillimeter scales serves as an elegant solution to the hierarchy problem. As a consequence of such large extra dimensions, is the possibility of producing primordial black holes (PBHs) from high-energy collisions in the early universe, leading to a novel source of dark matter. While four-dimensional PBHs have been extensively studied, they have received little attention in the context of extra dimensions. We derive the full cosmological history including creation and evolution of these PBHs, adapting and extending previous analyses of four-dimensional PBHs. We combine constraints from Big Bang Nucleosynthesis, the Cosmic Microwave Background, the Cosmic X-ray Background, and galactic centre gamma-rays. In addition to finding strong constraints on a large portion of available parameter space, we find that in the case of two extra dimensions, asteroid-mass ($\sim 10^{20}$ g) black holes could be created in the early universe and survive until today, potentially comprising the entirety of the observed dark matter abundance.

Collaboration name

Authors: FRIEDLANDER, Avi (Queen's University); MACK, Katherine (North Carolina State University); SCHON, Sarah (Pennsylvania State University); SONG, Ningqiang; VINCENT, Aaron (Queen's University)

Presenter: FRIEDLANDER, Avi (Queen's University)

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