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Exploration of Primordial Black Holes and Axion-Like Particles through a novel decay model on cosmological scale

Monday, 12 June 2023 16:50 (20 minutes)

Primordial black holes (PBHs) have been proposed as potential dark matter candidates and viable sources of axion-like particles (ALPs). Since ALPs primarily decay into photons, this process enables the detection of enhanced photon spectra with sensitive detectors. In this study, we develop a novel methodology for estimating photon spectra by considering significant redshift effects and time-dependent decay rates, defining time-varying decay processes on a cosmological scale. Furthermore, we rigorously compute the photon spectrum resulting from decaying ALPs, taking into account the Lorentz boost effect. Our analysis delineates additional photon spectra arising from photon emissions from PBHs and time-varying decay of ALPs, comparing them with the sensitivity of e-ASTROGAM, a future gamma-ray detector. This approach provides a new means to constrain parameters of PBH and ALP.

Secondary category for the parallel session (optional)

Dark Matter Physics

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