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Search for BSM Astroparticles in DUNE Far Detectors

Despite the gravitational evidence supporting the existence of Dark Matter (DM), its composition remains unknown. As new approaches were demanded, a well-motivated class of models beyond the minimal WIMP scenario was proposed in the last decade. In this context, the Deep Underground Neutrino Experiment (DUNE) presents an excellent opportunity to search for BSM particles with its massive, underground far detector based on the technology of liquid-argon time-projection chambers (LArTPCs).

In this work, we present sensitivity studies of cosmogenic BSM particle searches in DUNE. In the first, we search for boosted dark matter (BDM), a small fraction of relativistic DM particles generated through the annihilation of the cold and dominant dark matter component in concentrated regions of mass, specifically the Sun in our study. We look for BDM through nucleus scattering via hadronic interactions in DUNE with complete simulated and reconstructed samples, along with an initial evaluation for systematic uncertainties. Secondly, we present an early-stage study for the search for Cosmogenic Axions via Inverse Primakoff interaction in the detector, producing quasi-monoenergetic photons. In these searches, the main background consists of atmospheric neutrinos.

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