



Contribution ID: 468

Type: **not specified**

(In)elastic Boosted Dark Matter Search Prospects at DUNE

Thursday 26 August 2021 10:10 (20 minutes)

The far detector of the Deep Underground Neutrino Experiment (DUNE) comprising four liquid argon time projection chambers (LArTPCs) totaling 70-kton mass will be installed at a depth of 1,500 m at the Sanford Underground Research Facility. Thanks to its large volume and the LArTPC-based precision imaging capability, the DUNE far detector can probe signals of cosmic origin. Of these, boosted dark matter has been receiving a lot of attention as a plausible thermal dark matter scenario beyond the weakly interacting massive particle. We discuss the signal detection prospects of boosted dark matter at the DUNE far detector, taking solar-captured boosted dark matter and galactic inelastic boosted dark matter as concrete examples. In addition to the drastic cosmic background reduction due to the underground detector location, we argue that kinematic features arising in the unique boosted dark matter signatures can be readily captured by the far detector, strongly reducing contamination from neutrino-sourced backgrounds in these searches.

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Session Classification: Dark Matter and Astroparticle Physics

Track Classification: Dark Matter and Astroparticle Physics