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Millicharged Particles and Inelastic Dark Matter at the DUNE Near-Detector Complex

The DUNE Near-Detector (ND) complex, including LArTPC and HPgTPC detectors, provides a powerful multi-purpose facility to search for dark-sector particles, produced when 120 GeV proton beam ($\sim 10^{21}$ POT/yr) hits the LBNF target. In this talk, I will discuss two types of searches: decay and scattering.

For the decay search, I will talk about a sub-GeV dark matter (DM) candidate, inelastic dark matter (iDM), that also has a long-lived state to be searched for in DUNE. DUNE can provide one of the strongest probes of iDM in the MeV-GeV regime. For the scattering search, I will present a study of the millicharged particle (MCP), a stable particle carrying fractional charges in the LArTPC detector. DUNE can provide leading sensitivity to MCPs and strongly interacting DM that cannot be seen in traditional direct-detection experiments. Finally, I briefly discuss scattering-plus-decay studies.

Mini-abstract

DUNE near-detector provides a powerful facility to search for dark particles, including MCP & iDM.

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