

Physics Opportunities in the Near DUNE Detector hall: PONDD



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Search for sub-GeV dark matter at DUNE Near Detector

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Various cosmological and astrophysical observations strongly support the existence of the Dark Matter (DM) with an abundance of $\approx 27\%$. All the astrophysical evidences of dark matter are through its gravitational interactions. A central question is whether DM particles experience interactions with ordinary matter beyond gravity. Recent theoretical work has highlighted the motivations for sub-GeV dark matter candidates that interact with ordinary matter through new light mediator particles, called “vector portal” model. Such sub-GeV (or light) dark matter particles are difficult to probe using traditional methods of dark matter detection, but can be copiously produced in Long Baseline Neutrino Facility (LBNF). The DM particles can then be detected through neutral-current like interactions either with electrons or nucleons in the detector. Since the signature of DM events looks just like those of the neutrinos, the neutrino beam provides the major source of background for the DM signal. Several ways have been proposed to suppress neutrino backgrounds by using the unique characteristics of the DM beam. In this talk, we will discuss the possibility of searching DM particles, produced in high intensity proton beams at LBNF using the DUNE Near detector, which will be competitive to results from other experiments.

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