

The Near Detector Liquid Argon (ND-LAr) 2x2 prototype of DUNE

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The Deep Underground Neutrino Experiment (DUNE) is a next-generation, long-baseline experiment that will explore some of the fundamental open questions in neutrino physics. ND-LAr is a Liquid Argon Time Projection Chamber (LArTPC) in the near detector complex of DUNE that will precisely characterize the outgoing neutrino beam. With a modularized design, as well as state-of-the-art light and pixelated charge readout systems, ND-LAr possesses several advantages over traditional LArTPCs that allow it to cope with the high intensity flux of the near site. The 2x2 demonstrator is an array of 2x2 fully integrated LArTPC modules installed in a single cryostat at Fermilab. It has been previously tested with cosmic rays and is recording neutrino data from the NuMI beam. Each module is split into two optically isolated TPCs by a central cathode, each of which has roughly 30% optical coverage with two novel and complementary technologies namely, the light collection module and the ArCLight module. Ionization electrons drift to two pixelated anodes with 78.4k channels with ~3-4mm granularity through the application of an electric field. In addition, repurposed tracker planes from the MINERvA experiment have been installed upstream and downstream of 2x2 that provide 3D tracking of charged particles. Neutrino data collected with 2x2 is crucial to demonstrate the design capabilities of ND-LAr and will yield DUNE's first neutrino physics analyses. This talk will discuss the design and current status of the ND-LAr 2x2 demonstrator.

Working Group

WG 6: Detectors

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