



Canadian Association
of Physicists

Association canadienne
des physiciens et physiciennes

Contribution ID: 336

Type: Oral (Non-Student) / Orale (non-étudiant(e))

Testing DUNE's Near Detector Strategy

Tuesday 10 June 2025 10:45 (15 minutes)

The Deep Underground Neutrino Experiment (DUNE) is a next-generation long-baseline neutrino experiment designed to measure the leptonic CP phase and the neutrino mass ordering. To characterize the neutrino flux and constrain interaction models and systematic uncertainties, a suite of near detectors will be installed near the proton beam target. To address the high event pile-up over 50 interactions per 10 μ s spill in the liquid argon TPC near detector (ND-LAr), a modular pixelated charge readout system has been developed, complemented by a high-coverage light detection system.

To evaluate the performance of this detector, four 0.7 ton modules were built and tested at the University of Bern with cosmic data, then assembled into a 2x2 array and placed on-axis in the NuMI neutrino beam at Fermilab. Repurposed tracker planes of the MINERvA detector were positioned both upstream and downstream to allow a better tracking of exiting particles and rejection of rock muon backgrounds. The detector collected about four days of high-quality data during the summer of 2024.

This talk will present the design of the 2x2 demonstrator, detailing both the charge and light readout systems, along with the first calibration and reconstruction efforts.

Keyword-1

Neutrino

Keyword-2

Dune

Keyword-3

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Session Classification: (PPD) T1-9 Neutrino Experiments | Expériences de neutrinos (PPD)

Track Classification: Technical Sessions / Sessions techniques: Particle Physics / Physique des particules (PPD)