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Machine Learning Reconstruction for DUNE's Near Detector Prototype: Handling Multi-Detector Input to Identify 3D Particle Signatures

Wednesday, 18 September 2024 11:10 (20 minutes)

The Deep Underground Neutrino Experiment (DUNE) aims to make precision measurements of neutrino oscillation parameters. To accomplish this, new technologies must be utilized at the DUNE Near Detector to handle characterizing the intense neutrino beam. We are testing a novel Liquid Argon Time Projection Chamber (LArTPC) detector prototype with a modularized setup, composed of 4 modules each with 2 TPC planes that utilize a pixel readout that provides native 3D imaging. To aid in particle tracking, the MINERvA detector has been repurposed as an upstream and downstream muon tracker surrounding the LArTPC prototype detector placed in the NuMI neutrino beam at Fermilab. A dedicated Machine Learning reconstruction is in development to reconstruct the novel, modular 3D particle signatures in the LArTPC. This talk will show its current performance to cluster and classify particles, and explore the impact of expanding the input to include the MINERvA auxiliary detectors.

Working Group

WG 6: Detectors

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