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Energy reconstruction and calibration techniques of the DUNE LArTPC

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The Liquid Argon Time Projection Chamber (LArTPC) technology is widely used in neutrino experiments and beyond the standard model physics searches such as nucleon decay and dark matter. The Deep Underground Neutrino Experiment (DUNE) will employ the LArTPC technology at an unprecedented scale for physics programs, benefiting from its large target mass and excellent imaging, tracking, and particle identification capabilities. In DUNE, accurate energy reconstruction is important for precisely measuring CP violation, determining neutrino mass ordering and fully utilising the detector's capabilities. The energy calibration techniques developed for the DUNE far detector (FD) horizontal drift are presented, utilising stopping cosmic-ray muons and validating the methods with the stopping pions and protons. The study demonstrates the versatility of the calibration techniques, applicable to other LArTPC, and valid for different particles. The electromagnetic shower energy reconstruction from $\pi^0 \rightarrow 2\gamma$ events and the subsequent reconstruction of π^0 mass are also presented. These are important calibrations which address the measurement of energy loss in the DUNE FD volume and are critical for achieving the exciting physics goals of the experiment.

Working Group

WG 6: Detectors

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