

Abstract Submitted
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Charge and energy calibration of the ProtoDUNE-SP detector using cosmic muons AJIB PAUDEL, Kansas State Univ — ProtoDUNE-SP is a Liquid Argon Time Projection Chamber(LArTPC) built at the CERN neutrino platform. As a particle passes through a LArTPC, it ionizes the medium. The charge liberated drifts through the medium under the influence of a strong electric field and gets collected at the anode. Energy reconstruction is carried out based on the charge received at the anode. Many factors, including Space Charge Effect (SCE), attenuation due to electronegative impurities, diffusion, and inactive wires, lead to non-uniformity in the charge deposition in various parts of the detector. We use the detector response for the through-going cosmic muons as a data-driven correction to remove any non-uniformities in the charge deposition throughout the TPC. We then perform the energy scale calibration using a sample of stopping cosmic muons such that we have a portion of a track for which dE/dx is theoretically known to better than 1%. In this method, we calculate the correction factors to remove non-uniformity in dQ/dx in each part of the detector and in time. We then find the absolute calibration constant to convert dQ/dx to dE/dx comparing observed values with theoretical predictions.

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