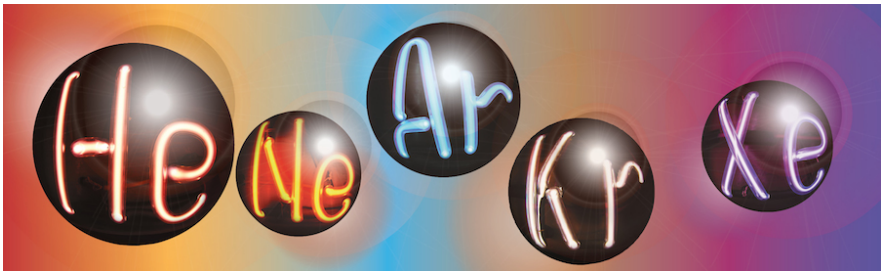

Contribution ID: **8** Type: **Oral**

Charge-Light Matching of Ambient Low-Energy Activity in the DUNE Near Detector Prototypes

Monday 26 August 2024 11:50 (20 minutes)

The Deep Underground Neutrino Experiment (DUNE) uses the Liquid Argon Time Projection Chamber (LArTPC) technology to study the neutrino oscillation phenomenon using a long baseline. Beyond neutrino oscillations, the project has a broad and extensive physics program. To ensure precise and accurate spatial and calorimetric resolution in the DUNE LArTPCs, it is important to be able to calibrate the detectors. An interesting prospect for calibration of the DUNE LArTPCs lies in utilizing the naturally occurring radioactivity present in liquid argon, e.g. 39Ar beta decays, which provide an abundant, uniform, and low-energy calibration source. However, the full reconstruction of the position and energy of such decays in LArTPCs is often difficult. This is largely due to the low scintillation light emitted by the low-energy decays and the large distances between the decays and the photon detectors. If the charge and light information for these decays can be detected, it would allow for full reconstruction and would open up multiple new avenues for calibrations that otherwise would not be possible with just charge alone. Results from a study of the reconstruction of the ambient low-energy activity using charge and light information in the DUNE near detector prototypes will be presented. The extent to which low-energy activity can be reconstructed in these prototypes will be discussed. In addition, a method for achieving high selection purity using appropriate data cuts, along with a method of measuring selection purity, will be described. Applications of the high selection purity samples will be shown, including using them as a probe of electric field uniformity in the detectors.

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Session Classification: Light/Charge Readout

Track Classification: Light/charge response in Noble Elements (gas, liquid, dual phase): Liquid