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Purity monitoring for ProtoDUNE-SP

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The Deep Underground Neutrino Experiment (DUNE) is a next-generation long-baseline neutrino oscillation experiment based on liquid argon time projection chamber (LArTPC) technology. In July 2020, DUNE's single-phase (SP) prototype ProtoDUNE-SP (PD-SP) at CERN finished its two-year Phase-1 running, which successfully collected test-beam data and cosmic ray data. A key aspect of LArTPC calibration is the lifetime of drift electrons, which corrects the charge attenuation caused by drift electrons which are captured by impurities. A purity monitor is a miniature TPC that measures the lifetime of electrons generated from the photocathode via the photoelectric effect. It enables continuous monitoring of the state of the detector, especially while filling the cryostat and when liquid argon recirculation systems are operating. The purity monitoring system in ProtoDUNE-SP Phase-1 (PD-SP-I) continuously monitored liquid argon purity throughout the entire lifetime of PD-SP-I, which was critical to the experiment's successful commissioning, operation, and data taking. I will discuss the design, implementation, and results of purity monitors in PD-SP-I and future plans.

Reference to paper (DOI or arXiv)

Your gender (free text)

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