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The Charge Readout Planes of the DUNE Vertical Drift TPC

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The Deep Underground Neutrino Experiment (DUNE) is a next-generation, long-baseline neutrino oscillation experiment. Its primary goals include measuring the neutrino CP-violating phase, determining the neutrino mass ordering, and conducting a broad physics program, including studies of supernova neutrinos, low-energy interactions, and searches for physics beyond the Standard Model.

DUNE's far detector complex will consist in its first phase of two large liquid-argon time projection chambers (LArTPCs) with distinct designs. One employs a well-established single-phase Horizontal Drift TPC with wirebased charge readout. The second is based on an innovative Vertical Drift TPC, where the wires are replaced by copper strips on perforated printed circuit boards for charge collection. The charged detector modules are called Charge Readout Planes (CRPs). This design maintains excellent tracking and calorimetry performance while significantly simplifying the TPC construction.

Building on the success of small-scale prototypes, full-scale CRP demonstrators have been developed and extensively tested at the CERN Neutrino Platform, validating key aspects of this novel technology for the future DUNE far detector.

In this talk, I will present an overview of the CRP's developments, from the prototype construction to operation in liquid argon in TPC mode.

Secondary track

T11 - Detectors

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