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Status and Performance of the ProtoDUNE Dual-Phase Detector: R&D on Large Scale Liquid Argon Time Projection Chambers[1] HECTOR CARRANZA[2], University of Texas at Arlington, DUNE COLLABORATION — Neutrino oscillations opened the door to new physics beyond the Standard Model, introducing new theoretical quantities such as the neutrino mixing parameters, and the CP phase parameter between neutrino and anti-neutrino oscillations. Liquid Argon Time Projection Chambers (LArTPCs) have undertaken an important role to determine these parameters more accurately. The Deep Underground Neutrino Experiment (DUNE) far detector is looking to push the technology to an unprecedented level, with an active mass on the order of 40 kilotonnes. At the Neutrino Platform at CERN, there are two prototype detectors: ProtoDUNE Single-Phase (PDSP) and ProtoDUNE Dual-Phase (PDDP). The single-phase detector has all the detector components in liquid argon, including the electronics for readout. In PDSP, the ionization electrons drift horizontally. On the other hand, in the dual-phase version, the ionization electrons are drifted vertically upwards, extracted into the argon gas above the liquid, and amplified by large electron multipliers (LEMs) in front of the readout planes. In principle, this could allow for a lower detection threshold than in the single-phase. My talk consists of the general aspects of the Dual-Phase technology, as well as updates and plans on PDDP at CERN.

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