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P1.023 The protoDUNE single-phase detector and beam measurement program at CERN

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The Deep Underground Neutrino Experiment (DUNE) will use a large liquid argon (LAr) detector to measure the CP violating phase, determine the neutrino mass hierarchy and perform precision tests of the three-flavor paradigm in long-baseline neutrino oscillations.

The detector will consist of four modules each with a fiducial mass of 10 kt of LAr and due to its unprecedented size will allow sensitive searches for proton decay and the detection of electron neutrinos from core collapse supernovae. We plan to construct and operate a single-phase LAr prototype detector (protoDUNE) with an active (total) LAr detector mass of 400 t (700 t) at CERN by 2018. The protoDUNE detector components will be identical to what is currently foreseen for the first 10 kt DUNE detector module and serve as an important engineering milestone. A charged particle beam with energies in the sub-GeV to few GeV energy range will be directed at protoDUNE. This well characterized charged particle beam provides critical calibration measurements as well as invaluable data sets to quantify and reduce systematic detector uncertainties for DUNE. We present an overview of the protoDUNE detector and the anticipated measurement program.