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LBNO-DEMO (WA105): a large demonstrator of the Liquid Argon double phase TPC

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A giant (10-50 kt) Liquid Argon Time Projection Chamber (LAr-
TPC) has been proposed as the detector for an underground observa-
tory for the study of neutrino oscillations, neutrino astrophysics and proton decay. This detector has excellent tracking and calorimetric capabilities, much superior to currently operating neutrino detectors.

LBNO-DEMO (WA105) is a large demonstrator of the double phase LAr-TPC based on the GLACIER design, with a 6x6x6 m3
(appr. 300t) active volume. Its construction and operation test scal-
able solutions for the crucial aspects of this detector: ultra-high argon purity in non-evacuable tanks, long drifts, very high drift voltages,large area Micro Pattern Gas Detectors (MPGD), and cold preamplifiers.

The TPC will be built inside a tank based on industrial technology
developed for liquefied natural gas transportation. Electrons produced in the liquid argon are extracted in the gas phase. Here, a readout plane based on Large Electron Multiplier (LEM) detectors provides amplfication before the charge collection onto an anode plane with strip readout. Photomultiplier tubes located on the bottom of the tank containing the liquid argon provide the readout of the scintillation light.

This demonstrator is an industrial prototype of the design pro-
posed for a large underground detector. WA105 is under construction
at CERN and will be exposed to a charged particle beam (0.5-20
GeV/c), consisting of p; e+-; pi+- and K+-, in the North Area in 2018. The data will provide necessary means for analysing and developing shower reconstruction, energy response and calibration, MC event generator tuning, particle identification, and tracking, as well as related eficiencies, and for development of analysis tools. This project is a crucial milestone providing feedback for future long baseline experiments considering LAr-TPCs.

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