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The WA105-3x1x1 m³ dual phase LAr-TPC demonstrator (12' + 3')

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The dual phase Liquid Argon Time Projection Chamber (LAr TPC) is the start-of-art technology for neutrino detection thanks to its superb 3D tracking and calorimetry performance. Its main feature is the charge amplification in gas argon which provides excellent signal-to-noise ratio. Electrons produced in the liquid argon are extracted in the gas phase. Here, a readout plane based on Large Electron Multiplier (LEM) detectors provides amplification before the charge collection onto an anode plane with strip readout.

The charge amplification enables constructing giant LAr-TPCs with drift lengths exceeding 10 meters without deteriorating the charge imaging performance.

Following a staged approach the WA105 collaboration is constructing a dual phase LAr-TPC with an active volume of 3x1x1 m³ that will be tested with cosmic rays before end of 2016. Its construction and operation aims to test scalable solutions for the crucial aspects of this technology: ultra high argon purity in non-evacuatable tank, large area dual phase charge readout system in several square meter scale, and accessible cold front-end electronics.

A milestone was achieved last year in the completion of the 24 m³ cryostat that hosts the TPC. This is the first cryostat based on membrane technology to be constructed at CERN and is therefore also an important step towards the realisation of the upcoming protoDUNE detectors.

The 3x1x1m³ LAr-TPC will be described in detail and we will report on the construction progress.

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