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APA integration test for the ProtoDUNE-SP LAr TPC at CERN

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As an important prototype of Deep Underground Neutrino Experiment (DUNE) far detector, ProtoDUNE single phase (ProtoDUNE-SP) with a total liquid argon (LAr) mass of 770 ton, represents the largest monolithic single-phase LAr TPC detector to be built to date. The detector elements, consisting of 6 Anode Plane Assemblies (APAs), 3 Cathode Plane Assemblies (CPAs), are housed in a cryostat that will contain the LAr target material. The development of readout electronics has been following an integral concept, which includes the APA, cold electronics (CE), signal feed-through assembly and warm interface electronics.

Since August 2017, the APAs have started to be instrumented with readout electronics for integration test and moved into the cryostat one by one at CERN. With the benefits of the well-designed CE developed for extremely low temperatures (77K-89K), the equivalent noise charge (ENC) measured on an induction wire (U or V) of APA is less than 500 e⁻ at 159K with peaking time of 2 μ s, for a collection wire (X) the ENC is less than 400 e⁻. The projected ENC of the single-phase DUNE far detector will meet the requirement which is to be less than 1000 e⁻ for induction wires under the situation of expected worse case instantaneous charge arriving at the APA from a minimum-ionizing particle (MIP). According to the current schedule, ProtoDUNE-SP will complete APA integration test by May 2018.

Minioral

Yes

Description

Detector?

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