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Testing the waters for the DUNE experiment

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The huge size of the liquid argon based Deep Underground Neutrino Experiment (DUNE) has motivated efforts to validate its technology at its full scale, in the form of the ProtoDUNE setups at CERN. The 770-ton Single-Phase ProtoDUNE setup was constructed in about two years, and successfully took beam data in late 2018, just before the shutdown of the CERN accelerator complex. A grand total of over four million triggers were collected, for a variety of beam particle optimisations (protons, pions, positrons, kaons), and with beam energies in the 300 MeV to 7 GeV range as appropriate for the neutrino oscillation programme driving the DUNE design.

We will discuss the experience gained from constructing and operating the ProtoDUNE-SP detector, as well as the effort to overcome the specific problem of electric field distortions, introduced by the slow ion signal caused by the many cosmic-ray particles traversing the detector.

The collected data are invaluable to develop the reconstruction and calibration strategies for DUNE, and we will describe the status of the experiment and the energy calibration results obtained to date.

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