

FELIX based readout of the Single-Phase ProtoDUNE detector

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The liquid argon Time Projection Chamber technique has matured and is now in use by several short-baseline neutrino experiments. This technology will be used in the long-baseline DUNE experiment; however, this experiment represents a large increase in scale, which needs to be validated explicitly. To this end, both the single-phase and dual-phase technology are being tested at CERN, in two full-scale ($6\times 6\times 6\text{ m}^3$) ProtoDUNE setups. Besides the detector technology, these setups also allow for extensive tests of readout strategies.

The Front-End Link eXchange (FELIX) system was initially developed within the ATLAS collaboration and is based on custom FPGA-based PCIe I/O cards in combination with commodity servers. FELIX will be used in the single-phase ProtoDUNE setup to read the data coming from 2560 anode wires organised in a single Anode Plane Assembly structure. With a sampling rate of 2 MHz, the system must deal with an input rate of 96 Gb/s, and buffer data. Event building requests will arrive at a rate of at least 25 Hz, and lossless compression must reduce the data within the selected time windows by a factor of 4 before being sent to the experiment's event building farm.

This presentation will discuss the design of the system as well as first operational experience.

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