

Light Readout System of the DUNE 2x2 Demonstrator

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The Deep Underground Neutrino Detector (DUNE) is a long-baseline neutrino oscillation experiment currently under construction at the Sanford Underground Research Facility, with a near detector planned for installation at Fermi National Laboratory. Prototypes for Near and Far Detector components have already recorded data from cosmic rays and mixed hadron beams; however, the 2x2 Demonstrator, currently installed at Fermi National Laboratory and slated to collect data in the Spring of 2024, will be the first DUNE prototype to collect data from a neutrino beam. Composed of four integrated, single-phase, 600 kg liquid argon modules, the 2x2 Demonstrator prototypes the modular design of the DUNE Liquid Argon Near Detector in beamline conditions. The 2x2's four modules are bisected into eight optically isolated time projection chambers (TPCs), each of which contains a pixelated charge readout, as well as 16 wavelength shifting light traps coupled to 48 silicon photomultiplier channels. This light readout system is optimized to mitigate event pileup through the precise timing of interactions in each TPC volume. Placed within each TPC's field structure to maximize light yield, the 2x2's high-coverage light traps provide localized timing resolution on the order of nanoseconds. This poster gives an overview of the 2x2 Demonstrator's light readout system: its design, its initial performance collecting cosmic ray data, and its efficacy in a high-intensity beam environment.

Poster prize

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