

# Power Over Fiber for the DUNE Vertical Drift Photon Detection System

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The Deep Underground Neutrino Experiment (DUNE) is a long-baseline neutrino experiment that will send an intense beam of neutrinos through two particle detectors: a near detector located at Fermilab (Chicago), and far detector located at ~1.5 km underground at Sanford Underground Research Facility (SURF) in South Dakota.

The first far detector module (FD1) will employ Horizontal Drift (HD) technology, and the second module will have the Vertical Drift (VD) technology. The second module (FD2) will vertically drift the ionized electrons from the cathode plane suspended at the mid-height of the active volume of the cryostat, dividing it into two vertically separated volumes. For the first time, photon detectors called X-ARAPUCAS will be installed in the cathode plane to increase the photon detection coverage in FD2. Because the cathode is biased with a high voltage (~300 kV) it is not possible to power the photon detectors with conventional copper cables. Power-over-Fiber (PoF) technology has been proposed to power the photon detection system (PDS) based on optical power transmission over optical fibers. The PoF technology has not been applied before in a particle physics experiment operating at cryogenic temperatures. This poster will present preliminary results on the different PoF components, their QA/QC, and their installation to supply electrical power to the PDS of the ProtoDUNE Vertical Drift (Module-0) located on the cathode plane.

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