



Contribution ID: 40

Type: **Oral contribution**

Innovative Power over Fiber Solutions for the DUNE Vertical Drift Photon Detection System

In modern physics, the nature of neutrinos remains one of the major open questions, motivating new experimental efforts to investigate their properties. The Deep Underground Neutrino Experiment (DUNE) is a next-generation international experiment designed to determine the neutrino mass ordering, study CP violation in the neutrino sector, detect neutrinos from astrophysical sources, and search for physics beyond the Standard Model.

Currently under construction in the United States, DUNE will use an intense neutrino beam produced at Fermilab and a Far Detector located 1300 km away at the Sanford Underground Research Facility. The Far Detector will consist of four 17-kton Liquid Argon Time Projection Chamber (LArTPC) modules, two with already planned geometry and technology, while the remaining two are still under discussion. Phase I includes one Vertical Drift (VD) detector and one Horizontal Drift (HD) detector. Both designs employ a Photon Detection System (PDS) based on X-ARAPUCA devices instrumented with Silicon Photomultipliers (SiPMs).

In the Vertical Drift module, X-ARAPUCAs are installed on both the detector walls and the cathode to optimize light collection in the active volume. However, powering the devices located on the cathode is challenging because this region operates at high voltage (-300 kV), making conventional copper cabling impractical. To address this issue, the DUNE collaboration is developing Power over Fiber (PoF) and Signal over Fiber (SoF) solutions, where both power delivery and signal readout are performed through optical fibers.

This contribution presents an overview of PoF and SoF applications for DUNE and reports on recent tests performed at CERN, where the full PDS was operated in a configuration closely resembling the final detector design.

Primary author: TRABATTONI, Valeria (Università degli Studi di Milano e INFN Milano)

Presenter: TRABATTONI, Valeria (Università degli Studi di Milano e INFN Milano)

Track Classification: WG6: Detector Physics