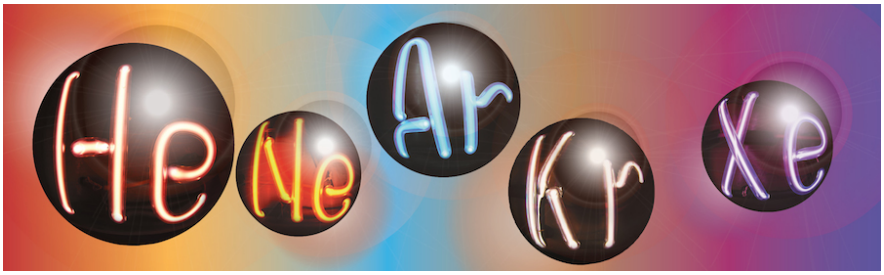

Contribution ID: **64** Type: **Oral Presentation**

Using Argon for neutrino Physics: the Deep Underground Neutrino Experiment

Tuesday, 21 October 2025 09:30 (30 minutes)

Thanks to its properties, argon is a special element for large apparatus used in searches for neutrinos. The single/dual phase liquid argon time projection chamber is a wellestablished technique that has been used by a number of projects since the 1980s. It is usually complemented by reading the scintillation light of the liquid/gas argon.
The Deep Underground Neutrino Experiment (DUNE) is a long baseline neutrino project with a broad physics program primarily aiming to probe CP violation in the neutrino sector and to identify the neutrino mass ordering. This by observing inside its far detectors located at the SURF Laboratory, the interactions of neutrino/antineutrino produced 1300 km away by the Long-Baseline Neutrino Facility. In addition, the search for proton decay and the measurement of the neutrino flux from supernova bursts are also goals of DUNE. The latters are no beam triggerable events whose detection will be enhanced by the Photon Detection System (PDS).
The experiment detectors are located at the near (FERMILAB) and at the far (SURF Laboratory) sites. The far detectors will be made of four modules: the first is a vertical drift single-phase LArTPC, the second is a horizontal drift single-phase LArTPC, and for both the PDS will complement the TPC. The technology of the last two modules is still being defined.
In this talk I will discuss the current status of the photon detection system of the first two modules, which uses two different optimized and modified version of the so-called XARAPUCA photon detector concept, that allow to safely attain the PDS sensitivity required for the low energy neutrino events. The main ingredient of the device optimization will be presented.
Thanks to an intense R&D campaign conducted in several labs and in ProtoDUNE runs at CERN, the PDS system has been finally optimized and validated: selected results from the protoDUNE and coldbox test runs performed at CERN will be also presented.

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Session Classification: Plenary Session

Track Classification: Applications (dark matter, neutrino, precision frontier, medicine, etc.)