

Photon detection system of the single phase DUNE far detector

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One of the most important experimental programs that will address some of the open questions in neutrino physics is the Deep Underground Neutrino Experiment (DUNE). It will be the first mega-science project on the US sole, which involves more than 1000 physicists. It will perform measurements of the CP violation in the leptonic sector, the neutrino mass hierarchy and on the θ_{23} octant. The DUNE foresees the realization of a neutrino beam and a near detector, both located at Fermilab (USA) and of a gigantic far detector based on the technology of liquid argon time projection chambers that will be installed at the Sanford Underground Research Facility in South Dakota, 1300 km away from Fermilab.

The photon detection system (SPPDS) is a fundamental component of the (single-phase) far detector, which will be used for timing, triggering and to improve the energy resolution of the detector for low energy events. Its baseline design relies on a newly developed technology, the ARAPUCA. Its operating principle is based on the combination of active silicon photon sensors with a passive collector. The latter allows increasing the effective detection efficiency of the active sensors by trapping the photons inside a highly reflective box. The design and the main features of the single-phase photon detection system (SPPDS) of DUNE, together with the impact on the physics reach of the experiment will be illustrated.

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