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A novel optical imaging system for the LAr detector GRAIN

DUNE is a leading-edge experiment for neutrino oscillation physics and is currently under construction in the United States, between Fermilab, where neutrino beam is generated, and the SURF underground laboratory, in South Dakota, hosting the Far Detector at a depth of 4,850 mwe and at a baseline of nearly 1,300 km.
GRAIN (GRanular Argon for Interactions of Neutrinos) is the Liquid Argon detector of SAND (System for On-Axis Neutrino Detection), which is part of the DUNE Near Detector complex.
SAND is expected to significantly decrease uncertainties related to neutrino flux and cross-sections. Additionally, SAND will have the capacity to monitor the beam stability, and to investigate various neutrino interactions models, constraining at the same time nuclear effects. A key element of SAND is GRAIN, which will serve as a Liquid Argon target for detecting neutrinos and low-energy particles, ensuring cross-calibration with the other Near Detector components.
This poster will discuss the novel GRAIN system designed for reconstructing charged particle tracks in LAr. It is based on the detection of scintillation light by an optical system optimised for the Vacuum Ultra-Violet, coupled to SiPM matrices. Another research topic that will be described concerns the development of a cryogenic, 1024-channel ASIC, able to read 32x32 SiPM matrices.

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