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Imaging Neutrino interactions with Liquid Argon scintillation light at the DUNE Near Detector Complex

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The Deep Underground Neutrino Experiment (DUNE) has among its primary goals the determination of the neutrino mass ordering and the possible CP-violating phase in the neutrino mixing matrix.

The System for On-Axis Neutrino Detection (SAND) at the DUNE Near Detector complex includes a novel liquid Argon detector - GRAIN - designed to image neutrino interactions using scintillation light produced in AR by charged particles, eliminating the dependence on slow charge collection of LAr TPCs. An innovative optical readout system based on SiPM matrices is being developed.

In this talk, the current design of GRAIN, its physics goals, the development of its optical elements and image reconstruction algorithms, and preliminary results from a cryogenic demonstrator will be presented.

The challenges of this novel approach will also be discussed, including limited photon detector and optical element performance, and the cryogenic photosensor readout.

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