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Innovative photo-detection systems for Liquid Argon TPC neutrino detectors

The Department of Physics and the INFN Pavia Section are actively involved in the SBN-ICARUS and DUNE experiments, both based on liquid-argon time projection chamber (LAr-TPC) technology. The Short-Baseline Neutrino (SBN) program at Fermilab aims to precisely investigate anomalies in neutrino oscillations and to search for sterile neutrinos using a short-baseline beam. DUNE represents the next generation of long-baseline experiments, targeting CP violation in the lepton sector, the neutrino mass ordering, and rare processes such as proton decay and supernova neutrinos.

A central focus of our work is scintillation-light detection, which is essential for the LAr-TPC trigger system. In ICARUS we designed and built the full photomultiplier system, while in DUNE we contribute to the development of innovative light-detection solutions, including X-ARAPUCA devices and other next-generation technologies. These activities significantly improve detector performance and help achieve the scientific goals of both programs.

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