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The electronic set-up for the scintillation light detection system of ICARUS-SBN at Fermilab

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The ICARUS-T600 liquid argon (LAr) time projection chamber (TPC) is presently used as a far detector of the Short Baseline Neutrino (SBN) program at Fermilab (USA) to search for a possible LSND-like sterile neutrino signal at $\Delta m^2 \sim \text{o}(\text{eV}^2)$ with the Booster Neutrino Beam (BNB).

A light detection system, based on large area Photo-Multiplier Tubes (PMTs), has been realized for ICARUS-T600 to detect VUV photons produced after the passage of ionizing particles in LAr. This system is fundamental for the TPC operation, providing an efficient trigger and contributing to the 3D reconstruction of events. Moreover, since the detector is exposed to a huge flux of cosmic rays due to its shallow depths operations, the light detection system allows for the time reconstruction of events, contributing to the identification and to the selection of neutrino interactions within the BNB spill gate.

Based on 360 Hamamatsu R5912-MOD PMTs deployed behind the four TPC wire chambers, the system requires a high performance electronic set-up. The electronics consists of fast sampling digitizers (500 MSa/s, 14-bit) allowing for the recording and the discrimination of the signals directly extracted from the PMT anodes, and providing a fast identification of interactions and the exploitation of the scintillation light for trigger purposes.

The main features of the electronics for the ICARUS-T600 scintillation light detection system are introduced together with a presentation of its installation and commissioning at Fermilab.

Collaboration

ICARUS

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