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Status and perspective of ICARUS-T600 detector at the Fermilab Short- Baseline Neutrino Program

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The ICARUS collaboration has employed the 760-ton T600 detector in a successful three-year physics run at the underground LNGS laboratory, performing a sensitive search for LSND-like anomalous neutrino-e appearance in the CERN Neutrino to Gran Sasso beam, which contributed to the constraints on the allowed neutrino oscillation parameters to a narrow region around 1 eV^2 . After a significant overhaul at CERN, the T600 detector has been installed at Fermilab. In 2020 the cryogenic commissioning began with detector cool down, liquid argon filling and recirculation. ICARUS then started its operation collecting the first neutrino events from the Booster Neutrino Beam (BNB) and the Neutrinos at the Main Injector (NuMI) beam off-axis, which were used to test the ICARUS event selection, reconstruction and analysis algorithms. ICARUS successfully completed its commissioning phase in June 2022, moving then to data taking for neutrino oscillation physics, aiming at first to either confirm or refute the claim by Neutrino-4 short-baseline reactor. ICARUS will also jointly search for evidence of sterile neutrinos with the Short-Baseline Near Detector (SBND), within the Fermilab Short-Baseline Neutrino (SBN) program experiment and perform measurements of neutrino cross sections with the NuMI beam and several Beyond Standard Model searches.

In this presentation, the main technical achievements of the ICARUS detector subsystems (Time Projection Chambers, Light Photodetection System, Cosmic Ray Tagger, Trigger and Data Acquisition) obtained with both BNB and NuMI neutrino beams during the commissioning phase and early data taking, will be presented in terms of the overall detector performance and capability to select and reconstruct neutrino events.

Collaboration

ICARUS

Role of Submitter

The presenter will be selected later by the Collaboration

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