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ICARUS at the Short-Baseline Neutrino program: first results

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The ICARUS collaboration 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 ν_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 experiment. ICARUS will also perform measurement of neutrino cross sections in LAr with the NuMI beam and several Beyond Standard Model studies. After the first year of operations, ICARUS will search for evidence of sterile neutrinos jointly with the Short-Baseline Near Detector, within the Short-Baseline Neutrino program. In this presentation, preliminary results from the ICARUS data with the BNB and NuMI beams are presented both in terms of performance of all ICARUS subsystems and of capability to select and reconstruct neutrino events.

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