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First Results from the Search for Muon-Neutrino Disappearance with the ICARUS Detector

After successful operation at LNGS and a major upgrade at CERN, the 760-ton ICARUS T600 detector has been running at Fermilab since 2020, collecting neutrino interactions from the BNB and NuMI beams. In late 2025, ICARUS reached five years of continuous data taking, demonstrating the maturity of large-scale LAr-TPC technology and its relevance for future experiments such as DUNE.

This contribution presents the first ICARUS search for muon-neutrino disappearance in the BNB. Charged-current $1\mu 1Np$ events selected from 2022–2023 data are compared to simulations and interpreted, for the first time, within a two-neutrino approximation of the 3+1 sterile-neutrino model, including systematic uncertainties from flux, interaction, and detector effects.

Although currently limited by systematic uncertainties, this first oscillation analysis probes the parameter space suggested by existing ν_μ disappearance results and lays the groundwork for future SBN combined analyses with SBND, which will significantly improve sensitivity to sterile-neutrino scenarios.

Primary author: MENEGOLLI, Alessandro

Presenter: MENEGOLLI, Alessandro

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