ID contributo: **394** Tipo: **Poster**

Cosmic background rejection of the ICARUS experiment at Fermilab

martedì 18 giugno 2024 17:30 (2 ore)

The Short Baseline Neutrino program at Fermilab aims to explore significant regions of parameter space, applicable to sterile neutrinos at the eV mass scale, as suggested by existing experimental anomalies. To this purpose it exploits Liquid Argon Time Projection Chamber detectors located along the Booster Neutrino Beamline to measure both νe appearance and νμ disappearance: the Short Baseline Neutrino Detector and the ICARUS-T600 detector at 110 and 600 m from the neutrino source, respectively. The ICARUS T-600 Far Detector, located at shallow depth, is surrounded by a Cosmic Ray Tagger system to mitigate the cosmic ray background. On average ~ 11 muon tracks are expected to cross the detector during the ~ 1 ms drift time. The cosmic ray tagger is composed of plastic scintillator bars, ensuring near 4π coverage of the detector aiming at tagging cosmic muons and thus reject s produced by muon interactions in the surrounding materials that can generate an electromagnetic showers mimicking a νe signal. The system allows one to disentangle cosmic rays from particles originated in a neutrino interaction inside the detector by measuring their position and crossing time. A synchronization of the cosmic ray tagger with the ICARUS photon detection system with a nanosecond accuracy allows one to reject cosmic particles recorded during the beam spill and thus select an enriched sample of neutrino triggered events ahead of the event reconstruction. An overview of the cosmic ray tagger system as well as its role in the neutrino events identification and cosmic background rejection will be presented.

Poster prize

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Classifica Sessioni: Poster session and reception 1

Classificazione della track: Accelerator neutrinos