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Enhancing Neutrino Event Simulation through Overlays at the ICARUS Experiment on the Short-Baseline Neutrino Program

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In the pursuit of precise neutrino event simulation, the ICARUS experiment within the Short-Baseline Neutrino (SBN) program at Fermilab uses an overlay technique to closely align simulations with experimental data. This technique consists of taking signals from data from each of the each of the three subsystems (TPC, PMT, CRT) and overlaying a simulated neutrino interaction onto the event. The overlay procedure includes superimposing simulated waveforms from neutrino interactions from both Time Projection Chambers (TPC) and Photomultiplier Tubes (PMTs) onto their respective data counterparts. Furthermore, the Cosmic Ray Tagger (CRT) hits from both data and simulations are combined to form the overlay event. By combining signals in this manner, we can obtain a data-driven modeling of cosmic backgrounds as well as the detector response enabling a more precise handling of noise sources when using neutrino simulations.

Poster prize

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