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Using boosted decision trees to identify supernova neutrino interactions in DUNE

The Deep Underground Neutrino Experiment (DUNE) is an upcoming experiment dedicated to the study of neutrino oscillation physics, nucleon decay, and core-collapse supernova neutrinos. Set for operation in 2026, DUNE will utilize the world's largest liquid argon time-projection chamber. For a 10 kpc core-collapse supernova, DUNE will observe about 3000 events through various interaction channels. These channels provide different information about the supernova burst and neutrino properties. DUNE must be able to distinguish the channels from one another to extract this information with high precision. This poster outlines tagging studies using machine learning methods (adaptive boosted decision tree algorithm in scikit-learn). These studies used simulations of three relevant neutrino channels: inelastic neutrino-argon charged-current, neutral-current, and neutrino-electron elastic scatter interactions.

Mini-abstract

Analysis of a supernova burst can be improved by separating different interaction channels

Experiment/Collaboration

Deep Underground Neutrino Experiment

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