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Signal discrimination for neutron-antineutron oscillation sensitivity study at DUNE

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The Deep Underground Neutrino Experiment (DUNE) aims to measure neutrino oscillations as well as search for beyond the standard model physics such as baryon number violating (BNV) processes. DUNE will use a 70 kt Liquid Argon Time Projection Chamber (LArTPC) located more than 1 km underground. A promising BNV process is neutron-antineutron oscillation ($n \to \bar{n}$) which, if discovered, would offer unique insight into the baryon asymmetry of the universe. We are developing a classification algorithm that separates $n \to \bar{n}$ events from major background atmospheric neutrino interactions using DUNE far detector simulations. We will perform the classification of signals and backgrounds by analyzing key features such as the multiplicity, isotropy, and kinematics of the reconstructed events. In the future, this algorithm can be used to obtain the sensitivity of the DUNE detectors to the neutron-antineutron oscillation lifetime.

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