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Event Classification using Neural Networks in DUNE

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The Deep Underground Neutrino Experiment is a next-generation neutrino oscillation experiment that aims to measure CP-violation in the neutrino sector. A deep learning approach based around a convolutional neural network has been developed to provide highly accurate and efficient selections of electron neutrino and muon neutrino interactions. The electron neutrino (antineutrino) selection efficiency peaks at 90% (94%) and exceeds 85% (90%) for reconstructed neutrino energies between the 2-5 GeV. The muon neutrino (antineutrino) event selection is found to have a maximum efficiency of 96% (97%) and exceeds 90% (95%) efficiency for reconstructed neutrino energies above 2 GeV. These event selections are critical to maximise the sensitivity of the experiment to CP-violating effects.

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