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Deep learning in DUNE

Wednesday, July 22, 2020 10:00 AM (40 minutes)

The Deep Underground Neutrino Experiment (DUNE) is a next-generation neutrino oscillation experiment that aims to measure CP-violation in the neutrino sector as part of a wider physics program. A deep learning approach based on a convolutional neural network has been developed to provide highly efficient and pure selections of electron neutrino and muon neutrino charged-current interactions. The electron neutrino (antineutrino) selection efficiency peaks at 90% (94%) and exceeds 85% (90%) for reconstructed neutrino energies between 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. When considering all electron neutrino and antineutrino interactions as signal, a selection purity of 90% is achieved. These event selections are critical to maximize the sensitivity of the experiment to CP-violating effects. In addition to the above, this talk will also discuss other deep learning studies in DUNE.

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