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Deep Learning and DUNE

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The observation of neutrino oscillations provides evidence of physics beyond the standard model, and the precise measurement of those oscillations remains an important goal for the field of particle physics. The planned DUNE experiment is set to become a leading experiment in the study of neutrino oscillations. Taking advantage of a two-detector technique, a tightly focused beam at Fermilab, and a far detector based on cutting edge Liquid Argon Time Projection chamber technology, DUNE will in a prime position to deliver precision measurements of the neutrino mass hierarchy, and CP violation.

A key part of the delivery of those precision measurement will be the accurate identification and reconstruction of neutrino interactions in the DUNE far detector. Liquid Argon Time Projection chambers are rich sources of physical information, offering the equivalent of incredibly high resolution "images" of the particles produced in neutrino interactions. Conventional reconstruction tools have so far struggled to fully exploit the promise of that rich source of information, particularly compared to expert human event scanners. This talk will describe a variety of novel ways in which cutting edge deep learning tools are being explored to aid both event reconstruction and selection in DUNE detector simulations.

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