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Event Reconstruction in the NOvA Experiment

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The NOvA experiment observes oscillations in two channels (electron-neutrino appearance and muon-neutrino disappearance) using a predominantly muon-neutrino NuMI beam. The Near Detector records multiple overlapping neutrino interactions in each event and the Far Detector has a large background of cosmic rays due to being located on the surface. The oscillation analyses rely on the accurate reconstruction of neutrino interactions in order to precisely measure the neutrino energy and identify the neutrino flavor and interaction mode. Similarly, measurements of neutrino cross sections using the Near Detector require accurate identification of the particle content of each interaction. A series of pattern recognition techniques have been developed to split event records into individual spatially and temporally separated interactions, to estimate the interaction vertex, and to isolate and classify individual particles within the event. This combination of methods to achieve full event reconstruction in the NOvA detectors will be discussed.

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