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Neutrino Reconstruction with Graph Neural Network on SND@LHC

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The SND@LHC experiment aims to observe and measure neutrinos produced at the LHC. The goal of the detector reconstruction is therefore to identify events as coming from neutrinos against the typical large background from neutral hadrons and muons, and to identify the type of neutrino interaction. Current reconstruction methods are based on reconstructing muon tracks and rectangular cuts, and only consider events that are fully in the detector acceptance. In this study, we applied a new machine learning model based on graph neural networks to achieve whole detector event reconstruction. Each individual detector hit is considered as a point (or node), and the graph neural network makes use of learned connections. We evaluated our method using simulated events, the current result shows our approach has the potential to significantly increase the precision of all measurements with neutrinos, and potentially to increase the reach of searches for feebly interacting particles.

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