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Interaction Clustering in Liquid Argon Time Projection Chamber using Graph Neural Networks

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Liquid Argon Time Projection Chamber (LArTPC) is a type of particle imaging detectors that can record an image of charged particle trajectories with high (\sim mm/pixel) spatial resolution and calorimetric information. LArTPC is widely used in accelerator-based neutrino oscillation experiments, including Short Baseline Neutrino (SBN) program and Deep Underground Neutrino Experiment (DUNE). The research team at SLAC leads the R&D of Machine Learning (ML) based full data reconstruction chain for LArTPCs, which aims at providing fully reconstructed event information that allows to infer the neutrino oscillation physics. In this poster, we present the multi-particle interaction clustering using Graph Neural Networks (GNNs) which can address the challenge of disambiguating individual neutrino interaction at the DUNE near detector where we expect more than a dozen “neutrino pile-up” per event.

Primary authors: LIN, Qing (SLAC); TERA0, Kazuhiro (SLAC); DRIELSMA, Francois (SLAC); Mr COTE DE SOUX, Pierre (Stanford University)

Presenter: LIN, Qing (SLAC)

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