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Development of particle flow algorithm with GNN for Higgs factories

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Particle flow plays an important role in precise measurement of Higgs bosons at future lepton colliders such as ILC and FCCee. Various detector concepts are designed to maximize the effect of particle flow to be able to separate each particle's inside jets and improve the resolutions. For the standard particle flow algorithm, PandoraPFA is used for long in ILC studies. It is a multi-step reconstruction algorithm consisting of clustering, track-cluster association, and various refinement processes. We have studied machine learned particle flow model using Graph Neural Network based algorithm developed in the context of CMS HGCal clustering. This model utilizes GravNet as GNN architecture and Object Condensation loss function for training. Since the HGCal algorithm only performs clustering at the calorimeter, we developed track-cluster matching feature inside the network to realize full PFA. Details of initial implementation of the track-cluster matching algorithm as well as performance evaluation with multiple tau events and jet events will be shown. We also report the comparison result between computational performance of the machine learned algorithm and the PandoraPFA.

Apply for poster award

Yes

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