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Track Fitting for GNN Tracking Pipelines

There have been several successful examples of Graph Neural Networks (GNNs) applied to the problem of charged particle tracking, including in high-density environments like that of the HL-LHC. Many of these applications have focused on edge-classifying GNNs that are a component of a multi-step pipeline including graph construction, GNN inference, and clustering on the classified edges. Recently, there has been growing interest in so-called 'one-shot' tracking architectures that could integrate some or all of these steps and translate directly from a point cloud or graph to a list of identified tracks and their physical parameters such as p_t , η , and displacement. In this work we study different track fitting schemes as a component of a GNN tracking pipeline. We introduce a conformal space fast parabolic fit and evaluate its performance on track candidates produced by an edge-classifying GNN tracking pipeline. We then compare the performance of this fit to a GNN-based track-parameter prediction model and assess the feasibility of including these both of these fitting mechanisms in a one-shot GNN-based tracking model.

Consider for young scientist forum (Student or postdoc speaker)

Yes

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