Contribution ID: **111** Type: **Oral**

High Pileup Particle Tracking with Learned Clustering

Monday 11 March 2024 15:30 (20 minutes)

The sub-optimal scaling of traditional tracking algorithms based on combinatorial Kalman filters causes performance concerns for future high-pileup experiments like the High Luminosity Large Hadron Collider. Graph Neural Network-based tracking approaches have been shown to significantly improve scaling at similar tracking performance levels. Rather than employing the popular edge classification approach, we use learned clustering to reconstruct track candidates. This talk presents our first results on the full-detector trackML dataset. We also show that standard embedding strategies deliver similar results to the more complicated object condensation approach and how base models trained with simplified approaches can be fine-tuned for optimal performance. Finally, we show results using a node filtering first stage that reduces the point cloud size before graphs are built, improving inference speeds.

Significance

First Object Condensation GNN tracking results that include all detector layers (not just pixel detector) of the trackML dataset without truth cuts or other simplifications. New approach with simplified loss functions. New hit filter approach that increases the inference speed.

References

Connecting the dots 23: https://indico.cern.ch/event/1252748/contributions/5521458/ and http://arxiv.org/abs/2312.03823
Chep 23: https://indico.jlab.org/event/459/contributions/11741/ and https://arxiv.org/abs/2309.16754

Experiment context, if any

Primary authors: DEZOORT, Gage (Princeton University (US)); LIERET, Kilian (Princeton University)

Presenter: LIERET, Kilian (Princeton University)

Session Classification: Track 2: Data Analysis - Algorithms and Tools

Track Classification: Track 2: Data Analysis - Algorithms and Tools