GNNs for Track Finding

Raw hit data embedded

Filter likely, adjacent doublets

Train/classify doublets in GNN

Filter, convert to triplets

Train/classify triplets in GNN

Apply cut for seeds

DBSCAN for track labels

Architecture: Attention Message Passing with Residuals

Threshold 0.5

- Accuracy: 0.9761
- Purity: 0.9133
- Efficiency: 0.9542

Threshold 0.8

- Accuracy: 0.9957
- Purity: 0.9923
- Efficiency: 0.9850

Seed Efficiency (PU=200)

- TrackML score = 0.932

DBSCAN on triplet GNN at least 5 adjacent hits

• Purity: 99.1% ± 0.07%

• Inference time: ~ 5 seconds per event per GPU, split between:

- Total Efficiency

- pT [GeV]