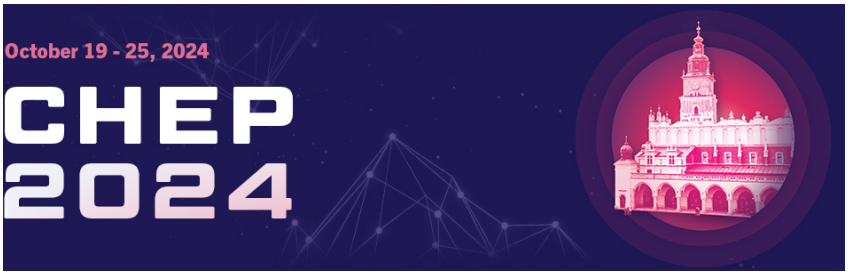

Contribution ID: **166** Type: **Talk**

Online track reconstruction with graph neural networks on FPGAs for the ATLAS experiment

Thursday 24 October 2024 13:30 (18 minutes)

For the HL-LHC upgrade of the ATLAS TDAQ system, a heterogeneous computing farm deploying GPUs and/or FPGAs is under study, together with the use of modern machine learning algorithms such as Graph Neural Networks (GNNs). We present a study on the reconstruction of tracks in the ATLAS Inner Tracker using GNNs on FPGAs for the Event Filter system. We explore each of the steps in a GNN-based tracking pipeline: graph construction, edge classification using an interaction network, and segmentation of the graph into track candidates. We investigate optimizations of the GNN approach that aim to minimize FPGA resources utilization and maximize throughput while retaining high track reconstruction efficiency and low fake rates required for the ATLAS Event Filter tracking system. These studies include model hyperparameter tuning, model pruning and quantization-aware training, and sequential processing of sub-graphs across the detector.

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Session Classification: Parallel (Track 2)

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