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# Graph Neural Network Acceleration on FPGAs for Fast Inference in the Future ATLAS Muon Trigger Update

The upcoming High Luminosity phase of the Large Hadron Collider will require significant advancements in real-time data processing to handle the increased event rates and maintain high-efficiency trigger decisions. In this work, we extend our previous studies on deploying compressed deep neural networks on FPGAs for high-energy physics applications by exploring the acceleration of graph neural networks for fast inference in the ATLAS muon trigger system.
Graph-based architectures offer a natural way to represent and process detector hits while preserving spatial and topological information, making them particularly suitable for muon reconstruction in a noisy and sparse environment. This work contributes to the broader goal of integrating AI-driven solutions into HEP triggering systems and represents a step forward in realizing fast, hardware-optimized, graph-based inference in experimental physics.

## AI keywords

fast-inference:FPGA:trigger:LHC

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