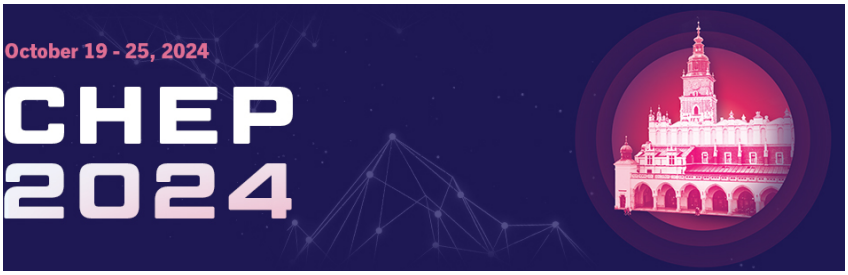

Contribution ID: **446** Type: **Talk**

Quantum Machine Learning for track reconstruction

Monday 21 October 2024 13:30 (18 minutes)

Tracking charged particles in high-energy physics experiments is a computationally intensive task. With the advent of the High Luminosity LHC era, which is expected to significantly increase the number of proton-proton interactions per beam collision, the amount of data to be analysed will increase dramatically. As a consequence, local pattern recognition algorithms suffer from scaling problems.

In this work, we investigate the possibility of using machine learning techniques in combination with quantum computing. In particular, we represent particle trajectories as a graph data structures and train a quantum graph neural network to perform global pattern recognition. We show recent results on the application of this method, with scalability tests for increasing pileup values. We discuss the critical points and give an outlook of potential improvements and alternative approaches.

We also provide insights into various aspects of code development in different quantum programming frameworks such as Pennylane and IBM Qiskit.

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