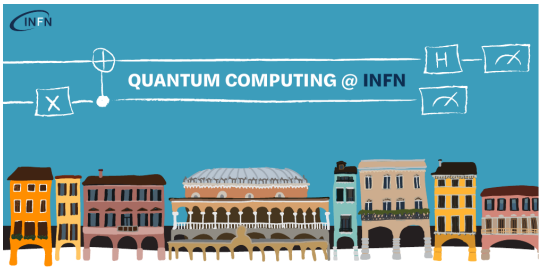

Contribution ID: **18** Type: **not specified**

Quantum Graph Neural Networks for charged particle tracking

Thursday, 31 October 2024 09:35 (20 minutes)

Tracking charged particles in high-energy physics experiments is one of the most computationally demanding steps in the data analysis pipeline.
As we approach the High Luminosity LHC era, which is expected to significantly increase the number of proton-proton interactions per beam collision, particle tracking will become even more problematic due to the massive increase in the volume of data to be analysed.

The problem is currently being tackled using a variety of methods. The best classical algorithms are local and scale worse than quadratically with the number of particle hits in the detector layers. Promising results are coming from global approaches. In particular, we explore the possibility of using quantum graph neural networks, a combination of machine learning techniques with quantum computing.

We show recent results on the application of this architecture, with scalability tests for increasing pileup values. We discuss the critical issues and give an outlook on potential improvements and alternative approaches.

Sessione

Quantum Machine Learning

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Session Classification: Quantum Machine Learning