



Contribution ID: 1372

Type: Poster

Grover's quantum search algorithm of causal multiloop Feynman integrals.

Friday, 8 July 2022 20:10 (20 minutes)

The ever-increasing demands of CERN's Large Hadron Collider and the different projects of future colliders lead the High Energy Physics community to pose quantum computing in the spotlight due to the advantages that can be obtained compared to classical computing. In this context, we explore quantum search algorithms and present a novel benchmark application of a modified version of Grover's algorithm for the identification of causal singular configurations of multiloop Feynman diagrams in the Loop-Tree Duality framework, obtaining a quadratic speed-up over classical algorithm. The output of the algorithm in IBM Quantum and QUTE simulators is used to bootstrap the causal representation of representative multiloop topologies. The algorithm may also find application and interest in graph theory to solve problems of directed acyclic graphs.

In-person participation

Yes

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