Contribution ID: **611** Type: **Parallel session talk**

From Feynman integrals to quantum algorithms: the Loop-Tree Duality connection

Saturday 20 July 2024 17:45 (15 minutes)

In the context of high-energy particle physics, a reliable theory-experiment confrontation requires precise theoretical predictions. This translates into accessing higher-perturbative orders, and when we pursue this objective, we inevitably face the presence of complicated multiloop Feynman integrals. There are serious bottlenecks to compute them with classical tools: the time to explore novel technologies has come. In this work, we study the implementation of quantum algorithms to optimize the integrands of scattering amplitudes. Our approach relies on the manifestly causal Loop-Tree Duality (LTD), which re-casts the loop integrand into phase-space integrals and avoids spurious non-physical singularities. Then, we codify this information in such a way that a quantum computer can understand the problem, and build Hamiltonians whose ground-state are directly related to the causal representation. Promising results for generic families of multiloop topologies are presented.

Alternate track

1. Formal Theory

I read the instructions above

Yes

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Session Classification: Formal Theory

Track Classification: 10. Formal Theory