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# Towards simulating fundamental physics with near-term quantum computers (25+5)

*Monday, January 13, 2025 8:40 AM (30 minutes)*

A fundamental goal of strong interaction physics is to describe and interpret scattering experiments from first principles quantum chromodynamics (QCD) and to understand the internal structure of nuclei. However, the complexity of QCD, particularly in its non-perturbative regime, presents major challenges. Classical computing techniques, while driving substantial progress, have inherent limitations: perturbative QCD is only applicable in the weakly coupled regime, and Euclidean-time lattice QCD is constrained by the sign problem, making it difficult to simulate real-time dynamics. Combining Hamiltonian formulations for field theories with emerging quantum computing techniques could offer a promising way to overcome the limitations of current methods. In this talk, we'll delve into the application of quantum computing for quantum simulations, exploring its algorithmic and hardware constraints. We'll also discuss strategies to overcome these limitations and unlock the full potential of quantum computers in the near future.

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