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Search for Efficient Formulations of non-Abelian Lattice Gauge Theories for Hamiltonian Simulation

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Hamiltonian formulation of lattice gauge theories provides the natural framework for the purpose of quantum simulation, an area of research that is growing with advances in quantum-computing algorithms and hardware. It is therefore important to identify the most accurate, while computationally economic, Hamiltonian formulation(s) of lattice gauge theories along with necessary truncation imposed on the Hilbert space of gauge bosons for any finite computing resources. We report a study toward addressing this question in the case of non-Abelian lattice gauge theories that require the imposition of non-Abelian Gauss's laws on the Hilbert space.

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