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Symmetries of the Loop-string-hadron Framework: Towards Quantum Simulating Gauge Theories

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Reformulating the Hamiltonian formulation of non-Abelian lattice gauge theories entirely in terms of gauge invariant loop-string-hadron degrees of freedom provides a set of advantages for simulating the theory on quantum hardware and in turn is expected to address a series of physics quests. The framework is manifestly (non-Abelian) gauge invariant, yet possesses a set of remnant Abelian gauge symmetries along with its global symmetry properties. In this talk, we describe all the symmetries of this framework and discuss the advantages/ challenges of the symmetry structure being present/preserved in a Hamiltonian simulation towards understanding real-time dynamics of non-Abelian gauge theories.

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