

Abstract Submitted  
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**Loop, String, and Hadron Dynamics in SU(2) Hamiltonian Lattice Gauge Theories**<sup>1</sup> INDRAKSHI RAYCHOWDHURY, University of Maryland, College Park, JESSE R STRYKER, Institute for Nuclear Theory, University of Washington, Seattle — The question of how to efficiently formulate Hamiltonian gauge theories is experiencing renewed interest due to advances in building quantum simulation platforms. We introduce a reformulation of SU(2) Hamiltonian lattice gauge theory a loop-string-hadron (LSH) formulation that describes dynamics directly in terms of its loop, string, and hadron degrees of freedom, while alleviating several disadvantages of quantum-simulating the Kogut-Susskind formulation. This LSH formulation transcends the local loop formulation of  $d + 1$ -dimensional lattice gauge theories by incorporating staggered quarks, furnishing the algebra of gauge-singlet operators, and being used to reconstruct dynamics between states that have Gauss law built in to them. LSH operators are then factored into products of normalized ladder operators and diagonal matrices, priming them for classical or quantum information processing. The LSH formalism makes little use of structures specific to SU(2) and its conceptual clarity makes it an attractive approach to apply to other non-Abelian groups like SU(3).

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