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# Tensor-network Toolbox for probing dynamics of non-Abelian Gauge Theories

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Tensor-network methods are valuable Hamiltonian-simulation methods which enable probing dynamics of strongly-interacting quantum-many-body systems, including gauge theories, without encountering sign problems. They also have the potential to inform efficient quantum-simulation algorithms of the same theories. We develop and benchmark a matrix-product-state (MPS) ansatz for the SU(2) lattice gauge theory using the loop-string-hadron (LSH) framework. The LSH framework has been demonstrated to be advantageous in Hamiltonian simulation of non-Abelian gauge theories. It is applicable to varying gauge groups [SU(2) and SU(3)], boundary conditions, and in higher dimensions. In this talk, I report on progress in achieving the continuum limit of the static observables in a SU(2) gauge theory in (1+1) D and pushing the boundary of dynamical studies. The current toolbox can be applied to studying scattering processes in this model. It can also be straightforwardly generalized to (2+1)D given the simplified constraints in an LSH framework.

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