

Simulating a Quantum Spin Liquid on a Kagome Lattice with VQE

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Abstract

In this paper, suggested methods to simulate the Kagome Antiferromagnetic Model on a Quantum Computer are benchmarked. These methods include symmetry enforcing gates, symmetry penalties, and Hamiltonian Variational Ansatz (HVA). The symmetry enforcing gate is derived from scratch, following the gate construction scheme in [16]. A conjecture on layering of symmetry enforcing gates suggested in [6] with $m = \lfloor n/2 \rfloor$ is tested. HVA, symmetry enforcing gates with full layering, symmetry enforcing gates with partial layering are compared. The success of post-processing with a symmetry penalty is evidently shown. The algorithm described in [11] was put to test; however, a significant result wasn't observed.

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