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Simulating Z2 lattice gauge theory on a quantum computer

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Quantum simulations of lattice gauge theories are currently limited by the noisiness of the physical hardware. Various error mitigation strategies exist to extend the use of quantum computers. We perform quantum simulations to compute two-point correlation functions of the 1 + 1d Z2 gauge theory with matter to determine the mass gap for this theory. These simulations are used as a laboratory for investigating the efficacy and interplay of different error mitigation methods: readout
error mitigation, randomized compiling, rescaling, and dynamical decoupling. We find interesting synergies between these methods and that their combined application increase the simulation times at a given level of accuracy by a factor of six or more compared to unmitigated results

Topical area

Quantum Computing and Quantum Information

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