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Digital Quantum Simulation of Heisenberg Model Dynamics[1]
BRITTA MANIFOLD, CHENG-CHIEN CHEN, University of Alabama at Birmingham — Recent advancements in universal quantum computer technologies have raised the possibility of leveraging the so-called quantum advantage to approach classically intractable problems. For simulations of quantum many-body systems,there is great potential to meet this goal in the near future. Here, we focus on small clusters of interacting spins and perform time evolution calculations in the quantum circuit paradigm using IBMs superconducting qubit platform. We compare and analyze the noisy and exact dynamics of magnetization,n-point correlation functions, and dynamical spin structure factors. We repeat these circuits under various magnetic and spatial regimes. We also explore current practical error mitigation methods for more efficient time evolution.

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