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NISQ-era Simulations of Quantum Many-Body 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 spin models 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 total magnetization, n-point correlation functions, occupation probabilities, and excitation spectra. We repeat these circuits under various magnetic and spatial regimes, and under the influence of external perturbations. We also explore different error mitigation methods in order to enhance quantitative accuracy.

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