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Model Independent Error Mitigation in Parametric Quantum Circuits and Depolarizibility of Quantum Noise

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Finding ground states and low-lying excitations of Hamiltonians is one of the most important problems that can be solved with near-term quantum computers. It can be utilized in fields ranging from optimization over chemistry and material science to particle physics. In this work, we propose an efficient error mitigation scheme that is independent of the Hamiltonian and the concrete noise model, applicable to low-depth quantum circuits as they occur in Variational Quantum Eigensolvers (VQE). In principle, our method can eliminate all systematic errors by exploring the depolarizibility of quantum noise up to certain approximations. We carry out both classical simulations and experiments on the IBM's quantum hardware, to illustrate the performance of the method by computing the mass gap of transversal Ising model and extracting its the zero-temperature critical point.

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