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Comparison of the Kitaev-Webb and Klco-Savage Algorithms on IBM Q Systems[1] AURELIA BROOK, DRIES SELS, JAVAD SHABANI, ANDREAS TSANTILAS, New York University (NYU) — Recent advancements in quantum algorithms have been significant, yet there is still much to be done in terms of benchmarking noisy quantum computing hardware. Utilizing IBMs Qiskit software development kit and quantum hardware, we have streamlined a novel way of benchmarking and characterizing error on noisy qubits. We tested the noise levels of IBMs quantum hardware by implementing the Kitaev-Webb state preparation algorithm (Kitaev, Webb 2008) and the Klco-Savage (Klco, Savage 2019) algorithm to prepare a 1D discrete Gaussian and a symmetric exponential distribution as a pseudo-Gaussian. Error data is then analyzed using KL divergence to quantify disparities between noiseless simulations and experimental runs on IBM Q processors. Such simulations provide insight into dominant sources of noise on quantum chips, and were subsequently compared to randomized benchmarking in order to evaluate how they compete with industry standard methods.

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