Abstract Submitted
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Iterated benchmarking to separate unitary errors from decoherence[1] LEV BISHOP, SARAH SHELDON, STEFAN FILIPP, MATTHIAS STEFFEN, JERRY M. CHOW, JAY M. GAMBETTA, IBM TJ Watson Research Center, Yorktown Heights, NY, USA — We describe a scalable experimental protocol for estimating the relative contribution of unitary errors and decoherence to the fidelity of individual quantum gates. As an extension to interleaved randomized benchmarking (Magesan PRL 109, 080505 2012), this protocol consists of interleaving random Clifford gates between n-fold repetitions of the gate of interest. The type of error is revealed by the scaling with number of repetitions: linear in the case of errors due to decoherence; quadratic in the case of pure unitary errors. This protocol has recently been implemented experimentally for transmon superconducting qubits and found useful for calibrating microwave pulses as well as identifying new error sources that may be affecting gate fidelity.

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