Abstract Submitted
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Adaptive quantum gate-set tomography[1] ROBIN BLUME-KOHOUT, Sandia National Laboratories — Quantum information hardware needs to be characterized and calibrated. This is the job of quantum state and process tomography, but standard tomographic methods have an Achilles heel: to characterize an unknown process, they rely on a set of absolutely calibrated measurements. But many technologies (e.g., solid-state qubits) admit only a single native measurement basis, and other bases are measured using unitary control. So tomography becomes circular – tomographic protocols are using gates to calibrate themselves! Gate-set tomography confronts this problem head-on and resolves it by treating gates relationally. We abandon all assumptions about what a given gate operation does, and characterize entire universal gate sets from the ground up using only the observed statistics of an [unknown] 2-outcome measurement after various strings of [unknown] gate operations. The accuracy and reliability of the resulting estimate depends critically on which gate strings are used, and benefits greatly from adaptivity.

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Robin Blume-Kohout
Sandia National Laboratories

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