Abstract Submitted
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Efficient gate set tomography on a multi-qubit superconducting processor[1] ERIK NIELSEN, KENNETH RUDINGER, ROBIN BLUME-KOHOUT, Sandia National Laboratories, ANDREW BESTWICK, BENJAMIN BLOOM, MAXWELL BLOCK, SHANE CALDWELL, MICHAEL CURTIS, ALEX HUDSON, JEAN-LUC ORGIAZZI, ALEXANDER PAPAGEORGE, ANTHONY POLLORENO, MATT REAGOR, NICHOLAS RUBIN, MICHAEL SCHEER, MICHAEL SELVANAYAGAM, EYOB SETE, RODNEY SINCLAIR, ROBERT SMITH, MEHRNOOSH VAHIDPOUR, MARIUS VILLIERS, WILLIAM ZENG, CHAD RIGETTI, Rigetti Quantum Computing — Quantum information processors with five or more qubits are becoming common. Complete, predictive characterization of such devicese.g. via any form of tomography, including gate set tomographyappears impossible because theparameter space is intractably large. Randomized benchmarking scales well, but cannot predict device behavior or diagnose failure modes. We introduce a new type of gate set tomography that uses an efficient ansatz to model physically plausible errors, but scalespolynomially with the number of qubits. We will describe the theory behind this multi-qubit tomography and present experimental results from using it to characterize a multi-qubit processor made by Rigetti Quantum Computing.

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