

Abstract Submitted
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Gate Set Tomography on a trapped ion qubit ERIK NIELSEN, ROBIN BLUME-KOHOUT, JOHN GAMBLE, KENNETH RUNDINGER, JONATHAN MIZRAHI, JOHATHAN STERK, PETER MAUNZ, Sandia National Laboratories — We present enhancements to gate-set tomography (GST), which is a framework in which an entire set of quantum logic gates (including preparation and measurement) can be fully characterized without need for pre-calibrated operations. Our new method, “extended Linear GST” (eLGST) uses fast, reliable analysis of structured long gate sequences to deliver tomographic precision at the Heisenberg limit with GST’s calibration-free framework. We demonstrate this precision on a trapped-ion qubit, and show significant (orders of magnitude) advantage over both standard process tomography and randomized benchmarking. This work was supported by the Laboratory Directed Research and Development (LDRD) program at Sandia National Laboratories. Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy’s National Nuclear Security Administration under Contract DE-AC04-94AL85000.

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