

Abstract Submitted  
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**Tomography of a superconducting phase qutrit** YONI SHALIBO, YAARA ROFE, DAVID SHWA, FELIX ZEIDES, Racah Institute of Physics, Hebrew University of Jerusalem, Jerusalem 91904, Israel, MATTHEW NEELEY, JOHN M. MARTINIS, Department of Physics, University of California, Santa Barbara, California 93106, USA, NADAV KATZ, Racah Institute of Physics, Hebrew University of Jerusalem, Jerusalem 91904, Israel — Benchmarking the fidelity of quantum state preparation and evolution is vital for further advances in quantum engineering. State and process tomography are normally used for such benchmarking of individual qubit and coupled qubit systems. We extend this procedure to a superconducting phase circuit operating with three levels (qutrit), and measure the  $3 \times 3$  density matrix for a set of arbitrary prepared states and their evolution. We quantify the diagonal and off diagonal decays due to relaxation and decoherence and compare to simulation.

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