Abstract Submitted
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Observing single quantum trajectories of a superconducting qubit: ensemble properties and driven dynamics[1] STEVEN WEBER, QNL, University of California, Berkeley, K.W. MURCH, Department of Physics, Washington University, A. CHANTASRI, Department of Physics and Astronomy and Rochester Theory Center, University of Rochester, J. DRESSEL, Department of Electrical Engineering, University of California, Riverside, A.N. JORDAN, Department of Physics and Astronomy and Rochester Theory Center, University of Rochester ; Institute of Quantum Studies, Chapman University, I. SIDDIQI, QNL, University of California, Berkeley — We use weak measurements to track individual quantum trajectories of a superconducting qubit embedded in a microwave cavity. Using a near-quantum-limited parametric amplifier, we selectively measure either the phase or amplitude of the cavity field, and thereby confine trajectories to either the equator or a meridian of the Bloch sphere. We analyze ensembles of trajectories to determine statistical properties such as the most likely path and most likely time connecting pre and post-selected quantum states. We compare our results with theoretical predictions derived from an action principle for continuous quantum measurement. Furthermore, by introducing a qubit drive, we investigate the interplay between unitary state evolution and non-unitary measurement dynamics.

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