

Abstract Submitted
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Exploring the Effect of Noise on the Berry Phase using circuit QED¹ S. BERGER, M. PECHAL, A.A. ABDUMALIKOV, C. EICHLER, L. STEFFEN, ETH Zurich, A. FEDOROV, The University of Queensland, A. WALLRAFF, S. FILIPP, ETH Zurich — The Berry phase is independent of both energy and time: it solely depends on the trajectory of the quantum system in state space, and is equipped with a certain degree of robustness against slow fluctuations [1,2]. By introducing artificial distortions in the path in state space, we measure the geometric contributions to the dephasing of an effective two-level system. Our experiments, realized with a microwave-driven superconducting qubit, demonstrate that only those fluctuations which deform the path cause geometric dephasing. A direct comparison with the path-independent dynamic phase reveals that the Berry phase is less affected by noise-induced dephasing in the adiabatic limit of long evolution times.

[1] G. De Chiara and G. M. Palma, *Phys. Rev. Lett.* **91**, 090404 (2003)

[2] S. Filipp *et al.*, *Phys. Rev. Lett.* **102**, 030404 (2009)

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