

Abstract Submitted
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Evidence for coherent quantum phase slips from dephasing of fluxonium qubit¹ ARCHANA KAMAL, NICHOLAS MASLUK, Yale University, VLADIMIR MANUCHARYAN, Harvard University, JENS KOCH, Northwestern University, LEONID GLAZMAN, MICHEL DEVORET, Yale University — Phase slips are events in which the phase across a superconducting wire changes by 2π . The thermally activated phase slips at high temperatures are well understood but the coherent phase slips caused by quantum fluctuations well below the critical temperature have, so far, eluded observation. We report new decoherence data for the fluxonium qubit [1] that provide evidence for coherent quantum phase slips across the qubit inductance, implemented with a long array of Josephson tunnel junctions. Coherent quantum phase slips result in broadening of the qubit transition frequency due to Aharonov-Casher interference of multiple phase slip paths (or flux tunneling through different junctions) encircling random offset charges on array islands [2].

[1] V.E. Manucharyan et al., Science 326, 113 (2009).

[2] D. Ivanov et al., Phys. Rev. B 65, 024509 (2002).

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