Abstract Submitted
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Observation of macroscopic resonant tunneling in a superconducting flux qubit[1] BO MAO, WEI QIU, SIYUAN HAN, University of Kansas — It has been argued recently that various coherent phenomena observed in superconducting phase and flux qubits could be due to classical phase-locking between oscillators (qubits) and sinusoidal driving (microwave) [1]. We report observation of macroscopic resonant tunneling (MRT) in a weakly damped flux qubit, i.e., a radio-frequency superconducting quantum interference device (rf SQUID). Since no microwave was involved in the experiment the observation of MRT unambiguously confirms that dynamics of superconducting flux qubits are governed by quantum rather than classical physics and that superconducting flux qubits are good candidates for implementing quantum computing. The measured tunneling rate as a function of flux bias agrees with the energy level structure calculated from independently determined physical parameters of the qubit.

[1] N. Gronbech-Jensen and M. Cirillo, Phys. Rev. Lett. 95, 067001 (2005).

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