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Superconducting phase qubit in a "camel" potential[1] EMILE HOSKINSON, FLORENT LECOCQ, AURÉLIEN FAY, NICOLAS DIDIER, Insitut Neel and LPMMC, CNRS/UJF, Grenoble, France, RALF DOLATA, ALEXANDER ZORIN, PTB, Braunschweig, Germany, FRANK HEKKING, WIEBKE GUICHARD, OLIVIER BUISSON, Insitut Neel and LPMMC, CNRS/UJF, Grenoble, France — A prototypical phase qubit consists of a single current biased Josephson junction, in which the dynamics of the phase across the junction is analogous to a quantum particle trapped in a quadratic-cubic potential. We demonstrate a phase qubit in a double barrier quadratic-quartic "camel" potential. This potential is formed by a 2-junction niobium circuit in a dc-SQUID configuration, with near zero current bias and flux bias close to half a flux quantum. Because of the symmetry of the potential, the qubit is predicted to be optimally insensitive to current fluctuations. We perform a nanosecond single shot measurement by applying a flux pulse which reduces the height of the two potential barriers, allowing the excited state of the qubit to escape by two independent paths to an adjacent flux state of the dc-SQUID. We find Rabi oscillation, Ramsey oscillation, and energy relaxation decay times on the order of 60 ns, 20 ns, and 100 ns, respectively. Via spectroscopy, we show that the effects of current noise are rendered negligible in this circuit.

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