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Quantum Behavior of the dc SQUID phase qubit. KAUSHIK MITRA[1], Center for Superconductivity Research and Joint Quantum Institute, University of Maryland, College Park, F. W. STRAUCH, National Institute of Standards and Technology, Gaithersburg, HANHEE PAIK, S. K. DUTTA, R. M. LEWIS, T. A. PALOMAKI, A.J. PRZYBYSZ, B.K. COOPER, A.J. DRAGT, J.R. ANDERSON, C.J. LOBB, F.C. WELLSTOOD, Center for Superconductivity Research and Joint Quantum Institute, University of Maryland, College Park — We analyze the quantum behavior of a SQUID phase qubit in which one junction acts as a qubit while the other filters out any external low frequency bias current noise. We solve Schrödinger's equation for the two dimensional Hamiltonian of the system at zero temperature assuming no dissipation. We obtain the states and from these the energy levels, tunneling rates, and expectation values of the currents in the junctions. We use these results to show how this design isolates the system from noise without affecting the essential nature of the qubit. This work is funded by the NSA, NSF Grant EIA 0323261, and the Center for Superconductivity Research.

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