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Evidence of Microstates in dc SQUID Phase Qubits TAUNO PALOMAKI, SUDEEP DUTTA, RUPERT LEWIS, ANTHONY PRZYBYSZ, HANHEE PAIK, KAUSHIK MITRA, BEN COOPER, HYEOKSHIN KWON, ALEX DRAGT, J.R. ANDERSON, CHRIS LOBB, FRED WELLSTOOD, Center for Superconductivity Research and Joint Quantum Institute, Department of Physics, University of Maryland — We report experimental results consistent with external quantum systems coupling to a Josephson junction phase qubit. When the energy level spacing for the qubit is made equal to that of the fixed external system the coupling lifts the degeneracy. By applying microwaves to excite transitions in the qubit, we are able to map out the splittings in the spectrum due to the coupling. This effect has been seen in both an Al/AlOx/Al and a Nb/AlOx/Nb dc SQUID phase qubit. This work is supported by the NSA, NSF Grant EIA 0323261, and the Center for Superconductivity Research.

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