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Extracting an Effective Jaynes-Cummings Model for an LC Filtered dc SQUID B.K. COOPER, R.P. BUDOYO, V. ZARETSKEY, C.J. BALLARD, J.R. ANDERSON, C.J. LOBB, F.C. WELLSTOOD, University of Maryland — Spectroscopy of an Al/AlOx/Al dc SQUID phase qubit revealed peaks suggestive of dispersive photon shifts in a Jaynes-Cummings model, where the role of the resonator is played by an on-chip rf LC filter. A lumped element analysis of the filter-qubit system reveals qubit and resonator modes at the expected frequencies (330 MHz and 8.7 GHz) but an isolation junction mode at $\sim$100 GHz and qubit-filter coupling that is smaller than observed. As an alternative to the lumped element picture, we examine a transmission line model of the SQUID and the first order correction to the lumped element model. We discuss Jaynes-Cummings approximations to these various models.

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