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Junction Resonances in Josephson Phase Qubits JOHN MARTINIS, R. MCDERMOTT, K.B. COOPER, M. STEFFEN, M. ANSMANN, UCSB, K. OSBORN, K. CICAK, S. OH, D.P. PAPPAS, R.W. SIMMONDS, NIST, Boulder —
Careful spectroscopic measurements of Josephson phase qubits have revealed avoided crossings characteristic of the qubit interacting with a set of two-level resonators. As these extra splittings degrade the quality of the qubit, it is extremely important to characterize and understand their origin. We will present data from a variety of qubits that show these resonators have an amplitude probability distribution which scales inversely with splitting magnitude up to a certain splitting size. This data can be explained with a model based on two-level critical-current fluctuators in the junction. This model is also reasonably consistent with previous measurements of 1/f (low frequency) critical-current noise.

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