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Suppressing Charge Noise Decoherence in a Transmon Qubit JOSEPH SCHREIER, STEVEN GIRVIN, ROBERT SCHOELKOPF, Yale University, THE YALE CIRCUIT QED TEAM — Here we discuss coherence measurements of the transmon qubit, an optimized Cooper Pair Box geometry. We show experimental verification that sensitivity to 1/f charge noise was exponentially suppressed in the transmon qubit. As a result, the effects of gate charge noise and quasiparticle poisoning have been nearly eliminated, and the qubit was seen to be nearly homogeneously broadened. Following an improvement in relaxation times, dephasing times were measured at over a microsecond, nearly twice the relaxation time, without the need of an echo experiment while being tuned over a range of several GHz. The tuning of the qubit excitation energy shows strong agreement with a quantum mechanical treatment of a two level system coupled to our readout geometry; the spectrum is nearly devoid of unintended avoided crossings. The dephasing times measured are limited by relaxation and further improvements in relaxation time could be matched by dephasing time increases.

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