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Quasiparticle Poisoning in a Cooper Pair Box caused by a measuring SET¹ CARLOS SANCHEZ, BENJAMIN PALMER, MARC MANHEIMER, Laboratory for Physical Sciences, FRED WELLSTOOD, University of Maryland — We have developed a model to calculate the average charge on a Cooper pair box in the presence of quasiparticle poisoning. The model uses a master equation approach to find the probabilities for the box to be in the even or odd state. The transition rates between the two states are calculated assuming a fixed number of non-equilibrium quasiparticles in the leads and island of the box. We fabricated Al/AlOx/Al devices with a Cooper pair box capacitively coupled to an SET and measured the charge on the box for SET bias currents ranging from about 1 pA to 1 nA. We find good agreement between the theory and measurements in the temperature range from 60 mK to 300 mK. For large SET bias the poisoning in the Cooper pair box increases and the charge staircase develops additional features. Our model is capable of qualitatively reproducing the features induced by the measuring SET.

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