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**Response of a SET to large rf interference signals** RUPERT LEWIS, C. THOMAS HARRIS, ERIC SHANER, Sandia Natl Labs — Single electron transistors (SETs) fabricated from aluminum thin films and Al/AlOx Josephson tunnel junctions can be added to other structures as charge sensors with large intrinsic bandwidth—for example, the charge sensing corral of an electrons on helium quantum chip. We characterized a SET at temperature T=40 mk for its ability to tolerate extraneous radio frequency (rf) interference in such applications at frequencies from 10 kHz to 50 MHz. Our SET, with charging energy, Ec $\approx$1 K, normal resistance $R_n \approx 600$ k$\Omega$, and peak measured charge sensitivity of $S_p = 5\ 10^{-5}$ electrons/$\sqrt{\text{Hz}}$ maintained usable sensitivity (S $<1\ 10^{-3}$ electrons/$\sqrt{\text{Hz}}$) when subjected to rf signals of strength greater than +/- 9 electrons. This suggests for frequencies well below $f_c \approx 1/2\pi R_n C_j$ where $C_j$ is the junction capacitance, that SETs respond nearly instantaneously even to large rf signals. Exploiting this knowledge, we were able to cancel a known rf signal at 1 MHz nearly recovering the charge sensitivity in the absence of rf signals—a result we expect will hold to higher frequencies. Work performed, in part, at the Center for Integrated Nanotechnologies, an Office of Science User Facility operated for the U.S. Department of Energy (DOE) Office of Science by Los Alamos National Laboratory (Contract DE-AC52-06NA25396) and Sandia National Laboratories (Contract DE-AC04-94AL85000). Sandia National Laboratories is a multi-mission laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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