Abstract Submitted
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Design and Characterization of a millikelvin dual-tip Josephson STM A. ROYCHOWDHURY, M. DREYER, Laboratory for Physical Sciences, University of Maryland, College Park, J.R. ANDERSON, C.J. LOBB, F.C. WELLSTOOD, University of Maryland, College Park — We describe the design and characterization of a dual-tip Josephson STM that operates at millikelvin temperatures. We report an effective noise temperature for the STM on the order of 200 mK.[1] In addition to the expected phase diffusive super current in the ultra-small Nb-Nb junction formed by one tip and the sample,[2] our high resolution spectroscopy at mK temperatures reveals resonant coupling between the STM junction and the electromagnetic environment it is embedded in, as predicted by P(E) theory.[3] We have for the first time, observed Shapiro-like steps in this limit by measuring the response of the P(E) supercurrent to microwave radiation as a function of amplitude. Fits to theory[4] indicate that the coupling of an ultra-small Josephson junction to its environment/circuit may be used to a) directly measure dissipation channels associated with circuit resonances and b) calibrate the frequency dependent microwave attenuation in cryogenic circuits as seen by the junction.

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[3]G. Ingold and H. Grabert, Phys. Rev. B., 50, 395 (1994)
[4]G. Falci, V. Bubunja and G. Schon, Z. Phys. B., 85, 451 (1991)

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