Abstract Submitted
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An asymmetric SQUID for measurement of ultra-small Josephson junctions D.F. SULLIVAN, Department of Physics, University of Maryland, Laboratory for Physical Sciences, J.R. ANDERSON, C.J. LOBB, F.C. WELLSTOOD, Department of Physics, University of Maryland — Ultra-small Josephson junctions offer a variety of potential applications, as well as an opportunity to probe the Josephson effect at the nanoscale. Such junctions, however, are susceptible to fluctuations in the phase difference, γ_1, across the junction, which leads to a suppression of the critical current I_{01}. The relevant energies which govern the physics of Josephson junctions are the charging energy E_C, the Josephson coupling energy E_J, and the thermal energy k_BT. Small junctions have $E_C/E_J >> 1$, while large junctions, with stable critical currents, have $E_C/E_J << 1$. A potential method for stabilizing the phase across a small junction will be presented, which entails shunting it with an additional capacitance $C_1$and incorporating it in a SQUID loop with another junction having a much larger critical current I_{02}. The SQUID loop inductance, L, couples γ_1 to the *stable* phase difference γ_2 of the large junction. Thus, by properly choosing L and C_1, the uncertainty in $\gamma_1$should be reduced, allowing a precise measurement of I_{01}. In addition to the theoretical arguments behind this approach, experimental data incorporating these ideas will be presented. This work was supported by the National Science Foundation.

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