Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Small Josephson junctions in asymmetric SQUIDs. DAN SULLIVAN, Department of Physics, University of Maryland, College Park , TAUNO PALOMAKI, MARK GUBRUD, MICHAEL DREYER, BARRY BARKER, JAMES ANDERSON, CHRIS LOBB, FRED WELLSTOOD — Ultra-small Josephson junctions are known to be susceptible to quantum fluctuations in the phase difference across the junction, resulting in an effective suppression of the critical current. We have investigated a method for stabilizing this phase difference by shunting a small junction (with a critical current $I_{01} \approx 1$ nA) with an additional capacitance and incorporating the junction in a dc SQUID loop. The second junction in the Al/AlO_x/Al SQUID has a much larger critical current ($I_{02} \approx 1$ μA), producing a SQUID that is highly asymmetric. Our results show that the SQUID inductively couples the phase differences of the large and small junctions, leading to reduced phase fluctuations, and thus allowing accurate measurement of the small junction's critical current at millikelvin temperatures. This work was supported by the National Science Foundation and the Laboratory for Physical Sciences.

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Date submitted: 05 Dec 2007 Electronic form version 1.4