Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Microscopic Model of 1/f Noise in Josephson Junctions MAGDALENA CONSTANTIN, CLARE YU, Department of Physics and Astronomy, University of California, Irvine, California 92697, JOHN MARTINIS, Physics Department, University of California, Santa Barbara , Santa Barbara, California 93106
— We present a simple microscopic model to show how fluctuating two-level systems in the Josephson junction tunnel barrier can modify the potential energy of the barrier and produce critical current noise spectra as well as charge noise. We find $1/f$ critical current and charge noise at low frequencies. Our values are in good quantitative agreement with recent experimental measurements of noise in $Al/AlO_x/Al$ Josephson junctions. We also investigate the sensitivity of the critical current noise on the nonuniformity of the tunnel barrier.

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Date submitted: 16 Nov 2006 Electronic form version 1.4