Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Decoherence in Superconducting Qubits from Surface Magnetic States DAVID HOVER, STEVEN SENDELBACH, UW-Madison Department of Physics, ACHIM KITTEL, Institut für Angewandte Physik, MICHAEL MUECK, Justus-Leibig-Universität Gießen, ROBERT MCDERMOTT, UW-Madison Department of Physics, UW-MADISON DEPARTMENT OF PHYSICS COLLABORATION, INSTITUT FÜR ANGEWANDTE PHYSIK COLLABORATION, JUSTUS-LEIBIG-UNIVERSITÄT GIEßEN COLLABORATION — Unpaired spins in amorphous surface oxides can act as a source of decoherence in superconducting and other solid-state qubits. A density of surface spins can give rise to low-frequency magnetic flux noise, which in turn leads to dephasing of the qubit state. In addition, magnetic surface states can couple to high-frequency resonant magnetic fields, and thereby contribute to energy relaxation of the qubit. We present the results of low-frequency measurements of the nonlinear and imaginary spin susceptibility of surface magnetic states in superconducting devices at millikelvin temperatures. In addition, we describe high-frequency magnetic resonance measurements that directly probe the surface spin density of states. We present calculations that connect the measurement results to qubit energy relaxation and dephasing times.

David Hover
UW-Madison Department of Physics

Date submitted: 27 Nov 2007 Electronic form version 1.4