

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Josephson Phase Qubits with Hydrogenated Amorphous Silicon Dielectric MATTHEW NEELEY, M. ANSMANN, R. BIALCZAK, N. KATZ, E. LUCERO, R. MCDERMOTT, A. O'CONNELL, M. STEFFEN, E. WEIG, A. CLELAND, J. MARTINIS, UC Santa Barbara — The lifetime of Josephson phase qubits is limited by the presence of two-level defect states in the dielectric material of the qubit. Improvements in the loss tangents of dielectric materials have resulted in substantial gains in qubit lifetime by reducing the number of such defects. Measurements of the loss tangent of hydrogenated amorphous silicon indicate at least a five-fold decrease in the loss tangent compared to our current SiN dielectric, making a-Si:H a promising candidate dielectric for use in phase qubits. We discuss the incorporation of a-Si:H dielectric into our qubit fabrication process, and present measurements of the energy decay and dephasing lifetimes of qubits made with this material.

Matthew Neeley
UC Santa Barbara

Date submitted: 24 Nov 2006

Electronic form version 1.4