Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Signatures of local superconducting islands at elevated temperatures in $LaAlO_3/SrTiO_3$ Heterostructure Interface R.C. ASHOORI, LU LI[1], Department of Physics, Massachusetts Institute of Technology, Cambridge, MA 02138, C. RICHTER, University of Augsburg, D-86135 Augsburg, Germany, J. MANNHART, Max Planck Institute for Solid State Research, 70569 Stuttgart, Germany — Superconductivity has been observed in $LaAlO_3$ /$SrTiO_3$ heterostructures below 300 mK in resistivity measurements and later confirmed with Meissner effect. Our detailed magnetization measurements in several $LaAlO_3/SrTiO_3$ samples indicate a quasi superconducting state persisting up to 4 K. In these samples, we discovered large nonreversible magnetization vs. field curves. Moreover, the magnitude of the nonreversible loop is proportional to sweep rates, suggesting that it is caused by local magnetic moments generated by eddy currents. Based on this eddy current picture, the inferred conductance is found to be 7 orders of magnitude larger than the conductance across the whole interface. This contrast suggests the existence of small local quasi superconducting regions at a temperature of 4 K, well above the long range superconducting transition temperature.

[1]Current address: University of Michigan, Dept. of Physics

R. C. Ashoori
Department of Physics, Massachusetts Institute of Technology,
Cambridge, MA 02138

Date submitted: 16 Dec 2011 Electronic form version 1.4