Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Magnetotransport behavior of $LaAlO_3/SrTiO_3$ and Ar-irradiated $SrTiO_3$: implications on Rashba Spin-Orbit coupling and magnetism in quasi-2-dimensional electron gases[1] J.H. NGAI, Y. SEGAL, F.J. WALKER, S. ISMAIL-BEIGI, K. LEHUR, C.H. AHN, Yale University, D. SU, Y. ZHU, Brookhaven National Laboratory — Quasi 2-dimensional electron gases (Q2DEG) in complex oxide heterostructures exhibit a wide range of tunable behavior that promises potentially new functionalities. In particular much interest has focused on the Q2DEG at the $LaAlO_3/SrTiO_3$ interface, where evidence for Rashba spin-orbit coupling and magnetic behavior has recently been found through magnetotransport measurements. At present it is unclear whether the spin-orbit and magnetic effects are unique to the $LaAlO_3/SrTiO_3$ interface, or if they arise from the properties of doped $SrTiO_3$. In order to shed light on this issue, we compare the magnetotransport properties of $LaAlO_3/SrTiO_3$ and Ar^+-irradiated $SrTiO_3$. Strikingly similar magnetotransport behavior is observed between $LaAlO_3/SrTiO_3$ and Ar^+-irradiated Q2DEGs. However, our analysis indicates changes in the confinement or thickness of the Q2DEG can account for the magnetotransport observed. Implications of our results on Rashba spin-orbit coupling and magnetism at the $LaAlO_3/SrTiO_3$ interface will be discussed.

[1]NSF MRSEC DMR-0520495 and DMR-1006256

Joseph Ngai

Date submitted: 19 Nov 2010 Electronic form version 1.4