

Abstract Submitted  
for the MAR09 Meeting of  
The American Physical Society

**Non-uniform magnetization in LaAlO<sub>3</sub>/SrTiO<sub>3</sub> superlattices.<sup>1</sup>**

M.R. FITZSIMMONS, M. ZHERNENKOV, N. HENGARTNER, LANL, A. SHARONI, IVAN K. SCHULLER, UCSD, J. GARCIA-BARRIOCANAL, F.Y. BRUNO, J. SANTAMARIA, U. Complutense Madrid, Spain — Recently, Brinkman et al., [Nature **6**, 493 (2007)] reported magnetism induced at the interface between LaAlO<sub>3</sub> (LAO) and SrTiO<sub>3</sub>(STO) inferred from transport measurements. They found the magnetization to be greatly enhanced at low temperatures (i.e., liquid He temperature) and by application of high (10+ T) fields. We report polarized neutron reflectometry measurements of the magnetization depth profile of two LAO/STO superlattices with the same number of bilayer repeats. For low temperatures and a field of 11 T, the intensities of the superlattice Bragg reflections for both samples exhibited a dependence upon neutron beam polarization. The spin dependence was much weaker at small field (and low temperature) and disappeared altogether at 11 T and 300 K. These observations demonstrate that the magnetization depth profile has the period of the LAO/STO superlattice. The neutron spin dependence was more pronounced for the sample with a thin LAO layer compared to one with a thick LAO layer, suggesting that the magnetism may be interfacial in origin.

<sup>1</sup>This work was supported by AFOSR and DOE.

Michael Fitzsimmons  
LANL

Date submitted: 19 Nov 2008

Electronic form version 1.4