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Origins of Anomalous Ferromagnetism in F/AF LCMO Multilayers B. J. KIRBY, S. M. WATSON, National Institute of Standards and Technology, M. KAREEV, J. CHAKHALIAN, University of Arkansas — Unexpected behavior can emerge from magneto-electronic interactions at the interface between two different strongly correlated electron systems. Exchange bias - giving a ferromagnet (F) a preferred direction via coupling with an antiferromagnet (AF) - is a phenomenon of great fundamental and applied research interest. Both topics are pertinent in the case of the interface between F and AF La[1-x]Ca[x]MnO3 (LCMO) layers. Depending on x, LCMO can be F (x = 1/3 Ca) or AF (x = 2/3 Ca), and exchange bias has been reported in superlattices consisting of such layers. Surprisingly SQUID magnetometry has shown that the saturation moment of such a structure increases as the nominally AF layer thickness is increased [1]. This has been attributed to electronic effects that cause F order to extend into the nominally AF layer. However, the location of the extra moment cannot be determined with bulk magnetometry techniques. Thus, we have used polarized neutron and x-ray reflectometry to measure the magnetic and structural depth profiles in an exchange biased x=1/3 LCMO / x=2/3 LCMO bilayer. Our results suggest that the magnetic profile extends beyond the x = 1/3 layer, implying that some F order indeed exists in the nominally AF x = 2/3 layer. [1] G. Campillo, et al., J. Appl. Phys. 97, 10K104 (2005).

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