Abstract Submitted
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Understanding the Origin of Ferromagnetism in $LaNiO_3/CaMnO_3$ Superlattices CHARLES FLINT, Stanford University, ALPHA N'DIAYE, PADRAIC SHAFER, ELKE ARENHOLZ, Advanced Light Source, YURI SUZUKI, Stanford University — Interfacial ferromagnetism (FM) in transition metal oxide heterostructures is a promising route for engineering new low-dimensional devices. In 2001, FM was discovered in $CaRuO_3/CaMnO_3$ superlattices (SLs), which is attributed to an itinerant electron-mediated Mn-Mn double-exchange (DE). Since then we have discovered interfacial FM in $(LaNiO_3)_N/(CaMnO_3)_8$ SLs that is consistent with this DE interaction[1]. Now we have explored even further reduced dimensionality by fabricating $[(LNO)_{n=2-7}/(CMO)_4]_{10}$ SLs. Transport measurements confirmed a thickness dependent metal-insulator transition, with insulating films for N<4. Bulk magnetometry measurements reveal interfacial FM in insulating and conducting SLs. Since there are no itinerant electrons in the insulating SLs, this FM must arise from a different source. Using x-ray absorption spectroscopy and magnetic circular dichroism, we have identified the coexistence of Ni^{2+} and Ni^{3+} and Ni magnetism. We therefore speculate that the FM in insulating SLs originates from a Mn-Ni superexchange interaction. We discuss the role of these interactions in interfacial FM and methods for controlling them.

[1]A.J. Grutter et al., *Phys. Rev. Lett.* **111**, 087202 (2013)

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