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Interface Magnetic Order in $LaFeO_3/LaCrO_3$ and $LaFeO_3/La_{1-\delta}MnO_3$ Superlattices H.N. LEE, Materials Science and Technology Division, Oak Ridge National Laboratory, J.W. FREELAND, Advanced Photon Source, Argonne National Laboratory, G. KHALIULLIN, B. KEIMER, Max Planck Institute for Solid State Research, Stuttgart, J. CHAKHALIAN, Department of Physics, University of Arkansas, Fayetteville — Creation of sharp interfaces between strongly correlated electron systems can result in novel states at the boundary. Here we present our work using element-resolved x-ray probes to study the magnetic order in $LaFeO_3$(LFO)/$LaCrO_3$(LCO) and $LaFeO_3/La_{1-\delta}MnO_3$ superlattices. Using pulsed laser deposition with RHEED control, (111) and (100) oriented ultra-thin superlattices were grown with layer thicknesses of 1 to 9 unit cells. In the bulk $LaFeO_3$ and $LaCrO_3$ are antiferromagnetic while $La_{1-\delta}MnO_3$ is ferromagnetic. At the interface of (111) oriented $LaFeO_3/La_{1-\delta}MnO_3$ superlattices we find clear sign of large net magnetic moment on both Mn and Fe even at moderate fields. For the LFO/LCO case, the (111) case displays small net mangetic moment in both layers while the (100) orientated samples shows no clear sign of net magnetic moment even at fields up to 5T. Research sponsored by the Division of Materials Sciences and Engineering, Office of Basic Energy Sciences, U.S. Department of Energy, under contract DE-AC05-00OR22725 with Oak Ridge National Laboratory, managed and operated by UT-Battelle, LLC.

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