

Abstract Submitted  
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**Direct observation of local magnetic properties in strain engineered lanthanum cobaltate thin films** S. PARK, WEIDA WU, Rutgers Center for Emergent Materials and Department of Physics and Astronomy, Rutgers University, Piscataway, New Jersey 08854, USA, J. W. FREELAND, Advanced Photon Source, Argonne National Laboratory, Argonne, Illinois 60439, USA, J. X. MA, J. SHI, Department of Physics, University of California, Riverside, California 92521, USA — Strain engineered thin film devices with emergent properties have significant impacts on both technical application and material science. We studied strain-induced modification of magnetic properties (Co spin state) in epitaxially grown lanthanum cobaltate ( $\text{LaCoO}_3$ ) thin films with a variable temperature magnetic force microscopy (VT-MFM). The real space observation confirms long range magnetic ordering on a tensile-strained film and non-magnetic low-spin configuration on a low-strained film at low temperature. Detailed study of local magnetic properties of these films under various external magnetic fields will be discussed. Our results also demonstrate that VT-MFM is a very sensitive tool to detect the nanoscale strain induced magnetic defects.

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