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Magnetic and structural phase transitions in epitaxial thin films of Manganites¹ VALERIA LAUTER, HAILEMARIAM AMBAYE, STEVEN NAGLER, HANS CHRISTEN, MIKE BIEGALSKI, Oak Ridge National Laboratory, SNS COLLABORATION, CNMS COLLABORATION — Understanding the magnetic properties of complex materials near interfaces is important for the development of functional nanostructures and devices. Epitaxial LaMnO₃ films were grown on SrTiO₃ substrates. Recent work on such thin-film samples has shown that “interface doping” can induce magnetism at interfaces. Our work on LaMnO₃/SrTiO₃ interfaces has shown that the nature of the interface determines its magnetic structure - with the MnO₂-SrO interface showing a different magnetization than the LaO-TiO₂ interface. To investigate interfacial structures, we used polarized neutron reflectometry with off-specular scattering. Our results give evidence of reversible temperature- and field- dependent structural changes in LaMnO₃ film which undergo a phase transition. We determined that a structural phase transition in SrTiO₃ and the misfit strain trigger appearance of twins to reduce stresses and to adjust lattice mismatch between the film and the substrate. We show that a laterally correlated superstructure appear due to interaction of structural modifications with the magnetization the film

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