

Abstract Submitted
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Evolution of antiferromagnetic order during the colossal magnetoresistive transition M.A. HOSSAIN, MARK H. BURKHARDT, SLAC, Stanford University, E. WESCHKE, E. SCHIERLE, Helmholtz-Zentrum Berlin, Y. TOMIOKA, National Institute of Advanced Industrial Science and Technology (AIST), Japan, Y. TOKURA, University of Tokyo, J. STÖHR, H.A. DÜRR, SLAC, Stanford University — $\text{Pr}_{0.7}\text{Ca}_{0.3}\text{MnO}_3$ (PCMO) displays one of the largest colossal magneto-resistances (CMR) among manganites. Magneto-transport data suggest that an insulating antiferromagnetic to metallic ferromagnetic transition occurs as the system goes through a CMR transition with the application of a high magnetic field (3-6T). However, the nature of this transition is a mystery. We report the first high magnetic field resonant soft x-ray scattering (RSXS) experiments on PCMO which follow the evolution of the antiferromagnetic superlattice order through the CMR transition. We find that the antiferromagnetic order is first enhanced by several orders of magnitude before melting away into the metallic ferromagnetic phase. Additional high field x-ray magnetic circular dichroism (XMCD) measurements allow us to track the spin and orbital moments and construct a microscopic picture of the competing forces at the heart of CMR.

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