Abstract Submitted
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The role of oxygen in the colossal magnetoresistance in manganites[1] M.A. HOSSAIN, M.H. BURKHARDT, SIMES, Stanford, S. SARKAR, H. OHLDAG, S. DE JONG, SLAC, A. SCHOLL, A.T. YOUNG, A. DORAN, Y.-D. CHUANG, Berkeley Lab, D. DESSAU, U. Colorado, J. MITCHELL, Argonne Lab, H.A. DÜRR, J. STÖHR, SLAC — We have used Low temperature Photo-Emission Electron Microscopy (PEEM) measurements on the bi-layered manganite compound $La_{1.8}Sr_{1.2}Mn_2O_7$ to explore the origin of the colossal magnetoresistance (CMR) effect. It is generally agreed that CMR cannot be explained by double exchange only, and that other interactions mediated by oxygen atoms such as polarons must be important. We have imaged the magnetic domain structure by x-ray magnetic circular dichroism PEEM spectro-microscopy at both the O and Mn sites. By probing the ferromagnetic domain formation below T_c, we find that the insulator-to-metal transition is mediated by magnetic interactions involving a strong magnetic moment on oxygen. The spatially resolved oxygen K-edge XMCD signal reveals the role of the in-plane and out-of- plane e_g orbitals in the magnetic transitions and thereby sheds light on the very origin of CMR.

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