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Imaging of nano domain fluctuations in manganites<sup>1</sup> MIRIAN GARCIA FERNANDEZ, STUART WILKINS, Condensed Matter Physics and Materials Science Department, Brookhaven National Laboratory, Upton, New York 11973, USA, HONG ZHENG, JOHN MITCHELL, Materials Science Division, Argonne National Laboratory, Argonne, Illinois 60439, USA — We present a soft x-ray resonant diffraction study of the electronic spatial nano-scale domains present in manganites. We explain the details of our new set up that allow us to perform this diffraction contrast microscopy in the nano regime. We will present preliminary results on the nanoscale domains in the bilayer manganite  $LaSr_2Mn_2O_7$ . The structural reflection (002) and the A-type antiferromagnetic reflection (001) have been investigated with soft x-rays in the vicinity of the manganese  $L_3$  edge. A resolution of ~ 150-200 nm has been achieved by implementing a zone plate focusing optic in our diffraction set up. These two reflections have been mapped in the same region of the sample. This region has dimensions of 20 x 20 microns. We will present measurements comparing the magnetic nano scale domains in  $LaSr_2Mn_2O_7$  probed directly by measuring the (001) antiferromagnetic reflection, with crystallographic inhomogeneities that are observed in the mapping of the (002) crystallographic reflection. Finally, future directions using this setup will be discussed for the study of strongly correlated systems.

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