

Abstract Submitted
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Resonant x-ray diffraction study of orbital and magnetic order in half-doped manganites JESSICA THOMAS, JOHN HILL, STEPHANE GRENIER, Brookhaven National Lab, MICHEL VAN VEENENDAAL, Northern Illinois University, PETER ABBAMONTE, National Synchrotron Light Source — Resonant x-ray diffraction performed near a transition metal L absorption edge is directly sensitive to the chemical and magnetic environment of the important 3d electrons in transition metal oxides. This technique can be used to directly probe and compare the orbital and magnetic correlations which form the ground state in half-doped, insulating manganites [1]. In this talk, we compare resonant diffraction measurements as a function of temperature, energy and scattering geometry for three half or near-half doped insulating manganites, $Pr_{1-x}Ca_xMnO_3$ ($x = 0.4$ and 0.5) and $Nd_{1-x}Sr_xMnO_3$ ($x = 0.5$). In all three samples, the orbital scattering exhibits a characteristic resonant (energy dependent) line- shape and dependence on azimuthal angle. However, subtle changes in the resonant line-shapes measured in different samples may indicate different interactions with the surrounding lattice. Interestingly, both $x=0.4$ and 0.5 $Pr_{1-x}Ca_xMnO_3$ samples show a smaller correlation length associated with orbital order compared to magnetic order. [1] K. J. Thomas et al, Phys. Rev. Lett. 92 237204 (2004).

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