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Spin structure probed by small-angle neutron scattering in $\mathbf{Bi_{0.125}Ca_{0.875}MnO_3}$ YUHAI QIN, TREVOR TYSON, New Jersey Insitute of Technology, KLAUS PRANZAS, HELMUT ECKERLEBE, GKSS Research Center — The manganite system $Bi_{1-x}Ca_xMnO_3$ possesses intriguing properties in the high calcium doping region. In this electron doped region (0.6<x<1), a ferromagnetic (FM) moment of ∼1.2 Bohr magnetons per Mn site is found for x ∼0.875. The magnetic moment per Mn site maintains a value ∼1/3 the theoretical limit even in fields a high as 60 T. The physical origin of this high moment region is not well understood. Various models including canted ferromagnetism and ferromagnetic clusters hosted by an antiferromagnetic background have been proposed. In order to understand the nature of magnetism in this system we have conducted small-angle neutron scattering (SANS) on $Bi_{0.125}Ca_{0.875}MnO_3$ polycrystalline samples. Both temperature and magnetic field dependent measurements were performed. Nontrivial spin structure was revealed in this system: cluster-like spin structure forms at temperatures above Tc. With a reduction in temperature, the clusters begin to be correlated and grow in size (and changing in shape) as Tc is approached. When an external magnetic field is applied, the clusters grow and the correlation is enhanced. The high moment suggests, that the spins inside the clusters are gradually aligned at temperature is educed or a magnetic filed is applied. This work is supported by NSF DMR-0209243 and NSF INT-0233316.

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