

Abstract Submitted  
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**Hall effect on strain-released  $\text{La}_{0.67}\text{Ca}_{0.33}\text{MnO}_3$  thin films** LIUQI YU, XIAOHANG ZHANG, S. VON MOLNÁR, P. XIONG, Florida State University, LINGFEI WANG, W.B. WU, University of Science and Technology of China — It has been demonstrated that releasing the in-plane anisotropic strain in thin films of  $\text{La}_{0.67}\text{Ca}_{0.33}\text{MnO}_3$  grown on orthorhombic  $\text{NdGaO}_3$  (001) substrates can induce a charge ordering state below the Curie temperature.<sup>1</sup> Three LCMO films on NGO, (PLD at 735°C and 45 Pa  $\text{O}_2$  pressure, 45 nm thick) were annealed at 780°C in flowing  $\text{O}_2$  for 1, 10 and 20 hours to increase degrees of strain relaxation. Hall measurements were performed. In all three samples, the Hall resistivity takes on two distinct slopes in the paramagnetic phase: a negative slope at low fields, which varies with temperature, and a temperature-independent positive slope at high fields. Notably, the switching field for the Hall slope decreases linearly with temperature and extrapolates to the paramagnetic Curie temperatures of the samples. The observation is similar to the behavior of the nonlinear Hall effect in  $\text{EuB}_6$  and suggests that the switches occur at a *constant critical magnetization*.<sup>2</sup> In strain-released samples, peaks in the Hall resistivity emerge near  $T_C$  and become more pronounced with decreasing temperature. The origins and implications of these observations will be discussed. Work supported in part by NSF DMR-0908625. <sup>1</sup>Z. Huang et al., JAP 105, 113919 (2009) <sup>2</sup>X. Zhang et al., PRL **103**, 106602 (2009)

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