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Phase modification of $\text{La}_{1/4}\text{Pr}_{3/8}\text{Ca}_{3/8}\text{MnO}_3$ thin films by light, magnetic field and applied stress¹ JUSTIN OLAMIT, MIKHAIL ZHERNENKOV, MIKE FITZSIMMONS, Los Alamos National Laboratory, HAILE AMBAYE, VALERIA LAUTER, Oak Ridge National Laboratory, HYOUNG JEEN JEEN, AMLAN BISWAS, University of Florida — Complex oxide materials exhibit a wide variety of fascinating electromagnetic properties related to the coexistence of multiple electronic and magnetic phases.[1,2] The temperature-magnetic field phase diagram of $\text{La}_{0.27}\text{Pr}_{0.40}\text{Ca}_{0.33}\text{MnO}_3$ (LPCMO) is intriguing; a ferromagnetic metallic (FMM) phase, charge ordered insulating (COI) phase and conditions where both phases coexist are accessible with changes in temperature and magnetic field.[3] We have performed neutron reflectometry to understand the emergence of the FMM phase in a COI matrix of a LPCMO thin film as functions of temperature, irradiation with light, magnetic field and stress. Specular reflectivity reveals the emergence of ferromagnetism below the phase transition temperature. Diffuse scattering shows that the length scale of FM domains is 1-2 microns. [1] Ch. Renner et al., *Nature* **416**, 518 (2002). [2] L. Zhang et al., *Science* **298**, 805 (2002). [3] T. Dhakal et al., *Phys. Rev. B* **75**, 092404 (2007).

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