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Unexpected nanoscale metamagnetic transition in a colossal magnetoresistance manganite[1] LINGJIA SHEN, ELIZABETH BLACKBURN, ALEXANDER. T. HOLMES, EDWARD. M. FORGAN, Univ of Birmingham, UK, SEBASTIAN MUEHLBAUER, Forschungsneutronenquelle Heinz Maier-Leibnitz, Technische Universität München, Garching, Germany, ANDRE HEINEMANN, German Engineering Materials Science Centre, Helmholtz-Zentrum Geesthacht, Geesthacht , Germany — Intrinsic inhomogeneities, both on the nanometer and micrometer scale, are crucial to the phase separation seen in the colossal magnetoresistance (CMR) perovskite manganites. The origin of these inhomogeneities has been an open question for the past decade [1, 2], but they clearly play an important role. To investigate these inhomogeneities, we have studied $Pr_{0.5}Ca_{0.5}Mn_{0.97}Ga_{0.03}O_3$ using small angle neutron scattering in fields up to 16 T. In zero field at $\sim$ 220 K, there is a transition to a charge/orbital ordered (CO/OO) paramagnet, as in $Pr_{1-x}Ca_xMnO_3$ [3]. At 150 K, the CO/OO phase is destroyed by applying a field of 6 T, and we find that above this field, nanoscale inhomogeneities undergo a separate, uncoupled, metamagnetic transition. We have also explored metamagnetic avalanches at low temperature [4] in this material, and a possible link between the avalanches and the magnetic nanoscale phases will be illustrated. [1] E. Dagotto et al. Physics Reports 344, 1-153 (2001). [2] K. H. Ahn et al. Nature, 428, 401 (2004). [3] Y. Tomioka et al. Phys. Rev. B 53, R1689 (1996). [4] C. Yaicle et al. Physical Review B, 68, 224412 (2003).

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