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Probing multiple magnetic transitions and phase coexistence in mixed phase manganites M.H. PHAN, N.S. BINGHAM, H. SRIKANTH, University of South Florida, C.L. ZHANG, S.W. CHEONG, Rutgers University — $La_{5/8-y}Pr_yCa_{3/8}MnO_3$(LPCMO) manganites exhibit a complex phase diagram due to coexisting and competing magnetic and electronic phases. A complete understanding of the origin of phase coexistence and separation in this system has remained elusive. To resolve this, it is essential to employ experimental methods that allow detailed investigations of the temperature and magnetic field response of the different phases. In this study we introduce magnetocaloric effect (MCE) and radio-frequency transverse susceptibility (TS) experiments as being ideally suited for this purpose. While MCE is generally considered in the community as an "applied" measurement tool to characterize magnetic refrigerant materials, we demonstrate that it is actually a very useful probe of magnetic transitions and ground state magnetic properties in LPCMO. TS experiments probe a phase conversion between the charge-ordered and ferromagnetic phases and magnetic field-induced kinetic arrest. Our studies provide an important understanding of the phase coexistence and separation in mixed phase systems like LPCMO.

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