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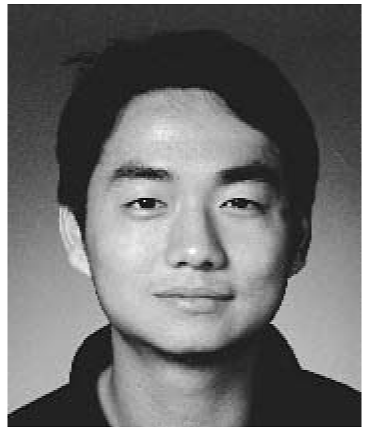

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"Magnetic Glasses in Colossal Magnetoresistive Manganites"

Thursday, May 18, 2006
Room 102, University of Houston Science Center
12:00 noon – 1:00 p.m.

Abstract

Spin glasses are founded in the frustration and randomness of microscopic magnetic interactions. They are non-ergodic systems, not described by thermodynamics. Magnetic glassy behaviour has been observed in many colossal magnetoresistive manganites, yet there is no consensus that they are spin glasses. Here, an intriguing glass transition in (La,Pr,Ca)MnO_3 is imaged using a variable-temperature magnetic force microscope. In contrast to the speculated spin glass picture, our results show that the observed static magnetic configuration seen below the glass temperature arises from the cooperative freezing of the first order antiferromagnetic (charge ordered) to ferromagnetic transition, leading to a non-ergodic state. Our data also suggest that accommodation strain plays an important role in the kinetics of the phase transition. This cooperative freezing idea has been applied to conventional glass systems including window glasses and supercooled liquids, and may be applicable across many systems to any first-order phase transition occurring on a complex free energy landscape.

Bio

Dr. Weida Wu received the Ph.D. in Physics from Princeton University (2004) under Prof. Paul M. Chaikin, the M.S. in Physics from Northwestern University (1999), and the B.S. in Physics from University of Science and Technology of China (1998). He was a postdoctoral fellow with A. de Lozanne at the University of Texas at Austin, where he worked to image the evolution of a glassy magnetic transition in disordered ferromagnetic manganite $La_{0.25}Pr_{0.375}MNO_3$ with a Variable Temperature Magnetic Force Microscope. He is designing and constructing a low temperature dual-tip STM for studying surface green function in strongly correlated electronic systems. While at Princeton, he discovered giant Nernst effect in organic conductor $(TMTSF)_2PF_6$, the largest Nernst effect in metal ever found.

His research interests include: glass transition and phase separation in disordered ferromagnetic manganites; multifunctional multiferroic materials and devices; and nanoscale electronic and magnetic properties of strongly correlated systems. His experimental expertise includes: low temperature Scanning Probe microscopes (MFM, EFM, STM); He^3-He^4 dilution refrigerator, high pressure, high magnetic field; transport, NMR, and AC susceptibility; SEM, Focus Ion Beam; and sample preparation and crystal growth.

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