Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Photoinduced Femtosecond Formation of Ferromagnetism in a Strongly Correlated Antiferromagentic Manganite TIANQI LI, AARON PATZ, Dept. of Physics and Astronomy, Iowa State University; Ames Lab - USDOE, JIAQIANG YAN, THOMAS LOGRASSO, Ames Lab - USDOE, JIGANG WANG, Dept. of Physics and Astronomy, Iowa State University; Ames Lab - USDOE — There has been strong current interest to manipulate collective spins and even induce magnetic phase transitions in their highly *non-equilibrium, non-thermal* states at *femtosecond* time scales. Such processes offer opportunities to exceed the upper limit of the magnetic switching speed (0.1-10 GHz) in modern magneto-optical recording industry and magnetic storage/logic devices. One prominent system to explore such femtosecond magnetism is strongly correlated manganites, which are truly "responsive" near the phase boundary, exhibiting extreme sensitivity to external stimuli, such as light, electric and magnetic fields. Using ultrafast two-color magnetic circular dichroism spectroscopy, we have observed a substantial photoinduced magnetization enhancement in $Pr_{0.7}Ca_{0.3}MnO_3$ within 180 fs above a threshold pump fluence and at low temperature. Such a photoinduced critical behavior vanishes at elevated temperature. These results clearly show a photoinduced ultrafast antiferromagnetic to ferromagnetic phase transition, demonstrating particularly, that one can reveal a hidden, thermally inaccessible ground state at fs time scales.

Tianqi Li
Dept. of Physics and Astronomy, Iowa State University;
Ames Lab - USDOE

Date submitted: 29 Dec 2010 Electronic form version 1.4