

**Invited Seminar  
Los Alamos National Laboratory  
Tuesday, November 17, 2004**

**Microscopic Spin Interactions in the Metallic and Insulating Phases of the  
Colossal Magnetoresistance Manganites**

J. A. Fernandez-Baca  
Center for Neutron Scattering  
Oak Ridge National Laboratory<sup>†</sup>,  
Oak Ridge, Tennessee 37831-6393

**ABSTRACT**

Inelastic neutron scattering has been utilized to study microscopic spin interactions in ferromagnetic  $\text{La}_{1-x}\text{Ca}_x\text{MnO}_3$  (LCMO) as a function of the hole-doping  $x$  (0.2, 0.25 and 0.30); and in ferromagnetic  $\text{Pr}_{0.70}\text{Ca}_{0.3}\text{MnO}_3$  (PCMO) as a function of external magnetic field. The evolution of the magnetic coupling in these systems as they undergo a metal-to-insulator transition is both surprising and inconsistent with existing models for these materials such as Heisenberg ferromagnetism, double-exchange or modified double-exchange. These results will be discussed in this talk.

<sup>†</sup>Oak Ridge National Laboratory is managed by UT-Battelle, LLC, for the U.S. Dept. of Energy under contract DE-AC05-00OR22725.