

Lectures on Pure and Applied Physics

Research Topics in the Mathematical Sciences



Announcing

A Seminar Presentation
on April 16, 2013 at 2:30 pm

Henry Lee Institute 301

at The University of New Haven

Speaker: Dr. Jason Haraldsen

Theoretical Division and the Center for Integrated Nanotechnologies
Los Alamos National Laboratory

Title: Understanding the magnetic ground state for multiferroic materials

Abstract:

Multiferroic materials have the unique multi-functionality of controlling magnetism through electric field and/or electric polarization through magnetic field, which presents possibilities for new technological advances and applications. To fully understand the connection between magnetism and electric polarization, one must have a full understanding of the underlying magnetic ground states within these materials. Through an investigation of the multiferroic material CuFeO_2 , I examine the effects of anisotropy and magnetic field on the frustrated triangular lattice and determine the magnetic ground states. Through a rotational algorithm of the Holstein-Primakoff expansion for the spin Hamiltonian, the spin-wave dynamics for the multiferroic and high-magnetic-field phases are determined. With the dynamics of the multiferroic phase, I modeled the experimental data of doped CuFeO_2 . From this detail analysis, it was concluded that the multiferroic ground state is that of a distorted incommensurate spiral, which provides insight into the effects of magnetic frustration within these materials. In closing, I will briefly discuss further research developments on the understanding of interfacial phenomena through magneto-electric coupling, and I will conclude with some future research directions in the pursuit of a full understanding multifunctional materials.

Further Information

Refreshments are served from 2:15 pm until 2:30 pm.