

**University of Vermont
Theoretical and Applied Physics**

Fall 2009

**Resonant X-ray Scattering Studies
of Orbital and Magnetic Ordering**

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Resonant x-ray scattering is a technique that utilizes a monochromatic x-ray beam tuned near the absorption edge of an element of interest. An enhancement in the scattering intensity at orbital and magnetic wave vectors provides element specific sensitivity to these important ordering phenomena. In this talk, I will describe how we have used resonant x-ray scattering to probe two different systems: calcium ruthenates and rare earth ferrobates. In the ruthenates, orbital ordering of the 4d t_{2g} states has been connected to a metal-insulator transition in Ca_2RuO_4 and colossal magnetoresistance in $\text{Ca}_3\text{Ru}_2\text{O}_7$. However in our studies, we found that the onset of orbital ordering in Ca_2RuO_4 occurs at a temperature well below the metal-insulator transition, and we observed no evidence of orbital ordering in $\text{Ca}_3\text{Ru}_2\text{O}_7$. In the rare earth ferrobates, we focused on samples in which field-induced multiferroic behavior has been reported. We investigated the magnetic structure of these ferrobates using the 13 Tesla, High-Field Facility at National Synchrotron Light Source Beamline X21, and observed a correlation between the field-induced destruction of incommensurate magnetic phases and multiferroic behavior.

Wednesday, November 4, 2009
4:00 p.m.
Terrill Room 108

Refreshments will be provided at 3:30 PM.