WEEKLY CALENDAR

October 27, 2008

Department Colloquium

"Novel types of orders and excitations in geometrically frustrated spinels"

3:40 PM, October 30, 2008
109 Nicholson Hall

Natalia B. Perkins
University of Wisconsin-Madison
Host: Ilya Vekhter

• Refreshments served at 3:15 PM in 201 Nicholson Hall •

In recent decades, there has been a lot of interest in geometrically frustrated systems. The term "geometrical frustrations" refers to situations where local order, as determined by local interactions, cannot freely propagate throughout the space, and the long-range order cannot be established. Instead, a highly degenerate ground state is formed. The pyrochlore lattice, which is composed by corner sharing tetrahedra is a typical example of a highly frustrated three dimensional structure, which does not support a magnetically ordered ground state. Interest in these systems stems from (i) the richness of their novel properties: the unexpected variety of ordered states and transitions between them; (ii) the complexity of the underlying physics: the close coupling and correlations among spin, orbital, charge and lattice degrees of freedom; (iii) the presence of frustration that makes the systems highly sensitive to any internal or external perturbations.

In real compounds geometrical frustration can be partially or fully lifted when magnetic ions forming a frustrated lattice possess an orbital degeneracy. Typically, this happens when magnetic ions are transition metal ions with orbitally degenerate partially filled d-levels, as for example, in spinels with the general formula AB_2O_4. The physical behavior of these systems differs drastically from that of pure spin models, as the occurrence of an orbital ordering can lift the geometrical degeneracy of the underlying lattice. In my talk I will discuss three orbitally degenerate spinels, LiV2O4, MgTi2O4, and ZnV2O4, and show how due to different orbital orderings these compounds have strikingly different macroscopic properties.

Announcements:

Tax treaty benefits expire December 31, 2008. To continue these for 2009 attend a tax treaty workshop on Wednesday, November 12 or Thursday, November 13 between 8:30 a.m. and 4:00 p.m. in the lobby of Thomas Boyd Hall. Bring your passport, Visa, I-94 card, I-20 or DS2019. It will take about 20 minutes to fill out the forms.

Publications:

"Black Holes in Loop Quantum Gravity: The Complete Space-Time," Rodolfo Gambini and **Jorge Pullin**, Physical Review Letters, 101, 161301 (2008).

"Measuring the Deposited Energy by the Scintillation Calorimeter in the ATIC Experiment," A.D. Panov, V.I. Zatsepin, N.V. Sokolskaya, J.H. Adams, Jr., H.S. Ahn, G.L. Bashindzhagyan, J.W. Watts, **J.P. Wefel**, J. Wu, O. Ganel, **T.G. Guzik**, R.M. Gunashingha, **J. Isbert**, K.C. Kim, M. Christl, E.N. Kouznetsov, M.I. Panasyuk, E.S. Seo, J. Chang, W.K.H. Schmidt, and A.R. Fazely, Instruments and Experimental Techniques, 2008, Vol. 51, No. 5, pp. 665-681.