清华大学高等研究院

Institute for Advanced Study, Tsinghua University

物理学术报告
Physics Seminars (biweekly)

Title: **Heat transport and magnetic phase transitions of low-dimensional quantum magnets**

Speaker: **Prof. Xuefeng Sun (*University of Science and Technology of China*)**

Time: **3:15pm, Wednesday, May 15, 2013**
(2:45~3:15pm, Tea, Coffee, and Cookie)

Venue: **Conference Hall 322, Science Building, Tsinghua University**

Abstract

Low-dimensional or frustrated quantum magnets were revealed to exhibit exotic ground states, magnetic excitations, and quantum phase transitions (QPTs). In the spin-gapped antiferromagnets, the external magnetic field can close the gap in the spectrum, which results in a QPT between a low-field disordered phase and a high-field long-range ordered one. An intriguing finding is that this ordered phase can be approximately described as a Bose-Einstein condensation (BEC) of magnons. In this talk, we show the low-temperature thermal conductivity (κ) of several spin-gapped quantum magnets, including the quasi-one-dimensional S=1 chain compound $NiCl_2$-4SC$(NH_2)_2$ (DTN), the quasi-one-dimensional ladder compound $(CH_3)_2CHNH_3CuCl_3$ ($IPACuCl_3$), and the layered spin-dimer compound $Ba_3Mn_2O_8$. It is found that the magnetic excitations can affect the heat transport rather strongly in these materials, particularly at the field-induced QPTs, by either transporting heat or scattering phonons. In addition, we pay attention to a fundamental issue whether the ballistic magnon heat transport ($\kappa \propto T^3$), which has actually never been observed in antiferromagnetic materials, can be realized.