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Photon Science Seminar

Opportunities and challenges of 2-dimensional triangular lattice magnetism

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Coffee:	10:45 h
SEMINAR:	11:00 h
PLACE:	WBGB/019

Two-dimensional triangular lattice has been the source of rich physics with its generic frustration effects. Despite the progresses made over the past decades, many fundamental questions remain poorly understood, to say least, and await further fresh investigations. In this talk, I will highlight two cases of how new physics emerges, when the 2d triangular lattice has strong magnon-magnon interaction in addition to magnon-phonon interaction or a significant orbital degree of freedom.

In the first part, I will present our works covering both structure and spin dynamics of multiferroic hexagonal manganite having a two-dimensional triangular lattice. Here I will focus mainly on two issues: (i) the origin of magnetoelectric coupling and (ii) the spin waves. By using high-resolution neutron and synchrotron diffraction studies, I will demonstrate that a strong spin-lattice coupling lies at the heart of the magnetoelectric coupling in these compounds. I will then show how the spin waves measured by inelastic neutron scattering techniques allow us not only to confirm the existence of a strong spin-lattice coupling but also to unravel unusual nonlinear magnon interaction effects in these materials.

In the second part, I will discuss how Li_2RuO_3 with a honeycomb lattice forms a very unusual low-temperature ground state through a metal-insulator transition, where the orbital degree of freedom of Ru 4d electrons plays an important role. Using both bulk characterization and high-resolution neutron scattering data, I am going to address the nature of the supposedly spin-gap state, and I will argue that it is most likely to be a new form of a highly correlated state.

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