PAUL SCHERRER INSTITUT

Invitation

LMU-Seminar

Title: **Spin-orbital entangled and spin liquid state in the 6H-perovskite compounds $Ba_3AB_2O_9$ (A=Cu,Ru,Ir;B=Sb,Ti)**

Speaker: **Kwang-Yong Choi (Chung-Ang University, Seoul)**

Time: **Thursday, November 27th 2014, 14:00**

Place: **WHGA/121**

Abstract:

Geometrically frustrated antiferromagnets are a versatile reservoir for emergent quantum-correlated phenomena such as spin liquids, fractionalized excitations, and magnetic monopoles. Recent experiments on the 6*H*-perovskite family $Ba_3AB_2O_9$ (A=Cu, Ni, Co, Ru, Ir; B=Sb, Ti) have disclosed a variety of interesting ground states: a random singlet, spin liquid, spin freezing, and 120° ordering, depending on a spin number, spin-orbit coupling, and Jahn-Teller (JT) distortions. In this talk, I will briefly introduce spin liquid in the context of topological order and then focus on two materials $Ba_3CuSb_2O_9$ and $Ba_3Ru_{1-x}Ir_xTi_2O_9$. In $Ba_3CuSb_2O_9$, a combined effect of frustration and local JT distortions may create a novel spin-orbital entangled state. Our ESR results provide evidence for intrinsic coupling of spins to orbital degrees of freedom and demonstrate that magnetism is dictated by a spatiotemporal structure of the JT distortions. In $Ba_3Ru_{1-x}Ir_xTi_2O_9$, we address the possibility of spin-orbit coupling tuned spin liquid in a two-dimensional triangular lattice. ac susceptibility and μSR experiments show that a spin freezing observed in $Ba_3RuTi_2O_9$ is melted down to form a fluctuating spin state in $Ba_3IrTi_2O_9$. As a possible origin, charge fluctuations enhanced by spin-orbit coupling are invoked.