PHYSICS

CONDENSED MATTER PHYSICS SEMINAR SERIES

4:00 pm - Rm 184 NSH

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Prof. Xianglin Ke

Department of Physics and Astronomy

Michigan State University

Neutron scattering studies of low dimensional quantum magnetism

Low dimensional quantum magnetism has been one of actively pursued research topics in the past decades. Various exciting phenomena has been revealed via neutron scattering. In this seminar, I will present our recent neutron scattering studies of two such systems. The first one is a spin dimer (quasi-0D) system, $Cr_2(Te,W)O_6$. We find that by tuning the orbital hybridization between Cr 3d and O 2p orbitals through W 5d states, the interdimer interaction can be tailored from antiferromagnetic to ferromagnetic by adjusting the ratio of nonmagnetic Te/W. Furthermore, we observe an amplitude mode, in addition to the phase mode, in the magnetic excitations of Cr_2TeO_6 and Cr_2WO_6 despite that both compounds are away from quantum critical point. This suggests that the amplitude mode excitation is a more common phenomenon than what has been usually thought in ordered spin dimer systems. The second example I will present is a unique quasi-1D system, $Cu_2(OH)_3Br$, which consists of nearly decoupled, ferromagnetic and antiferromagnetic alternating chains. The ferromagnetic chains give rise to conventional magnon excitation, while the antiferromagnetic chains lead to spinon continuum. This study illustrates a new toy model and opens an unexplored paradigm of studying the interaction between two different types of magnetic quasiparticles.