Neutron Scattering and Thermal Transport Studies of Novel Magnetic Excitations in Low-Dimensional Magnets

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Low-dimensional quantum magnetism has been one of actively pursued research topics in the past decades. In this Colloquium, I will present our recent neutron scattering and thermal transport studies of magnetic excitations in two low-dimensional magnets. The first one is a unique quasi-1D system, $Cu_2(OH)_3Br$, which consists of weakly-coupled, ferromagnetic and antiferromagnetic alternating chains. As a result, this system shows coexistence of two different magnetic quasiparticles, magnons arising from ferromagnetic chains and spinons from antiferromagnetic chains. Furthermore, these two magnetic quasiparticles interact via weak interchain interactions. The second example I will present is a 2D insulating van der Waals ferromagnet VI_3. This material exhibits an anomalous thermal Hall effect with large thermal Hall signal over a wide temperature region. The observed thermal Hall effect is of dual nature, dominated by topological magnons hosted by the ferromagnetic honeycomb lattice at higher temperatures while being driven by magnon polarons via magnon-phonon coupling at lower temperatures.

Biography:

Prof. Xianglin Ke is an associate professor in the Department of Physics and Astronomy at Michigan State University. He obtained his PhD from University of Wisconsin-Madison in 2006. He then was a postdoctoral scholar at Pennsylvania State University in 2006-2009 and a Clifford Shull Fellow at Oak Ridge National Laboratory in 2009-2012 before joining the faculty at Michigan State University. Combining material synthesis, neutron scattering, and various bulk electronic and thermal transport techniques, Ke's research group is focused on the studies of emergent phenomena and understand the underlying mechanism in quantum materials.