Departments of Physics Colloquium

Broken Symmetry and Magnetic Skyrmions

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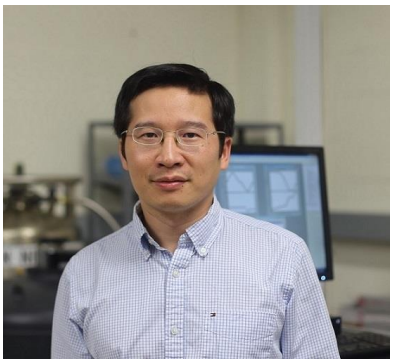

Friday, November 4, 2016
1:30 – 2:30 PM
Venue: RB 130, MMC

Abstract: Broken symmetry is a fundamental concept in physics. The broken symmetries at phase transitions, such as those at the gaseous/solid and the paramagnetic/ferromagnetic transitions, are familiar examples. In cubic B20 magnets, however, it is the inversion symmetry and the 4-fold rotation symmetry that are broken. The broken inversion symmetry leads the Dzyaloshinskii-Moriya (D-M) interaction, which dictates not an aligned ground state but a spin helix, and in addition, an exotic magnetic Skyrmion state with a new type of topological spin texture. Magnetic Skyrmions, with a double-twist spin structure on the nanometer scale, carry a topological charge and a Berry phase in real space. Magnetic Skyrmions not only provide a novel route to study the topological nature of magnetic defects but also exhibit spectacular static and dynamic properties which can be exploited for new spintronics devices. Among the various unusual properties, I'll describe experimental results of the direct consequence of the broken rotation symmetry in the electric transport properties, and the determination of the intrinsic resistance of the spin helix. I'll also describe the creation and detection of the magnetic kink state, a new spin texture that has been proposed in theory. The transport signature of Skyrmions and Skyrmions' response to a rotating magnetic field will be discussed. At the end, I'll briefly discuss Skyrmion research using multilayer thin films technique in my group at UM.

Biography: Dr. Sunxiang Huang joined University of Miami in 2014 as an assistant professor for Physics. He received his Ph.D. in physics from Johns Hopkins University. He is an experimental condensed matter physicist. His research interests lie in the studies of new materials for emerging physics and technological applications. His research focuses have been on the fabrication of epitaxial/multilayer thin films and nanostructures, and on the studies of their unusual magnetic, transport (charge, spin, and heat), and superconducting properties.

The event is free and open to the public.

Future seminars can be found at http://physics.fiu.edu/seminars/

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