Magnetic Skyrmions

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ABSTRACT: Skyrmions are a topological magnetic state that has been observed in several different magnetic materials, such as the chiral cubic magnets Cu2OSeO3, FeGe, and MnSi. In these non-centrosymmetric systems, competition between various magnetic interactions results in the formation of various nano-scale incommensurate spin textures, such as skyrmions, which usually form over a small temperature range near the magnetic transition temperature. These skyrmions display a diverse range of intriguing physics, and can be manipulated by small electrical currents (in metallic systems) or electric fields (in insulators), which has spurred proposals for their use in low energy data storage and processing. However, understanding of the mechanisms which stabilize these spin textures in various materials is still incomplete, requiring further experimental work to clarify. In this talk, I will discuss our work investigating skyrmions and related spin textures in Cu2OSeO3, including discussing aspects of skyrmion metastability as a function of temperature and through electric-field perturbation, and physics surrounding newly identified low-temperature spin textures. I will also discuss work we have done to understand the spin textures in Gd2PdSi3, a novel skyrmion host where the magnetism is stabilized by very different interactions to those in Cu2OSeO3. This work highlights the future potential of this research area, both for fundamental physics investigations, and for potential future technological applications.

ALL ARE WELCOME!