"Chiral Soliton Lattice in a Monoaxial Crystal of Chiral Magnet $CrNb_3S_6$"

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Abstract

Nontrivial spin orders with magnetic chirality appear in a particular class of magnetic materials with structural chirality, frequently referred to as chiral magnets. Various physical properties are expected to emerge in chiral magnets through the coupling of chiral magnetic orders with conduction electrons and electromagnetic fields. One promising candidate to achieve these couplings is a chiral spin soliton lattice (CSL), which is a magnetic super-lattice of forced ferromagnetic regions partitioned by a chiral soliton with 360 degrees twist of spin magnetic moments. In this talk, I will present recent experimental results done in a chiral mono-axial magnetic crystal, $CrNb_3S_6$, via TEM magnetic imaging and magnetoresistance measurements. The CSL is found to appear in the presence of a magnetic field applied perpendicular to the chiral axis, and be robust and stable over the specimen. Negative interlayer magnetoresistance is observed in a bulk crystal, which scales to the soliton density. The discretization effect becomes prominent when the sample size is reduced to micrometers. These observations indicate that the CSL is a magnetic order with the phase coherence on macroscopic length-scale. We could expect the CSL to exhibit various interesting functions, leading to the exploration of routes to a new paradigm for applications in spin electronics using spin phase coherence.

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