

Detecting Skyrmions using Magnetic Small-Angle Neutron Scattering

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The Dzyaloshinskii-Moriya interaction (DMI) is due to relativistic spin-orbit coupling, and in low-symmetry crystal structures lacking inversion symmetry it gives rise to antisymmetric magnetic interactions. The DMI is at the origin of many complex magnetization configurations, such as long-wavelength spin spirals, vortex states, and skyrmion textures. Using micromagnetic simulations, we model the formation of a skyrmion in FeGe nanospheres [1] and study its effects on the magnetic small-angle neutron scattering cross section and the related pair-distance distribution function [2]. This work aims to provide signatures for the experimentalist to detect these topological spin structures in the magnetic neutron data.

References

- [1] S. Pathak, and R. Hertel, Phys. Rev. B 103, 104414 (2021)
- [2] A. Michels, Magnetic Small-Angle Neutron Scattering: A Probe for Mesoscale Magnetism Analysis (Oxford University Press, Oxford, 2021).