
Introduction into physics of chiral skyrmions

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Abstract

Two dimensional chiral magnetic *vortices* or *skyrmions* represent areas of reverse magnetization localized into tubes with the diameters of nanoscale sizes. Importantly that in most of nonlinear physical systems such multidimensional *static* solitonic states are unstable and collapse spontaneously under the influence of external or internal perturbations. In condensed matter systems lacking inversion symmetry two- and three-dimensional localized states (*skyrmions*) are stabilized by a specific mechanism imposed by handedness of the underlying structure [1, 2]. This single out condensed matter systems with intrinsic and induced *chirality* (non-centrosymmetric magnetic crystals, multiferroics, ferroelectrics, and liquid crystals) into a particular class of materials where skyrmions can be induced and manipulated.

I overview basic results on experimental observations and theoretical description of isolated and embedded skyrmions arising in bulk and confined magnetic materials with intrinsic and induced chirality [3-7].

[1] A. N. Bogdanov, D. A. Yablonskii. Sov. Phys. JETP **68**, 101 (1989)., [2] A. Bogdanov, A. Hubert. JMMM **138**, 255 (1994); **195**, 182 (1999)., [3] X. Z. Yu et al. Nature, **465**, 901 (2010), PRB, **91**, 054411 (2015). [4] N. Romming et al. Science **341**, 636 (2013), PRL, **114**, 177203 (2015). [5] M. N. Wilson et al., PRB **89**, 094411 (2014). [6] S. A. Meynell et al., PRB **90**, 014406 (2014). [7] A. O. Leonov et al. ArXiv: 1508.02155