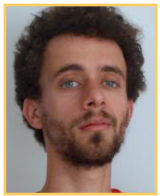
PHD GRANT



Topological magnetic solitons in thin epitaxial films with reduced symmetry

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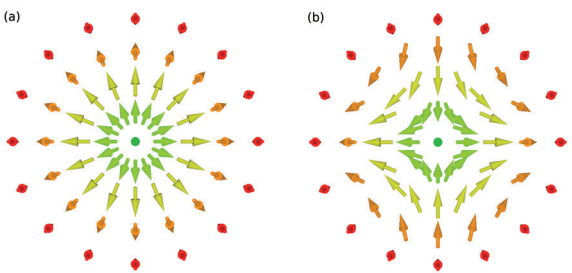
In my thesis, I used a combined theoretical and experimental approach to study the relationship between the crystal symmetry, the magnetic interactions and topological solitons in epitaxial magnetic thin films.

Solitons are field solutions that evolve without perturbing their configurations, to which one can associate particle properties like a charge. For topological magnetic solitons the considered field is the magnetization field and the charge is the topological charge.
I studied how the anisotropic magnetic interactions allow stabilizing domain walls and skyrmions, respectively 1D and 2D magnetic solitons, with different symmetries and topological charges. Theoretically, I developed a continuous model to characterize skyrmions [1] and understand the conditions to stabilize anti-skyrmions [2]. Experimentally I grew epitaxial thin films and studied the crystal symmetry, the magnetic properties and the magnetic configurations [3].



Schematic spin configuration of a skyrmion (a) and an anti-skyrmion (b)

OUTCOMES

[1] The skyrmion-bubble transition in a ferromagnetic thin film, SciPost Phys. 4, 027 (2018).

[2] Micromagnetics of antiskyrmions in ultrathin films, Phys. Rev. B 97, 134404 (2018)

[3] Anisotropic Dzyaloshinskii-Moriya interaction in ultrathin epitaxial Au/Co/W(110), Phys. Rev. B 95, 214422 (2017)

Oral presentations: JEMS, Glasgow, UK, 2016; INTERMAG, Dublin, Ireland 2017; SKYMAG 2, Paris, France, 2017 ; MAGNET, Assisi, Italy, 2017 ; DPG , Berlin, Germany, 2018.

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