Post-doctoral positions in spintronics on magnetic skyrmions at Spintec

The recent discovery of nanometer-size whirling magnetic structures named magnetic skyrmions has opened a new path to manipulate magnetization at the nanoscale [1,2]. Magnetic skyrmions are characterized by a chiral and topologically non-trivial spin structure, i.e their magnetization texture cannot be continuously transformed into the uniform magnetic state without causing a singularity (see Fig.1). Skyrmions can also be manipulated by in-plane current, which has led to novel concepts of non-volatile magnetic memories and logic devices where skyrmions in nanotracks are the information carriers. The nanometer size of the skyrmions combined with the low current density needed to induce their motion would lead to devices with an unprecedented combination of high storage density, fast operation and low power consumption. Although predicted at the end of the 1980's, magnetic skyrmions were first observed in 2009 in B20 chiral magnets thin films and later in ultrathin epitaxial films at low temperature. Recently, magnetic skyrmions were reported at room temperature in ultrathin sputtered thin films which is a first step toward the practical realization of skyrmion logic and memory based devices. In particular, Spintec recently demonstrated room temperature magnetic skyrmion in ultrathin Pt/Co/MgO nanostructure at zero external magnetic field [3] (Fig.1 (b-c)) as well as their fast current induced motion.

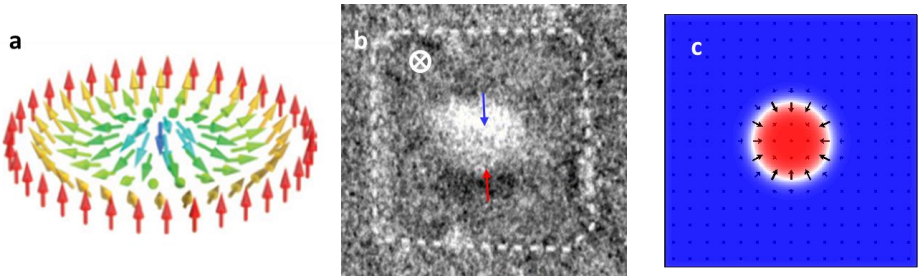

Fig. 1. a - Schematic representation of a magnetic skyrmion [1]. b XMCD-PEEM image of magnetic skyrmion (130 nm diameter) at room temperature and zero magnetic film in an ultrathin Pt/Co/MgO nanostructures [3]. *c. Spin structure from micromagnetic simulations.*

Spintec proposes several experimental post-doctoral positions on magnetic skyrmions and their manipulation with the objective of pushing forward fundamental knowledge in view of technological applications for memory and logics. The aims will be to develop **novel and unexplored material systems** to achieve nm scale skyrmions stable at room temperature and allow their fast and reliable current induced skyrmion manipulation, to develop **ultra-high sensitivity and spatial resolution metrology techniques** for their observation, to explore and control the skyrmion interactions in view of logic operations.
Applicants should send a CV and letter of motivation to Olivier Boulle, olivier.boulle@cea.fr. Spintec is located in Grenoble, France.

Reference [1] A. Fert, V. Cros, and J. Sampaio, Nat. Nanotechnol. **8**, 152 (2013) [2] N. Nagaosa and Y. Tokura, Nat. Nanotechnol. **8**, 899 (2013) [3]O. Boulle et al., Nat. Nanotechnol. **11**, 449 (2016).

SPINTEC
Commissariat à l'Énergie Atomique - INAC
Centre de Grenoble - 17, rue des Martyrs - 38054 Grenoble Cedex 9 France
Tél. : +33 (0)4 38 78 23 83 - +33 (0)4 38 78 21 27 - inac.cea.fr/spintec

Etablissement public à caractère industriel et commercial
R.C.S. PARIS B 775 685 019