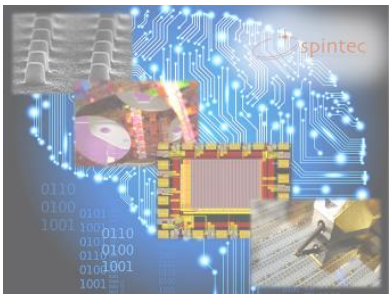
One year post-doctoral fellowship on domain walls and spin waves in core-shell magnetic nanowires



SPINTEC

Positioned at the crossroad of science and technology, SPINTEC (SPINtronique et TEchnologie des Composants, http://www.spintec.fr) is one of the leading spintronics research laboratories worldwide. SPINTEC was created in 2002 and rapidly expanded to currently exceed 100 persons, of which 48 permanent staff from CEA, CNRS and Grenoble-Alpes University. The lab aims at bridging the gap between fundamental research and applications in spin electronics. As such, the outcome of the laboratory is not only scientific publications and communications at international conferences, but also a consistent patent portfolio and implementation of relevant functional demonstrators and device nanofabrication. The lab has launched four start-up companies in the past 12 years. This synergy has placed SPINTEC at the forefront of spintronics research, having actively contributed to the emergence in industry of spintronic memories called MRAM, on which the laboratory holds key patents.

SPINTEC benefits from an idea local environment with a large spectrum of opportunities

- SPINTEC belongs with the Interdisciplinary Research Institute of Grenoble (IRIG), gathering 10 laboratories with of total of 1000 researchers, technicians, doctoral and post-doctoral students. IRIG covers interdisciplinary skills (physics, chemistry, biology), and provides access to cutting-edge scientific and technological platforms such as PTA cleanroom, and nano-characterization PFNC.
- The Giant Campus Site (also called Scientific Presqu'Ile) offers an exceptional scientific environment with partners such as CEA-LETI, Néel Institute and major European facilities (ESRF and ILL on the EPN Campus).
- The entire Campus of Grenoble Alpes University, whose excellence was recently recognized by the national IDEX award, bears a collective dynamics of research challenges in all fields of knowledge.

Grenoble is a cosmopolitan city at the heart of the French Alps. One out of five people living there works in the field of research, innovation or higher education. In addition, Grenoble offers various cultural and sportive opportunities all year round.

CONTEXT

Context. Spintronics has become a mature technology for applications, such as magnetic field sensing and solid-state memories. However, existing concepts are almost exclusively based on planar processes such as thin film deposition and patterning. Extending spintronics to 3D devices would provide new integrated functionalities such as three-dimensional magnetic field sensors, and also open prospects for an increase of data retention or capacity for future generations of solid-state memories. On the fundamental side, exploring the third dimension brings new physics related to curvature-induced effects and new topologies for magnetization textures. This is the fast-growing field of curvilinear magnetism.

Context at SPINTEC. The position is open in the framework of C3DS, a binational French-German ANR-DFG project (http://www.spintec.fr/c3ds-an-anr-dfg-project/). The purpose of C3DS is to develop and demonstrate the functionality of basic spintronic building blocks suitable for 3D integration. We will use the tubular geometry, compatible with deeply-3D integration in vertical pores, and which allows core-shell structures to be obtained as required to achieve spintronic effects. At SPINTEC the project involves both the Spin Textures team and the Theory / Simulation team, in close collaboration with Institut Néel, also a partner of the C3DS project.

POSITION

Single-wall and core-shell magnetic nanotubes have been developed by the German partners, and are now available for investigations. Here, the project consists in using the electric current flowing through the nanotube, in particular through its core, to induce the motion of domain walls, and the emission of spin waves. We will seek to evidence effects related to curvature, showing up as chiral and non-reciprocal effects. The post-doctoral fellow will be responsible of nanofabrication for electrical contacting, dc and ac electrical measurements including combined with magnetic force microscopy in the lab, and will be largely involved in TEM imaging with magnetic modes, and XMCD and STXM magnetic imaging at synchrotron facilities. She/he will also be interacting closely with the German partners in charge of chemical synthesis, and those Grenoble colleagues developing micromagnetic models and conducting micromagnetic simulations. She/He may be involved in the supervision of Master students and PhD candidates. Participation to international research schools and conferences is encouraged and will be supported. The salary is provided through CNRS. The gross salary depends on the carrier stage of the fellow, in the range 2757 € to 3915 €. The candidate will benefit from CNRS workers conditions, such as subsidized local transportation and privileged access to sporting activities.

Applicants must have a PhD diploma with expertise in one or several of these fields: nanomagnetism/spintronics, clean-room facilities, electrical measurements. They should display taste for experimental physics and collaborative work, with good understanding of condensed matter physics. .

How to apply: Applications must include a CV, motivation and recommendation letters, and be posted here: https://t.co/mO6o3OCD8z. The position is readily available and should be filled as soon as possible. Contact: Olivier FRUCHART (olivier.fruchart@cea.fr).