Candidate search for a permanent Junior Researcher CNRS position

Laboratory : Institut de Physique et Chimie des Matériaux de Strasbourg (IPCMS)
Team: Martin Bowen, Samy Boukari, Wolfgang Weber, Mebarek Alouani
Address : IPCMS-DMONS, 23 rue du Loess BP 43, 67034 Strasbourg Cedex 2

Contact : Martin Bowen, CNRS Senior Scientist
Telephone : 03-88-10-70-92
e-mail : martin.bowen@ipcms.unistra.fr

Experimental Solid-state Spintronics across Quantum objects

Spurred by potential device functionalities, some recent advances in **spintronics** address the conversion between charge and spin currents as a consequence of spin-orbit coupling[1], or the conversion between heat gradients and spin-polarized currents due to the spin Seebeck effect[2]. This effect is also generating strong interest in transforming heat into useable work[3], within an overall context of utilizing **quantum physics** to perform information-to-energy conversion processes[4], notably using self-contained electronic devices[5].

Our team has acquired world-class experimental/theoretical expertise into the assembly of ferromagnetic metal/molecule interfaces with high spin polarization at room temperature[6,7] (aka organic spinterfaces) that can interact magnetically with a molecular spin chain[8]. The chain's spin state can be altered by an applied bias voltage, as first demonstrated using a scanning tunnelling microscope, and recently now in a solid-state spintronic device[9,10].

Based on promising in-house experimental spintronic results of room-temperature quantum transport across spin chains, we are looking to expand our scientific team's core experimental expertise toward **quantum physics**: quantum dots, spin qubits, heat conversion processes, quantum thermodynamics, circuit quantum electrodynamics, thermal fluctuations and information-to-energy conversion processes... Research experience in spintronics and paramagnetic centers is a plus but is not required. Given the high level of academic competition within the CNRS screening process to recruit a Junior Scientist, we are looking for candidates with a strong CV (e.g. several high-impact-factor publications as 1st author) who have demonstrated research leadership in at least two positions (e.g. PhD and postdoc). Plusses here include international experience, an established collaboration network, the demonstrated ability to secure funding, and strong English oral/written scientific communication skills. The CNRS strongly encourages women to apply.

If you think you've got what it takes, please email your CV and a short letter of motivation. Letters of recommendation are welcome. We will contact potential candidates in early September, interview candidates through Nov. 15th, 2018, and help one candidate assemble a recruitment proposal package due in early Jan. 2019.

Starting References (from the team):

1. Soumyanarayanan, A., Reyren, N., Fert, A. & Panagopoulos, C. Emergent phenomena induced by spin–orbit coupling at surfaces and interfaces. *Nature* **539,** 509 (2016).
2. Hoffmann, A. & Bader, S. D. Opportunities at the Frontiers of Spintronics. *Phys. Rev. Applied* **4,** 047001 (2015).
3. Benenti, G., Casati, G., Saito, K. & Whitney, R. S. Fundamental aspects of steady-state conversion of heat to work at the nanoscale. *Physics Reports* **694,** 1–124 (2017).
4. Strasberg, P., Schaller, G., Brandes, T. & Esposito, M. Quantum and Information Thermodynamics: A Unifying Framework Based on Repeated Interactions. *Physical Review X* **7,** 021003 (2017).
5. Koski, J. V., Kutvonen, A., Khaymovich, I. M., Ala-Nissila, T. & Pekola, J. P. On-Chip Maxwell's Demon as an Information-Powered Refrigerator. *Physical Review Letters* **115,** 260602 (2015).
6. Djeghloul, F. *et al.* Direct observation of a highly spin-polarized organic spinterface at room temperature. *Scientific Reports* **3,** 1272 (2013).
7. Djeghloul, F. *et al.* High Spin Polarization at Ferromagnetic Metal-Organic Interfaces: a Generic Property. *J. Phys. Chem. Lett.* **7,** 2310–2315 (2016).
8. Gruber, M. *et al.* Exchange bias and room-temperature magnetic order in molecular layers. *Nat Mater.* **14,** 981–984 (2015).
9. Barraud, C. *et al.* Unidirectional Spin-Dependent Molecule-Ferromagnet Hybridized States Anisotropy in Cobalt Phthalocyanine Based Magnetic Tunnel Junctions. *Phys. Rev. Lett.* **114,** 206603 (2015).
10. Barraud, C. *et al.* Phthalocyanine based molecular spintronic devices. *Dalton Trans.* **45,** 16694–16699 (2016).