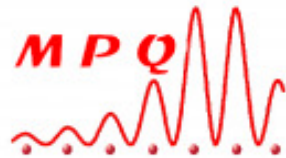


Internship proposal 2011-2012

<p>Laboratory : Laboratoire Matériaux et Phénomènes Quantiques Université Paris – Diderot et CNRS (UMR 7162)</p> <p>Address : Campus Paris Rive Gauche, Bâtiment Condorcet, 10, Rue Alice Domon et Léonie Duquet, 75013 Paris</p> <p>Laboratory director : C. Sirtori</p>	
<p>Internship supervisor : Vincent Repain</p> <p>Phone : + 33 (0)1 57 27 62 91 or 62 99</p> <p>e-mail: vincent.repain@univ-paris-diderot.fr</p>	

Molecular scale spintronics

Scientific project: The growing development of spintronics needs the discovery and understanding of new materials. A very active research is to inject spin polarized electrons in organic materials [1]. Such materials have a potential interest for new magneto-resistive devices as compared to inorganic ones due to their low spin-orbit coupling and their easy functionalization. However, the understanding of magnetism and spin polarization in hybrid organic/ferromagnetic systems is still poor.

The aim of the internship will be to realize magnetic nanostructures and to cover them by organic molecules to better understand their influence on the underlying magnetism. Experiments will be performed under ultra-high vacuum, with an in situ Scanning Tunneling Microscope (STM) and a variable temperature Magneto-Optical setup. The STM study will allow visualizing the molecular layer down to the single molecule scale and the magneto-optical measurements, done before and after the molecular deposition will give some insights on the influence of the molecular layer on magnetism.

This internship can be followed by a thesis. The aim will be therefore to study the spin transfer in the organic layer down to the molecular scale with a Spin Polarized STM. Such unique measurements will help to realize future spintronics devices based on hybrid organic/ferromagnetic materials [2]. A theoretical part based on the coupling between molecules and metals can also be considered.

[1] S. Sanvito, *Nature Materials* 6 (2007) 803

[2] C. Barraud et al., *Nature Physics* 6 (2010) 615

Techniques in use: Work in Ultra High Vacuum (UHV) conditions; Cryogenics; E-beam evaporation; Low Energy Electron diffraction (LEED); Auger Electron Spectroscopy (AES); Scanning Tunneling Microscopy (STM); Magneto-Optical Kerr Effect (MOKE).

Applicant skills: Knowledge in solid state physics and magnetism; willing to work in experimental physics as well as a team member.

Granted internship: yes (~ 417 €/month)

C'nano IdF laboratory (France only): yes

Possibility for a thesis: yes (type of grant : French ministry of Research, Région Ile de France, ...)