Master 2: ***International Centre for Fundamental Physics***

PhD PROPOSAL

(One page maximum)

Laboratory name: Laboratoire de Physique du Solide / FEMTO-ST
CNRS identification code: UMR 8502 / UMR 6174
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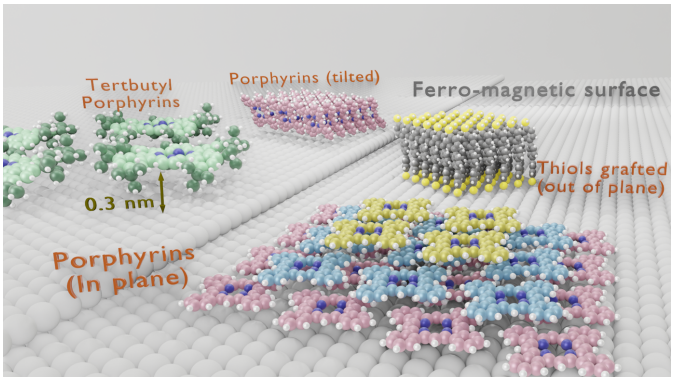
Internship location: Orsay / Montbéliard
Thesis possibility after internship: YES
Funding already obtained for a PhD: YES If YES, which type of funding: ANR

Structural and electronic properties of magnetic metal/organic interfaces

Next generation spintronics now efficiently targets ultra-low power memories for green electronics and on a longer term full-spin information processing. Effects related to interfaces are now at the core of this evolution. A particularly promising strategy is hybrid organic/inorganic interfaces (i.e. spinterface). Indeed, spin-dependent hybridized interface states have been shown to enhance magnetoresistance or even reverse its expected sign. For this reason, a new term has been coined to describe the study of spin tailoring at hybrid interfaces, i.e. spinterface. This sparkled many studies highlighting the richness of the physics, although the emerging domain remains mostly uncharted and a deep fundamental study of the hybridization at the interface is now required.

The ultimate motivation of the thesis is to tailor the properties of spin injection at hybrid metal/molecule interfaces towards efficient molecular spintronics devices. This will be achieved thanks to the development of a full understanding and leveraging of the key uncharted states involved in molecular spin-valves: hybrid unoccupied electronic states at the interface.



Examples of targeted hybrid metal/molecule interfaces investigated during the thesis

The first part of the work will consist of fabrication and atomically-precise characterizations of hybrid interfaces by UHV-STM experiments in FEMTO-ST (Montbéliard). Then, the study of the electronic properties of hybrid interfaces by the inverse photo-emission spectroscopy will be achieved in LPS (Orsay). This project deals with the fundamental understanding of the atomistic and electronic parameters controlling the hybrid interface that impact the future device operation. This thesis will be supported by ANR (HITS).

Please, indicate which speciality(ies) seem(s) to be more adapted to the subject:

Condensed Matter Physics: YES
Soft Matter and Biological Physics: NO
Quantum Physics: YES
Theoretical Physics: NO