



## Post-Doc Offer

### Spin Dynamics and Transport in Magnetic Topological Insulator

#### Missions

Three-dimensional Topological insulator (TI) have attracted tremendous interest due to the existence of two very different states in a single material: a gapped bulk band and gapless Dirac fermion surface states protected by time-reversal symmetry. The goal of this project is to explore spin properties, in TI and particularly magnetic topological insulators (MTI). The experimental study will focus on two TI families : (1) well known TIs such as  $\text{Sb}_2\text{Te}_3$  or  $\text{Bi}_2\text{Se}_3$  with one single Dirac cone; (2) Topological crystalline insulators (TCI) like  $\text{SnTe}$ , with four Dirac cones. Derived MTI compounds, obtained by Cr or Mn-doping will be also studied. The objectives will be to study and quantify, in different TIs: (i) the spin polarization dynamics; (ii) the carrier relaxation processes involving bulk and surface states (SS); (iii) the spin texture of the SS. To do so, NIR and MIR pump-probe experiments will be performed thanks to existing set-ups (low temperature, high magnetic field, fs/ps resolution). To complete these studies, a photocurrent set-up will be developed.

#### Activities

- Ultra-fast spectroscopy (photo-induced Kerr rotation, circular dichroism...)
- Magneto-transport measurements
- Lithography and microstructure fabrication (Hall cross...)
- SQUID or VSM measurements
- Data analysis, publication writing, conference attendance

#### Skills

The candidate must have a PhD in Physics, with a good knowledge of semiconductor and magnetic materials. A background in optical spectroscopy is necessary to deal with pump-probe or photocurrent experiments. A good experience in magnetic or transport measurements will be appreciated, as well as in micro/nanofabrication.

#### Work environment

The “Institut des NanoSciences de Paris” (INSP) is a joined laboratory of CNRS and Sorbonne Université and is located in the center of Paris. The INSP is a 200 peoples institute, with many facilities (Clean room, XRD, Spectroscopy platforms, magneto-transport, cryogeny ...). The project will be developed in the group “Photonic and Coherence of Spin” (PHOCOS). The post-doc will benefit of 2 pump-probe laser lines (ps/fs) in the NIR-VIS range dedicated to ultrafast spectroscopy. A MIR platform will be also available at the INSP. The photocurrent set-up development will benefit of all these equipments, plus dedicated fundings. The project will be in collaboration with an INSP group which has a strong expertise in TI molecular beam epitaxy and with international collaborators.

The post-doc is funded by the French National Research Agency (project ANR DYNTOPI) and is a two-year position.

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PHOCOS group : <https://w3.insp.upmc.fr/en/research/research-teams/photronics-and-coherence-of-spin/>

Gross salary : 3 to 4 k€/month according to professional experience