Direction de la recherche fondamentale (DRF)
Institut Rayonnement Matière (IRAMIS)
Service de Physique de l'Etat Condensé – SPEC

# Postdoctoral research position at CEA-Saclay, France

## Modelling of spin-orbitronics effects at interfaces.

**A 24-month postdoctoral position** is open in the laboratory of Physics of the Condensed State (SPEC: Service de Physique de l'état condensé) at CEA-Saclay.

**Subject description:**

Spintronics, born in 1988 with the discovery of the effect of Giant Magneto-Resistance, is the domain of material science in which one takes advantage of electron spin rather than its charge for designing novel devices and applications in the storage, reading, writing and information processing technologies.

Since more than one decade, a novel direction of spintronics called spin-orbitronics has emerged opening fascinating new roads for basic research and new applications. It is based on the use of orbital angular momentum as an information carrier. The associated orbital currents and related effects can be significantly enhanced at interfaces due to Rashba interactions (derived from relativistic spin-orbit coupling) and the breaking of inversion symmetry, becoming dominant in many intriguing phenomena such as various kinds of Hall effect, spin to charge interconversion processes, spin-orbit torques, direct and inverse Edelstein effects, etc.

The present post doc project sets in this novel field and will aim at exploring, via various modelling tools, such phenomena at various interfaces (starting from the widely studied STO/LAO case). The theoretical description will involve different approaches combining Density Functional Theory (DFT), Wannier functions, tight-binding based electronic structure calculations as well as transport within the Non-equilibrium Green functions (NEGF) formalism, using various codes (Quantum ESPRESSO, WANNIER90, Quantum ATK). Both the theoretical work and new numerical implementations to underlying codes will be considered and encouraged.

**Skill requirements:**

Applicants should hold a PhD degree in Solid State Physics, Materials Science or a closely related discipline, with a strong background in DFT and/or tight-binding methods, preferably with experience in spin-orbit related phenomena. Experience in a code development and electronic transport calculations based on NEGF is an advantage. We also prioritize candidates with a track-record proving successful collaborations with experimentalists since this project involves a tight collaboration with experimental teams.

Applicants should provide a **CV**, a **list of publications** and at least two **reference letters**.

**Contacts:**


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