



LABORATOIRE DE PHYSIQUE DES SOLIDES, Orsay

Post-doctoral position

Unconventional superconductors

Context: The Theory group at LPS in Orsay, France, part of Paris-Saclay University, is opening a postdoctoral position in theoretical study of unconventional and topological superconductivity. The successful applicant will work under the supervision of Prof. Pascal SIMON and Dr. Andrej MESAROS on unconventional superconductors, a project funded by the French National Research Agency. One strategy to realize exotic quantum states is to engineer arrays of magnetic impurities (Fe, Co, Mn,...) on a superconducting substrate [1]. The idea is to control and functionalize the intra-gap localized impurity bound states named Yu-Shiba-Rusinov (YSR) states [2], thus creating qubits or inducing topological superconductivity (TC) [3]. Another strategy is to analyse hybrid heterostructures based on stacking layers of transition metal dichalcogenides (TMDs), which can exhibit competing quantum states, separated by layers of magnetic or non-magnetic insulators, which enable the tuning of geometry, charge, and spin properties.

[1] L. Schneider *et al.*, Nat.Phys.17, 943(2021); *ibid* Nat. Nano. 17, 384(2022). [2] A.V.Balatsky *et al.*, Rev. Mod. Phys. 78, 373 (2006). [3] A.Mishra *et al.*, Phys. Rev. X Quantum 2, 040347 (2021).

Objectives: The successful applicant is expected to conduct and disseminate leading research, guided by the project objectives, with a degree of independency and initiative. He/she is expected to actively develop analytical and numerical modelling of ongoing experiments on impurities engineered on superconducting substrates and experiments on layered hybrid heterostructures. The candidate will also contribute to mentoring of PhD students and interns, while engaging in activities within the Theory group and the laboratory, including seminars, meetings and journal clubs.

Possible collaborations: The research will be carried out within the cohesive Theory group at LPS Orsay, UMR8502 of CNRS, benefiting from the collaborative project with nearby experimental groups at LPS Orsay, at C2N Saclay and INSP Paris developing state-of-the-art tunneling spectroscopy.

Required profile: The successful applicant is expected to have a strong background in some of the following areas: theory of (topological) superconductivity, modeling of quantum impurities.

Planned start for the position: October 2023

Duration: up to 24 months

Salary: The net salary (take-home pay) is about 2250 – 3300 Euros/month, depending on the experience.

Application: Please submit your application to contact emails below which shall contain a complete CV, a research statement and arrange for at least two recommendation letters to be sent. Review of applications will continue until the position is filled.

Contact and more information:

Pascal SIMON, pascal.simon@universite-paris-saclay.fr

Andrej MESAROS, andrej.mesaros@universite-paris-saclay.fr

<https://equip2.lps.u-psud.fr/pascal-simon/>

<https://equip2.lps.u-psud.fr/andrej-mesaros/>

<https://equip2.lps.u-psud.fr/theorie/>