



LNCMI (Laboratoire National des Champs Magnétiques Intenses)  
143 Avenue de Ranguel  
31400 Toulouse  
France



Research group:  
Nano-objects and semiconducting nano-structures

## Open post-doctoral position

### Landau levels spectroscopy of non-trivial topologic insulators

Selection process: Fall 2022

Start date: end of 2022 / beginning of 2023

Duration: 1 year + 1 year renewable

The group "Nano-objects and semiconducting nano-structures" is offering a post-doctoral position at the Laboratoire National des Champs Magnétiques Intenses (LNCMI)\* on the Toulouse site. The project aims at unveiling the electronic properties of GaAs/InSb quantum wells, where band inversion leads to the formation of non-trivial topological quantum states at the edges of the devices<sup>1,2</sup>. Such topologically protected edge states are of great interest for potential applications in metrology, spintronics and quantum information. The key to the eventual success of topological insulators becoming technologically important is inherently linked to a fine knowledge of the electronic properties. For this purpose, very high magnetic field (60T or more) will be used to perform Landau Level spectroscopy beyond the quantum limit in order to unveil the band-structure of the quantum wells. This project benefits from an established collaboration with the Laboratoire Charles Coulomb (LCC) in Montpellier.

The candidate must have a PhD. degree in experimental Physics, with strong knowledge in condensed matter. She/he will be in charge of carrying out transport measurements at cryogenic temperatures under a pulse of magnetic field (duration: 300ms, max. strength: 60T). Knowledge on operating low-temperature cryostats (<sup>4</sup>He and <sup>3</sup>He) and will be highly valued.

To apply, please send a CV, a motivation letter and references to W. Escoffier (walter.escoffier@lncmi.cnrs.fr) and M. Goiran (michel.goiran@lncmi.cnrs.fr). The starting date will be before the end of the year 2022.

*(\* The LNCMI laboratory generates high magnetic fields for fundamental and applied research. The site of Grenoble operates DC magnetic field of up to 32 T, the site of Toulouse generates pulsed magnetic field of maximum strength 90 T. Beyond conducting their own research projects, LNCMI researchers (including post-doctoral researchers) assist foreign scientists whose high field research project has been previously accepted by a selection committee. The LNCMI is part of the EMFL (European High Magnetic Field Laboratory), a consortium of laboratories including LNCMI, HFML in Nijmegen and DHMFL in Dresden. More information can be found at <https://emfl.eu/>*

<sup>1</sup>Quantum spin Hall insulator with a large bandgap, Dirac fermions, and bilayer graphene analog, *Sci. Adv.* **4**, eaap7529 (2018)

<sup>2</sup>Massless Dirac fermions in III-V semiconductor quantum wells, *Phys. Rev. B* **99**, 121405(R) (2019)