

The mission of the Catalan Institute of Nanoscience and Nanotechnology (ICN2) is to achieve the highest level of scientific and technological excellence in Nanoscience and Nanotechnology. Its research lines focus on the newly-discovered physical and chemical properties that arise from the behavior of matter at the nanoscale. ICN2 has been awarded with the Severo Ochoa Center of Excellence distinction for two consecutive periods (2014-2018 and 2018-2022). ICN2 comprises 19 Research Groups, 7 Technical Development and Support Units and Facilities, and 2 Research Platforms, covering different areas of nanoscience and nanotechnology.

Job Title: PhD Student

Research area or group: Theoretical and Computational Nanoscience Group

Description of Group/Project:

This project targets the theoretical study of quantum entanglement dynamics of single and many-particles quantum states in topological quantum matter using analytical and numerical methods. The challenges is to demonstrate new ways for harvesting intraparticle degrees of freedom to control and manipulate entanglement between spins of multiple particles, in the context of quantum computing and quantum technologies.

Main Tasks and responsibilities:

- Develop theoretical studies of entanglement dynamics in hybrid Dirac matter.
- Demonstrate the possibility to detect interparticle entanglement via Bell's inequality violation.
- Simulate graphene-based devices able to detect spin-spin entanglement.

Requirements:

• **Education:**

Bachelor and Master in quantum physics, preferentially master in quantum science and technology with knowledge on quantum computing, advanced quantum mechanics, quantum information theory and topological quantum matter

• **Knowledge and Professional experience:**

The student should have in-depth knowledge on Berry phase, topological physics and advanced skills in numerical modelling (PYTHON), and already able to make his/her own computational codes. He/ she should be immediately available.

Summary of conditions:

- Full time work (37,5h/week)
- Contract Length: Temporary (4 years)
- Location: Bellaterra (Barcelona)
- Salary will depend on qualifications and demonstrated experience.
- Support to the relocation issues.
- Life Insurance.

Estimated Incorporation date: September 2023

How to apply:

All applications must be made via the ICN2 website <https://jobs.icn2.cat/job-openings/371/phd-student-theoretical-and-computational-nanoscience-group> and include the following:

1. A cover letter.
2. A full CV including contact details.
3. 2 Reference letters or referee contacts.

Deadline for applications: 15th July 2023

Equal opportunities:

ICN2 is an equal opportunity employer committed to diversity and inclusion of people with disabilities.

ICN2 is following the procedure for contract of people with disabilities according with article 59 of the Royal Decree 1/2015, of 30 of October.