

PhD Fellowship

in Nanoscience



A **PhD fellowship** is available to work on the physics of two-dimensional materials (2DM) at the Catalan Institute of Nanoscience and Nanotechnology (ICN2) which is located 30 minutes north of downtown Barcelona, Spain (www.icn2.cat). ICN2 is a young, and vibrant research centre investigating newly discovered physical and chemical properties that arise from the fascinating behaviour of matter at the nanoscale. ICN2 is recognized by the Spanish government by the most prestigious “Severo Ochoa” Centre of Excellence accreditation – one of about 20 centres in Spain to hold the award.

The student will be hosted by the group of Prof. Sergio O. Valenzuela (<https://nanodevices.icn2.cat/>), whose main focus is on electronic properties of nanomaterials and nanodevices. The group counts with extensive state-of-the-art facilities for material growth, nanodevice design and fabrication, as well as dc and radiofrequency magnetotransport measurements (from 20mK to room temperature). The group activities on 2DMs are funded in part by the H2020 EU Graphene Flagship, the Spanish Research Agency and the Generalitat of Catalonia.

Project “Spin transport phenomena and thermoelectric effects in two-dimensional van der Waals heterostructures”

Driven by recent technical advances in the field of 2DMs, heterostructures based on graphene and other layered materials are leading to new paradigms for data storage and computing. Because 2DMs consist of atomically thin planes, their electrical, optical and spin properties can be enriched and tailored by proximity effects. Furthermore, thermoelectric generation within the same circuitry is envisioned to play a key role in future electronics. The focus of the project is on engineering the spin and thermoelectric response of 2DMs by fabricating and investigating the electronic properties of hybrid 2DM heterostructures, comprising metals, semimetals, semiconductors and ferromagnets.

Recent work published in Valenzuela’s group related to this thesis can be found in:

- L. A. Benítez, et al., *Nature Materials* **19**, 170 (2020)
- L. A. Benítez, et al., *Nature Physics* **14**, 303 (2019)
- J. F. Sierra, et al., *Nature Nanotechnology* **13**, 107 (2018)

Candidate’s profile

Applicants must show motivation, excellent disposition towards challenging research problems and a good level of the English language. A strong background on solid-state physics and experience in experimental methods (*e.g.* electric transport) will be valued. A Master (or Licenciatura) degree in Physics, Material Science, Nanotechnology or related discipline is required at the time of joining ICN2. Applications from women and minority candidates are especially encouraged.

Deadline: Applications will be evaluated as they are received. The contract will be funded by the Spanish Research Agency through a “*Formación de Personal Investigador*” (FPI) fellowship and is expected to start during early 2021, with a flexible starting date. The expected duration is 4 years.

How to apply

All applications must be made via the ICN2 careers website (<https://jobs.icn2.cat/>) and include the following:

1. A cover letter.
2. A full CV including contact details.
3. Two reference contacts.
4. Academic records (if the transcripts are not in English, Catalan or Spanish, applicants should also attach a translation in one of the mentioned languages).

Questions?

Candidates interested in the position can send an e-mail to Prof. Sergio O. Valenzuela (SOV@icrea.cat) and Dr. Juan F. Sierra (juan.sierra@icn2.cat)