

ICN2 is a renowned research centre. Its research lines focus on the newly discovered physical and chemical properties that arise from the behaviour of matter at the nanoscale.

The Institute promotes collaboration among scientists from diverse backgrounds (physics, chemistry, biology, and engineering) to develop basic and applied research, while seeking out new ways to interact with local and global industry.

It also offers researchers training in nanotechnology, develops numerous activities to promote and enable the uptake of nanotechnology by industry, and promotes networking among scientists, engineers, technicians, business people, society, and policy makers.

ICN2 was accredited in 2014 as a Severo Ochoa Centre of Excellence and is a founding member of the Barcelona Institute of Science and Technology (BIST). The aim of the Severo Ochoa Program, sponsored by the Spanish Ministry of Economy, Industry and Competitiveness, are to identify and support those Spanish research centres that demonstrate scientific leadership and impact at global level.

#### **Job Title: Postdoctoral Researcher (Phononic and Photonic Nanostructures group)**

**Research area or group:** Phononic and Photonic Nanostructures (P2N)

#### **Description of Group/Project:**

The P2N research topics include studies based on phonon and photon confinement, optomechanics, nanoscale heat transport and phononic and photonic crystals in semiconductor, organic and oxide nanostructures. The group carries out pioneering in nanophononics and in nanofabrication and nanometrology.

The position is connected to an EU-FET project in on **Topological bosonics** starting in **January 2019** to develop the next generation of topological devices and architectures across which information can flow without losses. This conceptually simple yet technologically and fundamentally challenging requirement is crucial for the development of technologies in fields ranging from information processing to quantum communication and metrology. In each of these areas, the dissipation of information is a key hurdle that leads, for example, to unacceptable thermal loads or error rates. This project will harness topological protection in novel materials and nanoscopic structures to empower electrons, phonons and photons to flow with little or no dissipation and, ultimately, crosslink them within a hybrid platform. This will entail the design of novel topological photonic/phononic waveguides and the engineering of disruptive heterostructures elaborated from the combination of topological insulators and ferromagnetic materials. In the optical domain, this will enable the creation of reflection and scattering free waveguides and, in thermal management, efficient transport and localized dissipation of heat. The project aims gathering a young consortium and fosters the creation of a new community in Europe on the use of topology for Information and Communication Technologies (ICT). Thanks to its high interdisciplinary embodiment involving electronic materials, optics, thermal management and metrology, the project will help advance all levels of the value chain, from fundamental science to engineering and technology.

### **Main Tasks and responsibilities:**

The candidate will conduct analytical theory combined with simulations using group theory to specifically **design and optimization of topological waveguides for bosons**. In particular, the candidate will explore and optimize novel and existing designs for planar and layered topological waveguides and heterostructures for near-infrared photons and phonons in a wide spectral range from few to 100's of GHz. Based on topological photonic crystals, these waveguides will be optimized for low-loss transport while simultaneously controlling the dispersion and topology of photonic and phononic modes.

### **Education, Experience, Knowledge and Competences required:**

Theoretical physics with background in photonic/phononic crystals and/or optomechanics with expertise in analytical and numerical tools for band structure analysis and calculation. Background on group theory will be a plus. Fluent in English.

### **Research Career Profile (According to the European Framework for Research Careers):**

R3-Established Researcher

### **Summary of conditions:**

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

Estimated Incorporation date: January 2019

### **How to apply:**

All applications must be made via the ICN2 website <http://jobs.icn2.cat/job-openings/158/postdoctoral-researcher-phononic-and-photonic-nanostructures-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: Review and Interviews of candidates will start immediately and continue until the position is filled.

### **Equal opportunities:**

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