

Call reference number	(2025-04)
Call name	Pre-doctoral position EU Doctoral Network Track-the-Twin: neutron scattering
Application Deadline	2025/03/31

Introduction and main description

BCMaterials, Basque Center on Materials, Applications and Nanostructures, Leioa, Spain (www.bcmaterials.net), is an autonomous research center, belonging to Ikerbasque, the Basque Foundation for Science and the University of the Basque Country (UPV/EHU).

We seek a pre-doctoral student in Condensed Matter Physics within the Horizon Europe MSCA Doctoral Network *Track The Twin* project.

Quantum dots (QDs) exemplify the successful transfer of innovative nanomaterials from a lab-scale invention to a technology that offers better and more power-efficient electronic devices, or makes buildings generate renewable energy. Such implementations, however, keep QDs under permanent loading, such as constant illumination, elevated temperature or exposure to environmental agents. Efforts to make QDs resilient against loading induced ageing and loss of performance are time-consuming and costly.

The EU Doctoral Network *Track The Twin* addresses this problem through a research and training program aimed at creating and using QD digital twins (QDDTs). Focused on the case of QDs under illumination, this goal creates an exceptionally rich environment for research training of doctoral candidates (DCs) in nanomaterials. Research topics range from the latest methods of synthesis, structure analysis and time-resolved spectroscopy – from infrared to x-ray – to computational materials science. DCs will join forces to reach the common goal of demonstrating loading-resilient QDs synthesized according to best QD structures as predicted by the QDDTs.

To facilitate such a collaborative endeavour, all DCs will be trained to use and co-develop a common data platform and they will be permanently exposed to the diversity of environments needed to implement together a QDDT. Moreover, thanks to the deep collaboration between world-leading academic beneficiaries and start-up companies in nanomaterials and computational chemistry, scientific training is complemented by extensive transferrable skills training.

Skills and Requirements

The candidate must have a master in Materials Science, Physics, Chemistry or related areas. A background in condensed matter physics is desirable but not compulsory. Knowledge in advanced structural characterization techniques, in particular scattering-type ones, is also desirable.

Proficiency in speaking and writing in English.

Self-motivated and ability to work in a team and willing to coordinate the research in a particular topic.

A high level of motivation and independent thinking abilities.

Ability and eagerness to learn new skills outside his/her own discipline.

Presentation skills and being able to meet the deadline are also required.

Work Program / Duties / Responsibilities

The Pre-doctoral candidate's primary focus will be to use neutron-scattering based techniques to study the structure of Quantum Dots, paying particular attention to resolve the core/shell structure and ageing-related structural changes of QDs.

The main responsibilities include:

- Prepare SANS and NR experiments on QDs and BNCs by contributing to beamtime proposals writing, setting up the experiments, and learning neutron scattering data processing and analysis.
- Obtain a clear picture of the core/shell structure, including surfaces and interfaces, of GEN1 and BNCs via SANS and/or NR techniques and alignment with other structure analysis methods.
- Investigate ageing-related structural changes of QDs and BNCs via in-operando SANS and/or NR.
- Confirm envisaged structure changes in forward-engineered QDs and BNCs using the developed methodology of SANS and NR.

The PhD student will be incorporated at the Neutron Science transverse research line of BCMaterials, under the supervision of Jose Maria Porro, Ikerbasque and Ramón y Cajal Research Fellow.

The candidate will be in close contact with several renown international groups in the field of QDs, in Europe and the rest of the world.

Application Procedure

Apply by submitting a motivation letter and a CV (in English) using the "Contact" button at the corresponding offer, at the "Join Us" area on BCMaterials' portal (<https://www.bcmaterials.net/join-us>).
Your name and email address will be required for further contact too.

Other Relevant Information

Include contact details for 2 referees.
Contracts will preferably start by June 1st, 2025.
Interviews will be conducted soon after the deadline.

For full details, visit: <https://euraxess.ec.europa.eu/jobs/320923>