

The Nanoscience Cooperative Research Center, CIC nanoGUNE, located in Donostia / San Sebastian, Basque Country (Spain), is currently looking for a

PRE DOCTORAL RESEARCHER

to work on

Quantum behavior of artificial spin ice lattices

NanoGUNE is a research center devoted to conducting world-class nanoscience research for a competitive growth of the Basque Country. NanoGUNE is a member of the Basque Research and Technology Alliance (BRTA) and is recognized by the Spanish Research Agency as a *María de Maeztu* Unit of Excellence.

The [Nanomagnetism group](#) at the [CIC nanoGUNE](#), the nanoscience research centre in San Sebastián, Spain is seeking to recruit talented, enthusiastic young scientists who are highly motivated to boost their research career in the area of nanoscience and quantum technologies.

The successful **candidate** will be part of a project carried out in our group in the framework of a collaborative project with the BCMaterials, Basque Center for Materials, Applications and Nanostructures and the University of the Basque Country (UPV/EHU) through a funding provided via the IKUR strategic program promoted by the Education Department of the Basque Government to boost Scientific Research.

Motivation

Over the last decade, a novel class of magnetic metamaterials appeared related as artificial analogues to spin-ice materials, rare-earth titanate materials where the frustration between magnetic moments leads to a playground of fundamental physics studies. These novel materials, dubbed artificial spin ices (ASIs), made of interacting elongated nanomagnets, have emerged as a fertile ground for the study and discovery of novel phenomena not present in natural magnetic materials, bound to a strong inspiration for potential applications.

The field of ASIs is currently reaching levels of maturity that bring the state-of-the-art to a position where different pathways emerge as natural alleys for the field to evolve into. In particular, pushing the limits of the nanofabrication skills of the ASIs will

eventually allow these systems to be used as playgrounds to prove quantum effects, being this ground-breaking approach the issue of study of the present project.

In more detail, we plan to exploit methods in which a classical ASI ground state manifold can serve as a rich playground to explore quantum lattice gauge theories. Subsequently, we will be able to stimulate string physics “on a chip”, using the ASIs as playgrounds to study the propagation of open-loop and closed-loop quantum excitations (monopoles). This task will allow us to get ready for the engineering of ASIs as platforms where deterministic quantum effects can be experimentally explored.

Required qualifications – Eligibility

- To apply for a PhD fellowship, candidates must hold an internationally recognized Master-equivalent degree in physics, nanoscience, or engineering.
- Previous experience in magnetism at the nanoscale, thin films deposition, and e-beam lithography would be positively evaluated.
- No restrictions of citizenship apply to the PhD fellowship.

We **offer** an international and competitive environment, state-of-the-art equipment, and the possibility to perform research at the highest level. We promote teamwork in a diverse and inclusive environment and welcome all kinds of applicants regardless of age, disability, gender, nationality, race, religion, or sexual orientation.

The **position** should start no later than June 30, 2023 and go on for up to 36 months. A PhD degree from local University (UPV/EHU) will be granted after successful completion of the PhD research.

Candidates should **apply** by completing the form below and attaching the following documents:

1. A complete CV
2. A presentation letter with declaration of interests and a description of your past achievements (max. 1 page)
3. Contact email of 1/2 potential references
4. A scanned copy of your university academic transcripts in English
5. A scanned copy of the Master degree, if available at the time of application
6. A scanned copy of standardized English test results if available

For more information about the position, please contact the Nanomagnetism Group Co-leader, [Paolo Vavassori](#).

The **deadline** for applications is **31/03/2023**.

NOTES:

(i) All applicants will receive an answer after the end of the selection process; but please note that due to the large number of submissions that are expected, we cannot provide individual feedback.

(ii) Additional information about nanoGUNE's commitment towards HR excellence in Research and Gender Equality are available on our website.

(iii) We encourage you to subscribe to our HR mailing list to receive information related to nanoGUNE's open positions and open calls for different training and talent attraction programs.