VNIVERSITAT DE VALÈNCIA

ICMOL Instituto de Ciencia Molecular

JOB POSITION

FERROIC ORDERS AND NON-RECIPROCITY IN THE 2D LIMIT

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Materials that manifest spontaneous polarizations of the electric and magnetic types represent the paradigm of non-reciprocal optoelectronics and, at the same time, a future promise as active elements for efficient magneto-electric devices.

Upon being confined in two-dimensions, these ferroic orders exhibit characteristics that are fundamentally different from those of the starting 3D materials on the one hand, and offer opportunities for integration in devices beyond conventional 3D materials on the other.

The current scientific situation, with the recent discovery of these materials and the absence of an integrated solution to the problem of optical isolation, allows us to identify a first priority research challenge: the use of 2D magnetic materials for non-reciprocal optoelectronics.

INPhINIT "la Caixa" Fellowship Programme

Objectives of this project

The current project proposes the study of ferroic materials from different points of view: the chemical design and growth of atomically-thin crystals; the fundamental study of the non-reciprocal light-matter interaction; and the fabrication of atomically-thin devices with non-reciprocal optical and electronic properties.

Job description

The successful candidate will be part of an emerging research group, which focuses on physical phenomena in crystalline inorganic materials and their integration in nano-optoelectronic devices.

The group, led by Dr. Efrén Navarro Moratalla, is composed by a multidisciplinary team that takes an integral approach to research, covering all the steps from the materials design, crystal growth and device fabrication all the way to low temperature physics.

The proposed work focuses in the rational design of new magnetic 2D materials and the use of different crystal growth techniques for the isolation of high quality atomically-thin materials. Once isolated, different fabrication methods will be explored in order to integrate the crystals in optoelectronic devices and heterostructures. Investigation of the magnetic phases, both in the parent materials and in the few-layer nano-devices will be carried out by magnetometry techniques and local magneto-optical and optoelectronic experiments. The candidate will thus embark in a multidisciplinary research traversing the boundaries between chemistry and condensed matter physics, acquiring expertise in both the synthesis and physical characterization of crystalline solids.

Qualification

Applicants will be expected to be highly motivated and have an MSc in Chemistry, Materials Science or Nanoscience.

Work environment

ICMol is an attractive destination for top talent PhD students. It currently hosts 8 ERC grantees at different stages of theircareers (Advanced, Consolidator and Starting) and Marie Curie Fellows, andsince 2016 has been awarded the seal of excellence “Maria de Maeztu” by the Spanish Government, which recognises top research institutions in Spain.