



# PhD Thesis Proposal

Last Updated on 13th November 2024

## affiliations



## contact

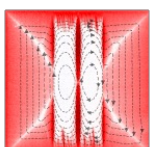
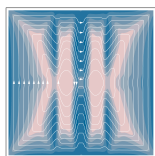


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## applicants

MSc degrees in  
Physics,  
Material Science,  
Solid State Chemistry  
or similar

## Manipulating flux



## Title

Magnetic flux manipulation via functionalized superconducting materials

## Supervisors

Antonio Badía-Majós, Elena Martínez Fernández

## Laboratory

Laser, Energy and Advanced Materials (LEMA), multidisciplinary research group within the Institute of Nanoscience and Materials of Aragón (INMA), awarded as "Severo Ochoa" center of excellence

## Field of research

- Surface modification by laser treatments
- Microstructural characterisation
- Low-temperature electromagnetic measurements
- Numerical simulation of superconducting properties

## Motivations and general objectives

We propose an integrated approach, enabling the student to undertake research both theoretically as well as experimentally. Thus, subsequent to the initial training period in basic techniques and Superconductivity, the student will be able to pattern and characterize superconducting samples and explain their subsequent electromagnetic behavior based on numerical modeling. Given that the research activities in this thesis are tightly related to our collaborations, the student will have the chance of enjoying scientific missions at the groups of Prof. A. V. Silhanek (University of Liège) and Prof. U. K. Ozturk (Karadeniz Technical University). This international experience will complete his/her preparation with the knowledge of MOI and levitation force measurements

## Financial support

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## Background

The PhD will build upon recent research activity started in our group with continuation supported by the project PID2023-146041OB-C21

- [1] A. BADÍA-MAJÓS, E. MARTÍNEZ, L. A. ANGUREL, G. F. DE LA FUENTE, E. FOURNEAU, S. MARINKOVIĆ, AND A. V. SILHANEK, Laser nanostructured metasurfaces in Nb superconducting thin films, Applied Surface Science, 649 (2024), p. 159164.
- [2] E. MARTÍNEZ, N. LEJEUNE, J. FRECHILLA, L. PORTA-VELILLA, E. FOURNEAU, L. A. ANGUREL, G. F. DE LA FUENTE, J. BONSE, A. V. SILHANEK, AND A. BADÍA-MAJÓS, Laser engineered architectures for magnetic flux manipulation on superconducting Nb thin films, Applied Surface Science, 679 (2025), p. 161214.