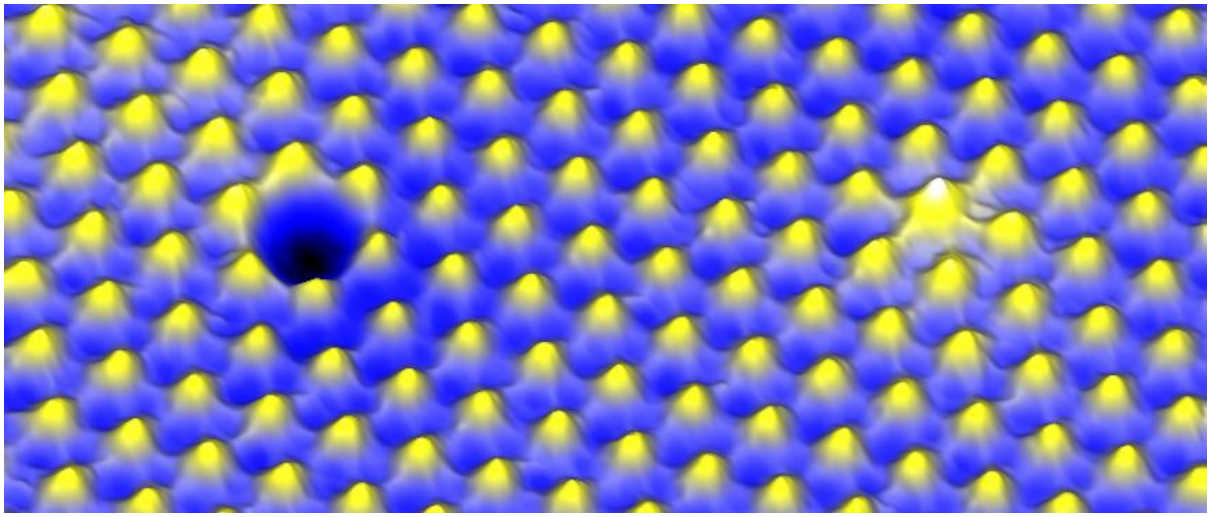


MASTER IN CONDENSED MATTER PHYSICS AND QUANTUM MATERIALS

A new master of the University of the Basque Country (EHU), the Materials Physics Center (CFM), the Donostia International Physics Center, and CIC nanoGUNE in San Sebastian

(In the process of verification. Expected to begin in the 2027/2028 academic year)

The interaction between electrons and ions gives rise to complex and emerging phenomena, such as magnetism and superconductivity, and defines, for instance, the optical and transport properties of materials. The technologies that define modern society, from computers and smartphones to medical imaging devices and advanced sensors, are deeply rooted in fundamental discoveries made in condensed matter physics. Demonstrating its immense impact, this field accounts for more Nobel Prizes in Physics than any other domain. Today, the field stands at the center of a new scientific and technological revolution driven by quantum materials, from topological to two-dimensional systems, which are reshaping the future of technology. The ***Master in Condensed Matter Physics and Quantum Materials*** provides students with the advanced knowledge and practical skills needed to face the most important challenges in the field from an academic point of view and to be part of the development of the materials that will shape the next generation of technological innovations.

Students joining this program will become part of one of the most dynamic and internationally recognized scientific hubs for condensed matter physics in Europe. Located in Donostia/San Sebastián, the program benefits from the unique research ecosystem formed by the University of the Basque Country (EHU), the Materials Physics Center (CFM), the Donostia International Physics Center (DIPC), and CIC nanoGUNE. These institutions bring together world-leading researchers, cutting-edge facilities, and a vibrant international scientific community, offering students daily exposure to frontier research and an exceptional environment for academic and professional growth.

A distinctive feature of the Master's program is its balanced training across experimental, theoretical, and computational approaches, with the possibility of focusing on one of them. Through its dual-track opportunities, students may carry out their Master's Thesis within internationally renowned research centers such as CFM, DIPC, and nanoGUNE, working directly on active research projects under the supervision of leading scientists. Whether focusing on experimental laboratory work, theoretical modeling, or advanced computational approaches, graduates will gain the versatile expertise required for doctoral research and careers in emerging high-technology sectors.

WHY STUDY THIS MASTER?

- To acquire the necessary knowledge and skills to shape the technologies of tomorrow.
- To prepare yourself for an academic career in one of the most important fields in physics.
- To join one of Europe's most dynamic condensed matter physics ecosystems.
- To develop a unique combination of experimental, theoretical and computational skills in the field of condensed matter physics

CURRUCULUM

The program covers a whole academic year with 60 ECTS and consists of mandatory courses, elective courses, and a Master's thesis project.

Mandatory Courses

- Fundamentals of Condensed Matter Physics (6ECTS)
- Experimental Methods in Condensed Matter Physics (6ECTS)
- Computational Methods in Condensed Matter Physics (6ECTS)

Elective Courses (5 to choose)

- Hands-On Experimental Condensed Matter Physics (4ECTS)
- Classical and Quantum Transport (4ECTS)
- Magnetism and Spintronics (4ECTS)
- Optical properties in materials (4ECTS)
- Many Body Physics (4ECTS)
- Modern Theory of the Electronic Structure and Topology (4ECTS)
- Advanced Density Functional Theory Methods (4ECTS)
- Group Theory in Condensed Matter Physics (4ECTS)
- Superconductivity (4ECTS)
- Artificial Intelligence Methods in Condensed Matter Physics (4ECTS)
- Advanced Theory of Lattice Vibrations (4ECTS)
- Quantum Devices and Quantum Computing in Condensed Matter Physics (4ECTS)
- Strongly Correlated Physics (4ECTS)

Master thesis Project (22ECTS) to be develop under the supervision of leading researchers at the EHU, CFM, DIPC or nanoGUNE.

LECTURERS

- Maider Ormaza
- Ion Errea
- Iñaki Juaristi
- Jon Zubeltzu
- Antton Babaze
- Ivo Souza
- Stefan Kurth
- Juan Borge
- Vitaly Golovach
- Marco Gobbi
- Sebastián Bergeret
- Felix Casanova
- Julen Ibañez
- Daniel Hernangómez
- Adolfo Grushin
- Fernando De Juan
- Maia G. Vergniory
- Maria Gastiasoro
- Pablo Piaggi
- Fernando González Zalba

Master's thesis project will also be offered by other researchers at the EHU, CFM, DIPC, and nanoGUNE.

SPECIFICS

- The program is aimed primarily at graduates in Physics, as well as students from related disciplines such as Chemistry, Mathematics, Materials Science, and Engineering, provided they possess a solid background in physics, quantum mechanics, and advanced mathematics.
- Students selected for the dual-track will be hired at the CFM, DIPC or nanoGUNE during their Master's thesis project.
- All lectures will be in English.
- Lectures will take place at the premises of the CFM.
- Real lab experience at CFM, DIPC or nanoGUNE will be possible in the elective Hands-On Experimental Condensed Matter Physics subject.

ENROLLMENT

Enrollment will be possible in late spring or early summer 2027. If you are interested in preregistering, please send an email to Ion Errea (ion.errea@ehu.eus) attaching a CV and an Academic Track Record.