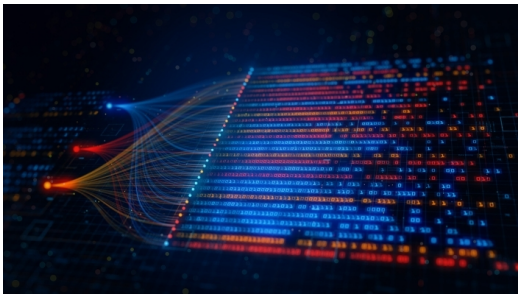
Numerical Methods for Quantum Matter: From Nanographenes to Moiré Materials (NM4QM)



13.Oct - 16.Oct 2026

Cód. Z68-26

Mod.:
Presencial

Edición
2026

Tipo de actividad
Workshop

Fecha
13.Oct - 16.Oct 2026

Ubicación
Donostia International Physics Center

Idiomas
Inglés

Validez académica
40 horas

Web
https://nm4qm.dipc.org/

DIRECCIÓN

Thomas Frederiksen, Donostia International Physics Center and Ikerbasque

Comité Organizador

Descripción

In recent years, powerful numerical techniques have been developed to tackle various two-dimensional materials on the atomic level including quantum many-body systems. With the advent of machine learning, quantum simulations and tensor networks, the tool-box has been considerably extended which can now complement more traditional methods such as First-Principle and Density Functional, Dynamical Mean-Field or atomistic Hartree-Fock theories. The aim of the conference is to address new developments of these numerical methods when applied to large-scale atomistic two-dimensional systems which also include quasi three-dimensional moiré systems or non-commensurate quasicrystals. Implications on quantum transport, unconventional superconductivity, magnetic ordering and many-body ground states shall also be discussed.

This workshop brings together researchers developing and applying advanced numerical methods to study the rich physics of carbon-based systems. Topics will span moiré systems, van der Waals heterostructures, low-dimensional nanocarbons, and charge and heat transport in complex carbon architectures. Emphasis will be placed on method development, including electronic structure, many-body approaches, machine learning and multiscale modeling techniques.

With a particular focus on numerical techniques, the meeting will span 2.5 days of scientific talks followed by half a day of hands-on sessions and a loosely organized 1 day hackathon. Participants are encouraged not only to present their latest results, but also to showcase their code developments and numerical tools, offering others the opportunity to explore and use publicly available software.

ORGANIZING COMMITTEE:

B. Andrei Bernevig (Princeton, DIPC)
Tobias Stauber (CSIC)
Thomas Frederiksen (DIPC, Ikerbasque)

Objetivos

The workshop aims to foster collaboration across communities working on graphene, carbon nanotubes, twisted bilayers, and related quantum materials.

By combining presentations, discussions, and interactive sessions, the workshop seeks for knowledge exchange, and the dissemination of open computational methods across the community.

Colaboradores específicos del curso

Donostia International Physics Center

CSIC icmm

Dirigido por:

Thomas Frederiksen

Donostia International Physics Center and Ikerbasque

Thomas Frederiksen (TF) obtained his PhD in physics in 2007 from the Technical University of Denmark on the topic of inelastic transport theory for nanoscale systems. In 2008 he was awarded a 5-year Gipuzkoa Fellowship to carry out research at the Donostia International Physics Center (DIPC) and abroad. In 2012 he was appointed Ikerbasque Research Professor at the DIPC where he leads a research group on Nanoelectronics. TF is one of the main developers of the DFT-NEGF code "Inelastica" to perform atomistic simulations of inelastic electron transport and local heating in nanoscale devices.

Precios matrícula

REGISTRATION FEES	HASTA 04-10-2026
Fee Waiver	0 EUR
Regular Attendant	275,00 EUR

Lugar

Donostia International Physics Center

Paseo Manuel Lardizabal, 4, 20018 Donostia/San Sebastián

Gipuzkoa