

Master NANOSCIENCES, NANOTECHNOLOGIES

International Master in English

M1 NanoPhysics & Quantum Physics



M2 NanoPhysics

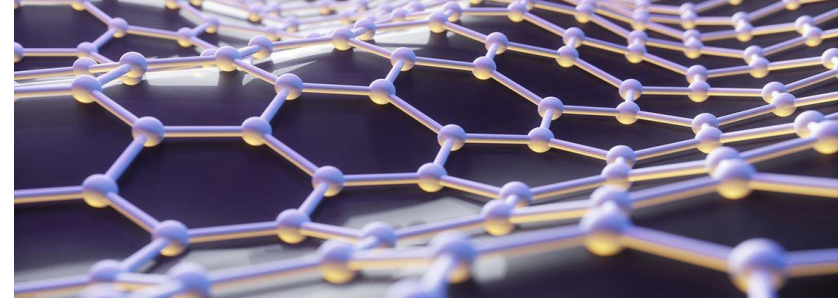


**M2 Quantum Information
& Quantum Engineering**



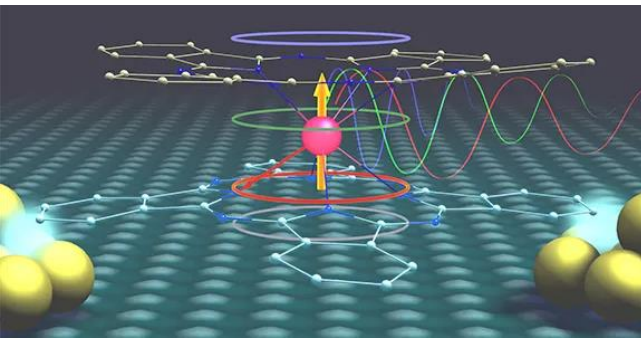
M2 IMN

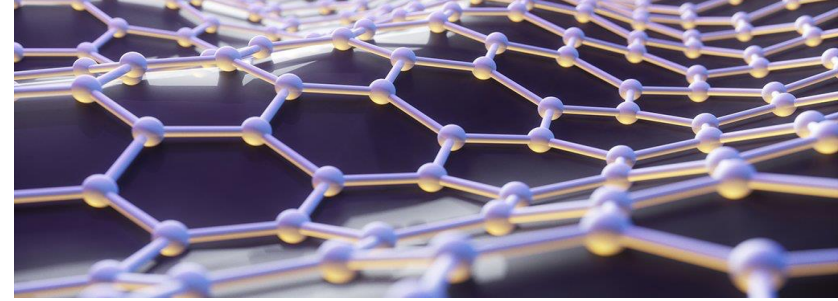




M1 NanoPhysics & Quantum Physics

- High-level Master training at the crossing between **fundamental** physics and its **applications** in nanotechnologies and quantum technologies.
- Provide a solid knowledge in nanophysics and quantum physics for students willing to pursue a Master 2 and a **PhD** in these fields.
- **Multi-disciplinary** training with courses from other fields of nanosciences such as soft matter, biophysics and nanochemistry.
- Open to students with a Bachelor in physics (or equivalent) from **national** and **international** origin.





M1 NanoPhysics & Quantum Physics

Semester 7

Core courses

Quantum physics
 Solid state physics I
 Semiconductor physics
 Magnetism and nanosciences
 Optics

Elective courses

Statistical physics
 Mechanics at the micro & nano-scale
 Surface and interface
 Image and signal processing
 Electrochemistry

 Professional insertion
 French as foreign language

Semester 8

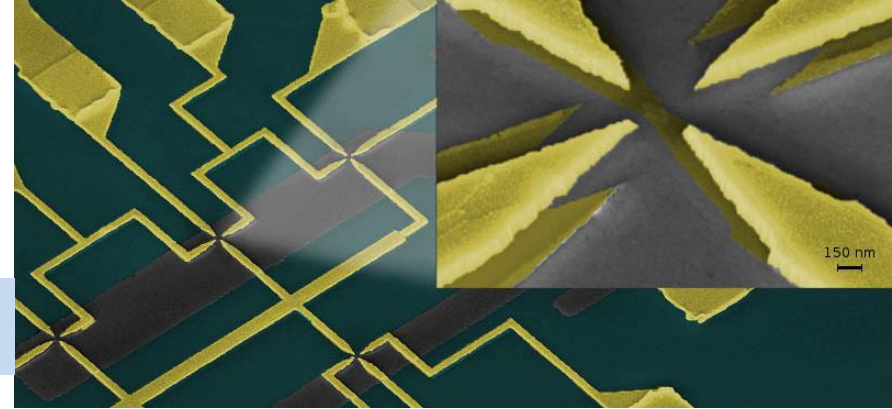
Solid state physics II
 Modeling and numerical simulations
 Physical measurement by local probes
 Nanosciences I

Nanosciences II
 Quantum labworks

 Quantum statistics and interactions
 Molecular electronics and magnetism
 Physics of 2D nanomaterials
 Molecular photophysics
 Ray-matter interaction
 Materials science
 Thin Films

Research internship (2 months)

M2 NanoPhysics



[web site → click here](#)

Motivations

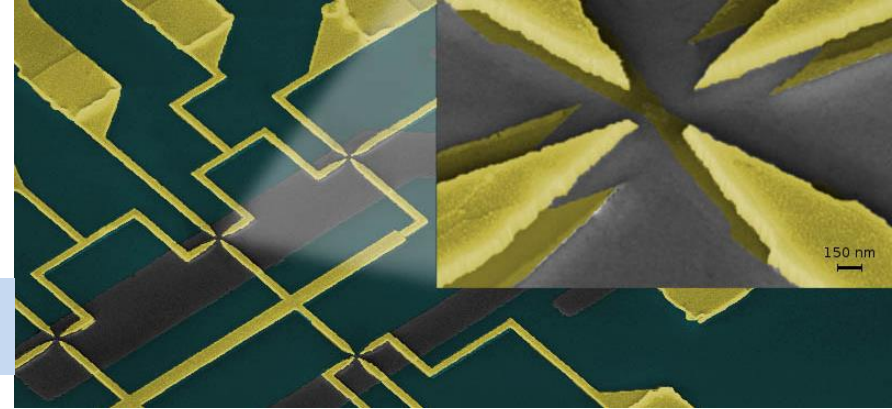
- Fundamental and applied courses on the physical properties, growth, advanced characterization, and applications of nanostructures.
- Specialization in nanophysics, within the broader field of nanosciences and with knowledge on quantum applications.
- Pluri-disciplinary experimental training on top-levels equipment of research laboratories and clean-room facilities.
- Preparation to a PhD in a research laboratory or a nanotech R&D company.

Pre-requisites

- Open to national and international students.
- Students with a Master 1 or a 4-year Bachelor in Physics.
- Courses on Quantum Physics, Solid State Physics, Semiconductors, Optics.



M2 NanoPhysics



[web site → click here](#)

Core courses

Elaboration of nanostructures and physics of 2D materials
Advanced characterization techniques for nanostructures
From nanofabrication in research labs to VLSI

Applications

Advanced semiconductor devices
Nanophotonics and plasmonics
Nanomagnetism and spintronics
Nanomaterials and energy

} 1 choice

Specializing courses

- *Quantum thematic courses* :

Quantum condensed matter
Quantum optics

- *broadening courses* :

Active matter
Machine statistical learning

} 2 choices

Thematic and interdisciplinary projects

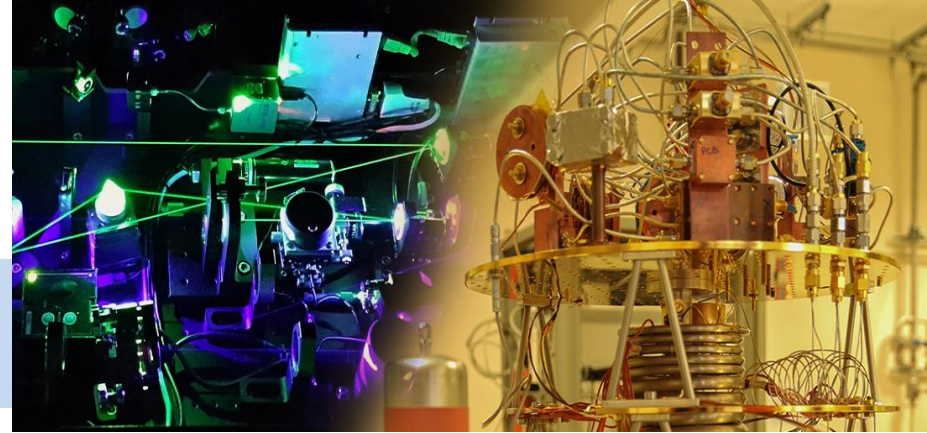
Seminars + Modeling or Research training

Master thesis

5-months internship in a research lab



Contact : helene.bea@cea.fr



[web site → click here](#)

M2 QIQE

Quantum Information & Quantum Engineering



Motivations

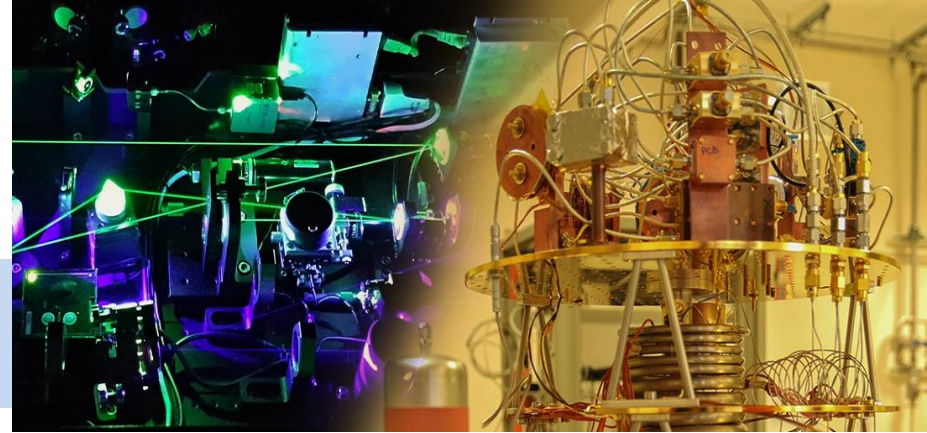
- Working on fundamental quantum physics and/or participate to the emergence of Quantum Technologies.
- Enhancing connections between education, research and industry working on Quantum Technologies in adequation with national and European programs.
- Lectures, practicals, seminars covering the whole spectrum from fundamental quantum physics to implementations of quantum bits and algorithms.
- Preparation to a PhD in a research laboratory, a start-up, or a R&D company.

Pre-requisites

- Open to national and international students.
- Students with a Master 1 or a 4-year Bachelor in Physics.
- Courses on Quantum Physics, Solid State Physics, Semiconductors, Optics.

M2 QIQE

Quantum Information & Quantum Engineering



[web site → click here](#)



Fundamentals

Open quantum systems
Quantum condensed matter
Quantum optics

Implementations

Solid state qubits
Quantum algorithms
Nanomagnetism and spintronics

Advanced instrumentations

Microwave and cryoelectronics
From nanofabrication in research labs to VLSI

Thematic and interdisciplinary projects

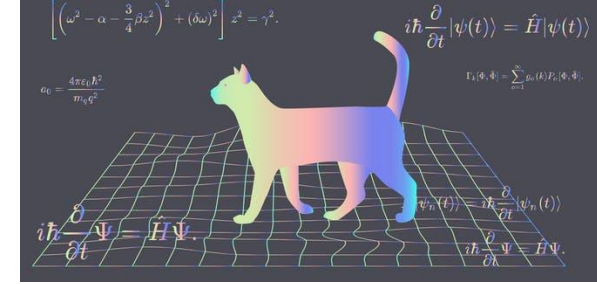
Seminars, Simulations, Practicals (IBM-Q)

Master thesis

5-months internship in a research lab



Contact : franck.balestro@neel.cnrs.fr



Graduate School thematic program « Quantum »

Objective :

Training the future generation of students in the field of quantum technologies including communication, computing, simulation, sensing, metrology

Quantum Engineering and Hardware :

Coherent manipulation of quantum objects

Quantum Information and Software :

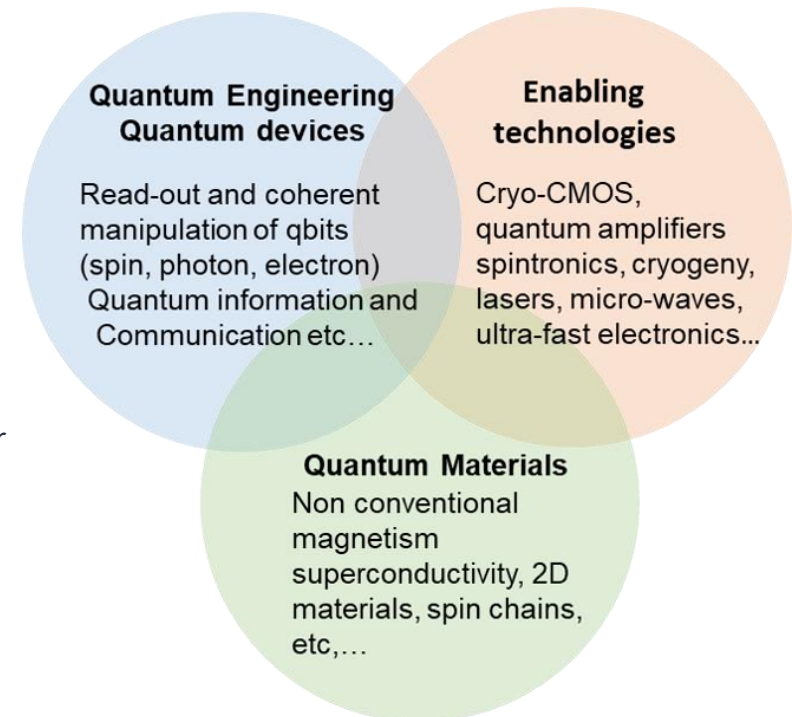
Processing and transfer of quantum information

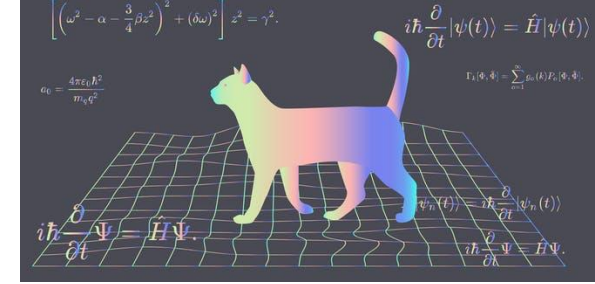
Quantum Materials :

Collective quantum effects and new states of matter

Enabling Technologies :

Elaboration, cryogenics, cryo-electronics, spintronics





Graduate School thematic program « Quantum »

Program for **excellent** students with **international** origin

Delivery of a « **Quantum label** » in addition to the Master diploma

Two year program with **dedicated** lectures and trainings

First year (M1)

- **Quantum labworks** : superconductivity, 2D materials, quantum optics,...
- **Quantum statistics and interactions** : second quantization, light-matter interaction,...

Second year (M2)

- **Quantum condensed matter** : theory of superconductivity, quantum transport,...
- **Quantum optics** : cavity quantum electrodynamics, quantum cryptography,...

**Two-year « Quantum » scholarship
from UGA Graduate School**

For students with non-French high-school diploma

[Follow this link to apply](#)



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M1 NanoPhysics & Quantum Physics

M2 NanoPhysics

M2 Quantum Information & Quantum Engineering

Graduate School thematic program « Quantum »

Presentation and answer to questions during the **UGA Master Forum**

Thursday the 3rd of March 2022
from 12:00 to 13:00 and from 16:00 to 17:00

Zoom link :

<https://univ-grenoble-alpes-fr.zoom.us/j/95035879831?pwd=dkViMGEF2S21IZERYTd5Y21XOGVDUT09>