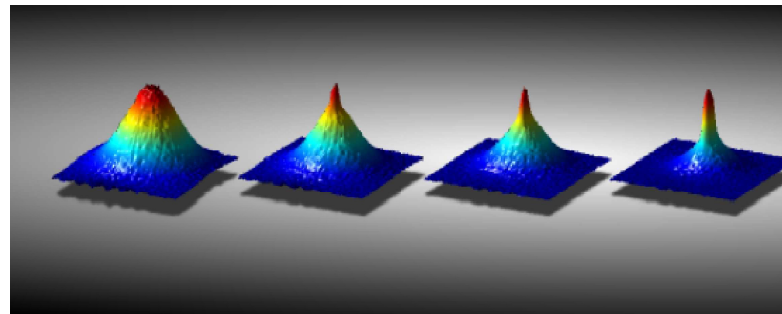


# Master in Engineering Physics

November 14, 2017

ETSETB- Departament de Física,  
Universitat Politècnica de Catalunya



## Motivation

- Education in Engineering Physics (EP) in UPC: at present there is not continuation from Bachelor to Master.
- Master degree is important to show to our own community (UPC) and outside that UPC offers full education in the EP field.
- It is now lacking to close the Academic career because we offer at present a well-established PhD program.
- Considering the staff of the Physics Department and Engineering Departments collaborating in EP education one is convinced that we have the manpower to deal properly with it.
- The noticeable success of the Bachelor's degree is encouraging us to offer this Master to students who want to remain in the UPC and others worldwide to join us in this initiative.

# Objectives

- Offer an innovative Master programme with a proper combination of Advanced Physics and cutting-edge Engineering.
- Appealing by itself and inspired in the successful implementation of the Bachelor's degree in EP in UPC.
- Connected with active research groups in the UPC in a rich variety of topics: materials, nanotechnology, quantum optics, instrumentation, complex fluids, biophysics, quantum matter, ...
- Open to our EP graduates and students from abroad.
- Fill a gap in EP education at the Master level.

# Academic Organization

- Hosted and managed by the ETSETB, Campus Nord, Barcelona.
- Academic direction by a Coordinator, assisted by an Advisory Committee.
- Class rooms in Campus Nord, UPC. Labs in the same Campus and other Campus of UPC.
- Master Thesis in research groups of UPC and other Research Institutions from here and abroad.

# Program

The Master extent is of **60 ECTS** corresponding to two semesters

The Program is organized in three modules:

1. **Compulsory courses: 23 ECTS**
2. **Elective courses: 20 ECTS**
3. **Master thesis: 17 ECTS**



# Program

Compulsory courses: **5 subjects**

1. Critical phenomena and complexity (5 ECTS)
2. Quantum matter (5 ECTS)
3. Surface engineering and microdevices (5 ECTS)
4. Large facilities: synchrotron and neutron sources (5 ECTS)
5. Project management (3 ECTS)

# Program

Elective courses: 5 subjects of 4 ECTS credits each

- Molecular and soft condensed matter
- Atomic and molecular physics
- Physics of materials
- Complexity in biological systems
- Machine learning with neural networks
- Numerical methods for continuum systems
- Stochastic methods for optimization and simulation
- Computational astrophysics

Not all will be open in the first year

# Program

Elective courses: in addition to our offer our students can choose up to a maximum of 12 ECTS in other UPC Masters

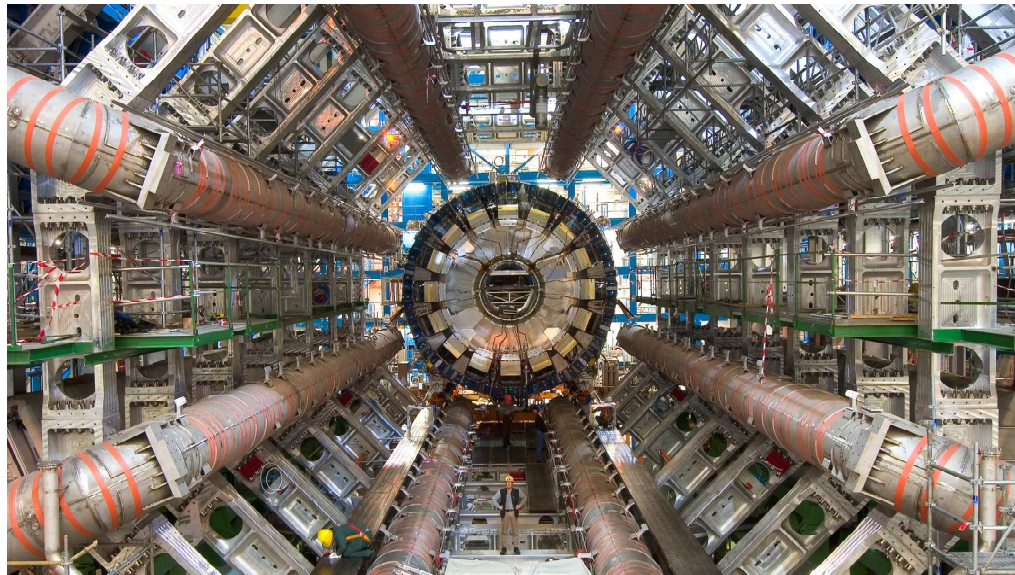
- Fundamentals of Nuclear Engineering and radiologic protection (Master in nuclear engineering)
- Energy technology (Master in chemical engineering)
- Renewable energy technology (Master in energy engineering)
- Quantum optics (Master of photonics)
- Introduction to computer vision (Master's degree in Telecommunications Engineering)
- Data mining (Master in big data management and analytics)
- Biomaterials (Master in materials science and engineering)



# Program

Master Thesis: **17 ECTS** credits

- Experimental/Engineering/Theoretical work supervised by Professors of the Master.
- Opened to be done in other UPC centers or abroad under the supervision of a co-director of the Academic Staff of the Master.



# Schedule

- Starting of Academic activity: **September 2018**



# Summary

## UPC Master in Engineering Physics

### ETSETB–Departament de Física

**Compulsory courses: 23 ECTS**      **Elective courses: 20 ECTS**

Critical phenomena and complexity

Quantum Matter

Surface engineering and microdevices

Large facilities: synchrotron and neutron sources

Project management

Molecular and soft condensed matter

Atomic and molecular physics

Physics of materials

Complexity in biological system

Machine learning with neural networks

Numerical methods for continuum systems

Stochastic methods for optimization and simulation

Computational astrophysics

## References

Many Masters in EP are offered abroad and there is a single one in Spain

- Master of Engineering in Engineering Physics, Cornell University, USA.
- Master in Engineering Physics, Polytechnique Montréal, Canada.
- Master in Engineering Physics, Politecnico de Milano, Italy.
- Master's programme in Engineering Physics, KTH, Sweden.
- Master's Programme in Engineering Physics, Aalto University, Finland
- Master Universitario en Ingeniería Física, Universidad del País Vasco, Spain