Master in Physics
Master in Applied Physics
2023-2024
Physics
120 ECTS
2 years

Courses (19)
group I

MA1

Courses (19)
group I

MA2

Physics Project 1
(8)

SHS (3)

Physics Project 2
(8)

SHS (3)

Courses (30)
group IIa

MA3

Minor (30)

MA4

Physics Research Training Semester (30)
Semestre de spécialisation

Master Project (30)
Applied Physics
120 ECTS
2 years

**Year 1**
- MA1: Courses (19) group I
- MA2: Courses (19) group I
- Engineering courses (≥19/38)
- Physics Project 1 (8)
- SHS (3)
- Physics Project 2 (8)
- SHS (3)

**Year 2**
- MA3: Courses (30) group IIb
- MA4: Master Project (30) in industry (compulsory)
- Minor (30)
- Internship in industry (30)
- Master Project (30)
## Fall Semester (MA1/MA3)

<table>
<thead>
<tr>
<th>Code 6XX: advanced courses</th>
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<tbody>
<tr>
<td><strong>Astrophysics, Particles, High energy Physics</strong></td>
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<tr>
<td>Quantum Field Theory I - 431</td>
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<td>Relativity Cosmology I - 427</td>
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<td>Quantum Physics III - 425</td>
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<td><strong>Intr. Particle Accelerators - 448</strong></td>
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<td><strong>Particle detection - 440</strong></td>
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<td><strong>Computer simulation - 403</strong></td>
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<td><strong>Machine Learning Physics - 467</strong></td>
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<tr>
<td><strong>Plasma Physics and Energy</strong></td>
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<td>Plasma I - 423</td>
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<td><strong>Nucl. Fusion&amp;Plasma Physics - 445</strong></td>
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<td><strong>Reactor technology - 447</strong></td>
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<td><strong>Phys. of nuclear reactors - 443</strong></td>
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<td><strong>Radiation biology - 450</strong></td>
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<td><strong>Particle detection - 440</strong></td>
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<tr>
<td><strong>Computer simulation - 403</strong></td>
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<td><strong>Machine Learning Physics - 467</strong></td>
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<td><strong>Radiation detection - 452</strong></td>
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<td><strong>Physics of Biological and Complex Systems</strong></td>
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<td>Statistical Physics III - 435</td>
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<td><strong>Radiation biology - 450</strong></td>
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<td><strong>Stat. Ph. biomacromolecul. - 441</strong></td>
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<td><strong>Biophysics: biol. sys. - 302</strong></td>
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<td><strong>Stat. Phys. Computation - 512</strong></td>
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<td><strong>Computer simulation - 403</strong></td>
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<td><strong>Machine Learning Physics - 467</strong></td>
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<td><strong>Condensed Matter Physics</strong></td>
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<td>Solid State Physics III - 419</td>
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<td><strong>Semiconductor Physics - 433</strong></td>
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<td><strong>Computer simulation - 403</strong></td>
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<td><strong>Exp. methods in Physics. - 405</strong></td>
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<td><strong>Frontiers in NanoSciences - 407</strong></td>
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<td><strong>Quantum Science and Technology</strong></td>
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<td>QED &amp; Quantum Optics - 453</td>
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6 ECTS

4 ECTS

3 ECTS

: Engineering courses
### Spring Semester (MA2)

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<td>Quantum Physics IV - 426</td>
<td>Relativity Cosmology II - 428</td>
<td>Plasma II - 424</td>
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<td>Quantum Optics ... - 454</td>
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<td>Modeling Design of Exp. - 442</td>
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- 6 ECTS
- 4 ECTS
- 3 ECTS

*: Engineering courses
Master in Physics and Applied Physics

Optional Courses

- options SPH : in the study plan :
- options FSB : in mathematics (SMA), Chemistry and Chemical Engineering (SCGC) schools + list of courses approved out of FSB
- options other faculties : schools of the other faculties of EPFL.

Courses outside the Physics Study Plan

- max 18 credits among FSB + list of approved courses out of FSB+other faculty courses
- max 6 credits among bachelor optional courses
- max 6 credits among options in other faculties, submitted to Physics school director approval

Master Cycle in Physics and Applied Physics

- 38 credits obtained in option courses
- 22 credits obtained in lab courses (16) et projects SHS (6)

+ Intership in INDUSTRY (Applied Physics) or Research Training Semester (Physics) 30 credits

or Minor (Applied Physics and Physics) 30 credits
or 3rd study semester (Applied Physics and Physics) 30 credits

+ Master Project 30 credits

The choice of the TP4 lab and Master Project must be announced to the School secretariat
About the Research Training Semester

Under the supervision of a Professor or Senior Scientist (MER) of the PH School

No grade but success with 30 ECTS or fail

• It can be performed internally (Physics lab) or outside EPFL (lab or research institute)
• The Professor responsible for such work can require that the student takes some courses relevant for the specialisation
About the Internship (for engineers only)

Internship subjects must be approved by the Physics School

A wide database of subjects proposed by companies is available

No grade but success with 30 ECTS or fail

- Under full responsibility of the company supervisor
- At the end, the student must provide a manuscript and make an oral presentation of the work in front of the school supervisor and the company audience that will evaluate the internship
About the 3rd study semester

Aimed at student who would like to take additional specialty courses

• For Engineers: other courses in Applied Physics + courses of Engineering School (according to list)
• For Physicists: other courses in Physics + master courses of Engineering School + doctoral courses (max. 2)
Master Project and Physics Project (TP4)

• **Art. 10 - Laboratoires de Physique IV**

Le choix du laboratoire pour les Laboratoires de Physique IVa et IVb ainsi que le Projet de master doit être annoncé à la Section de Physique et validé par celle-ci.

In principle, TP4 are performed in a lab of the Physics School
Short presentations are available with this link

**Art. 2 – Étapes de formation**

• Le master en physique est composé de deux étapes successives de formation : le cycle master d’une durée de trois semestres .....  
• 3... le projet de master d’une durée de 17 semaines à l’EPFL ou de 25 semaines hors EPFL, et dont la réussite implique l’acquisition de 30 crédits. Il est placé sous la responsabilité d'un Professeur ou d’un MER affilié à la section de Physique.

The Master Project is under the supervision of a Professor or Senior Scientist (MER) of the Physics School
Plasma Physics, fusion and fission

Research

- Prof. Ambrogio Fasoli
- Prof. Paolo Ricci
- Prof. Laurent Villard
- Prof. Christian Theiler
- Prof. Ivo Furno
- Prof. Andreas Pautz
- Dr. Jean-Marc Moret
- Dr. Basil Duval
- Dr. Stefano Coda
- Dr. Stefano Alberti
- Dr. Jonathan Graves
- Dr. Jean Philippe Hogge
- Dr. Stephan Brunner
- Dr. Olivier Sauter
- Dr. Holger Reimerdes
Astrophysics and Particle Physics

Particle physics:
- Prof. Olivier Schneider
- Prof. Riccardo Rattazzi
- Prof. Lesya Shchutska
- Prof. Mike Seidel
- Prof. Viktor Gorbenko
- Prof. Radoslav Marchevski

Astrophysics:
- Prof. Jean-Paul Richard Kneib
- Prof. Pascale Jablonka
- Prof. Frédéric Courbin
- Prof. Joao Miguel Penedones
- Prof. Michaela Hirschmann
- Prof. Richard Anderson
- Dr. Yves Revaz
- Dr. Pierre North
Condensed Matter Physics

Nanostructures with well defined size, shape and composition

- **Prof. Harald Brune** (nanostructures)
- Prof. Cécile Hébert (electron microscopy)
- Prof. Hugo Dil
- Dr. Stefano Rusponi

Novel materials including superconductors, soft matter and high-pressure phases

Prof. Henrik Ronnow
**Prof. Daniele Mari**
Dr. Arnaud Magrez
Condensed Matter Physics

Quantum devices and quantum photonics

- Prof. Fabrizio Carbone
- Prof. Gabriel Aeppli
- Prof. Mitali Banerjee

Theory and simulation

- Prof. Frédéric Mila
- Prof. Alfredo Pasquarello
- Prof. Oleg Yazief
- Prof. Andreas Läuchli
- Prof. Manuel Guizar Sicairos
- Prof. Christopher Marc Mudry
Physics of Biological and Complex Systems

function, structure and properties of biological systems

- Prof. Hennig Stahlberg
- Prof. Paolo De Los Rios
- Prof. Suliana Manley
- Prof. Rolf Gruetter (LIFMET)
- Prof. Sahand Jamal Rahi
- Prof. Florent Krzakala
- Prof. Lenka Zdeborová
- Prof. Mathieu Wyart
- Prof. Guillermina Ramirez-San-Juan
Quantum Science and Technology

Photonics, quantum computing, quantum matter

- Prof. Jean Philippe Brantut
- Prof. Vincenzo Savona
- Prof. Giuseppe Carleo
- Prof. Anna Fontcuberta
- Prof. Zoe Holmes
- Prof. Christophe Galland
- Prof. Romuald Houdré
- Prof. Tobias Kippenberg
- Prof. Pasquale Scarlino
- Prof. Nicolas Grandjean
- Prof. Vladimir Manucharyan
- Dr. Raphael Butté
SHS program
Need of SHS competences!?

• Any engineering project is related to society, worldwide.

• Many are involving cutting edge science.

• Thus, acting as engineer, scientist or manager requires SHS competences,

  probably more than ever!
Competences: OK, but of which kind?

• Understanding practices, norms, values and history of social environnements (*cultural*)

• Knowing the rules and habits in which one works (*practical*)

• Learning other ways of reasoning (*intellectual*)

• Developing the hability to perceive and express emotions (*emotional*)
Basic informations & rules

SHS Project

- Group work introduced by courses/seminars
- Planned on an annual basis
- (semestrial project? Ask your professor)

Credits

- 6 ECTS given at the end of the academic year

Language of courses/seminars

- French, or english.

Language of interaction/redaction

- French, english (other commonly agreed)

Evaluation

- Usually a mix of project process, final report and presentation.
- Inscription: 1 option via IS ACADEMIA
- CDH web site: [www.epfl.ch/cdh](http://www.epfl.ch/cdh)
- Office: CM 1 222 (Centre Midi)
- Opening hours: Tuesday and Thursday 14h – 17h30
EPFL is a community of around 20,000 people

- Who enrich our community every day with their skills, identities, and differences
- By joining EPFL, we commit to upholding values based on respect and well-being
- To live up to these values EPFL has created the Trust and Support Network
- Easy access through Trust Point
Towards a culture of respect and well-being

- Health days

- Get trained to know how to act and react
  Moodle Promoting respect

- Speak up and seek support
  Trust & Support Network (TSN)

- Internal entity to file formal complaints
  Respect Compliance Office (RCO)

Everyone has a role to play!

We are all concerned!
For all information

sph.epfl.ch

master.epfl.ch

Contact: daniele.mari@epfl.ch  valerie.schaererbusinger@epfl.ch