

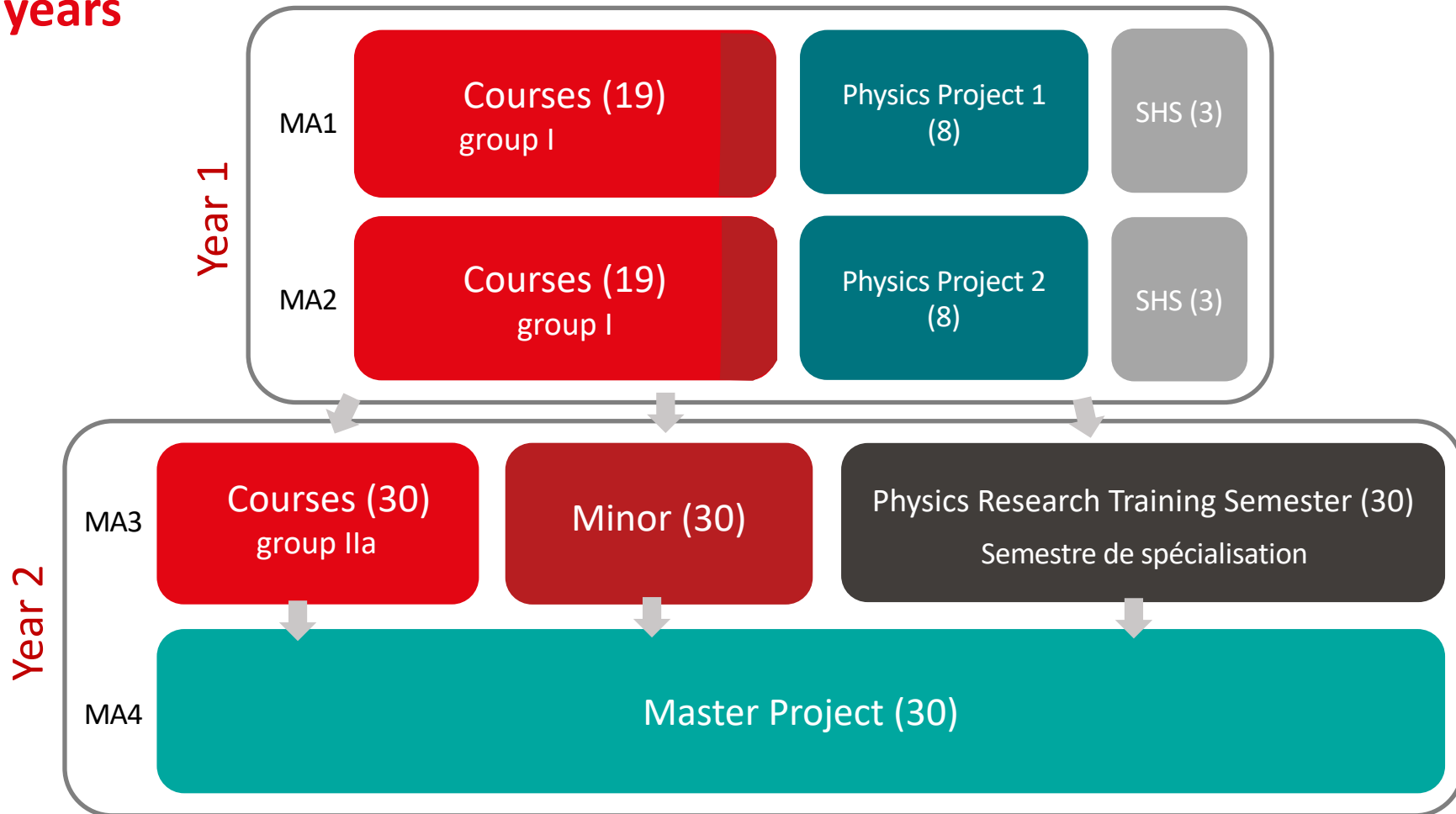
EPFL

Master in Physics
Master in Applied Physics
2023-2024

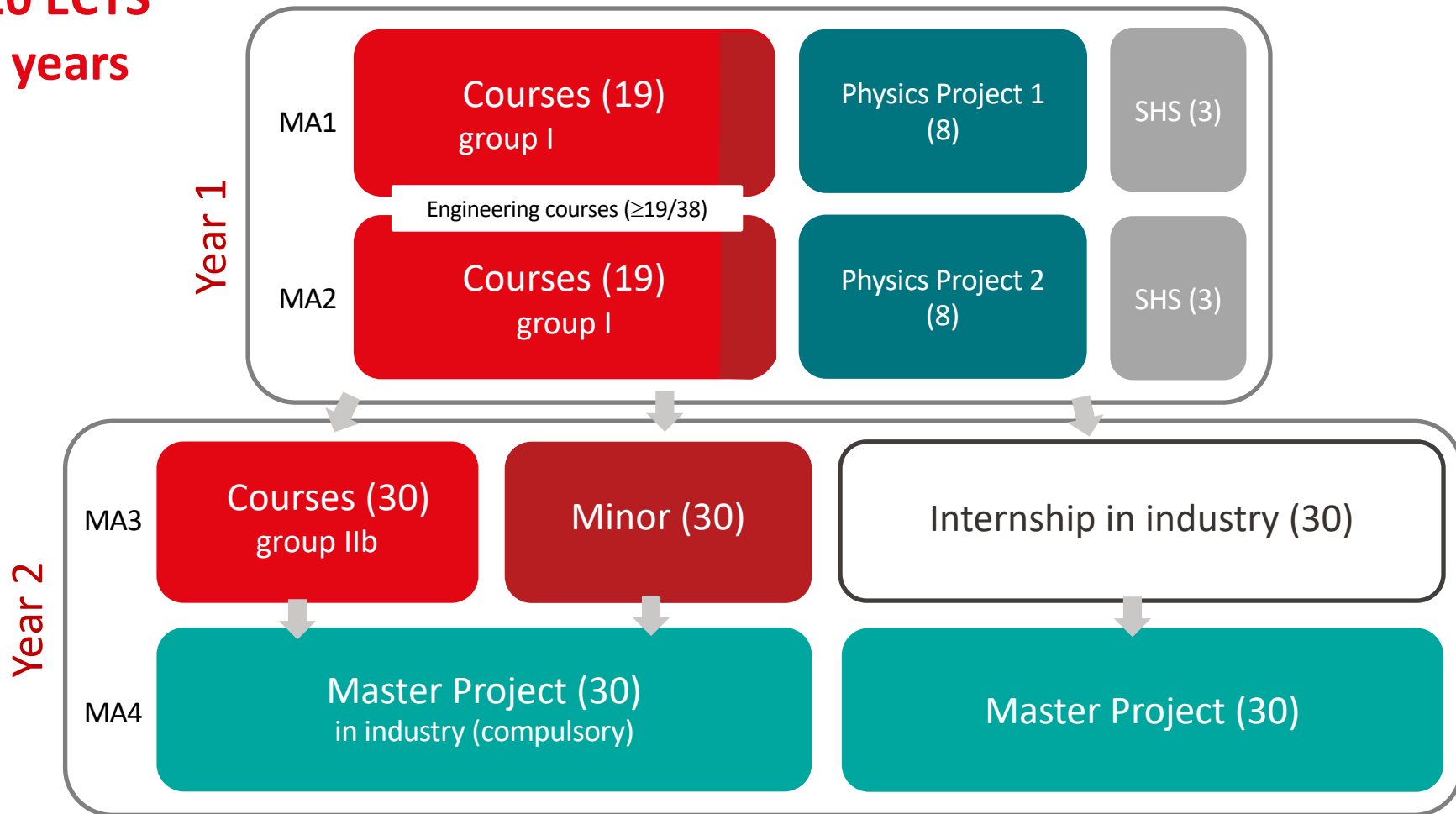
Physics

120 ECTS


2 years




Applied Physics 120 ECTS 2 years



Fall Semester (MA1/MA3)

	Astrophysics, Particles, High energy Physics	Plasma Physics and Energy	Physics of Biological and Complex Systems	Condensed Matter Physics	Quantum Science and Technology
6 ECTS	<ul style="list-style-type: none"> Quantum Field Theory I - 431 Relativity Cosmology I - 427 Quantum Physics III - 425 	<ul style="list-style-type: none"> Plasma I - 423 	<ul style="list-style-type: none"> Statistical Physics III - 435 	<ul style="list-style-type: none"> Solid State Physics III - 419 Quantum Physics III - 425 	<ul style="list-style-type: none"> QED & Quantum Optics - 453 Solid State Physics III - 419
4 ECTS	<ul style="list-style-type: none"> Astrophysics III - 401 Particle Physics I - 415 Intr. Particle Accelerators - 448 Particle detection - 440 Computer simulation - 403 Machine Learning Physics - 467 	<ul style="list-style-type: none"> Nucl. Fusion&Plasma Physics - 445 Reactor technology - 447 Phys. of nuclear reactors - 443 Radiation biology - 450 Particle detection - 440 Computer simulation - 403 Machine Learning Physics - 467 	<ul style="list-style-type: none"> Radiation biology - 450 Stat. Ph. biomacromolecul. - 441 Biophysics: biol. sys. - 302 Stat. Phys. Computation - 512 Computer simulation - 403 Machine Learning Physics - 467 	<ul style="list-style-type: none"> Semiconductor Physics - 433 Physics of Materials - 307 Electron spectroscopy - 511 Neutron scattering - 640 Computer simulation - 403 Machine Learning Physics - 467 	<ul style="list-style-type: none"> Semiconductor Physics - 433 Lasers - MICRO422 Quantum transport - 462 Quantum Information - 641 Nonlinear Optics - 470 Computer simulation - 403 Machine Learning Physics - 467
3 ECTS		<ul style="list-style-type: none"> Radiation detection - 452 		<ul style="list-style-type: none"> Exp. methods in Physics. - 405 Frontiers in NanoSciences - 407 	<ul style="list-style-type: none"> Exp. methods in Physics - 405 Frontiers in NanoSciences - 407
	<p> : Engineering courses</p>			<p>Code 6XX: advanced courses</p>	

Spring Semester (MA2)

	Astrophysics, Particles, High energy Physics	Plasma Physics and Energy	Physics of Biological and Complex Systems	Condensed Matter Physics	Quantum Science and Technology
6 ECTS	<ul style="list-style-type: none"> Quantum Field Theory II - 432 Quantum Physics IV - 426 Relativity Cosmology II - 428 	<ul style="list-style-type: none"> Nonlinear dynamics, chaos - 460 Plasma II - 424 	<ul style="list-style-type: none"> Nonlinear dynamics, chaos - 460 	<ul style="list-style-type: none"> Statistical Physics IV - 436 	<ul style="list-style-type: none"> Statistical Physics IV - 436 Quantum Optics ... - 454
4 ECTS	<ul style="list-style-type: none"> Astrophysics IV - 402 Particle physics II - 416 Introd. Astroparticles - 439 Selec. topics Nucl. Particle - 400 Modeling Design of Exp. - 442 	<ul style="list-style-type: none"> Modeling Design of Exp. - 442 	<ul style="list-style-type: none"> Fund. Biomedical imaging - 438 Physics of Life - 468 Modeling Design of Exp. - 442 	<ul style="list-style-type: none"> Solid State Physics- 420 Comput. Quantum Phys. - 463 Magnetism in Materials – 491 Modeling Design of Exp. - 442 	<ul style="list-style-type: none"> Phys. Photonic. Devices - 434 Comput. Quantum Phys. - 463 Solid Stat. Syst. Q. Infor. - 464 Modeling Design of Exp. - 442
3 ECTS			<ul style="list-style-type: none"> Topics in Biophysics - 466 	<ul style="list-style-type: none"> Electron microscopy – MSE 450 	
	 : 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)

+ Internship 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](#)

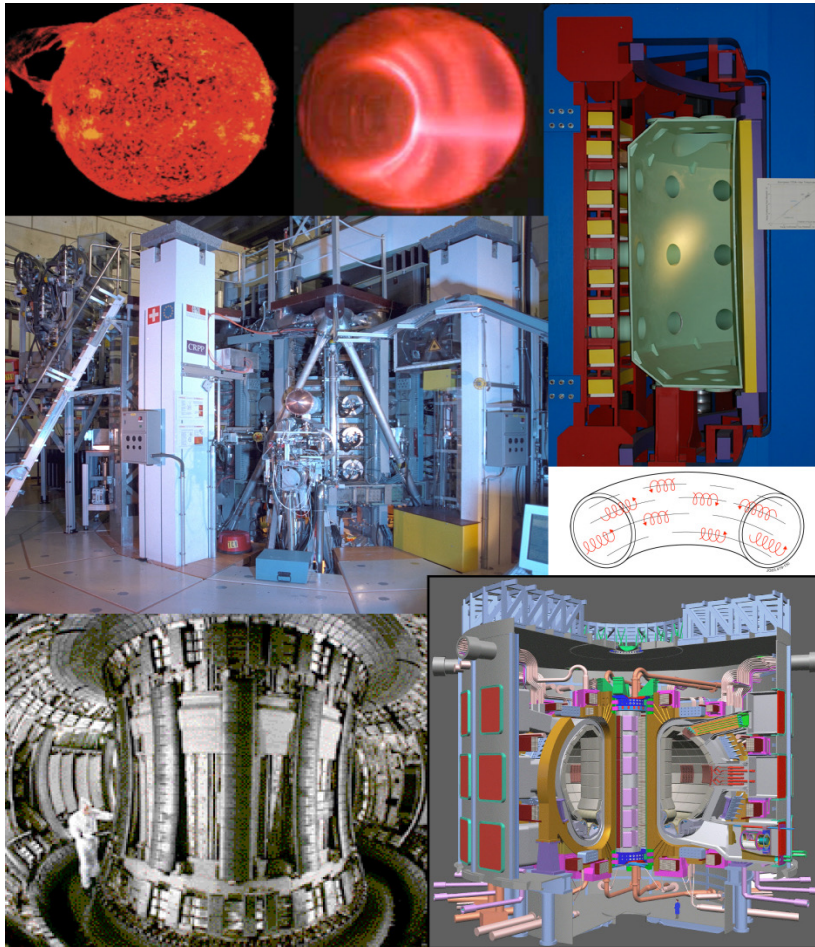
Art. 2 – Étapes de formation

- 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 Shchutka
- [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

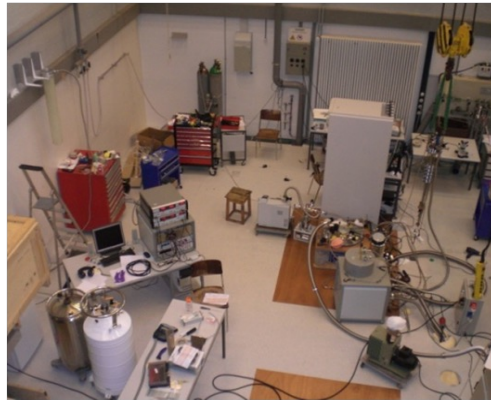
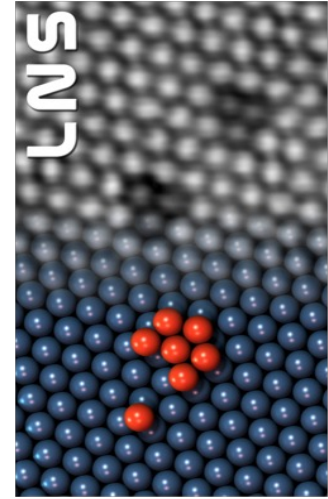


Condensed Matter Physics



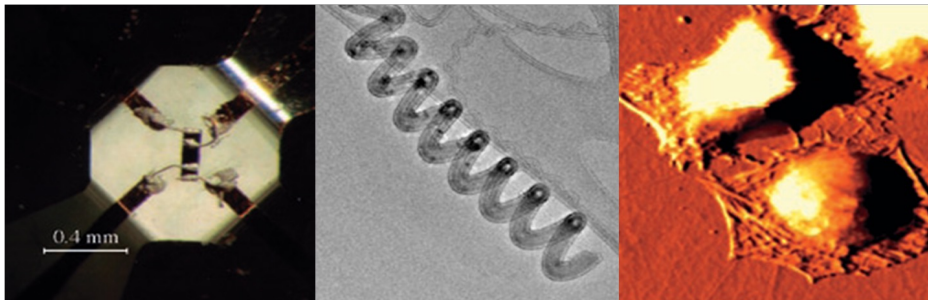
Nanostructures with well defined size, shape and composition

- [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



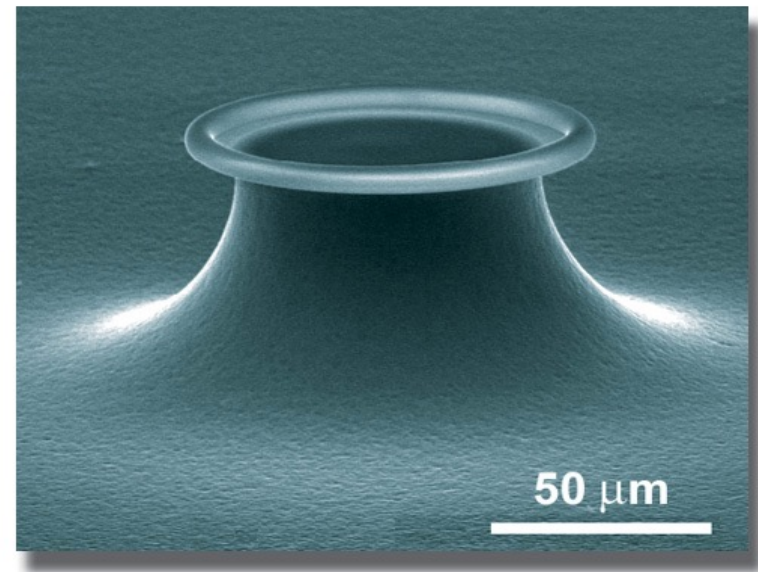
Condensed Matter Physics

Quantum devices and quantum photonics

- Prof. Fabrizio Carbone
- Prof. Gabriel Aeppli
- [Prof. Mitali Banerjee](#)

Theory and simulation

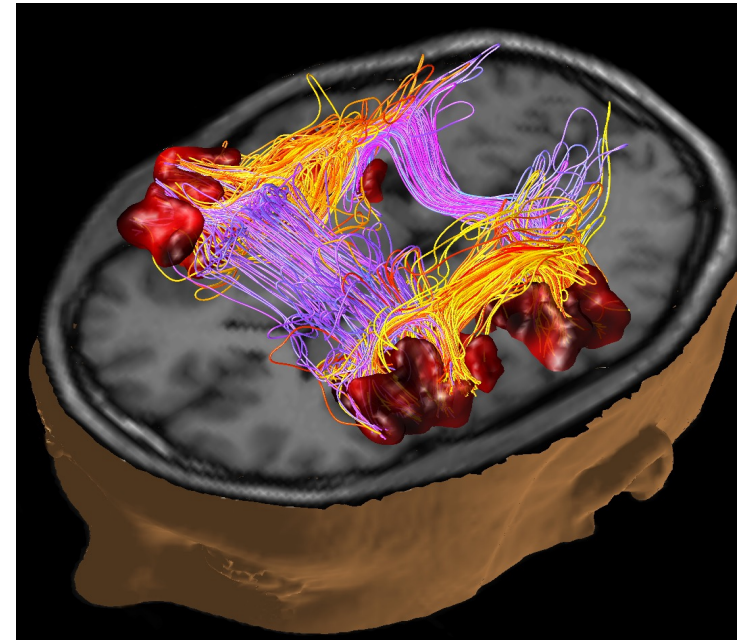
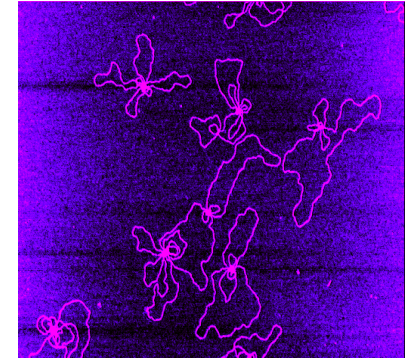
- Prof. Frédéric Mila
- Prof. Alfredo Pasquarello
- [Prof. Oleg Yazief](#)
- Prof. Andreas Läuchli
- Prof. Manuel Guizar Sicaïros
- Prof. Christopher Marc Mudry



Physics of Biological and Complex Systems

function, structure and properties of biological systems

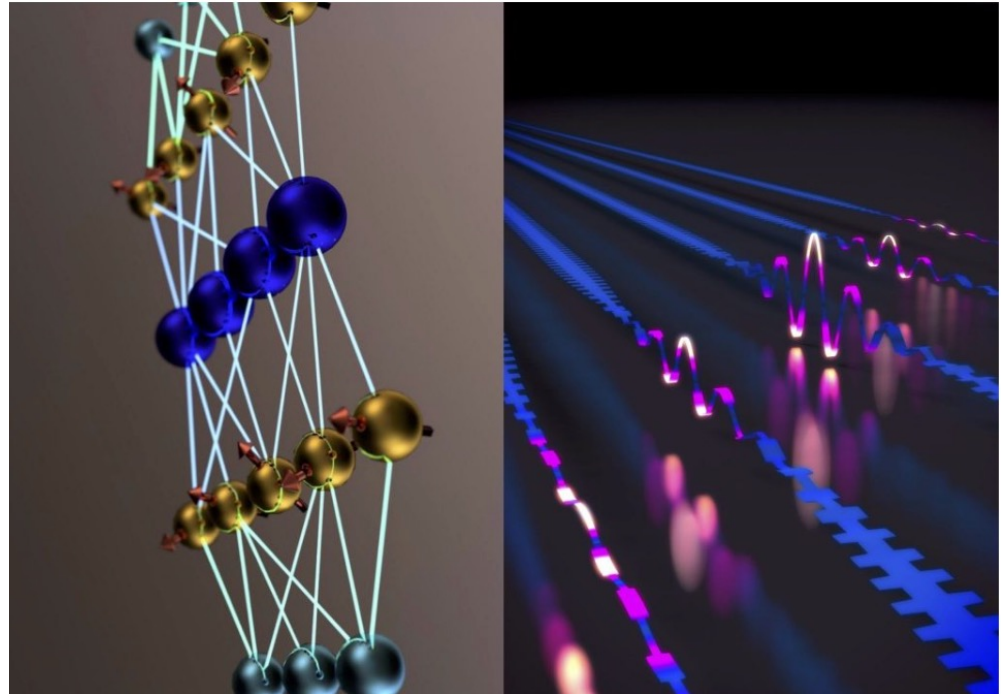
- [Prof. Hennig Stahlberg](#)
- [Prof. Paolo De Los Rios](#)
- [Prof. Suliana Manley](#)
- [Prof. Rolf Gruetter](#) (LIFMET)
- Prof. Sahand Jamal Rahi
- Prof. Florent Krzakala
- [Prof. Lenka Zdeborová](#)
- [Prof. Mathieu Wyart](#)
- Prof. Guillermina Ramirez-San-Juan



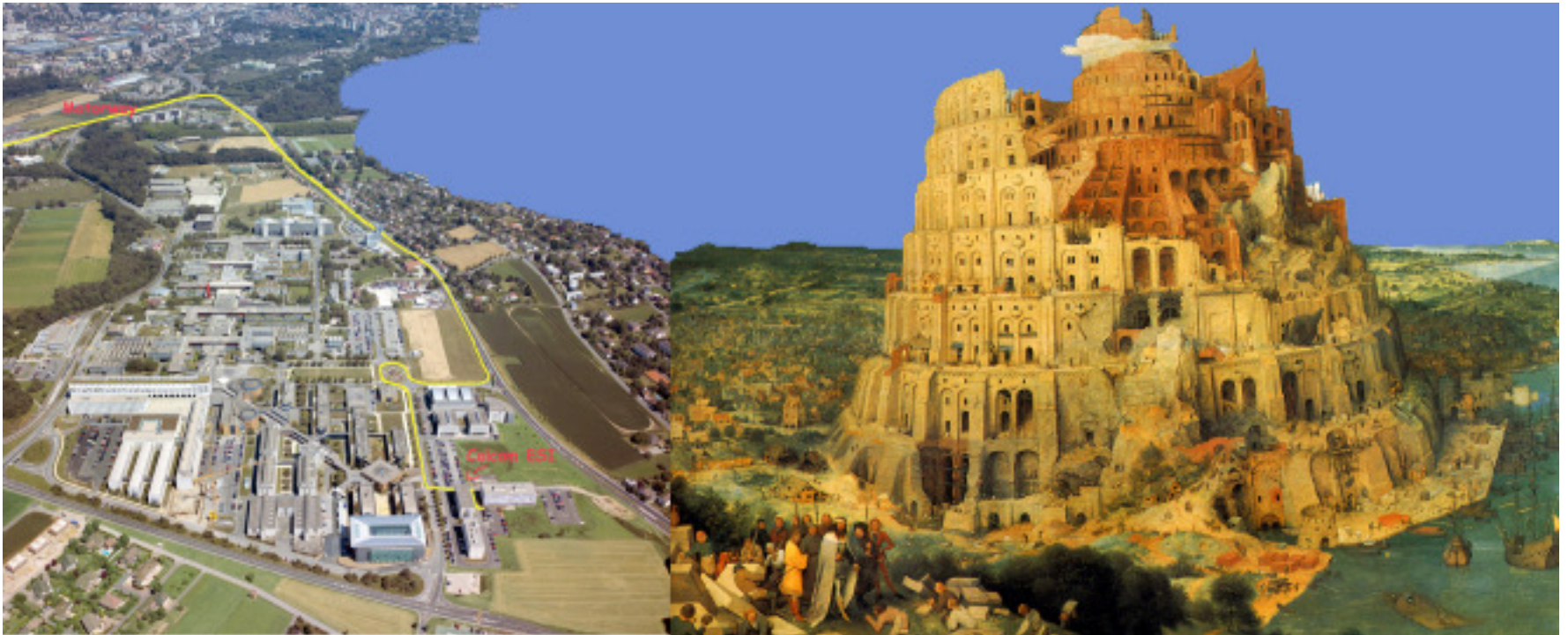
Quantum Science and Technology

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**
- Office **CM 1 222 (Centre Midi)**
- Opening hours **Tuesday and Thursday 14h – 17h30**

Context

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



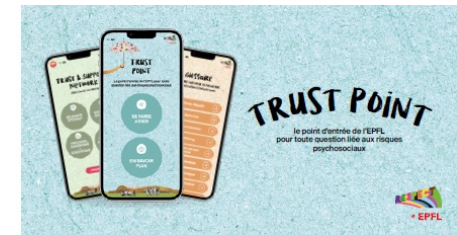
- Health days



- 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

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