Université Paris-Saclay

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M1 Large Scale Accelerators and Lasers - Erasmus Mundus Lascala

Master's degree

Specialisation Physique fondamentale et applications

Language(s) of instruction

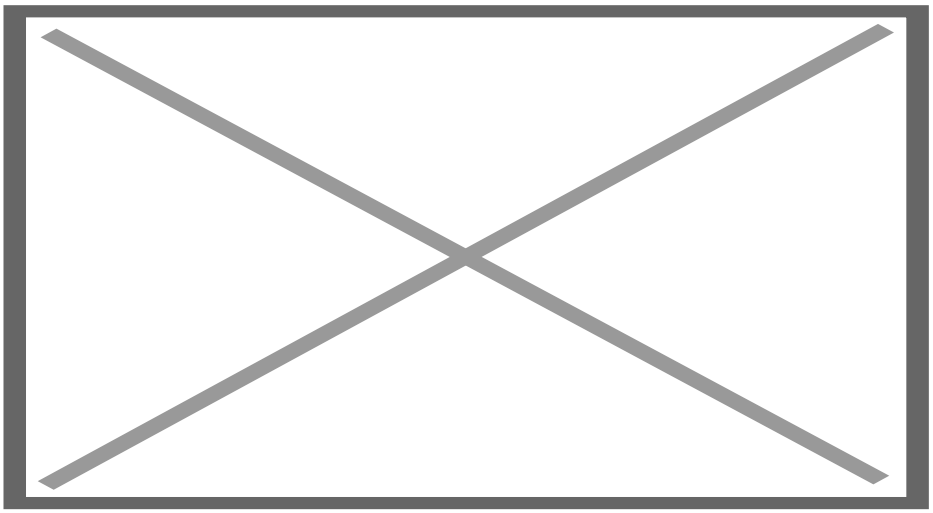
English

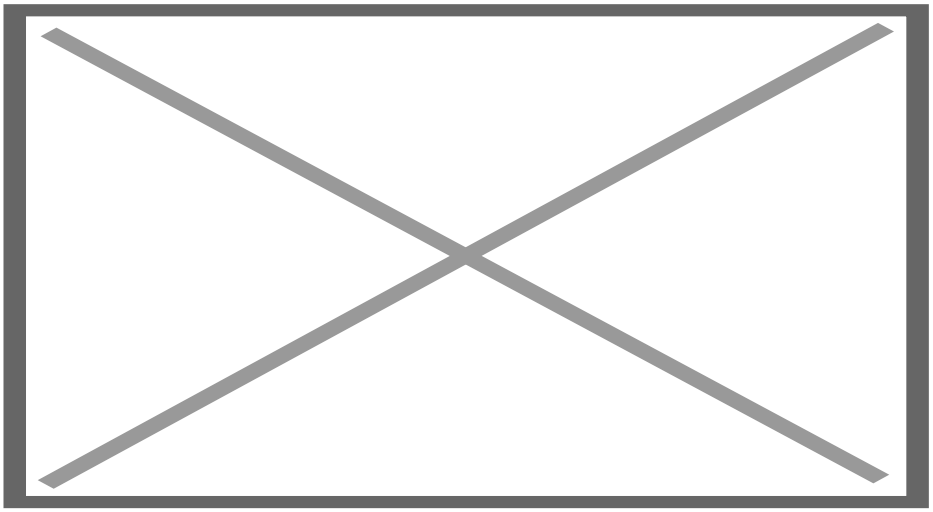
LASCALA is an Erasmus Mundus Master programme run in partnership with Sapienza Universita di Roma, Lund University and Salamanca University dedicated to large-scale high-intensity lasers, accelerators and gravitational wave detectors. This programme leads to joint degrees from the partner universities and, for Paris Saclay, is based on the M1 General Physics and M2 GI/PLATO programmes.

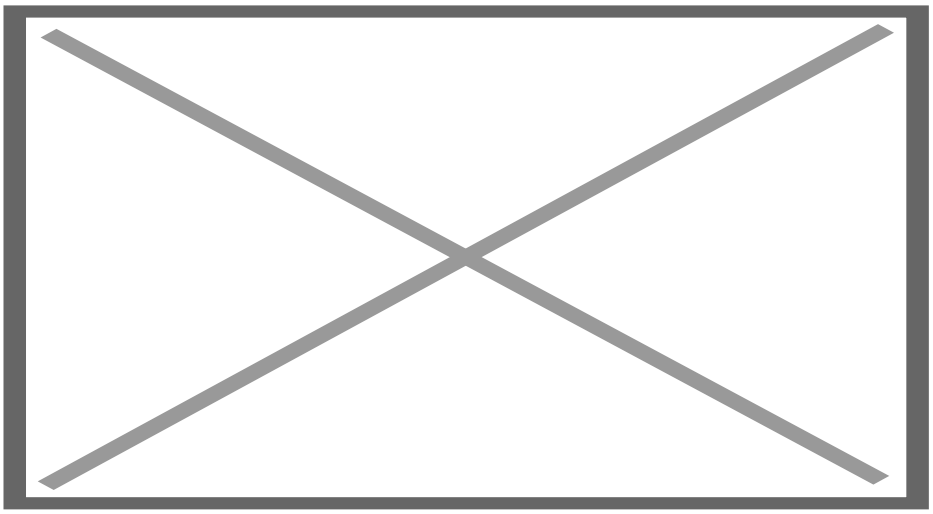
Students selected for the M1 programme choose to spend their first semester at Paris Saclay or Salamanca. For the second semester, they choose between Rome (focusing on accelerators and gravitational wave detectors) or Lund (focusing on lasers and femtosecond or attosecond physics). The third semester is spent at Paris Saclay with M2 GI/PLATO students. After a core curriculum and several immersion sessions on the major facilities at the Saclay plateau, students gradually specialise in one of three areas: intense lasers, accelerators, or gravitational wave detectors. The semester ends with a thematic winter school. The Master's programme concludes with a 5-month Master's thesis in a research laboratory or a company in the field.

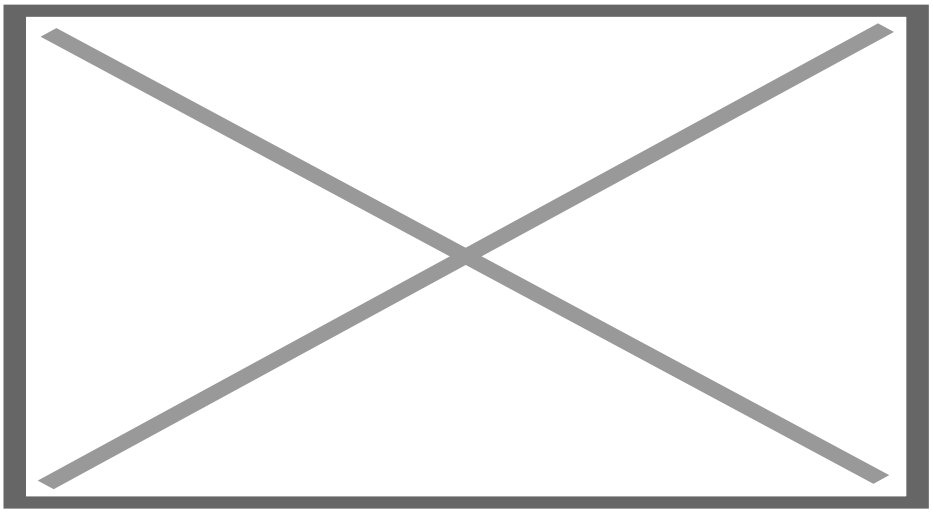
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Information

- Overview
- Application requirements
- Schedule

Présentation

Skills

Students acquire solid knowledge of accelerator physics, intense lasers and their interaction with plasmas, as well as gravitational wave detection. Cross-disciplinary skills are also taught, such as cross-disciplinary technologies and large project management. Students also acquire experimental skills, the ability to work in groups and, of course, to work and express themselves in a highly international context.

Objectives

The LASCALA master aims at training experts in the most advancedexperimental and theoretical tools and concepts in accelerators, high power lasersand associated advanced sources, as well as in their applications for science and society. The LASCALA master was created in the frame of theEuropean universityalliance for Global Health -EUGLOH, coordinated byParis-Saclay University, withLund University,Sapienza University of Romeand theUniversity of Szegedas partners. The students will be ready to develop innovative ideas and enterprises related to large scale facilities. This course addresses an increasing demand for highly skilled scientists and engineers ready to contribute to this adventure and enter the job market with solid skills.The programme includes classes, tutorials, project

- and research-based trainings. Students will take advantage of seminars by international speakers, up-to-date technology demonstrations, as well as visits and practices on large scale facilities (e.g. Synchrotron SOLEIL, Pettawatt laser APOLLON, Proton Therapy Centre of Orsay, Lund Laser Centre, MaxIV synchrotron, ELI-ALPS laser facility, SPARC particle accelerator, FLAME multiterrawatt laser, CERN, etc.).Students must complete their training with a 6-month internship in the academic sector or in the industry.An intensive summer school also fosters the students' entrepreneurial skills including economy management, communication, patent law, and technology transfer courses so they can face the job market.The strong partnership with SMEs and research & innovation centres allows the students to strengthen their professional skills and build their international network.The medium of instruction is English.Scholarships are available. Look the website for precise dates:https://master-lascala.eu/

Débouchés

Further Study Opportunities

R&D researcher or data modelling and analysis expert in leading-edge companies or laboratories.
Data Scientist, Data Analyst, Ingénieur·e en Machine Learning dans des secteurs innovants (tech, finance, santé, énergie, etc.) ;
PhD
PhD thesis

Admission

Admission Route

Physics

Capacity

Available Places

25

Target Audience and Entry Requirements

Students recruited for this programme are enrolled in the first year of a Master's degree (M1 level) for a period of two years. The target audience is students who are comfortable with the international context of research, the use of English in teaching, and who have a solid foundation (Bachelor's degree level) in fundamental or applied physics.

Période(s) de candidature

Inception Platform

From 30/01/2026 to 25/04/2026

Supporting documents

Compulsory supporting documents

Copy of passport.

Motivation letter.

All transcripts of the years / semesters validated since the high school diploma at the date of application.

Certificate of English level.

Curriculum Vitae.

Additional supporting documents

VAP file (obligatory for all persons requesting a valuation of the assets to enter the diploma).

Supporting documents :
- Residence permit stating the country of residence of the first country
- Or receipt of request stating the country of first asylum
- Or document from the UNHCR granting refugee status
- Or receipt of refugee status request delivered in France
- Or residence permit stating the refugee status delivered in France
- Or document stating subsidiary protection in France or abroad
- Or document stating temporary protection in France or abroad.

Programme

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	
Compulsory courses Paris-Saclay									
European history of science and communication of research results(EHS)	3	Semestre 1							
Charger le détail									
Mathematical and statistical methods: from big data to relevant information	3	Semester 1	20	5	5				
Charger le détail									
Quantum Solid State Physics	6	Semester 1	28	20					
Charger le détail									
Nuclei	4	Semester 1							
Charger le détail									
Atoms, Molecules and Optics	4	Semester 1							
Charger le détail									
Experimental Physics	6	Semester 1			48				
Charger le détail									

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	
experimental physics and free option	6	Semestre 1							
Charger le détail									
Physics for a sustainable world	0	Semestre 1							
Charger le détail									
Optional path Paris-Saclay (Choice of 1 among 3)									
Path 1: Femto and attosecond									
plasmas	3	Semestre 1	12	12					
Charger le détail									
lasers	3	Semestre 1	12	12	7				
Charger le détail									
Path 2: Accelerators									
particles	3	Semestre 1	12	12					
Charger le détail									
plasmas	3	Semestre 1	12	12					
Charger le détail									
Path 3: Gravitational wave detectors									
lasers	3	Semestre 1	12	12	7				
Charger le détail									
joint winter school introduction to gravitational waves	3	Semestre 1	12	12					
Charger le détail									

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	distan learni cours

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
Path 1: Femto and attosecond - Compulsory courses								
Advanced Optics and lasers Charger le détail	7.5	Semestre 2						
Optoelectronics and optical communications Charger le détail	7.5	Semestre 2						
Optional courses Lund University (2 to be chosen)								
Accelerators and free electron lasers Charger le détail	7.5	Semestre 2						
Biophotonics Charger le détail	7.5	Semestre 2						
Electro dynamics Charger le détail	7.5	Semestre 2						
Light matter interaction Charger le détail	7.5	Semestre 2						
Modern X-Ray physics, diffraction and imaging Charger le détail	7.5	Semestre 2						

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
Path 2: Accelerators								
Compulsory courses (accelerators)								
Physics laboratory in Frascati Charger le détail	9	Semestre 2						

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
Detectors and accelerators in particle physics	6	Semestre 2						
Charger le détail								
Advanced Machine Learning for Physics	6	Semestre 2						
Charger le détail								
Accelerator Physics and relativistic electrodynamics	6	Semestre 2						
Charger le détail								
Optional course (accelerators)								
Particle Physics	6	Semestre 2						
Charger le détail								
Laboratory of data analysis	6	Semestre 2						
Charger le détail								
Path 3: Gravitational wave detectors								
Physics laboratory in Frascati	9	Semestre 2						
Charger le détail								
Laboratory of data analysis	6	Semestre 2						
Charger le détail								
Advanced Machine Learning for Physics	6	Semestre 2						
Charger le détail								
Experimental gravitation	6	Semestre 2						
Charger le détail								

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
Gravitational Waves, Compact Stars and Black Holes	6	Semestre 2						

Charger le détail

Contact

- **Sophie Kazamias**

http://www.universite-paris-saclay.fr/formation/master/physique-fondamentale-et-applications/m1-large-scale-accelerators-and-lasers-erasmus-mundus-lascala