

Studying physics

AT UNIGE



UNIVERSITÉ
DE GENÈVE

FACULTY OF SCIENCE

Message from the President



The Physics Section of the University of Geneva (UNIGE) is a recognized center of excellence, both for the quality of its teaching and the vitality of its research, as well as for its active role towards society.

Teaching lies at the heart of our mission, and we are committed to offering our students a rich and stimulating learning environment. Our pedagogical approaches are constantly evolving to meet the highest academic standards and address today's major scientific challenges. With this in mind, we have thoroughly revised our Master's program, launched in the fall of 2024. This redesigned curriculum offers in-depth and flexible training, enabling each student to acquire a strong specialization while developing essential transferable skills for the future.

Another strength of the Physics Section is its human scale, which fosters personalized support and direct exchanges between teachers and students. Thanks to an especially supportive environment, our internationally renowned professors and researchers remain available to guide students at every stage of their academic journey.

Located in the heart of Geneva, UNIGE also provides a wide range of services to ensure an optimal study environment. The Physics Student Association, for its part, plays a key role in enriching both academic and social life.

In research, the Section stands out for its exceptional scientific level and recognized dynamism. Its activities are structured around four main areas: theoretical physics, particle physics, quantum materials, and quantum applications.

Each year, our researchers publish an increasing number of articles in leading journals, confirming the international visibility of our work. Indeed, the 15th place obtained in the 2025 Shanghai ranking highlights the excellence of physics at UNIGE and places it at the top among Swiss institutions in the field.

Our mission naturally extends beyond the strictly academic framework. In today's world, profoundly shaped by technology, it is essential to share science with the general public. Since 2007, we offer science outreach activities through the Physiscope, a laboratory-theater created with the National Research Center MaNEP, which makes physics accessible to everyone. The ATHENA program, meanwhile, allows upper secondary school students to attend university courses in physics and mathematics, giving them a first-hand experience of academic life.

Finally, with a strong focus on the future, the Section is actively involved in the Physics and Mathematics Science Center (CSPM) project, scheduled to open in 2031 on Quai Ernest-Ansermet. This future building dedicated to research and teaching will strengthen Geneva's position in the international scientific landscape while offering the public new places for discovery and exchange.

Through this brochure, you will find detailed information about our physics programs, research topics, and outreach activities. We hope these pages will spark your interest and inspire you to learn more about our Section!.

Antonio Riotto, Physics Section President.

A handwritten signature in black ink that reads "Pietro Antus".

Studying physics at UNIGE

The Physics Section is deeply committed to its mission to educate and mentor its students. The teaching staff strive constantly to take their teaching practices to the next level.

The physics curriculum follows the model drawn up in the Bologna Agreement: a three-year bachelor's degree offering 180 ECTS credits, followed by a two-year master's granting 120 ECTS credits, and a doctoral thesis over three to five years.

From the first year of the bachelor's degree onwards, a sizeable chunk of the teaching programme is devoted to experimentation, with the second year of the master's in particular spent in a laboratory research group. In addition,

advanced maths and computer science play a prominent role, since they are vital for physics students to progress in their university courses.

University registration takes place before April 30 of the current year (February 28 for students who require a visa). Furthermore, although the University of Geneva is French-speaking, from the master's degree onwards all courses are delivered in English.



Assets

Excellent student-teacher ratio

The Physics Section has a unique student-teacher ratio with one teacher for every six students. The teaching team consists of professors, post-doctoral fellows and graduate teaching assistants. Thesis students also supervise other students, for the most part during exercise sessions and practical work.

Comprehensive range of courses

Physics at UNIGE includes a very wide choice of courses. These prepare the ground for a number of pathways and specialisations not just in physics but also in astrophysics and other trans-disciplinary specialist fields.

Outstanding supervision and personal relations

The teaching staff is at the leading edge of teaching and educational methods. But there is also a friendly, family-like atmosphere here. The fact that the teaching team is always close at hand helps our students thrive and flourish.

Ground-breaking research

A university is not just about teaching, it is also about research, and UNIGE's Physics Section is a world leader in its fields. In 2025, the Section was 15th in the Shanghai Ranking of the world's top universities. This has a direct impact on the quality of the qualifications we award.

Worldwide recognition

The University of Geneva is a signatory to the Bologna Agreement: degrees awarded at UNIGE are compatible with the vast majority of European universities, which gives our student body great mobility in Europe. Thanks to the quality of the teaching and research in the Physics Section, the degrees awarded here are recognised across the globe.

An international environment

Our strong links to a host of institutions – not to mention our contributions to the largest scientific collaborations worldwide – means that the Physics Section is a forum for international discussion and debate. This facilitates the mobility of our students and boosts recognition of the qualifications awarded here.

Multi-disciplinary

Students touch on many different fields when studying for a degree in physics: not just physics itself – of course! – but also maths and computer science. This wide-ranging approach helps students acquire an open mind and a methodology that helps them adjust to multiple challenges, with many graduates turning to very diverse professional careers.



Physics study plan



Bachelor - 3 years

Mathematics: analysis, algebra

Computing: programming, algorithms, numerical methods

Basic physics: mechanics, electrodynamics, thermodynamics, quantum and statistical physics

Introductory course: particles and nuclei, solids, astrophysics, quantum optics

Elective courses and practical work

Careers

Computer science, finance, science journalism, etc.



Master - 2 years

Master in physics

Orientations:

- Quantum science and information
 - Quantum optics
 - Quantum materials
- Particle physics
- Physics of complex systems
- Theoretical physics
- Cosmology and astrophysics of particles

Master in astrophysics

Provided by the Department of Astronomy

Personal work in a research group



PhD - 3 to 5 years

Specialised education

Personal research work

Integration in a research group

Publication of results

Participation in teaching

Careers

Research, education, industry, management, finance, medical applications, meteorology, climatology, energy, environmental applications, etc.

Bachelor's degree - 180 ECTS credits

The bachelor's degree in physics provides a solid basic training in conventional and quantum mechanics, electrodynamics, thermodynamics and statistical mechanics. The bachelor's also introduces students to solid-state physics, astronomy, astrophysics, applied physics and particle physics. In addition, the course includes the acquisition and development of the mathematical and IT tools used in physics and the natural sciences in general. Obtaining a bachelor's degree gives students access to master's degrees in physics, astrophysics and joint science degrees.

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Master's degree - 120 ECTS credits

The master's in physics gives students an intensive training that includes specialisations in different subject areas: quantum information science (which is split into two streams: quantum optics and quantum materials), theoretical physics, particle physics, physics of complex systems, cosmology and particle astrophysics. This training and the internships give students the opportunity to work very closely with prestigious institutions such as CERN or the Paul Scherrer Institute (PSI). It also provides a solid base in modern physics and in-depth expertise specific to a specialised field. The master's in physics is an ideal entry point for professional and academic careers – such as research, teaching or industry – where the skills of physicists are in great demand. The degree also equips students with a modelling capacity that is highly valued in economics and finance.

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Doctorate

A thesis is much more than an individual piece of work: it is an adventure that prepares students for research and teaching. In addition to their research, which is always carried out under the auspices of a professor, students take courses, attend conferences, teach and give seminars. The thesis is usually undertaken in a student's specialist field, chosen in the third year of his or her bachelor's degree or during the master's, and lasts for between three and five years.

You're following in their footsteps...



«I was lucky enough on my physics course at UNIGE to have top-quality teaching and to make the most of the different courses on offer and the huge freedom to custom-build my course. What I liked in particular was the study environment provided by this Section, which is on a human scale. It makes it easier to be in contact with the teaching staff and showcases the current research being done here. It also means you're more likely to bump into people and exchange ideas – and it encourages students to support each other.»

Gaëtan, physicist



« I did all my studies at the University of Geneva from my first degree to my thesis. I really enjoyed the close relationships you have with all the teaching body, and the fact they're always available. Our year group was small, and there was a very good team spirit among the students. What's more, I was able to take part in the Physics and Faculty of Science student associations, and they're my fondest memories! »

Julien, engineering physicist

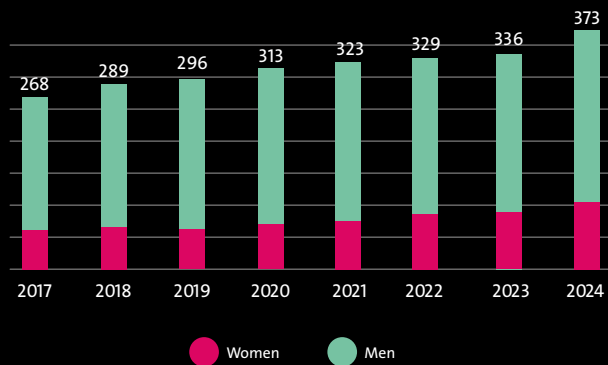


«Studying at UNIGE is very flexible, and you can organise yourself how you want. You have a lot of contact with the other students. You're all in the same boat together, which creates very strong bonds. The way you chill out at the university is also really cool, it's always cheerful and the atmosphere's very good. It really does feel like one big family! »

Florian, Manager in reforestation company

Physics Section in figures

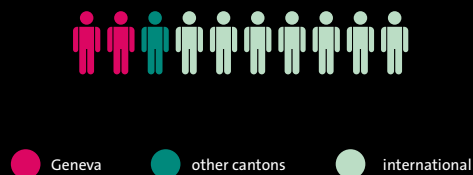
Evolution of the number of students



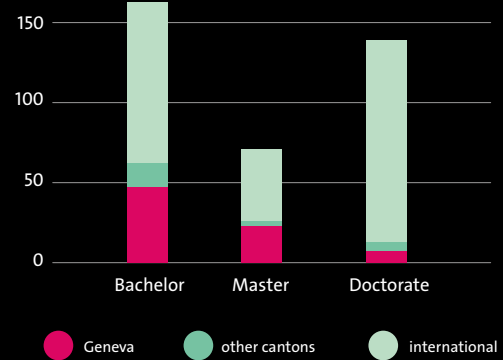
Student teacher ratio



Origin of students 2024-25



Origin of students 2024-25
Per level



Student Life

The Physics Student Association (AEP)



The AEP brings together physics students at the University of Geneva, mainly at bachelor's and master's level. Its aim is not just to promote discussion, debate and mutual assistance by connecting physics students of all levels, but also to provide support if a student encounters a problem with his or her course, exams or university administrative procedures.

The AEP has set up weekly rehearsals for its members, with the second and third year student body volunteering to help the first years with their series of exercises. As well as developing a mentoring system for first year students, the AEP also runs a study room reserved for physics students and WhatsApp groups for each year so that information can be disseminated rapidly.

The AEP enjoys excellent relations with the Physics Section and its teaching staff, which facilitates exchanges or better mediation in the event of a conflict.

Last but not least, the AEP works closely with the Association des Étudiants en Sciences (AESc), which is responsible for student life across the science campus and which, over time, has developed good relations with student associations across all sections in the Faculty of Science.

The AEP also boasts a very rich community life outside the classroom, organising a number of events throughout the year (barbecues, parties, and the like)! In short, the association exists because, although studying physics may be stressful, life beyond your studies does not have to be!

A healthy mind in a healthy body



The university boasts an exceptional environment in which it pays special attention to the well-being of its students and staff. It offers a wide range of services to help its members work and study in the best possible conditions.

Everyone can discover at least one supervised physical activity among the very many put on by the university's sports department.

The mental health service is available for members of the university community who want to express themselves freely and access psychological support in complete confidence and with total confidentiality.

In addition, the welfare centre provides support and assistance for resolving any financial problems thanks to its welfare service that give students the tools they need to complete each course in the best living conditions.





Research at UNIGE

The University of Geneva has a strong tradition of excellence, as reflected in the growing number of scientific papers and the Physics Section's very high position in most international rankings. It is the leading Swiss institution in the Shanghai 2023 league table, where it lies in 19th place. Furthermore, the 2019 Nobel Prize in Physics was awarded to two researchers in the Department of Astronomy: Michel Mayor and Didier Queloz – incontrovertible proof of the avant-garde and visionary quality of the research conducted at UNIGE.

The funding awarded by the Swiss National Science Foundation (FNS), which is bigger every year, and the European Union are further evidence of the vibrancy of the University's research activities.

Members of the Section have extremely diverse profiles, with backgrounds in physics, IT, electronics, mechanics, administration or even student profiles. These broad

skillsets, interests and areas of activities are a major asset for the Section's research in this extremely collaborative, international environment.

The Section undertakes a host of projects with other scientific disciplines, such as biology, chemistry, climatology and maths. The Physics Section has been particularly active in setting up four intra-faculty research centres in five fields: the science of gravitational waves, quantum sciences and technologies, the physics of biology and life in the universe.

« If we consider a theory perfect and stop verifying it by daily scientific experience, it becomes a doctrine.»

Claude Bernard, physician (1813 -1878)

Axes de recherches prioritaires

Theoretical physics

Cosmology and astroparticles
Mathematical physics
Quantum physics of condensed matter
Physics of biological systems
Particle physics

Particle physics

Collider physics
Astroparticle physics and multi-messangers
Neutrino physics
Machine learning applied to physics
Detector development

Quantum matter

Artificial materials at the atomic scale
Superconductivity
Oxide interfaces
Ferroelectrics, multiferroics
Strong light-matter coupling and non-equilibrium
Quantum matter theory

Quantum applications

Biophotonics
Non-linearity and climate
Quantum electronics
Communication and quantum technologies
Quantum information theory

You're following in their footsteps...



« Doing a thesis isn't just a great experience for research or a first job. Depending on the direction you're thinking of taking, it's also an opportunity to explore experimental techniques that are more closely connected to the world of industry and fundamental research. It's the best way to build up your profile so you can make the transition to a professional future as simple as possible, whatever it may be. »

Alexandre, engineering physicist



« You have to be able to come up with a lot of ideas if you want to do research in physics, and demonstrate creative thinking, a passionate interest and dedication. But one of the most important things is communication: for funding requests, where you need to explain the science behind what you want to do and put it in context, or to make the research accessible to everyone. »

Xavier, assistant professor



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Theoretical Physics

The Department of Theoretical Physics (DPT) works in close collaboration with the other departments of the Physics Section as well as with renowned international teams, focusing on five main research areas. In cosmology, it explores inflation, dark energy, and modified gravity, relying on experimental data from missions such as the Planck and Euclid satellites. In quantum field theory (QFT) and gravity, it investigates non-perturbative structures of QFT and its unification with general relativity, complemented by work in high-energy phenomenology.

In condensed matter, the DPT studies collective states of matter, particularly out of equilibrium, at the interface with quantum information theory. It is also involved in the study of gravitational waves to probe the Universe, in anticipation of future advances with the Einstein Telescope. Finally, the DPT investigates the physics of active matter in connection with biology, strengthening its interdisciplinary collaborations.

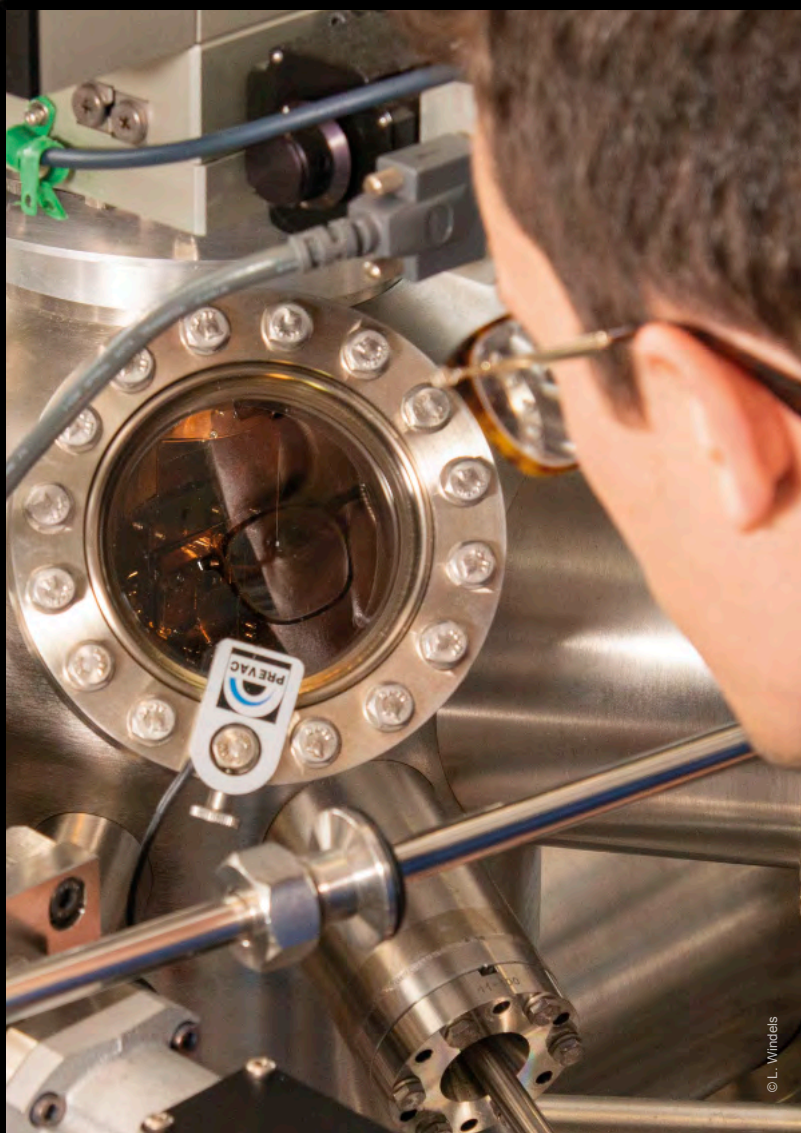
This intense synergy between theorists and experimentalists, both locally and internationally, fosters an exceptional scientific dynamism.

Quantum Matter Physics

The Department of Quantum Matter Physics (DQMP) investigates the fundamental properties of matter and pioneering electronic functionalities. Its research, both theoretical and experimental, focuses on atomically controlled synthetic quantum materials, such as thin films, oxide superlattices, and van der Waals heterostructures. The DQMP employs state-of-the-art techniques such as scanning tunneling microscopy, electron-beam lithography, photoemission spectroscopy, and ultrafast optics.

Its work spans strongly correlated electron materials, applied superconductivity, and innovative single crystals. In collaboration with industry, it develops cutting-edge technologies such as a new marking technique for the watchmaking and medical sectors, as well as superconducting wires for record magnetic fields, essential for spectroscopy and accelerators.

As the second quantum revolution unfolds, the DQMP offers unique prospects in a field at the forefront of science and technology.



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Nuclear and Particle Physics

The Department of Nuclear and Particle Physics (DPNC) conducts research at the frontier of fundamental physics. Its aim is to understand both the fundamental laws governing subatomic particles and certain extreme phenomena in the Universe, such as the incompleteness of the Standard Model of particle physics, dark matter, matter–antimatter asymmetry, astrophysical magnetic fields, particle acceleration processes in the Universe, and gravitational waves. The DPNC's multidisciplinary approach ranges from particle collisions to multi-messenger astrophysics, with both ground-based and space experiments.

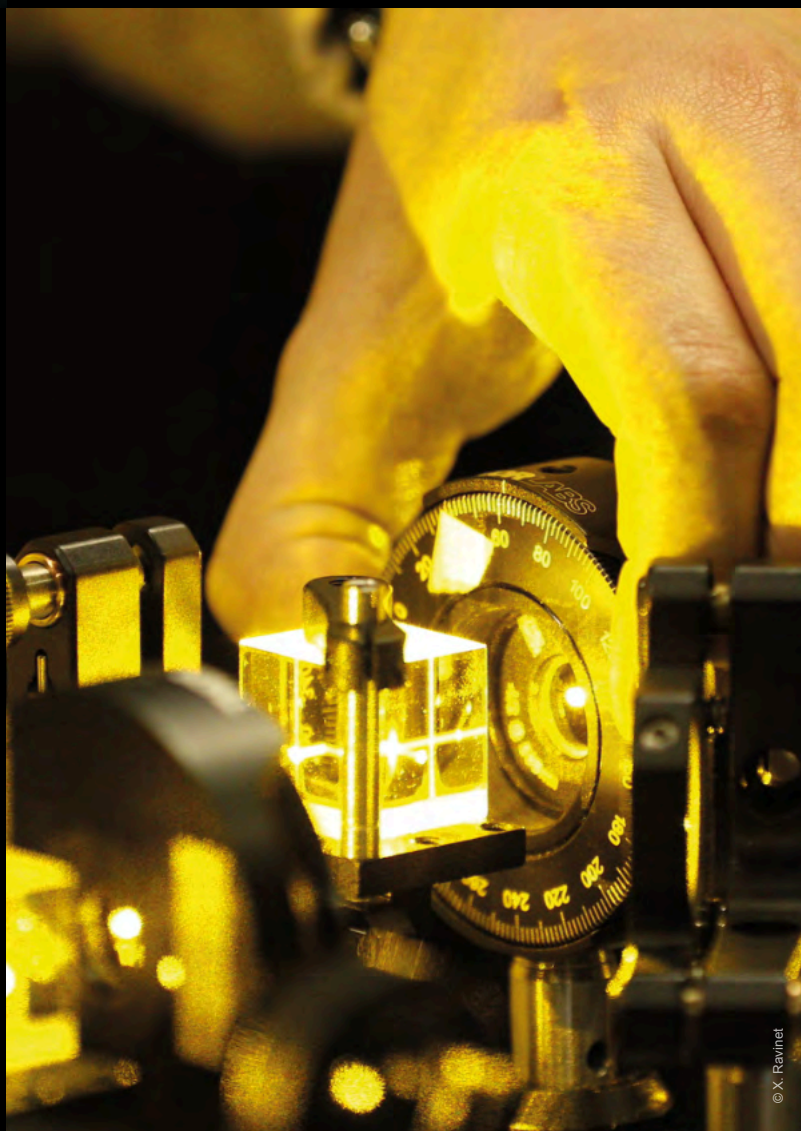
As part of major international collaborations, the DPNC develops innovative technologies such as particle detectors for terrestrial and space experiments, as well as tools for detecting gamma radiation, cosmic rays, and neutrinos. Many of these innovations also find medical applications, including imaging, proton therapy, and radio guided surgery. Finally, the DPNC applies machine learning across various fields of physics, reinforcing its role in modern, dynamic, and international research.

Applied Physics

Physics goes far beyond fundamental laws, driving innovations that benefit society. The Department of Applied Physics (GAP) plays a central role in developing applications arising from its research, with a particular focus on technology transfer to industry.

In biophotonics, GAP develops processes to monitor and control biological and atmospheric systems, with applications such as pollutant detection, bacterial identification, and lightning control. In quantum communication, it advances unbreakable cryptography and quantum optics tools, in collaboration with specialists in quantum information and thermodynamics.

GAP also studies nonlinear physics (lasers, ocean waves, climate) and ultra-thin materials for innovative optoelectronic devices. Active and prolific, it prepares students and researchers for careers in both industry and academic research, combining fundamental knowledge with concrete applications.



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Services to the wider community

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The Physics Section strives to make science more accessible to everyone, creating opportunities to bring it closer to the general public. It promotes science through a range of innovative actions in order to educate and inform people, especially young people, about the fascinating aspects of its cutting-edge research and science.

Physiscope



The PhysiScope, which was created with the MaNEP National Research Centre, aims to give a fun and interactive introduction to science using **discovery workshops**. It is constantly adjusting its curriculum to meet the latest developments and advances in its field. External institutions regularly call on the PhysiScope's expertise in **scientific mediation**, which is recognised at European level, to help them develop their public-facing activities.

Athéna



The Physics and Mathematics Sections have also devised the Athéna **early study programme** as a way of encouraging young people **to embark on scientific careers**. Athéna is intended for college and sixth-form students in their penultimate or last year at school who are keen to find out more about studying at university, and possibly even to get a head start in their studies.

Scientify



As **scientific mediation** and **communication** develop at an increasing pace, the Physics Section has created Scientify: the first scientific media laboratory of its type at UNIGE. Scientify is dedicated to promoting its research activities. Its aim is to produce and create new scientific, **“edutaining”** and **educational** content that is access-free and rights-free. This content is intended for the media, social networks, general public and scientific community.

Laboratory of Advanced Technology (LTA)



The LTA was set up by the DQMP in collaboration with Geneva HES-SO. Today it is a key platform for the Faculty of Science and innovation in Geneva. The LTA gives companies and academic partners easy access to UNIGE's and HES-SO's leading-edge equipment and expertise, including the Physics Section's.

You're following in their footsteps...



«I was lucky enough to put on scientific activities for schools at the PhysiScope on a wide range of physics topics. I thought it was great because it was really varied, with students from all walks of life, and there were always different questions. It was every Tuesday, and I never knew whether it would be easy or hard, and so I learned a lot about teaching and listening »

Rebecka, physics teacher



Practical Information

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UNIGE: a European, global university

Geneva is the westernmost city in Switzerland, located in a canton on a human scale that is close to the Alps and France. It is the country's diplomatic capital, host to most international organisations (UN, WTO, WHO, CERN, etc.), boasting an ideal location in the heart of Europe. Geneva is a very cosmopolitan city, home to a great number of people from all walks of life and all sorts of geographical and cultural backgrounds. In other words, it is the ideal place to grow your personal and professional network!

Europe on the doorstep

The Physics Section and UNIGE are blessed with an ideal location in the centre of international Geneva. They are close to the Cornavin and Eaux-Vives train stations, giving easy access to France and most major cities and foreign capitals in a matter of hours. Although Geneva is not the biggest of cities, it is home to an international airport with good connections, which makes it easier to develop and grow our international activities.

Surrounded by lakes and mountains

Switzerland ranks in fourth place in the list of the "happiest" countries worldwide, and Geneva is a highly liveable city. Ideally located at the crossroads of Lake Geneva, the Jura and the Alps, it gives access to endless cultural, sporting and outdoor activities. Geneva is a very dynamic city on a human scale with many and varied attractions, cultural centres and places of entertainment to suit everyone's tastes, no matter what they are looking for!

A university at the heart of the city

Spread over a number of different sites, the University of Geneva lies at the heart of the city. You can find the Physics Section, which is part of the Faculty of Science, on the banks of the river Arve in the Quartier des Bains, a short walk from the Plaine de Plainpalais (the esplanade made famous by Mary Shelley's *Frankenstein*), the Promenade des Bastions and the old town of Geneva.

Science meets culture in Geneva

The Quartier des Bains is one of Geneva's most dynamic districts, home to a number of art galleries, museums, theatres and concert venues. It is an extremely lively area, both during the day and in the evening. The nightlife makes it a very popular area for students, due to its numerous restaurants and bars.

Address and telephone

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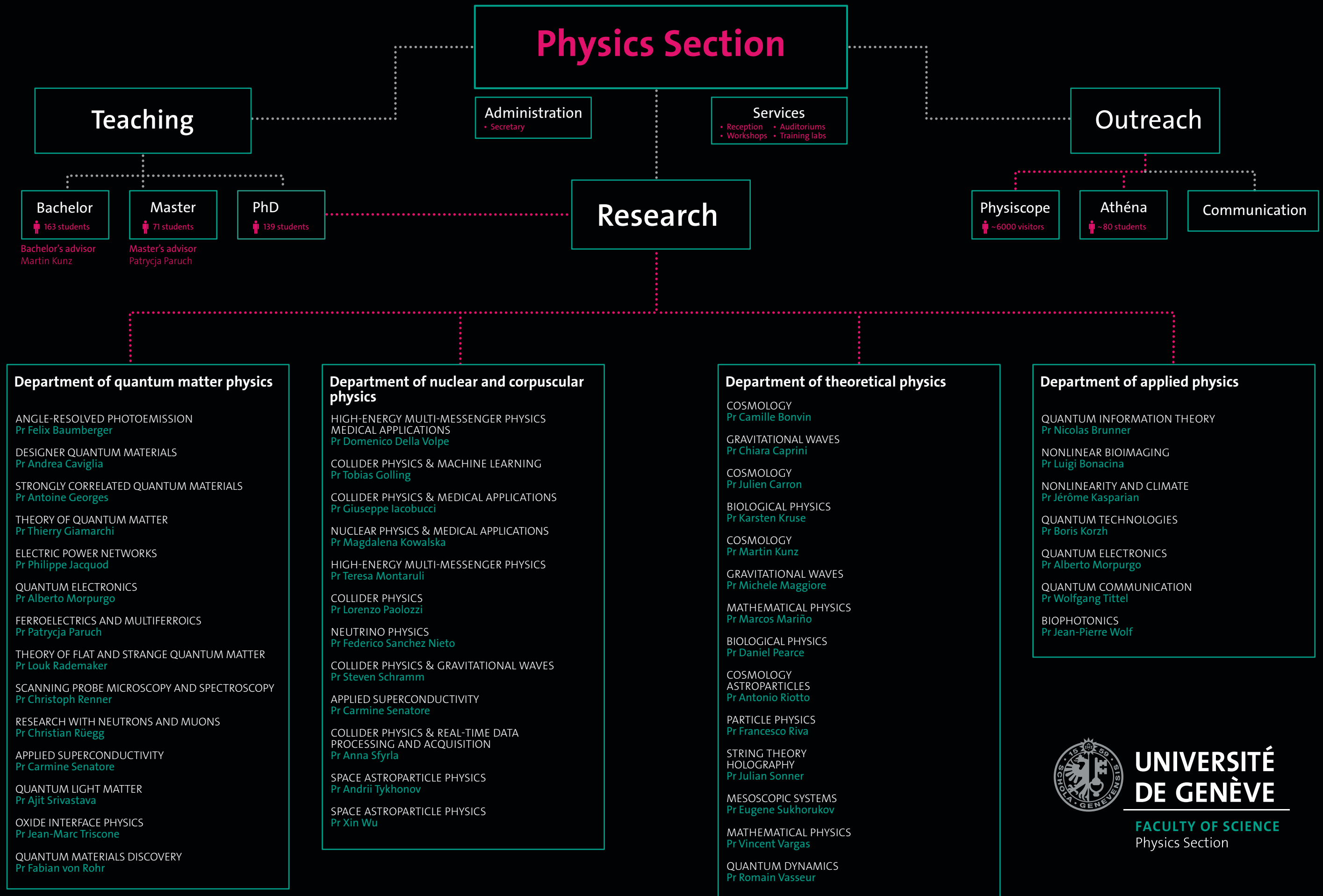
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registration





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