

University of Trento
Department of Physics
English-taught Masters
www.physics.unitn.it/en



UNIVERSITY
OF TRENTO - Italy
Department of Physics



The Department of Physics

Experimental Physics, Theoretical and Computational Physics, Chemical Physics, Applied Physics and Communication of Physical Sciences are investigated in the Department of Physics of our University. Our researches span from cosmology to nuclear, molecular and atomic spectroscopy, from supercomputing and simulation of complex systems, to biophysics, organic chemistry, research in education, from gravitation to solid state physics, photonics, nano-science and medical physics. We aim at studying the basics and the fundamentals as well as to develop new experiments, new set-ups or new applications. We transfer our findings into our teaching activities to form young professionals and young researchers in physics as well as to society through specific actions in science communication and in nurturing spin-offs or industrial collaborations. We are also interested in interdisciplinary research, specifically between Physics and Chemistry, in such different fields as life science, health, biology, materials, energy and environment, mathematics, informatics and telecommunications.

The current staff of the Department consists of about 40 researchers and professors along with about 30 units of technical and administrative staff. About 40 PhD students and almost 80 fellows and visitors are also associated with our Department. The Department is organized in laboratories and hosts centralized technical services in electronics, mechanics and cryogenics.

There are various forms of scientific collaborations and participations in research projects between the Department and different organizations and agencies, such as INFN (National Institute for Nuclear Physics), CNR (National Research Council), ASI (Italian Space Agency), ESA (European Space Agency), and the European Union. Many research units from these organizations are directly hosted within the Department. Significant funds also come from private, local companies engaged in scientific and technological research and the dissemination of scientific culture. Strategic collaborations exist with the Bruno Kessler Foundation, the Edmund Mach Foundation, the Science Museum of Trento, ECT* (European Centre for Theoretical Studies in Nuclear Physics and Related Areas) and other institutions headed by, among others, the Department of Knowledge of the Autonomous Province of Trento.

The Department coordinates a Bachelor's Degree Course in Physics and a Master's Degree Course in Physics. It also runs a PhD School in Physics and offers various courses to the whole University, as well as a training programme for future secondary school teachers. We are very proud of our teaching activities and we dedicate a lot of efforts to prepare young professionals and researchers. Teaching is organized in a first three-year Bachelor's Degree Course in Physics (in Italian) and in a second two-year Master's Degree Course in Physics (in English). Specifically, the Master has two distinct study programmes, i.e. Theoretical and Computational Physics and Experimental Physics, with several proposed tracks along all the research activities of the Department. Students are exposed to an international environment and have the opportunity to receive a hands-on training due to the large number of laboratory courses. We organize also two joint Master's degrees with Tübingen University in Germany and SISSA in Trieste, Italy. We host many foreign students which account for 20% of all Master's Degree Course students.

Living in Trento

Trento is a city of around one hundred thousand inhabitants, located in the Dolomites mountain region, Trentino, of which it is the capital. Trento is a cosmopolitan city, with highly developed and organized modern social services. The city has a picturesque Medieval and Renaissance historic centre, with ancient buildings such as the cathedral and the ***Castello del Buonconsiglio***. The city often ranks high out of all 103 Italian cities for its quality of life, standard of living and business and job opportunities.

The city of Trento is also very well connected with many Italian and international destinations. Cities such as Rome and Munich can be easily reached in about four hours by train, while Verona international airport is only one hour from Trento.

In order to facilitate the arrival and stay of international students, the University of Trento operates a “Welcome Office”. The Welcome Office provides international students with a dedicated service by supporting them in the necessary administrative procedures related to their arrival and stay in Trento. The office facilitates the integration of international students in the University and in town and encourages the multi-cultural exchange between international and national students. The Welcome Office periodically organizes initiatives and social and cultural events open to all international guests with the aim to help them settle down, both at University and in the local community.

International students who come to Trento participating in a bilateral agreement, or in an international mobility programme, are entitled to on-campus accommodation at affordable costs.

Opera Universitaria is the provincial institution responsible for the management and organization of student accommodation facilities.

International students have free access to the five university libraries and receive a University card to access the five University canteens.





Master's course in Physics

The specific training objective of the Master's Degree Course in Physics is to provide students with the necessary instruments to establish a direct contact with at least one of the leading topics of physics research, bringing a personal contribution with their thesis work. Such aim is pursued in the belief that the opening to the research world will develop an innovative attitude among students, regardless of the sector in which this has been carried on. The whole course will be taught in English.

Programme overview

Degree Awarded	Master of Science in Physics
Intake	September
Duration	2 years
Teaching Language	English
Application deadlines	non-EU citizens living abroad: January/February each year EU citizens: September each year November for applicants graduated after October 31 st
Admission requirements	Bachelor's degree in Physics or related fields; B1 English language knowledge
Tuition fees and funding	Students may benefit from partial or total exemption from university tuition fees and grants to cover part of the living expenses
Further information	international.unitn.it/master-physics
Contacts	masterphysics@unitn.it

Study programmes

There are two main Study Programmes, i.e. **“Theoretical and Computational Physics”** and **“Experimental Physics”**, which consist of the following courses:

Theoretical and Computational Physics Study programme

Experimental Methods
Nuclear and Subnuclear Physics (Advanced)
Physics of Matter (Advanced)
Quantum Mechanics (Advanced)
Statistical Mechanics
Quantum field Theory
Many-Body Theory

Experimental Physics Study programme

Experimental Methods
Nuclear and Subnuclear Physics (Advanced)
Physics of Matter (Advanced)
Quantum Mechanics (Advanced)
Statistical Mechanics
Experimental Physics (Advanced)
One free-choice elective course among:
Laboratory of Advanced Electronics
Laboratory of Energy Conversion Processes
Laboratory of Advanced Photonics

In both study programmes students can attend 4 more courses in a specific scientific area. Furthermore, students gain 12 ECTS in free-choice activities, 3 ECTS in English language knowledge, and 39 ECTS in writing and defending their thesis.

The complete list of the available courses can be downloaded from
<http://web.unitn.it/en/dphys/6759/course-organization>

Career opportunities

Students finishing their studies will be in a position to perform with wide autonomy, taking up responsibility on projects and structures in the fields of research and scientific and technological innovation; they will be able to use their knowledge, according to their specific curriculum, for the planning of sophisticated instruments of measure or for the modelling of complex systems in various fields of sciences as well as in less scientific fields.

The Physics department has also excellent connections with industries. Every year students can participate in a competition to find solutions to practical industrial problems that need to be fixed by private companies. This event is called "Industrial Problem Solving with Physics". Moreover, private companies also sponsor some fellowships for PhD students in Physics.

For details visit <http://events.unitn.it/en/ipsp2016>



Master of Science in Quantitative and Computational Biology (QCB)

The Master of Science degree in Quantitative and Computational Biology (QCB) is a multidisciplinary degree that formally integrates quantitative sciences and applied biology, thanks to the involvement of the following organizations at the University of Trento:

- CIBIO, Centre for Integrative Biology
- Department of Physics
- Department of Mathematics
- Department of Information Engineering and Computer Science

The course focuses on a strategic area where technology and methodology enable students to face essential questions at the interface between fundamental research and clinical and pre-clinical areas, through analytical and quantitative approaches.

The course - entirely taught in English - is designed to capture the increasing need for researchers and experts able to transform the enormous amount of biological information ("big data") into knowledge, and to gain quantitative insight into the behaviour of biological systems by means of bio-mathematical and bio-physical models.

Key target areas include pharmacogenomics, biotechnology, food science, and precision medicine, which represent applied research fields where the growing availability of multidimensional data demands high interdisciplinarity.

The QCB course is designed to train **experts in biotechnology, computational biology, bioinformatics and biological data and systems biology analysis**, who will have the opportunity to learn in a multidisciplinary context, interacting with students with different experiences. Strong emphasis will be given to quantitative and computational aspects, with a focus on tools to analyse, model and understand biological systems and phenomena.

The course consists of two tracks, the "Biotechnological Track" and the "Computational Track".

Admitted students will follow one of the two tracks based on their educational background acquired in previous studies. The two different tracks offer the opportunity for students to integrate their background based on their first-level degree and individual preparation. In the first, second and third semesters, students will take different courses with a focus on biotechnological or computational topics. The fourth semester is entirely dedicated to the preparation of the thesis.

Students will have the chance to carry out research projects within the University of Trento organizations involved in the Master's Degree, at other Italian or European Universities, or in companies operating in the biotechnology, bioinformatics and computational areas.

Programme overview

Degree Awarded	Master of Science in Quantitative and Computational Biology
Intake	September
Duration	2 years
Teaching Language	English
Maximum number of admitted students	30
Location	Centre for Integrative Biology (CIBIO)
Application deadlines	non-EU citizens living abroad: January/February each year EU citizens and non-EU citizens living in Italy: June each year
Admission requirements	Bachelor's degree in biotechnologies, computer science, mathematics, physics or related fields; B1 English language knowledge
Tuition fees and funding	Students may benefit from partial or total exemption from university tuition fees and grants to cover part of the living expenses
Further information	international.unitn.it/mqcb
Contacts	masterbio@unitn.it

Career opportunities

Students of the QCB Master will be trained for the following professional profiles:

- Biotechnologist
- Computational Biologist
- Bioinformatics technician
- Biologists data and systems biology analyst

The profiles are characterized by a set of shared competences and by specific expertise in the field of biotechnology, information technology and/or mathematics and physics.

Graduates, trained for the above mentioned professions, will be able to use publicly available biological data and to work closely with biologists, clinicians, pharmacologists, engineers, epidemiologists in experimental research and pre-clinical context, in analysis/hospital laboratories, by using a common language.

Admission requirements

To be admitted to the QCB Master, students must have a first-level university degree, or another degree recognized as valid, in the fields of Biotechnology, Information Engineering, Life Sciences, Science and agro-food Technology, Sciences and Chemical Technologies, Pharmacy, Physics, Computer Science, Mathematics and have obtained at least 6 ECTS in the following area: Biology or Chemistry, Mathematics, Physics and Computer Science or Information Engineering. More details are available on the website: international.unitn.it/mqcb

An English language certificate of B1 level or equivalent is required if the Bachelor's degree courses were not taught in English. Each student must submit a complete online application package, which provides the University with fundamental information that the Admissions Committee will use to evaluate candidates on the basis of their proficiency, as well as on their potential to further develop their skills.

Courses

Biotechnological Track

Mandatory courses

1st year: Biostatistics; Scientific Programming; Genomics; Biotechnology Engineering 1st year

English B2 level (3 credits)

Three elective courses among:

1st year: Modern Physics; Bioinformatics; Biological Networks

2nd year: Computational Biophysics; Data Mining; Mathematical Modelling; Biotechnology Management and Regulations

Computational Track

Mandatory courses:

1st year: Molecular Biology of the Cell; Chemistry and Biochemistry; Biological Networks

2nd year: Mathematical Modelling

English B2 level (3 credits)

Three elective courses among:

1st year: Modern Physics; Bioinformatics

2nd year: Computational Biophysics; Data Mining; Biotechnology Management and Regulations

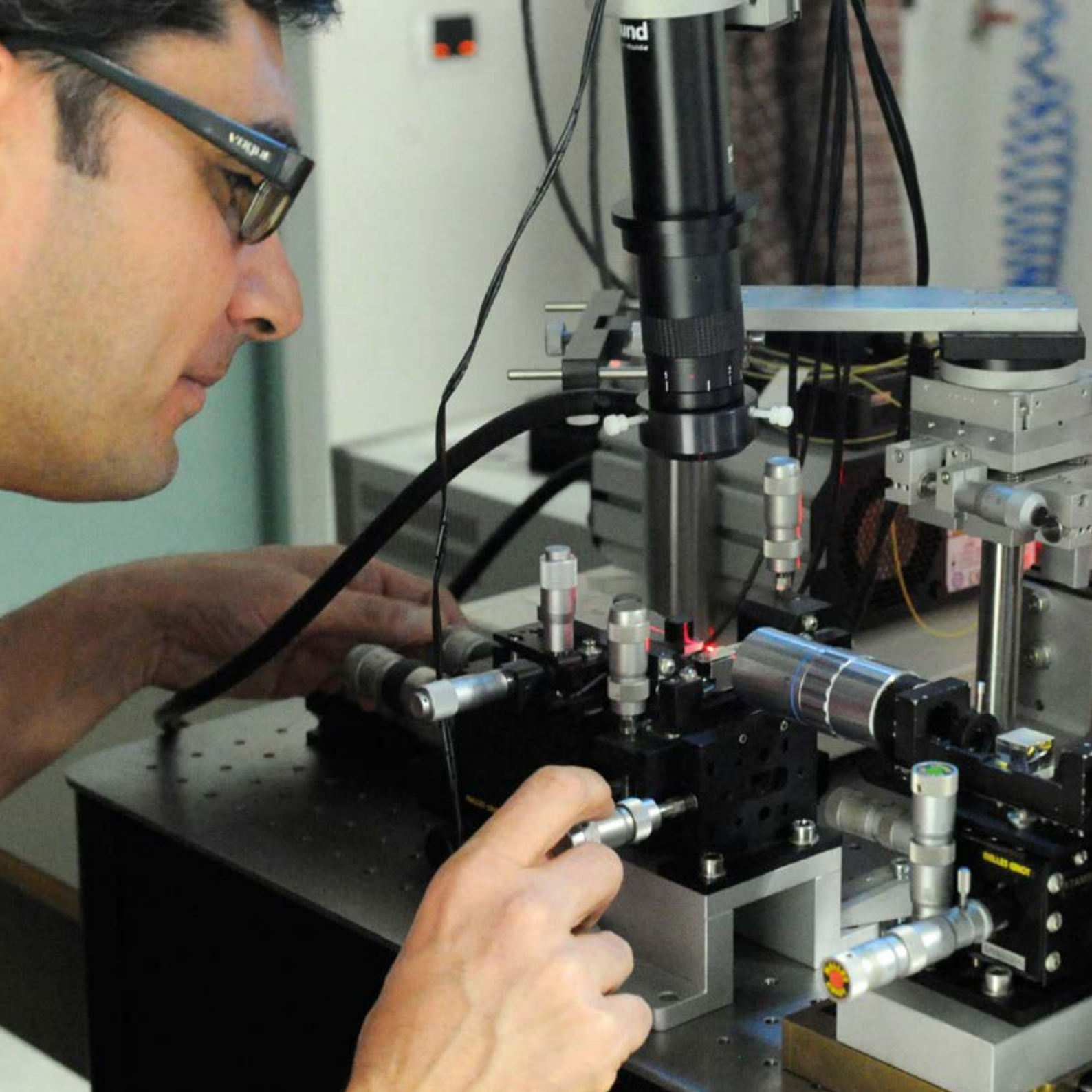
Additional credits for both tracks:

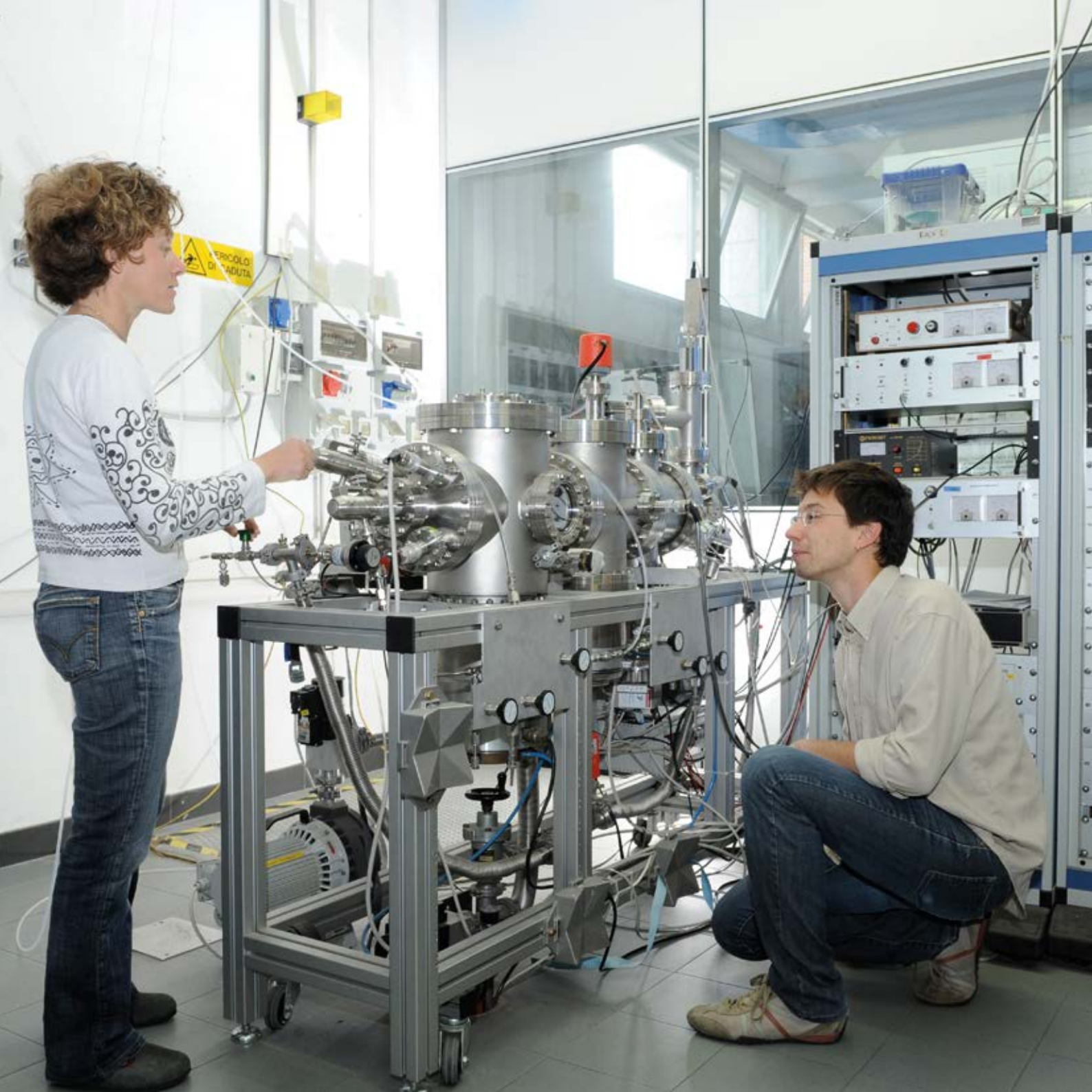
One free choice course

Traineeship

Thesis

Complete Programme 120 ECTS





ART> UniTrento

IMG> Archivio UniTrento (AgF Bernardinatti, A. Coser, fototonina.com)

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Contacts

International Staff - Science and Technology Area

via Sommarive, 5 – 38123 Povo (Trento), Italy

phone: +39 0461 283976

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