



UNIVERSITY  
OF TRENTO - Italy

Department of Physics

Doctoral Programme in Physics

Training programme a.y. 2015/2016

**TRAINING PROGRAMME**  
**Academic Year 2015/2016**  
**DOCTORAL PROGRAMME IN PHYSICS**



## Doctoral School in Physics Training Programme

The Doctoral Programme in Physics aims to provide students with the necessary skills for highly qualified employments at universities, public and private research institutions and industries.

The Doctoral Programme is the natural prosecution of the first and second level degree in Physics (Bachelor and Master degree).

The PhD programme in Physics is activated in accordance with the Ministerial Decree of November 3, 1999 n. 509.

The Doctoral Programme is organized and sponsored by the Physics Department. Some grants are offered by external institutions according to specific agreements.

The following local research Institutions collaborate with the Doctoral Programme providing the students with scientific support and access to their laboratories and infrastructure facilities:

- **CNR – Consiglio Nazionale delle Ricerche**

- IBF, Institute of Biophysics
- IFN, Institute for Photonics and Nanotechnologies
- IMEM, Institute of Materials for Electronics and Magnetism
- INO BEC, Research and Development Center on Bose Einstein Condensation, National Optics Institute

- **FBK - Fondazione Bruno Kessler, Trento**

- ECT\*- European Centre for Theoretical Studies in Nuclear Physics and Related Areas
- Center for Materials and Microsystems,
- LISC (Interdisciplinary Laboratory for Computational Science) – joint venture between FBK and University of Trento;

- **IIT – CNCS Center for Neuroscience and Cognitive Systems**

- **INFN – Istituto Nazionale di Fisica Nucleare**

- National Center TIFPA, Trento Institute for Fundamental Physics and Applications



The Doctoral Programme in Physics lasts three years. Candidates are admitted to it after passing a competitive examination. The doctoral training is based on research activities and attendance of advanced courses and seminars.

The courses are expected to be mainly attended during the first year aiming to complete the students' cultural background in physics. During the first year, all PhD students must select the subject of their thesis work among those proposed by the Physics Department. A tutor will be assigned to each student by the Doctoral School Committee. The research programme of the thesis is approved every year by the Doctoral School Committee.

### **Admission requirements**

The admission is opened to students, regardless of sex, age and nationality, having an Italian "laurea specialistica" or "laurea magistrale", instituted in compliance with Ministerial Decree no. 509 of 3.11.1999 and subsequent amendments, a university degree of the previous Italian regulations in force or an equivalent degree qualification obtained abroad.

As concerns the assessment of qualifications, the degree in Physics or in similar areas and subjects will be a preferential title.

Foreign Academic Degrees (Master's degree) must be comparable to the "Laurea Magistrale" in terms of duration and level. Based on this principle, the Admissions Committee will decide on their eligibility.

Admission to the Doctoral Programme is offered through a selective procedure, assessment of qualifications and oral examination. At the end of the selection the final ranking is posted on the website.

### **Dispositions on activities connected with the educational programme and compatible activities with the attendance of the Doctoral Programme**

Each student must fulfil the Doctoral Programme requirements by attending:

- Advanced courses of general characters
- Advanced courses for research training
- Research activity, followed by a tutor assigned by the Doctoral School Committee.
- Seminars organised by his/her own Research group
- Dialogues and Joint Colloquia organized by the Department of Physics also on topics different from the research activity carried out by the PhD students.



Other activities include:

- Summer/Winter Schools, scientific meetings either in Italy or abroad
- Research internship at laboratories other than those of the Physics Department

Each PhD student must attend courses corresponding to 12 credits by choosing advanced courses organized:

- by the Doctoral Programme in Physics (see annexes 1 and 2 to the present Training Programme)
- by the Master degree in Physics, or by other similar Master degree courses
- by other similar Doctoral programmes

PhD students can obtain up to 3 credits for the attendance of International Schools (Summer/Winter school, etc.) upon the authorization by the tutor and the Doctoral School committee and after passing an examination or giving a seminar.

Usually the training activity (courses), relative assessments included, ends **by the end of the first year, with an extension to the first semester of the second year limited only to courses activated in that time and only for up to 6 credits.**

For any exceptions PhD students must submit the request to the supervisor and to the tutor for the approval by the Doctoral School Committee.

Each study plan must be agreed with her/his tutor and then submitted to the Doctoral school Committee for the approval.

PhD Students, upon request to the Doctoral Programme Committee, may be required to carry out the following activities, to be considered as an integral part of their educational programme:

- a) Tutoring activities for undergraduate and graduate students;
- b) Integrative teaching activities, up to a maximum of 40 hours for the first three years of the programme;

The total commitment during the three year is up to a maximum of 100 hours. The annual limit of commitment is established by the University regulations for doctoral Programmes ( Art . 28 - Activities related with the training and commitments compatible with a PhD).



Each tutor must ensure that the teaching or tutoring activity performed by the student does not interfere with his PhD research training and with the development of the scientific project thesis topic.

### **Evaluation and admission to following years**

The admission to the 2<sup>nd</sup> year of Doctoral Programme in Physics is conditional on passing the final examinations of the courses. Moreover, the Doctoral Programme Committee must verify that the scientific and training goals have been achieved on the specific topics of the candidate. For this purpose the Doctoral Programme Committee reviews the written reports on the candidate's activities presented by the tutor and by the student. The Doctoral School Committee assigns the credits of the year and approves the admission to the 2<sup>nd</sup> year of Doctoral Programme.

In order to be admitted to the 3<sup>rd</sup> year, each student must report on the achieved scientific results in a seminar in front of a Committee nominated by the Executive Committee. The committee gives an evaluation related to the quality of the presentation and to the scientific maturity of the PhD student.

The Doctoral School Committee takes into account the reports presented by the tutor and by PhD student himself and the opinion of the committee and expresses its evaluation approving the admission of the PhD student to the III year.

The tutor has to regularly supervisor that the student has been attending the relevant training and research activities, and has to promptly communicate to the Doctoral School Committee any related problem. Upon tutor's advisory, the Doctoral School Committee may check the student's performance at any time.

### **Research and training abroad**

PhD students can carry out research and training activity abroad, if required by the tutor and approved by the Doctoral School Committee.

Phd students can spend a continuative period abroad, but if longer than three months, the authorization of the Doctoral school Committee on the tutor's request is necessary.

For the abroad research or training activity the PhD student can require a scholarship increase, up to a maximum amount of 50% and for a overall period not shorter than one month and not longer than 18 months (in accordance with the 24<sup>th</sup> article of the University Regulations for Doctoral Programmes).



An abroad staying is to be considered a continuous period of no less than a month, unless the coordinator gives different dispositions.

### **PhD Title Award**

By the end of the third year the PhD student submits the request to admission to the final examination.

Students applying for the final exam, who do not have published papers should submit to the Doctoral School Committee a detailed abstract of the thesis together with the report on the activity carried out during the third year.

The Doctoral school committee, taking into account the opinion of the tutor and the reports on the research activity presented both by the tutor and by the PhD student himself, expresses an evaluation on the scientific value of the results achieved and, in case of a positive one, identifies two or more referees in accordance to art. 31 of the University Regulations for Doctoral Programmes

In case of positive evaluation of the thesis by the referees and within a month from the acquisition of their analytical judgment, the Doctoral School Committee shall appoint the members of the Commission for the final examination in accordance with art. 32 of the University Regulations concerning PhD.

The final exam is held in accordance with art. 33 and Art. 34 of the University Regulations for Doctoral Programmes and with the guidelines decided by the Doctoral school committee and communicated to the members of the Final examination Committee.

If the candidate belongs to International programmes agreements or to Co-tutored PhD programmes ("co-tutelle de these"), the Examination Committee and regulations are defined according to the agreement made with the partner university.



Annexe n. 1

**Courses organized by the Doctoral School in Physics  
Academic year 2015/2016**

Professor	Course	Credits	Hours
I. LAZZIZZERA	<b>ADVANCED COURSE ON FUNDAMENTAL INTERACTIONS</b>	3	21
G.A. PRODI, R.S. BRUSA (COORDINATORS)	<b>ADVANCED TECHNIQUES IN EXPERIMENTAL PHYSICS</b>	3	21
P. FORNASINI	<b>APPLICATIONS OF SYNCHROTRON RADIATION</b>	3	21
R. CIOLFI	<b>MULTIMESSENGER ASTROPHYSICS</b>	3	24
M. FERRARI	<b>OPTICAL AND SPECTROSCOPIC DIAGNOSTIC OF MATERIALS FOR PHOTONICS</b>	3	21
M. CERDONIO	<b>SPACE-TIME AND GRAVITATION: AN EXPERIMENTALIST OVERVIEW</b>	3	21
TALENT (Training in Advanced Low-Energy Nuclear Physics)		6	45
ECT* (European Centre for Theoretical Studies in Nuclear Physics and related Areas)	<b>ECT* DOCTORAL TRAINING PROGRAMME 2016</b>	*	
SISSA (Scuola Internazionale Superiore di Studi Avanzati)	<b>COURSES TO BE DEFINED</b> Topics on the Physics of Matter and on Astroparticle Physics	*	
CIAL	<b>TECHNICAL AND SCIENTIFIC ENGLISH</b>	**	24

\*up to 6 credits

\*\*up to 3 credits in addition to the 12 mandatory credits.