UNIVERSITÀ DI PARMA

PHYSICS	
CYCLE	**XLI**
COORDINATOR	Prof.ssa Raffaella BURIONI email: raffaella.burioni@unipr.it Department of Mathematical, Physical and Computer Sciences
DURATION	3 years
STARTING DATE OF THE PHD PROGRAM	01/11/2025
POSITIONS PUT OUT TO COMPETITION	**8**
ADMISSION PROCEDURES	Assessment of QUALIFICATIONS and Research Project Oral Exam in PRESENCE or REMOTELY
ADMISSION REQUIREMENTS	Regardless of age and citizenship, applicants holding at least one of the following academic qualifications can apply for admission: – Laurea specialistica or Laurea magistrale (second cycle master's degree) – Laurea Vecchio Ordinamento (degree obtained under the previous Italian regulations); – Second cycle Master's degree obtained abroad, equivalent to the above mentioned Italian degrees and recognized as suitable for the admission to doctoral program Undergraduates can also apply for admission to the selection, with the obligation to obtain the degree **by 31.10.2025**

TRAINING OBJECTIVES

The PhD Program in Physics, which lasts three years, is established as a unifying element for all third-level university education in the field of Physics. In addition to the primary focus on research activities, the program includes a training and study component consisting of advanced courses and participation in national and international schools. Students are encouraged to spend part of their time abroad to engage in scientific collaborations in their respective fields of interest and to attend advanced courses relevant to their research program. Over the course of the three years, the teaching commitment is gradually reduced in favor of full-time independent research activity. The training progress is evaluated at the end of each year through open seminars. Independent scientific research is expected to lead to the publication of results in international peer-reviewed journals. The target of the PhD in Physics is to provide high-level professional training that can be applied both in academic settings and in public or private research centers and laboratories. The PhD in Physics is structured into three specializations, corresponding to the main disciplinary groups within the Physical Sciences in which the Department of Mathematical, Physical and Computer Sciences carries out its research activities: Condensed Matter and Materials Physics, Theoretical Physics, Biophysics and Applied Physics.

RESEARCH AREAS

- Multiferroic heterostructures for electrical control of magnetism and quantum transport (Bound Research Topic)
- Modeling Chirality-Induced Spin Selectivity in Electron Transfer for Quantum Applications (Bound Research Topic)
- Non-fullerene acceptors for efficient vacuum-processed organic photovoltaic (Bound Research Topic)
- New aspects and applications of field theories (Bound Research Topic)
- Archaeometric analysis of glass and ceramics from Roman villas in Italy and France
- Intrinsic Dynamics of Emulsion, from Experiments on Earth and in Microgravity
- Computational gastronomy: networks, ingredients and culinary structures in complex food systems
- Inverse problems in quantum field theories
- Stochastic Dynamics and Large Deviations in High-Dimensional Learning: A Statistical Physics Perspective on Deep and Recurrent Neural Networks
- Development of models of new physics and their cosmological analysis using galaxy survey data
- Control of many-body quantum systems for quantum technologies

UNIVERSITÀ DI PARMA

Position with Scholarship		
N°	***Funding entity***	***Research Topic***
2	Scholarship funded by University of Parma (Ministerial funds)	
1	Scholarship co-funded by Fondazione Cariparma	
Position with Scholarship LINKED TO SPECIFIC TOPICS (art. 6 of the Competition notice)		
N°	***Funding entity***	***BOUND RESEARCH TOPIC***
1	Scholarship partly financed with UNIVERSITY funds and co-financed by the Department of Mathematical, Physical and Computer Sciences (funds Project PRIN 2022 Settore ERC PE3 "Berry phase Engineering with Antiferromagnets and Topological Insulators (BEAT)" – Cod. Project 2022LP5K7Z - CUP D53C24003310006 and funds Project UNIPR-Diamond Light Source)	Multiferroic heterostructures for electrical control of magnetism and quantum transport
1	Scholarship partly financed with UNIVERSITY funds and co-financed by the Department of Mathematical, Physical and Computer Sciences (funds Project CASTLE - ERC-2022-SYG PROGRAM HORIZON EUROPE, G.A. n. 101071533, CUP D93C22001170006")	Modeling Chirality-Induced Spin Selectivity in Electron Transfer for Quantum Applications
1	Scholarship funded by INFN – The Italian National Institute for Nuclear Physics	New aspects and applications of field theories
1	Scholarship funded by EMILIA ROMAGNA REGION (PR.FSE + 2021/2027 – DGR n. 344 del 10/03/2025) - CUP D92J25000110002)	Non-fullerene acceptors for efficient vacuum-processed organic photovoltaic

POSITION RESERVED	
Reserved to **Holders of RESEARCH GRANT** within the Project MARIE SKLODOWSKA-CURIE ACTIONS – COFUND "Training Future Big Data Experts for Europe (**FutureData4EU**)"	**1**

ADMISSION PROCEDURES

Assessment of QUALIFICATIONS: up to 50 points
(a minimum score of 20 points shall be required to be admitted to the Oral Exam)
ORAL EXAM: up to 70 points
Minimum score for ELIGIBILITY: 70/120

UNIVERSITÀ DI PARMA

ORAL EXAM PROGRAM		
Applicants admitted to the ORAL EXAM can take it either in PRESENCE or REMOTELY in Audio and Video Teleconference (Applicants who intend to take the Oral Exam remotely must submit a formal request, using the form attached to the competition notice)		
Foreign Language the fluency of which shall be assessed	**ENGLISH**	The evaluation of the knowledge of this language will be oral and will consist of carrying out part of the interview in English

SCHEDULE OF THE ADMISSION EXAMS		
ASSESSMENT OF QUALIFICATIONS		It is the candidate's responsibility to verify the outcome of the evaluation of qualifications, which can be consulted in their reserved area by connecting to the page http://unipr.esse3.cineca.it/Home.do in the days preceding the date of the Oral Exam
ORAL EXAM	**DATE**	3rd September 2025 (with possible extension in the following days)
	TIME	09:00 am (Italian time)
	PLACE	Department of Mathematical, Physical and Computer Sciences PHYSICS BUILDING Parco Area delle Scienze, 7/A – Campus 43124 PARMA – ITALY
FURTHER INFORMATION		The Oral Exam will focus on the description of the research work carried out to prepare the Graduation Thesis for the Laurea Magistrale/Specialistica, as well as on the research project that the candidate proposes to carry out within the research topics of the Research Doctorate Program in Physics at the Department of Mathematical, Physical and Computer Sciences of the University of Parma which are described at https://corsi.unipr.it/en/phd-fis/progetti In the application to participate in the competitive examination, the candidate must choose and specify one research topic. The candidate may indicate a second priority choice.
		For foreign candidates, the admission examinations may be held in English at the candidate's choice.

LIST OF QUALIFICATIONS TO BE SUBMITTED AND THEIR ASSESSMENT	
MANDATORY DOCUMENTS TO BE ATTACHED TO THE ON-LINE APPLICATION	
ANNEX A	(art. 3.2 of the Competition notice)
Identification Document	Scanned Copy of a valid identity document with photo (i.e. identity card, passport)
Curriculum Vitae et studiorum	No specific CV format is required (see art. 3.2 of the Competition notice)
Abstract of degree thesis	Abstract of the second cycle master's degree thesis. Undergraduate applicants must submit the draft of the thesis countersigned by their supervisor.
Academic Qualifications	**Certificates and academic transcript of records for both Bachelor' and Master' degrees** containing the following details for each degree held: (art. 3.2 of the Competition notice): University that granted the degree - Type of degree (first cycle/second cycle/single cycle) Name of the degree program - Date of graduation - Final mark - List of exams and corresponding scores (academic transcript of records) - Translation into Italian or English (only for degrees issued in languages other than Italian or English).

Research Project and Statement of Research interest	A brief text (max 3 pages) in English. The candidates must describe their research interests and indicate the preferred topic among those listed above, possibly suggesting a second choice theme. For the first choice theme, candidates must outlay an original research project including a concise state of the art, the relevance of the problem and the expected results. Candidates are warmly invited to contact the potential supervisors listed at https://corsi.unipr.it/en/phd-fis/progetti The presented project does not represent a constraint with respect to the following choice of the doctoral thesis, that shall be defined together with the supervisor and approved by the Academic Board.	
LIST OF EVALUABLE QUALIFICATIONS (only qualifications attested by a document drawn up in Italian or in English)		
Curriculum Vitae et studiorum	Including academic career and postgraduate experience, accompanied by a statutory declaration in lieu of the certification of the exams passed with the relevant marks, as well as the final graduation mark.	**Up to 25 points**
Graduation thesis	Consistency of the Master' Degree thesis with the doctoral program research topics. The assessment will make use of the information contained in the abstract (max 1 page) of the thesis (although not yet discussed, in this case countersigned by the thesis supervisor) and in the curriculum, where a brief description of the thesis work should be reported.	**Up to 5 points**
Research Project and Statement of Research Interest	The project will be evaluated in relation to its scientific value and originality. The motivation expressed by the candidate in relation to the themes of the research doctorate will be evaluated	**Up to 10 points**
Other qualifications	Publications, awards, presentations to scientific meeting, stages, fellowships, reference letters, etc	**Up to 10 points**

EVALUATION ORAL EXAM		
Interview Program	**Evaluation CRITERIA**	**POINTS**
The ORAL EXAM includes the presentation of the research project and is intended to assess the suitability of the applicant to pursue scientific research as well as the general knowledge of issues connected to the PhD course	○ knowledge of the topics of the Master's degree thesis ○ research project presentation ○ general knowledge of issues connected to the PhD course ○ knowledge of the foreign language	**Up to 70 points**