



PHYSICS	
CYCLE	XL
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	01/11/2024
POSITIONS PUT OUT TO COMPETITION	11
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: <ul style="list-style-type: none"> – 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 31.10.2024
TRAINING OBJECTIVES	
<p>The PhD programme in Physics, which lasts 3 years, is established as the unifying element of all third-level university education in the field of Physics. In addition to the predominant commitment to research activities, there is a significant teaching and study component consisting of advanced teaching courses and participation in national and international schools. Students are encouraged to spend part of their time abroad to participate in scientific collaborations in their areas of interest and to attend advanced courses relevant to their research programme. Over the three years, the teaching commitment tends to decrease in favour of a full commitment to independent research activities. At the end of each year, an open seminar is held to evaluate the progress made. Independent scientific research must result in peer-reviewed publications in international journals. The aim of the PhD in Physics is to provide high-level professional skills that can be used both in academia and in public and private research centres and laboratories. The PhD in Physics is divided into three tracks, corresponding to the main groups of physical science disciplines in which the research activities of the Department of Mathematical, Physical and Computer Sciences are carried out: Condensed Matter and Materials Physics, Theoretical Physics, Biophysics and Applied Physics.</p>	
RESEARCH AREAS	
<ul style="list-style-type: none"> • Quantitative aspects of Single Molecule fluorescence Microscopy and Spectroscopy - (Bound research topic) • Industrial applications of laser-induced graphene (Bound research topic) • Application of artificial intelligence protocols to semiconductor oxides for the development of aroma sensors (Bound research topic) • New aspects and applications of field theories (Bound research topic) • Rotational domains in Ga₂O₃: identification of their origin and strategies to prevent them (Bound research topic) • Learning Early Universe Physics with Galaxy Survey and Gravitational Wave Data (Bound research topic) • Comparing feature learning in deep networks in and out of equilibrium: a statistical physics approach • Reversible-binding aptamers for single-molecule imaging • Emulsion Dynamics on Earth and in Microgravity • Characterization and control of molecular qudits for quantum algorithms • Solving superconformal field theories 	

Position with Scholarship		
N°	Funding entity	Research Topic, if any
2	Scholarship funded by University of Parma (Ministerial funds)	
1	Scholarship funded by University of Parma (University 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 PNRR codice CUP D53d23002180006 "UV-C Sensor based on Gallium Oxide (USE GAO))	Rotational domains in Ga ₂ O ₃ : identification of their origin and strategies to prevent them
1	Scholarship partly financed with UNIVERSITY funds and co-financed by the Department of Mathematical, Physical and Computer Sciences (funds Project PRIN 2022 "Learning Early Universe Physics with Galaxy Survey and Gravitational Wave Data")	Learning Early Universe Physics with Galaxy Survey and Gravitational Wave Data
1	Scholarship funded by INFN – The Italian National Institute for Nuclear Physics	New aspects and applications of field theories
1	Scholarship funded by IIT – Italian Institute of Technology	Quantitative aspects of Single Molecule fluorescence Microscopy and Spectroscopy
1	Scholarship co-financed with funds under the PNRR - Mission 4 component 2 (Ministerial Decree 630/2024) and co-financed by the Company X_LAV S.r.l.s. CUP D92J24000220004 	Industrial applications of laser-induced graphene
1	Scholarship co-financed with funds under the PNRR - Mission 4 component 2 (Ministerial Decree 630/2024) and co-financed by the Company NANO SENSOR SYSTEM S.r.l. CUP D92J24000220004 	Application of artificial intelligence protocols to semiconductor oxides for the development of aroma sensors

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

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

28th August September 2024 (with possible extension in the following days)

TIME

09:30 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 <http://smfi.unipr.it/it>

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 http://smfi.unipr.it/it <u>The presented project does not represent a constraint with respect to the following choice of the doctoral thesis</u> , 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	<ul style="list-style-type: none"> ○ 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