





PHYSICS	
CYCLE	XXXIX
COORDINATOR	Prof. Stefano CARRETTA email: stefano.carretta@unipr.it Department of Mathematical, Physical and Computer Sciences
DURATION	3 years
STARTING DATE OF THE PHD PROGRAM	01/11/2023
TRAINING OBJECTIVES	
<p>The PhD in Physics, with a duration of 3 years, is established as a unifying element of the third-level University education in the Physics area. Besides their main commitment to the research activity, students are supposed to spend a substantial part of their training period in attending advanced courses as well as national and international schools. Students are encouraged to spend part of their time abroad, in order to participate in scientific collaborations in their fields of interest, and follow advanced courses in support of their research program. During the three years, teaching commitments are progressively reduced towards a full time engagement in the research activity. The evaluation of the training program is carried out - at the end of each year - through open seminars held by the students. The independent scientific research is expected to lead to publication of results in international, peer reviewed journals. The ultimate goal of the PhD in Physics is a highly specialized scientific training that opens professional carriers in academic institutions and research laboratories, either public or private. The PhD in Physics is divided into three areas corresponding to major groups of disciplines of Physical Sciences covered by the research activity of the Department of Mathematical, Physical and Computer Sciences: Condensed Matter and Materials Physics, Theoretical Physics, Biophysics and Applied Physics.</p>	
RESEARCH AREAS (The candidate MUST mandatorily indicate one research topic in the form ANNEX A and submit a RESEARCH PROJECT in the relevant field)	
<ul style="list-style-type: none">• Non-perturbative studies of the QCD phase diagram (Bound research topic)• Spin selectivity in chiral molecules and its applications to quantum technologies (Bound research topic)• Laser induced graphene for sensing and energy applications (Bound research topic)• Optoelectronic measurements to characterize and improve materials for photovoltaic applications (Bound research topic)• Emulsions and foams for space exploration• Large deviations and Big Jump effects in stochastic processes• Effect of complex networks sparsification methods on network robustness• Development of a model for RNA folding• A molecular platform for intracellular nitric oxide monitoring• Nonlinear dynamics and structure formation in quantum systems: from the laboratory to the universe• Theoretical models and quantum information processing protocols for molecular qubits	
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 31.10.2023

POSITIONS PUT OUT TO COMPETITION* (Modified by Rector Decree n. 1320 of 19.07.2023)	10
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With Scholarship		10
Position with Scholarship		
N°	Funding entity	Research Topic, if any
3	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. 11 of the Competition notice) (Modified by Rector Decree n. 1320 of 19.07.2023)		
N°	Funding entity	BOUND RESEARCH TOPIC
1	Scholarship partly financed with UNIVERSITY funds and co-financed by the Department of Department of Mathematical, Physical and Computer Sciences Project ERC SYG "CASTLE" CUP D93C22001170006 	Spin selectivity in chiral molecules and its applications to quantum technologies
1	Scholarship funded by INFN – The Italian National Institute for Nuclear Physics	Non-perturbative studies of the QCD phase diagram
1	Scholarship financed with funds under the PNRR– Mission 4 component 1 (Ministerial Decree 118/2023 art. 8 "PNRR Research") CUP D92J23000170006 	Laser induced graphene for sensing and energy applications
1	Scholarship financed with funds under the PNRR– Mission 4 component 1 (Ministerial Decree 118/2023 art. 8 "PNRR Research") CUP D92J23000170006 	Optoelectronic measurements to characterize and improve materials for photovoltaic applications
1	PhD scholarship funded within the PNRR research program called "National Quantum Science and Technology Institute - NQSTI "Extended partnerships Investment 1.3 creation of " related to the notice Partnerships extended to universities, research centers, companies for the financing of basic research projects" - Notice 341 of 15/03/2022 - funded by the European Union – NextGenerationEU (CUP D93C22000940001) 	Theoretical models and quantum information processing protocols for molecular qubits

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



Foreign Language	Language the fluency of which shall be assessed during the Oral Exam	ENGLISH
ORAL EXAMINATION INDICATION		
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)		
THE INTERVIEW MAY BE HELD ALSO IN ENGLISH		
LIST OF QUALIFICATIONS TO BE SUBMITTED AND THEIR ASSESSMENT		
MANDATORY DOCUMENTS TO BE ATTACHED TO THE ON-LINE APPLICATION		
ANNEX A	(art. 5 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. 4 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	<p>Certificates and academic transcript of records for both Bachelor' and Master' degrees containing the following details for each degree held: (art. 4 of the Competition notice):</p> <p>University that granted the degree - Type of degree (first cycle/second cycle/single cycle)</p> <p>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).</p>	
Research Project and Statement of Research interest	<p>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</p> <p>It <u>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.</p>	
FURTHER QUALIFICATIONS THAT MAY BE ATTACHED TO THE APPLICATION, IF IN POSSESSION OF THE APPLICANT (only qualifications attested by a document drawn up in Italian or in English)		
Other qualifications	Any other document certifying the applicant's training and abilities. Publications, awards, presentations to scientific meeting, stages, fellowships, reference letters, etc	
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
ORAL EXAM		
Interview Program	Evaluation CRITERIA	POINTS
The ORAL EXAM includes the presentation of the research project and is intend 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">○ preparation on the issues related to 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

SCHEDULE OF THE ADMISSION EXAMS

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	12 September 2023 (with possible extension in the following days)
	TIME	11:00 AM (Italian time) The schedule of oral examinations will appear at http://smfi.unipr.it/it
	PLACE	Department of Mathematical, Physical and Computer Sciences PHYSICS BUILDING Parco Area delle Scienze, 7/A – Campus 43124 PARMA - ITALY
ALTRE INDICAZIONI	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.	