



| PHYSICS   |   |
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| CYCLE   | XXXVII  |
| COORDINATOR   | Prof. Stefano CARRETTA<br>email: <a href="mailto:stefano.carretta@unipr.it">stefano.carretta@unipr.it</a><br>Department of Mathematical, Physical and Computer Sciences   |
| DURATION  | 3 anni  |
| STARTING DATE OF THE PHD PROGRAM  | 01/11/2021  |
| PARTNER INSTITUTION FOR UNIVERSITY COOPERATION AGREEMENTS   | <ul style="list-style-type: none"><li>• Technische Universität Dresden (Germany)</li></ul>  |
| <b>RESEARCH TOPICS</b> (The candidate <b>MUST mandatorily</b> indicate one research topic in the ANNEX A)   |   |
| <ul style="list-style-type: none"><li>• Novel environmental-friendly solar cells with absorber made of Earth-abundant elements</li><li>• Diffusion phenomena and structure of real-world complex networks</li><li>• Numerical Modeling of the Gravitational-Wave signal emitted by Neutron stars and characterization of the post-merger signal of Binary Neutron Star systems (BNS) (<i>Bound research topic</i>)</li><li>• Stimuli-responsive nanostructures for biomedical applications</li><li>• Carbon nanostructures for high-performance lithium and sodium ion batteries</li><li>• New physics searches from cosmological observations</li><li>• Solving superconformal field theories with bootstrap methods</li><li>• Biophysics of Chromatin by Correlative Imaging and Simulation (<i>Bound research topic</i>)</li><li>• Metal-insulator transitions and Dirac insulators in strong spin-orbit interaction metal oxides by local-probe experiments and DFT</li></ul>   |   |
| <b>TRAINING OBJECTIVES</b>  |   |
| <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> |   |
| <b>ADMISSION REQUIREMENTS</b>   | <p>Regardless of age and citizenship, applicants holding at least one of the following academic qualifications can apply for admission:</p> <ul style="list-style-type: none"><li>– Laurea specialistica or Laurea magistrale (second cycle master's degree)</li><li>– Laurea Vecchio Ordinamento (degree obtained under the previous Italian regulations);</li><li>– Second cycle Master's degree obtained abroad, equivalent to the above mentioned Italian degrees and recognized as suitable for the admission to doctoral program</li></ul> <p>Undergraduate applicants may also submit applications with the obligation of getting their degree by <b>October 31<sup>st</sup> 2021</b>.</p> |



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| <b>POSITION PUT OUT TO COMPETITION</b>   | <b>7</b>  | With Scholarship   | <b>7</b> |
| <b>Position with Scholarship</b>   |   |  |          |
| <b>N°</b>  | <b>Funding entity</b>   | <b>Research Topic, if any</b>  |          |
| <b>4</b>   | Scholarship funded by University of Parma (Ministerial funds)                   | ---  |          |
| <b>1</b>   | Scholarship co-funded by Fondazione Cariparma                                   | ---  |          |
| <b>Position with Scholarship LINKED TO SPECIFIC TOPICS (art. 11 of the Competition notice)</b>   |   |  |          |
| During the Oral Exam, applicants may express and / or confirm their interest to the Examination Board in being assigned a scholarship dedicated to a specific research topic.. The Board will express its judgement on eligibility to be assigned the scholarship in consideration of the specific competences, experience and specific aptitudes of the applicants. |   |  |          |
| <b>N°</b>  | <b>Funding entity</b>   | <b>BOUND RESEARCH TOPIC</b>  |          |
| <b>1</b>   | Scholarship funded by INFN – The Italian National Institute for Nuclear Physics | <ul style="list-style-type: none"> <li>Numerical Modeling of the Gravitational-Wave signal emitted by Neutron stars and characterization of the post-merger signal of Binary Neutron Star systems (BNS)</li> </ul> |          |
| <b>1</b>   | Scholarship funded by ITT – Istituto Italiano di Tecnologia                     | <ul style="list-style-type: none"> <li>Biophysics of Chromatin by Correlative Imaging and Simulation</li> </ul>  |          |

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| <b>ADMISSION PROCEDURES</b>   | <b>Assessment of QUALIFICATIONS:</b> up to 50 points<br>(a minimum score of 20 points shall be required to be admitted to the Oral Exam)<br><b>ORAL EXAM:</b> up to 70 points<br><b>Minimum score for ELIGIBILITY:</b> 70/120 |
| <b>Foreign Language</b>   | Language the fluency of which shall be assessed during the Oral Exam: <b>ENGLISH</b> .  |
| <b>CANDIDATES ADMITTED TO THE ORAL TEXT CAN TAKE THE EXAM IN PRESENCE<br/>OR REMOTELY IN AUDIO AND VIDEO TELECONFERENCE</b><br>(Candidates who intend to take the Oral Exam remotely must submit request, to this purpose, as per the model attached to the competition notice) |   |
| <b>THE INTERVIEW MAY BE HELD ALSO IN ENGLISH</b>  |   |
| <b>LIST OF QUALIFICATIONS TO BE SUBMITTED AND THEIR ASSESSMENT</b>  |   |
| <b>MANDATORY DOCUMENTS TO BE ATTACHED TO THE ON-LINE APPLICATION</b>  |   |
| <b>ANNEX A</b>  | (art. 5 of the Competition notice)  |
| <b>Identification Document</b>  | Scanned Copy of a valid identity document with photo (i.e. identity card, passport)   |
| <b>Curriculum Vitae et studiorum</b>  | No specific CV format is required (see art. 4 of the Competition notice)  |
| <b>Abstract of degree thesis</b>  | Abstract of the second cycle master's degree thesis. Undergraduate applicants must submit the draft of the thesis countersigned by their supervisor.  |



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| <b>Qualifications</b>   | <b>Certificates and academic transcript of records for both Bachelor' and Master' degrees</b> containing the following details for each degree held: (art. 4 of the Competition notice):<br>University that granted the degree - Type of degree (first cycle/second cycle/single cycle)<br>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).  |                        |
| <b>FURTHER QUALIFICATIONS THAT MAY BE ATTACHED TO THE APPLICATION, IF IN POSSESSION OF THE APPLICANT</b><br>(only qualifications attested by a document drawn up in Italian or in English)                                    |  |                        |
| <b>Research Project and Statement of Research interest</b>  | 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 <a href="http://smfi.unipr.it/it">http://smfi.unipr.it/it</a><br>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. |                        |
| <b>Other qualifications</b>   | Any other document certifying the applicant's training and abilities. Publications, awards, presentations to scientific meeting, stages, fellowships, reference letters, etc   |                        |
| <b>EVALUATION CRITERIA</b>  |  |                        |
| <b>QUALIFICATION</b>  | <b>EVALUTATION CRITERIA</b>  | <b>POINTS</b>          |
| <b>Curriculum Vitae et studiorum</b>  | 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.  | <b>Up to 25 points</b> |
| <b>Graduation thesis</b>  | 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.   | <b>Up to 5 points</b>  |
| <b>Research Project and Statement of Research Iterest</b>   | 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   | <b>Up to 10 points</b> |
| <b>Other qualifications</b>   | Publications, awards, presentations to scientific meeting, stages, fellowships, reference letters, etc   | <b>Up to 10 points</b> |
| <b>ORAL EXAM</b>  | <b>EVALUATION CRITERIA</b>   | <b>POINTS</b>          |
| 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"> <li>○ preparation on the issues related to the Master's degree thesis</li> <li>○ research project presentation</li> <li>○ general knowledge of issues connected to the PhD course</li> <li>○ knowledge of the foreign language</li> </ul>   | <b>Up to 70 points</b> |



## SCHEDULE OF THE ADMISSION EXAMS

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| <b>ORAL EXAM</b>         | <b>DATE</b>   | 14 September 2021 (with possible extension in the following days)   |
|                          | <b>TIME</b>   | 09.30 am (Italian time)<br>The schedule of oral examinations will appear at <a href="http://smfi.unipr.it/it">http://smfi.unipr.it/it</a>       |
|                          | <b>PLACE</b>  | Department of Mathematical, Physical and Computer Sciences<br>PHYSICS BUILDING<br>Parco Area delle Scienze, 7/A – Campus<br>43124 PARMA - ITALY |
| <b>OTHER INFORMATION</b> | <p>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 <a href="http://smfi.unipr.it/it">http://smfi.unipr.it/it</a></p> <p>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. The above choice will be binding with regard to the winner's research activity.</p> <p>For foreign candidates, the admission examinations may be held in English at the candidate's choice.</p> |   |