

GRAN SASSO SCIENCE INSTITUTE PHD PROGRAMMES – CALL FOR APPLICATIONS 2024 (AY 2024/2025)

The Gran Sasso Science Institute (GSSI), based in L'Aquila, Italy, offers post-graduate training to obtain **“Philosophiae Doctor” (Ph.D.)** degrees in the following fields:

- **Astroparticle Physics:**

- 10 scholarships;

The research and Ph.D. in physics at the GSSI is focused on astroparticle physics. Astroparticle physics is an interdisciplinary and young research field, grown at the intersection of particle physics, nuclear physics, astrophysics and cosmology. It addresses some of the most pressing and fundamental questions in science today: the origin and the evolution of our universe, the nature of dark matter and dark energy, the study of neutrinos and of the ultimate constituents of matter, the search for gravitational waves, the investigation and explanation of the cosmic rays.

- **Mathematics in Natural, Social and Life Sciences:**

- 10 scholarships;
- 1 scholarship funded under the Grant Agreement n. 101039657 (Call: ERC-2021-STG) project “CARDIOTRIALS -CARDIac simulations to run in-silicO clinical TRIALS; The candidates willing to apply are required to work on the following research project: “CARDIOTRIALS - CARDIac simulations to run in-silicO clinical TRIALS”. The project aims at building a virtual model of the human heart based on the fluid-structure-electrophysiology interaction, which will be exploited to study numerically pathologies and assess the efficacy of cardiac devices, accounting for the statistical variability of the population. The project comprises the study of fluid dynamics phenomena and the application of numerical mathematics and high performance computing.”
- 1 scholarship funded under the Grant Agreement n. 101117299 project “MaTCh- Macroscopic properties of interacting bosons: a unified approach to the Thermodynamic Challenge”. The project aims at investigating the low energy properties of interacting quantum particles, and at gaining a mathematical understanding of the emergence of correlated phases, as well as of their instabilities. The successful applicant will be expected to work on problems related to the mathematical description of thermodynamic properties of interacting quantum systems, and in particular the emergence of effective theories from their fundamental, microscopic description. A background in the mathematics of quantum statistical mechanics is welcome but not required.

Within the Ph.D. course in Mathematics in Natural, Social and Life Sciences, a priority has been established on mathematical modeling, both towards the traditional areas of application, such as Physics or Engineering, and towards emerging issues in Biology and Social Sciences. An emphasis will be given also to: partial differential equations and their applications, in particular mathematical models in fluid dynamics and in the study of nonlinear waves; statistical mechanics, hydrodynamic limits and derivation of effective equations in classical and quantum mechanics, phase transitions, disordered systems; methods of statistical physics in data science; numerical linear algebra and its applications, numerical methods for differential equations, high-performance computational techniques; network analysis problems; continuum mechanics, fluid dynamics models for cardiovascular circulation, computational fluid dynamics; mathematical models in biology and social sciences.

Within the Ph.D. Programme in Mathematics in Natural, Social and Life Sciences, it is possible to apply both for GSSI scholarships, and for the scholarships funded under CardiOTrials and MaTCh projects, by submitting different applications.

GSSI will organize an open day where shortlisted candidates could be invited.

- **Computer Science:**

- 10 scholarships;

The Ph.D. Programme in Computer Science of the GSSI aims to provide students with the main results, theories, techniques and methodologies regarding algorithms, models, languages, software and services to cope successfully with the challenges of the present and future Information and Communication Technology.

- **Regional Science and Economic Geography:**

- 10 scholarships;

The Ph.D. program in “Regional Science and Economic Geography” is a cutting-edge and interdisciplinary program designed to explore the intricate relationship between space and socio-economic phenomena, by employing mixed methods and interdisciplinary approaches. This Ph.D. program equips students with the skills to offer evidence-based policy recommendations, rooted in robust empirical findings and established causal relationships, and fosters research in economic and/or human

geography. It aims to address the challenges posed by globalization, urbanization, climate change, and development by fostering a deeper understanding of these processes. We welcome students with different backgrounds, including (but not limited to) applied economics, economic and/or human geography, or sociology, who share an interest in these issues.

The Ph.D. Programmes will be activated after approval by the MUR (Italian Ministry of University and Research).

Official language of the Ph.D. Programmes: English.

Activities and Duration

The Ph.D. Programmes last four years. Nevertheless, it is possible to be awarded the Ph.D. degree after the completion of the third year.

The Academic Year will start on November 1st 2024.

Scholarships

GSSI awards scholarships until the dissertation defense and for a maximum of four years. **The yearly gross amount of the scholarship is € 16.243,00.** An additional 50% on a monthly basis may be awarded for research periods abroad if approved by the GSSI.

Facilities and benefits

- all Ph.D. students normally benefit from free accommodation at the guest house during the first year, in case of particular organizational needs by GSSI, or particular, motivated and authorized needs by the students, they will benefit, in substitution of the accommodation, from a financial substitute of 350,00 Euros gross/month; starting from the second year, all Ph.D. students are provided with a financial substitute of 350,00 Euros gross/month (the contribution will be paid upon the presentation of a rental agreement in L'Aquila or, in case of mandatory stays required from the Ph.D. Programme, according to the relevant agreements);
- all Ph.D. students will have free luncheon vouchers (1 per day, working days, except school closures, missions, and other situations contemplated by the GSSI rules);
- all Ph.D. students will have tuition fees waived;
 - all Ph.D. students will be covered by insurance against any accident and/or injury that may occur while carrying out their Ph.D. activities;
- all Ph.D. students are entitled to a contribution of up to 1.200,00 euro (net) for the purchase of a laptop for study and research purposes. The contribution will be paid upon the presentation of the fiscal receipt headed to the applicant.

Requirements

English knowledge is compulsory. Applications are open to candidates in possession of one of the following degrees:

- “Laurea Magistrale” or “Laurea Specialistica” or a four or five years degree.
- a foreign University degree (minimum legal duration of the University course: four years). The eligibility of foreign degrees is assessed by the Selection Committee.

Applicants obtaining their degree by no later than **October 31, 2024** may apply (both Italian or foreign degree according to the previous description). Applicants will have to send a copy of their

degree certificate at phd.secretariat@gssi.it within **November 20, 2024** (for Italian degrees a “self declaration” can also be accepted).

Application

Applicants must fill out the **online application form** (www.gssi.it/phd), where it is possible to find all the necessary information for the submission, and attach the required documents by:

- **May 23rd 2024, 3 pm (Italian time zone)** for the following Ph.D. Programmes: Astroparticle Physics, Computer Science, Regional Science and Economic Geography, Mathematics in Natural, Social and Life Sciences and MaTCh project;
- **August 26th 2024, 3 pm (Italian time zone)** for CardiOTrials project within the Ph.D. Programme in Mathematics in Natural, Social and Life Sciences.

No other application method will be accepted.

Candidates willing to apply for more than one position need to submit different applications. It is necessary to fill-in and upload all the required documents independently for each submission.

Data and documents entered into the application form are the sole responsibility of the applicant. In the event of false declarations, the applicant will be excluded from the selection procedure.

In order to successfully submit the application form, applicants must insert all the data/information and upload the attachments as listed below. We strongly recommend applicants to review the inserted information and uploaded attachments before submitting the application. **No changes are allowed to submitted data.** Erroneous data and/or attachments will be evaluated as they are submitted.

Please note that applicants are responsible for ensuring that their completed application arrives on time. Applicants are strongly advised to submit their application well in advance of the deadline in order to avoid last-minute congestion in the online application procedure.

Candidates should upload the following documents in pdf format:

- a valid id document, signed and dated;
- curriculum vitae et studiorum;
- a final degree certificate (for EU citizens or NON EU citizens residing in Italy: a copy of the certificate or a self-declaration declaring the possession of a degree indicating: conferral date, issuing University and final grade; for other applicants: certificate declaring the possession of a degree indicating: conferral date, issuing University and final grade). For applicants who expect to complete their degree **by October 31 2024**: certificate or self-declaration (only for EU citizens and NON EU citizens residing in Italy) indicating the single examinations taken and grades obtained. If the official document released by the University is not available in Italian or English, candidates should also attach a translation of the document under their responsibility;
- academic transcript or diploma supplement (the academic transcript is an official document released by the University detailing the courses/classes taken or subjects studied and related grades).

In addition, candidates are required to upload additional documents or give additional information depending on the Ph.D. Programme chosen:

- **Astroparticle Physics:**

- motivational letter describing research interests and reasons for having chosen to apply to the GSSI Ph.D.;
- extended abstract of the Master's Degree thesis (max 2000 words).

- **Mathematics in Natural, Social and Life Sciences and CardiOTrials project:**

- a synthetic report of the core courses followed on the topics below:
 - Partial Differential Equations
 - Probability/Stochastic Processes
 - Functional Analysis
 - Numerical Analysis
 - Physics/Continuum Mechanics/Fluid Dynamics

For each course in this area, students should provide a short syllabus (no more than 10 lines) containing main textbooks, name of the instructors and possibly the link to the courses' home page.

- **MaTCh Project - Mathematics in Natural, Social and Life Sciences:**

- motivational letter, describing the reasons for the application, with particular reference to MaTCh project;
- a synthetic report of the core courses followed on the topics below:
 - Functional Analysis
 - Quantum Mechanics
 - Probability and Stochastic Processes
 - Statistical Mechanics
- optional: extended abstract (max 1000 words) of the Master's Degree thesis or of the thesis project;

- **Computer Science:**

- motivational letter describing expertise and main research interests, a research project indicating the main subjects the candidate would like to approach during the Ph.D. Programme, the reasons for having chosen GSSI for Ph.D. studies.

- **Regional Science and Economic Geography:**
 - motivational letter, structured as follows: i) acquired expertise; ii) main research fields of interest; iii) prospected research project to develop during the Ph.D. Programme; iv) reasons for having chosen to apply to the GSSI for a Ph.D. Programme in Regional Science and Economic Geography;
 - extended abstract of the Master's Degree thesis or of thesis of the last obtained title (max 2000 words);
 - GRE scores (Verbal and Quantitative) are preferred but optional (please include them in the application package).

Applicants can provide the names and contact information of up to **two referees**. The information provided by the applicants in the online form will be used to send the referees an email with a link to a page where they can upload the reference letter: referees should submit the reference letters in English or Italian through the online application system within:

May 24th 2024, for Mathematics in Natural, Social and Life Sciences Ph.D. Programme and MaTCh project;

May 30th 2024, for Astroparticle Physics, Computer Science, Regional Science and Economic Geography Ph.D. Programmes;

September 1st 2024, for CardiOTrials project within the Mathematics in Natural, Social and Life Sciences Ph.D. Programme.

No reference letter uploaded by the candidates will be admitted. The reference letters are not mandatory.

In the event that any of the documents downloaded during the application procedure do not correspond to those submitted during the enrolment, due to deliberate false declaration, the applicant will automatically forfeit his/her place in the Programme.

Selection Procedure

Candidates will be evaluated by the Selection Committee on the basis of their academic background, skills and scientific value. The Selection Committee will also assess the relevance of any publication, the suitability of the candidates' CV, the reference letters and any additional special qualification, educational activities and/or participation in research groups or projects.

The selection procedure will be carried out in two phases:

- **assessment of all the applications admitted through the online procedure**, ending with the publication on the GSSI website of the shortlist of candidates admitted to the interview.
- **interview**: once shortlisted, the applicants will be required to participate in a comprehensive in-person or remote interview in English, in order to assess their aptitude for research in the curriculum for which they have applied, as well as their English proficiency.

It is possible to choose a method of interviewing. Please note that GSSI reserves the right to hold the interviews only through video conference in case of particular organizational needs.

The shortlist and the interviews will be organized according to the following schedule:

Ph.D. Programme	Shortlist	Interviews
Astroparticle Physics	Within June 20th	June 24th to 28th
Computer Science	Within June 19th	June 26th to 28th
Regional Science and Economic Geography	Within June 13th	June 17th to 21st
Mathematics in Natural, Social and Life Sciences, including MaTCh project	Within June 7th	July 1st to 10th
Mathematics- CardiOTrials project	Within Septemb er 4th	September 5th to 13th

The list of the candidates admitted to the interview will be published on GSSI website (www.gssi.it). The admitted candidates will soon be informed about the calendar of the interviews.

Admission

The general ranking lists and evaluation results will be published on the GSSI website: www.gssi.it. The list will indicate the names of the admitted applicants to the different Ph.D. Programmes.

In the event of forfeiture or exclusion of a candidate within 45 days from the date of beginning of the Programme, the candidate shall be replaced by the next eligible candidate according to the ranking.

The admitted candidates are required to be at GSSI by the date communicated by the Ph.D. Secretariat. No shows, without adequate justification, will result in the exclusion of the candidate from the Ph.D. Programme.

The admitted candidates are subject to the Ph.D. Courses Regulation, Code of Conduct and Code Ethics of the GSSI.

Contact and info

www.gssi.it; applications@gssi.it; +39 0862 4280 431

Disclaimer

Please be advised that this is a mere extract of the D.R. 54/2024. In case of doubt, the Italian version is the official document and shall prevail.

L'Aquila, March 19, 2024