

Call for postdoctoral research grants

1. The Gran Sasso Science Institute (GSSI) is opening fellowships for research activity in the following fields: Physics, Mathematics, Computer Science and Social Sciences.
2. The research grants referred to this call may be renewed on the basis of what is foreseen by current legislation and the University Regulation, subject to financial coverage.
3. Applicants willing to apply for the postdoctoral research grants must hold a PhD degree or an equivalent qualification. The PhD title should be earned before starting the appointment.

Art. 1 - Physics

- 1.1 One postdoctoral position financed through the GSSI funds, for the following profile: “Developing a Newtonian noise model for ET and explore limitations of a noise cancellation system”.

The scientific coordinator of the activities is Prof. Jan Harms.

Yearly gross salary: € 45.000,00 (gross amount before taxes, including taxes owed by the Institution).

The duration of the appointment is 24 months, with possibility of extension.

- 1.2 One postdoctoral position financed through the GSSI funds for the 50% and through the MERAC_PRIZE_ARCASEDDA The missing link: are intermediate-mass black holes the real link between stellar and supermassive black holes? (CUP: D13C23003370007) for the other 50%, for the following profile: **MLIBH** “Development of astrophysical models for the formation of compact binary sources and intermediate-mass black holes, and techniques for predicting their detectability with present and future gravitational wave observatories”

The scientific coordinator of the activities is Dr. Manuel Arca Sedda.

Yearly gross salary: € 45.000,00 (gross amount before taxes, including taxes owed by the Institution).

The duration of the appointment is 24 months, with possibility of extension.

- 1.3 One postdoctoral position funded through the GSSI funds for the 50% and through the PRIN2022_BARBATO WINK: a pathfinder mission for the future Crystal Eye X and gamma rays all sky monitor (CUP: D53D23002550006), for the other 50%, for the following profile: **WINK** “Development of WINK flight model for Space Rider mission and relative simulations”

The scientific coordinator is Dr. Felicia Carla Tiziana Barbato.

Yearly gross salary: € 45.000,00 (gross amount before taxes, including taxes owed by the Institution).

The duration of the appointment is 24 months, with possibility of extension.

- 1.4 One postdoctoral position financed through the GSSI funds for the following profile: **Rare Events** - “Rare event search with low-temperature calorimeters”.

The scientific coordinator is Dr. Lorenzo Pagnanini.

Yearly gross salary: € 45.000,00 (gross amount before taxes, including taxes owed by the Institution).

The duration of the appointment is 24 months, with possibility of extension.

Art. 2 - Mathematics

1.1 Three postdoctoral positions financed through the GSSI funds for the following profile (to be intended that the candidate should have interests in at least one of the specified areas): “Numerical Analysis, Partial Differential Equations, Probability, Scientific Computing”:

- Numerical analysis and in particular numerical linear algebra, numerical optimization and applications, matrix methods in systems theory and data science, numerical methods for machine learning and compressed sensing, low rank techniques, numerical methods for time dependent evolution problems, numerical methods for delay differential equations.
- Partial differential equations and their applications in fluid dynamics, including non-classical fluids, capillary fluids and quantum fluids. Non-uniqueness problems, convex integration methods. Problems of singularity and instability in fluid dynamics, including boundary layers analysis. Partial differential equations of dispersive type, existence and dynamics of vortices, solitary waves and dispersive shocks. Quantum synchronization problems. Problems of pattern formation in biology.
- Probability and Statistical Mechanics, in particular mathematical models in non-equilibrium statistical mechanics and the mathematical treatment of emerging collective behaviors in many-body classical and quantum systems.

The scientific coordinator is Professor Nicola Guglielmi.

Yearly gross salary: € 45.000,00 (gross amount before taxes, including taxes owed by the Institution).

The duration of the appointment is 24 months, with possibility of extension.

1.2 One postdoctoral position financed through the CARDIOTRIALS Using CARDIac simulations to run in-silico clinical TRIALS (CUP: D13C22000870006) project funds for the following profile: **Cardiotrials-numeric** “The research activity aims at running in-silico trials to investigate cardiac pathologies and testing innovative medical devices. The analysis is based on a digital twin of the human heart accounting for the fluid-structure-electrophysiology interaction. The candidate should have a strong background in fluid dynamics and numerical mathematics. For this position, it is possible to provide in special cases and subject to authorization, an additional contribution for research of up to a maximum of €10.000,00 (gross amount before taxes, including taxes owed by the Institution).

The scientific coordinator is Professor Francesco Viola.

Yearly gross salary: € 45.000,00 (gross amount before taxes, including taxes owed by the Institution).

The duration of the appointment is 24 months, with possibility of extension.

- 1.3 One postdoctoral position financed through the **CARDIOTRIALS** Using **CARDIac** simulations to run in-silico clinical **TRIALS** (CUP: D13C22000870006) project funds for the following profile: **Cardiotrials-experiments** “The research activity aims at investigating in-vitro the hemodynamics within a subset of the cardiovascular system, such as the left and/or right heart. The experimental results will be used both to test in-vitro medical devices and to validate computational methods. The candidate should have a strong background in fluid dynamics, experimental modelling and data processing.” For this position, it is possible to provide in special cases and subject to authorization, an additional contribution for research of up to a maximum of €10.000,00 (gross amount before taxes, including taxes owed by the Institution).

The scientific coordinator is Professor Francesco Viola.

Yearly gross salary: € 45.000,00 (gross amount before taxes, including taxes owed by the Institution).

The duration of the appointment is 24 months, with possibility of extension.

- 1.4 One postdoctoral position financed through the **HE_ERC_MATCH MaTCh** - Macroscopic properties of interacting bosons: a unified approach to the Thermodynamic Challenge (CUP: D13C23002820006) project funds for the following profile: “The project aims at investigating the low energy properties of interacting bosons in the thermodynamic limit, and at gaining a mathematical understanding of the emergence of correlated phases, in the form of Bose-Einstein condensation and quasi-long range order, as well as of their instabilities, due to thermal fluctuations or three-body recombination effects of Efimov type. The ideal candidate should have a background in the mathematics of quantum statistical mechanics. Experience in second quantization techniques, rigorous renormalization group approaches, Skorniakov-Ter-Martirosyan Hamiltonians, quantum spin models are welcome but not required.” The research statement is required. For this position, it is possible to provide in special cases and subject to authorization, an additional contribution for research of up to a maximum of €10.000,00 (gross amount before taxes, including taxes owed by the Institution).

The scientific coordinator is Professor Serena Cenatiempo.

Yearly gross salary: € 45.000,00 (gross amount before taxes, including taxes owed by the Institution).

The duration of the appointment is 24 months, with possibility of extension.

Art. 3 - Computer Science

- 1.1 One postdoctoral position financed through the **GAMING_PNRR** “Graph Algorithms and MinINg for Green agents - **GAMING**” (CUP: D13C24000430001) project funds for the following profile: **GAMING** “The research activities will focus on the design and analysis of efficient algorithms for graph mining and network design. Relevant research topics include: graph algorithms, graph mining, network analysis, temporal and dynamic graphs, approximation algorithms, network design, and algorithm engineering”.

The scientific coordinator is Professor Gianlorenzo D’Angelo.

Yearly gross salary: € 45.000,00 (gross amount before taxes, including taxes owed by the Institution).

The duration of the appointment is 24 months, with possibility of extension.

- 1.2 One postdoctoral position financed through the GSSI funds, for the following profile: “The research activities should be connected to one of the pillars of the Computer Science area, i.e., algorithms, formal methods, or software engineering”.

The scientific coordinator is Professor Patrizio Pelliccione.

Yearly gross salary: € 45.000,00 (gross amount before taxes, including taxes owed by the Institution).

The duration of the appointment is 24 months, with possibility of extension.

- 1.3 One postdoctoral position funded through the MATISSE “Model-based engineering of Digital Twins for early verification and validation of Industrial Systems - MATISSE” (CUP: D13C24001180006) project for the following profile: **MATISSE_V&V** “The research activities will focus on runtime verification and validation techniques, both monitoring and field- based testing to check the behavior and performance of systems when they will be working in the operational environment. We will also experiment the design and implementation of automatic fault detections and predictions based on machine learning techniques. These techniques will be applicable to real-life systems and conected to digital twin solutions. The proposed techniques will be experimented in various domains, including the use of robots in the space domain.”

The scientific coordinator is Professor Patrizio Pelliccione.

Yearly gross salary: € 45.000,00 (gross amount before taxes, including taxes owed by the Institution).

The duration of the appointment is 24 months, with possibility of extension.

- 1.4 One postdoctoral position funded through the MATISSE “Model-based engineering of Digital Twins for early verification and validation of Industrial Systems - MATISSE” (CUP: D13C24001180006) project for the following profile: **MATISSE_DigitalTwin** “The research activities will focus on digital twin and software engineering solutions for detection of faults and prediction in production environments. These techniques will be applicable to real-life systems in various domains, including the use of robots in the space domain. Previous experiences in the robotic and space domains are welcome but not required.”

The scientific coordinator is Professor Patrizio Pelliccione.

Yearly gross salary: € 45.000,00 (gross amount before taxes, including taxes owed by the Institution).

The duration of the appointment is 24 months, with possibility of extension.

- 1.5 One postdoctoral position funded through the SpaceItUP (CUP: D53C24000580005) project for the following profile: “The research activities will focus on user-friendly ways to program and interact with robots, as well as techniques to coordinate a team of mobile robots under uncertainty. The

research activities will be applied to the space exploration domain. Previous experiences in the robotic and space domains are welcome but not required.”

The scientific coordinator is Professor Patrizio Pelliccione.

Yearly gross salary: € 45.000,00 (gross amount before taxes, including taxes owed by the Institution).

The duration of the appointment is 24 months, with possibility of extension.

Art. 4 - Social Sciences

1.1 One postdoctoral position funded through the PRIN2022_PNRR_PALMA (CUP: D53D23017700001) project for the following profile: The ideal candidate has knowledge in environmental economics and experience in data manipulation (preferably microdata) and analysis using common statistical software (Stata, R, or Python). The candidate will be involved in the analysis of the impacts of extreme climatic events, including their effects on the labour market, firms' performance and resilience capacity to climate change”

The scientific coordinator is Professor Alessandro Palma.

Yearly gross salary: € 45.000,00 (gross amount before taxes, including taxes owed by the Institution).

The duration of the appointment is 24 months, with possibility of extension.

Benefits

The GSSI makes available to each postdoc a contribution for the purchase of IT equipment, upon request motivated by research needs, from the funds of the research project or on the GSSI funds. The contribution, up to a maximum of € 3.000,00, (gross amount before taxes, including taxes owed by the Institution), will be paid upon the presentation of a fiscal purchase receipt and the authorization of the Scientific coordinator or the Head of the Area.

Requirements

1. Applicants willing to apply for the **postdoctoral research grants** must hold a PhD degree or an equivalent qualification. The PhD title should be earned before starting the appointment.
2. Candidates in possession of an academic qualification obtained abroad which has not already been declared equivalent pursuant to the current legislation, must attach to the application form the documents necessary to allow the selection committee to declare its equivalence for the sole purpose of participating in the selection procedure. If the above-mentioned documents are in a different language other than Italian or English, they must be translated and legalized by the competent diplomatic representatives abroad, according to the current legislation.
3. A **very good knowledge of English** is required.

Application

The applications must be sent to GSSI only by filling in the online application form at the following link: <https://applications.gssi.it/postdoc/> and attach all the required documents:

- a curriculum vitae, including the complete list of publications;

- a research statement (not required for the Mathematics Area, **except for the fellowship funded by MaTCh where it is required**)
- up to three selected publications which will be evaluated individually. The PhD thesis can be included, since it is considered as a publication;
- a valid ID document.

Deadline: August 20, 2024 - 3 p.m. (Italian time zone).

The candidate can provide the names and contact information of up to two referees. The information provided by the applicants (name, institute and email address) 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 **August 27, 2024**. No reference letter uploaded by the candidates will be admitted. The reference letters are not mandatory.

Candidates willing to apply for more than one position should go through the application procedures for each position separately. It is necessary to register again and upload all the required documents separately and independently for each application.

All communications to candidates will be published on the GSSI Official Bulletin Board <https://www.gssi.it/albo-ufficiale-online-gssi> in the notice dedicated to this Call, with notification value to candidates.

Selection procedure

1. The selection procedure is carried out in accordance with the "Regulations for the awarding of research grants", to which reference is made.
2. In the preliminary session, the Evaluation Committee has the right to provide for an interview, governed by the "Regulations for the awarding of research grants".

The full call for applications is available at <https://applications.gssi.it/postdoc/>

For additional information please contact the following e-mail address: applications@gssi.it

Disclaimer

Please be advised that this is a mere extract of the D.R. 138/2024. In case of doubt, the Italian version is the official document and shall prevail.

L'Aquila, July 2, 2024