GRAN SASSO SCIENCE INSTITUTE PHD PROGRAMS – CALL FOR APPLICATIONS 2019

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:**
  - 6 scholarships;
  - 2 scholarships for the research project “Experimental galactic and directional signatures of Dark Matter candidates”. The positions are supported under the Grant Agreement n. 818744 (Call: ERC-2018-COG) “INITIUM – an Innovative Negative Ion Time projection chamber for Underground dark Matter searches” (CUP D16C19000160006) of the Horizon 2020 Framework Program. The student is expected to work on assembly, operation, calibration, data taking and data analysis of detector prototypes and experiments with directional sensitivity.
  - 1 scholarship for the research project “Surface brightness fluctuations distances, cosmology and gravitational waves” co-financed by National Institute for Astrophysics (INAF).

The research and PhD 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:**
  - 6 scholarships;
  - 2 scholarships for the research project "GrowBot - Towards a new generation of plant-inspired growing artefacts". The positions are supported under the Grant Agreement n. 824074 (Call: FETPROACT-2018-2020) of the Horizon 2020 Framework Program. The project is directed by Prof. Pierangelo Marcati. The project will address the following issues: mathematical models for the growth and movement of climbing plants, their relationship with experimental data existing in the literature. Control problems originating from bio-inspired robotics. The main mathematical techniques are related to ordinary differential and partial differential equations, dynamical systems, control theory, numerical analysis, stochastic techniques and statistical mechanics.

Within the PhD course in Mathematics in Natural, Social and Life Sciences a priority has been established on mathematical modeling, both towards the traditional areas of application as Physics or Engineering and towards emerging issues in Biology and in Social Sciences. An emphasis will be given also to numerical methods, high performance computing techniques, stochastic analysis and partial differential equation methods, in
particular those one related to fluid dynamics and quantum physics. Numerical and stochastic methods for mathematical models in seismology will be of special interest.

- **Computer Science:**
  - 6 scholarships;
  - 1 scholarship for the research project “Design and implementation of efficient algorithms and data structures for the analysis of genomic data” financed by Dante Labs srl. The PhD student will help to develop scalable tools for genome informatics that can handle very large genomic databases, starting from recent advances involving the run-length compressed Burrows-Wheeler Transform.

The PhD program 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.

- **Urban Studies and Regional Science:**
  - 7 scholarships.
  - The aim of the PhD in Urban Studies and Regional Science is to address issues related to local and regional development. The methodological perspective of research and teaching is multidisciplinary, combining regional and urban economics, economic and human geography, spatial planning and sociology.

The PhD programs will be activated after approval by the MIUR.

**Activities and Duration**
The PhD programs last four years.
The **Academic Year will start on November 1st 2019.**

**Scholarships**
GSSI awards scholarships until the thesis dissertation and for a maximum of four years.

**The yearly amount of the scholarship is of € 16,159.91** gross. An additional 50% on monthly basis may be awarded for research period abroad if approved by the GSSI.

**Official language of the PhD Programs:** English.
Facilities and benefits

- all PhD students will have free accommodation at the guest house or other accommodation offered by GSSI or a financial substitute of 350,00 Euros gross/month (to obtain the contribution, the students would have to present a rental agreement in L’Aquila);
- all PhD students will have free lunch on vouchers (1 per day, working days, except school closures, missions and other situations contemplated by the GSSI rules);
- all PhD students will have tuition fees waived;
- all PhD students will be covered by insurance against any accident and/or injury that may occur while carrying out their PhD activities.

Requirements

English knowledge is compulsory. Applications are opened 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, 2019 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, 2019 (for Italian degrees a “self declaration” can also be accepted).

Application

Applicants must fill out the online application form (www.gssi.it/phd/) and attach the required documents by June 18, 2019, 6 pm (Italian time zone). No other application method will be accepted.

Data and documents entered into the application form are the sole responsibility of the applicant. In the events 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. We strongly suggest that applicants submit their application well in advance of the deadline in order to avoid last-minute congestion in the online application procedure.
It is possible to apply to more than one curriculum.

Candidates should upload the following documents in pdf format:
- 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, 2018: 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.
- a valid ID document, signed and dated;
- academic transcript or diploma supplement (the academic transcript is an official document released by the university detailing the courses/classes taken or subjects studies and related grades).

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 reference letters in English or Italian through the online application system within June 24, 2019. No reference letter uploaded by the candidates will be admitted.

Candidates should upload additional documents or give additional information:
- Mathematics in Natural, Social and Life Sciences:
  - a synthetic report of the core courses followed on the following topics:
    1- Partial Differential Equations
    2- Probability/stochastic processes
    3- Functional Analysis
    4- Numerical Analysis
    5- Physics/continuum mechanics/fluid dynamics
  For each course in this area, students should provide a short syllabus (no more than 10 lines) main textbooks, name of the instructors and possibly the link to the course home page.
• Computer Science:
  - motivational letter describing expertise and general research interests together with future plans and reasons for having chosen GSSI for PhD studies.

• Urban Studies and Regional Science:
  - motivational letter describing research interests and reasons for having chosen to apply to the GSSI PhD;
  - extended abstract of the thesis (max 2000 words);
  - GRE scores (Verbal and Quantitative) are preferred but optional (please include them in the application package).

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

**Selection Procedure**

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

There will be one Selection Committee for each Scientific Area (Physics, Mathematics, Computer Science, Social Sciences).

The selection procedure will be carried out in two phases:

- **assessment of all application admitted through the online procedure**, ending with the publication on the GSSI web site of the shortlist of the candidates admitted to the interview.

- **interview**: once short-listed, applicants will be required to participate in a comprehensive interview in English in order to assess their aptitude for research in the track/curricula for which they have applied, as well as their English proficiency.

The list of the candidates admitted to the interview and the calendar of the interviews will be published on GSSI website (www.gssi.it).
Admission
General ranking list and evaluation results will be published on the GSSI web site: www.gssi.it. The list will indicate the names of the applicants who have been admitted to the different PhD Programs. In the event of forfeiture or exclusion of a candidate within 45 days from the date of beginning of the program, the candidate shall be replaced by the next suitable candidate according to the ranking.

Contact and info
www.gssi.it; info@gssi.it; +39 0862 4280433

L’Aquila, 5 marzo 2019