PhD course in Theory and Numerical Simulations of the Condensed Matter

Selection for the conferment of ERC Funded Fellowship on Wave-function Networks: Probe and understand quantum many-body systems via network and complexity theory (WaveNets)
ACADEMIC YEAR 2024/25

The goal of this project will be the development and application of network theory methods to unravel properties of quantum many-body systems, of direct relevance to quantum simulators and computers. The PhD, which will be carried out within the framework of the ERC Consolidator project WaveNets hosted at the International Center of Theoretical Physics (ICTP), will specifically involve the large-scale simulation of many-body Liouvilians and Hamiltonians, via either tensor network or Monte Carlo methods, and the investigation of strong correlations in the context of highly entangled states of matter (e.g., topological and critical states). Based on this understanding, efficient methods for the cross-verification of quantum devices will be proposed and analyzed, with emphasis on atomic and ion platforms.
The project will involve ICTP and SISSA leading researchers in the field as well as high-level international collaborations.

Research Fields: Physics, Data-Science

Amount of the fellowship: € 1.400,00 net per month (such amount includes a contribution towards rent expenses and does not foresee social security coverage – see below)
Financing Body: **International Centre for Theoretical Physics (ICTP) though European Research Council (ERC) Project on *WaveNets.***
Duration of the programme: 3 years (01.10.2024 – 30.09.2027) with a possible fourth

● **Other benefits:**

- private health insurance;
- a contribution towards a social security plan amounting to 10% of the salary;
- special allowances for family members;
- a travel grant;
- a contribution towards removal expenses;
- maternal/paternal leave

● **Requirements:**

SISSA welcomes applications from young candidates who have completed, or are going to complete, their undergraduate studies, with a strong interest in research.
Candidates, without limitations of age and nationality, must be in possession of a university degree (Master of Science/ Laurea Magistrale) in Physics, Chemistry, Engineering.

● **Online application:**

An online application must be filled and sent using the procedure available at the page https://pica.cineca.it/sissa/tipologia/dottorato **by 13.00 hrs of 12th March 2024 (Italian time)**

Candidates should upload the following documents in pdf format:

- *curriculum vitae*;
- a certificate of University examinations taken (with marks);
- a final degree certificate;
- If, at the time of application, candidates should not be yet in possession of a degree certificate, they can submit it at the time of the examination.
  European Union candidates can submit a personal declaration instead of the aforementioned certificates.
- a copy of the diploma thesis (if any), or its abstract.

At the end of the procedure, candidates will have to indicate the names and email addresses of two professors that will receive an email requesting to send a recommendation letter through the same online procedure **by 13.00 hrs. of 14th March 2024 (Italian time).**

The candidate will then have to print out the admission request form, sign it and send it through the same online procedure.

Candidates with disabilities certified according to the law n. 104/1992 and subsequent modifications, and those diagnosed with Specific Learning Disorder certified according to the law n. 170/2010 and to the D.M. n. 5669 dated 12/07/2011, can report their needs together with the submission of the admission application, within the deadline set by this announcement.

● **Selection Procedure:**

After the deadline of the announcement, the Selection Committee, which will be composed of at least three CM Faculty Members of SISSA and one ICTP Faculty Member, will evaluate the documentation produced by the candidates (*curriculum vitae*, letters of recommendation). Candidates who have obtained a minimum score of 21/30 will be invited to take the **interview via Zoom on 21st March 2024**.

For the interview, the candidate should be reachable at the address indicated in the application, at the time communicated by SISSA through email.

Candidates should show an ID document for identification at the beginning of the interview. The absence of a contact email in the application or of a valid ID during the interview, imply the exclusion from the competition.

To be considered eligible, candidates must pass all the phases (academic qualifications, and interview) with a minimum mark of 7/10 or equivalent.

● **Admission:**

The admitted candidate will be notified by email and will be asked to be present at SISSA on 1st October 2024, for the registration.

Failure to do so without a valid reason will result in the loss of the fellowship awarded.

In order to be enrolled and to be awarded the fellowship, admitted candidates must pay a "Regional Tax" of the amount of € 120,00 - € 160,00 per year. Information can be retrieved at http://www.ardiss.fvg.it/.

For information about rights and duties of the doctoral students please consult the Teaching Regulations of the PhD courses of SISSA issued with D.D. 750 of 31.10.2022 at this page.

As per Legislative Decree 30.06.2003 n.196, and of the European Regulation 2016/679 (General Data Protection Regulation), we inform that all data given to this Administration will be processed only for purposes related to and instrumental to the existing contract, in compliance with the provisions in force.

The Director
Prof. Andrea Romanino
(digitally signed)

ri/

SISSA
Firmato digitalmente da
Andrea Romanino
Data: 05.02.2024 13:59:32 CET
Organizzazione:
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