

### **Translation of Announcement for 1 research position**

at the Physics Area of SISSA – partially financed by "National Centre for HPC, Big Data and Quantum Computing" within the National Recovery and Resilience Plan (NRRP)

**Decree No. 549/2024 dated 25.06.2024**

THE DIRECTOR

Having regard to Law No. 168 of 9 May 1989;  
Having regard to Law No. 241 of 7 August 1990 and all subsequent amendments and additions;  
Having regard to Law No. 413 of 12 October 1993;  
Having regard to Presidential Decree No. 445 dated 28 December 2000;  
Having regard to Legislative Decree No. 165 of 30 March 2001 and all subsequent amendments and additions;  
Having regard to Legislative Decree No. 196 of 30 June 2003, as amended by Legislative Decree No. 101 of 10 August 2018, which transposes the EU General Data Protection Regulation 2016/679 (GDPR);  
Having regard to Law No. 240 of 30 December 2010, and to Art. 22 in particular, in its former version prior to Law No. 79 of 29 June 2022;  
Having regard to Ministerial Decree No. 102 of 9 March 2011;  
Having regard to the Ministerial Note No. 583 of 8 April 2011;  
Having regard to Ministerial Decree No. 336 of 29 July 2011, defining and updating all academic scientific sectors, classified into public selection sectors, pursuant to Art. 2 of Ministerial Decree dated 23 December 1999 and subsequent amendments and additions;  
Having regard to Law No. 183 of 12 November 2011, and to Art. 15 in particular;  
Having regard to the Statute of SISSA, issued by Directorial Decree No. 40 of 18 January 2012, published in the Official Journal No. 36 dated 13 February 2012, in force since 28 February 2012;  
Having regard to SISSA Directorial Decree No. 121 dated 5 March 2012;  
Having regard to Directorial Decree No. 295 of 21 May 2012, establishing SISSA's scientific Areas;  
Having regard to the resolutions of the Academic Senate and the Board of Directors of SISSA dated 24 March 2015 and 31 March 2015, which also updated the yearly amount due to research fellows;  
Having regard to SISSA "Regulation governing the granting of research fellowships, pursuant to Art. 22 of Law No. 240 of 30 December 2010", issued by Directorial Decree No. 440 of 31 May 2021 pursuant to Art. 22 of Law 240 of 30 December 2010, in its former version prior to Law No. 79 of 29 June 2022;

Having regard to Decree Law No. 36 of 30 April 2022, as converted, with amendments, into Law No. 79 of 29 June 2022, and to Art. 16, par. 6 quaterdecies, in particular;

Having regard to the National Recovery and Resilience Plan (PNRR), submitted to the European Commission on 30 April.2021 pursuant to Article 18 of Regulation (EU) No. 2021/241 and approved by the ECOFIN Council on 13 July 2021, its resolution being notified to Italy by the Council's General Secretariat by means of Note LT161/21 of 14 July 2021. The plan consists of 6 missions and 16 components. Having regard to Mission 4, Component 2 (M4C2) "From Research to Enterprise" in particular, which aims at supporting investment in research and development, promoting innovation and the dissemination of technologies, strengthening skills by fostering the transition to a knowledge-based economy, covering the entire chain of the research and innovation process, from basic research to technology transfer;

Having regard to the Guidelines defined by the Italian Ministry of University and Research for M4C2 system initiatives, approved by Ministerial Decree No. 1141 of 07 October 2021, shared with the NRRP Education and Research Steering Committee;

Given investment 1.4 of M4C2 "Strengthening of research structures and creation of "national R&D champions" in certain Key Enabling Technologies", which aims at financing the creation of national research centres, selected through competitive procedures, that are able to reach, cooperating with Universities, research centres and private companies, a critical threshold of research and innovation capacity;

Having regard to Directorial Decree No. 3138 of 16 December 2021, as amended by Directorial Decree No. 3175 of 18 December 2021, issuing a "Public Notice for the submission of Proposals for the Strengthening of Research Structures and the creation of R&D "national champions" in certain Key Enabling Technologies to be financed under the National Recovery and Resilience Plan, Mission 4 Component 2 Investment 1. 4 "Strengthening research structures and creation of "national R&D champions" in some Key Enabling Technologies", financed by the European Union - NextGenerationEU";

Given the participation of SISSA as a founding member in the "National Centre for HPC, Big Data and Quantum Computing" - "Simulation, Computation and Analysis of High Performance Data" for the implementation of the Research Programme "National Centre for HPC, Big Data and Quantum Computing" (aid application code: CN000013);

Given that, under MUR Directorial Decree No. 1031 of 17.06.2022, registered by the Court of Auditors on 14.07.2022 as No. 1880, the National Centre for HPC, Big Data and Quantum Computing, "Simulations, Computing and Analysis of High Performance Data", has been accepted for funding for the implementation of the Research Programme "National Centre for HPC, Big Data and Quantum Computing";

Having regard to the resolution of the Physics Area Council dated 16 May 2024, requesting a public selection procedure for the award of a research fellowship focusing on "Development and application of dimensionality reduction and optimal data compression techniques, applied to cosmological data and in particular to simulations and data of the cosmological signal produced by the hydrogen line at 21cm";

Having regard to the resolution of the Board of Directors dated 4 June 2024, based on the assent granted by the Academic Senate on 28 May 2024, authorising the public selection procedure for the award of a research fellowship pursuant to Art. 22 of Law No. 240/10, in its former version prior to Law no. 79 of 29.06.2022 - scientists responsible for projects: prof. Roberto Trotta and prof. Alessandro Laio; scientists responsible for research activity: prof. Roberto Trotta;

Having established the availability of funds to cover the expenditure for the above-mentioned research position, guaranteed by the School funds assigned to the Physics Area up to EUR 24,336.00 (gross yearly amount), and the remaining cost shall be covered by the following project:

- For 3 months by the project R\_H2020\_INFRAEDI\_FISI\_Baroni\_0500; H2020-INFRAEDI-2018- 824143 Acronyme:"MaX". European Data Infrastructure. Full title: "MAterials design at the eXascale. European Centre of Excellence in materials modelling, simulations, and design" - Prof. Baroni; CUP: G96C18000260006;
- For 11 months by the project R\_PNRR\_CN\_HPC\_FISI\_Baroni\_0814; PNRR Mission 4, Component 2, Investment 1.4\_CN\_00000013\_CN-HPC: National Centre for HPC, Big Data and Quantum Computing - spoke 7 - Financing institution: European Union – NextGenerationEU - Prof. Baroni; CUP: G93C22000600001;
- For 10 months by the project A\_SISSA\_PRO3\_FISI\_Trotta\_0751- Programmazione triennale 2021/2023 (DM n.2503 dd. 09/12/2019) Programma congiunto Scuole: progetto dal titolo "Data Science methods for MultiMessenger Astrophysics & Multi-Survey Cosmology" - Prof. Trotta; CUP: G95F21001980006;

#### DECREES AS FOLLOWS:

Art.1 A public selection based on qualifications is hereby announced for 1 research position in the research field detailed in Annex 1. Full details, admission requirements and duration are listed in Annex 1.

Pursuant to Art. 7, par. 1, of the Italian Legislative Decree No. 165/2001, public administration bodies ensure gender equality and equal opportunities, as well as the absence of any form of direct or indirect discrimination on grounds of gender, age, sexual orientation, ethnicity, disability, religious belief and language, affecting access to employment, working conditions and economic treatment, vocational training, career advancement and workplace safety.

Art.2 Eligible candidates must be in possession of a scientific-professional curriculum which enables them to carry out research activity and meet the further requirements specified in Annex 1.

Personnel with permanent positions in Italian universities, public research and experimentation institutions, ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development), ASI (Italian Space Agency) or institutions which award scientific degrees equivalent to PhD, in accordance with art. 74, par. 4 of the Italian Presidential Decree No. 382 dated 11.07.80, are excluded from applying.

In accordance with art. 18 of the Italian Law No. 240/10, candidates having a family relationship or other degree of kinship up to the 4<sup>th</sup> degree with the following persons are also excluded from applying:

- SISSA Professors belonging to the Area that requested the position;
- Director of SISSA;
- Secretary General of SISSA;
- Member of the Board of Directors of SISSA (please see Annex A).

The research fellowship is awarded through a private law contract which does not give any right to be employed by universities.

Art.3 The salary of the research fellowship detailed in Annex 1 is gross per year and includes contributions to be paid by the researcher. The fellowship is paid monthly in arrears. The fiscal and social security treatment of the research fellowship is in accordance with art. 4 of Italian Law No. 476 dated 13.08.84 and subsequent integrations and modifications, and par. 26 and followings of art. 2, Italian Law No. 335 dated 08.08.95 and subsequent integrations and modifications.

The School arranges for insurance coverage for the fellowship holders against accidents in the workplace and for third-party liability while they are carrying out their research work. The insurance premium is deducted from the fellowship.

Art.4 The fellowship cannot be held simultaneously with other fellowships of whatever kind, except those awarded by Italian or foreign institutions with the aim of integrating the research activity of the candidate through a period spent abroad.

Provided that they fulfil their research obligations, fellowship holders are authorized to carry out professional activity as long as the activity is compatible with the research position, does not pose a conflict of interest and is not prejudicial to the School. Fellowship holders willing to carry out an external activity on a continuous basis shall submit a specific request, which will be evaluated by the relevant Area Council and subsequently submitted to the Academic Senate of the School for approval.

If compatible with their research duties, and following written approval by the scientist responsible for the research project, fellowship holders can participate in research assignments commissioned to SISSA by third parties (pursuant to art. 66 of the Italian Presidential Decree No. 382/80), in accordance with the current regulations.

Fellowship holders cannot be enrolled in University Degree courses, PhD courses with scholarship or medical school of specialization in Italy or abroad.

Government employees must be given unpaid leave for the entire duration of the fellowship.

Art.5 The qualifications required for the admission to the selection procedure shall be carried out by the examining board according to the following table:

Qualification	Evaluation criteria	Score
PhD	Relevance to the project	max 10 points
University Degree	Type of degree listed in the announcement - according to the degree mark	max 5 points
Published works and other research products	Relevance to the scientific disciplinary sector of the research project	max 25 points
Other post-lauream Degrees	Relevance to the scientific disciplinary sector	max 5 points
Other qualifications	Contracts, scholarships, enrollment in PhD degrees,	max 15 points

	periods spent abroad, etc., if any	
<b>TOTAL</b>		<b>60 points</b>

A candidate is eligible if s/he scores at least 42/60.

To prove the equivalence of a qualification so as to meet the requirements described in Annex 1, the candidate must refer to the list of equivalences available on the website of the Italian Ministry of University and Research (<https://www.mur.gov.it/it/aree-tematiche/universita/equipollenze-equivalenza-ed-equiparazioni-tra-titoli-di-studio/titoli-0>). Qualifications obtained abroad and declared equivalent by the Italian authority, according to the current legislation, will be accepted for the purposes of the selection procedure.

In the event of a foreign degree that has not already been declared equivalent in Italy according to the law (<https://www.cimea.it/EN/>), the examining board may admit the candidate upon evaluation of his/her study plan and its consistency with the scientific sectors specified in Annex 1.

The qualifications evaluation criteria, which can be set by the examining board according to internationally recognised parameters, are consistency with the subject of the research fellowship, relevance and quality of the following qualifications and activities:

- proven research activity;
- academic qualifications (University Degree, PhD, specialization degrees or attendance certificates of other postgraduate specialization courses held in Italy or abroad);
- other qualifications.

For foreign degrees that have not already been declared equivalent in Italy according to the law, the candidate must attach a translation of the study plan into English and/or Italian.

The scientific qualifications must be relevant to the Area referred to in this announcement or to interdisciplinary subjects relevant to the areas involved.

Art.6 The examining board is appointed by decree of the Director of SISSA, upon a proposal of the relevant Area Council. It comprises a minimum of three and a maximum of five members, of which one shall act as President and one as Secretary. The members of the examining board shall be chosen among professors and researchers of SISSA, other research institutions



and universities, or among experts in the subjects referred to in this announcement. A deputy can be appointed for each member.

The examining board evaluates the qualifications according to the criteria indicated above (see the Table in Art. 5).

At the end of the evaluations the examining board will draw up a report, including the evaluation criteria, the total mark obtained by each candidate and a classification list of the eligible candidates. The acts of the selection procedure and the ranking are approved by Directorial Decree.

The first eligible candidate will undertake a research contract with SISSA in accordance with Italian Law No. 240/10, Art. 22, in its former version prior to Law No. 79 of 29.06.2022.

Being in the ranking does not give any right in other selection procedures.

Art.7 **Under penalty of exclusion, the application** for this selection procedure, along with the relevant qualifications held and relevant scientific publications, **shall be submitted online through the electronic application accessible at the following address:** <https://pica.cineca.it/sissa/ar-fm-fisi-36-2024>. A valid

email address is required for the registration process.

Applicants shall upload all personal and professional data as requested by the application procedure; all documents must be uploaded in .pdf format. Each applicant can produce a maximum of no. 30 publications and a maximum of no. 30 other titles and qualifications.

All fields in the online application form must be filled out. Under penalty of exclusion, the application must contain:

- a curriculum vitae with a complete list of the candidate's scientific and professional activities;
- a valid ID of the candidate, to be uploaded in electronic format.

Candidates accessing the PICA platform using their digital identity (SPID – Public Digital Identity System) will not be required to upload a scan of their personal ID, nor to sign and upload their application.

**Failure to comply with the online application procedure will result in the exclusion of the applicant from the selection.**

Prior to final submission, and within the given deadline for applications submission, the online application procedure allows to modify and save the inserted information in a draft copy. Confirmation of final submission date will be certified by an automatic notification email. Submissions after the

given deadline will not be accepted by the system, as the online application procedure won't be accessible.

**The online application and submission procedure shall be completed by 26 July 2024, 11:59 p.m. CEST (Rome time). The reference letters shall be uploaded on the PICA platform by the candidate's referees/supervisors by 2 August 2024, 1:00 p.m. CEST (Rome time).**

The submission of the online application must be completed and finalized:

- **with the digital signature of the candidate**, by means of smart card, USB token or remote digital signature allowing the applicant to digitally sign electronic documents with a software using a PC or a web portal for Remote Signature, provided by a Certification Service Provider (CSP). Candidates with a smart card or a USB token for digital signature should check the compatibility with the Digital Signature system embedded in our server. In case of compatibility, candidates shall sign the application on the server (e.g. ConFirma);
- **holders of server-incompatible Digital Signature and holders of Remote Digital Signature** who can access a web portal for digitally signing electronic documents shall save the .pdf file generated by the system on their PC. The .pdf file shall not be modified in any way, and it shall be digitally signed in CADES format: the system will generate a file with .p7m extension. The candidate shall upload the .p7m file on the system. No changes are to be made to the file by the candidates before the Digital Signature, on pain of exclusion from the selection procedure;
- **in case the two above-mentioned options do not apply**, candidates shall save the .pdf file generated by the system on their PC. The .pdf file shall not be modified in any way, on pain of exclusion from the selection procedure. The .pdf shall be printed out, signed on the last page, scanned in .pdf format and uploaded on the system.

For any technical issue regarding the application, candidates may ask for assistance through the link at the bottom of the page: <https://pica.cineca.it/sissa> ("supporto").

SISSA will verify that all the statements made in the application and accompanying documentation comply with the provisions of Presidential Decree No. 445/2000.

Art.8 After a budget verification has been carried out, the selected candidate will be formally notified of the award of the research fellowship.



Within 30 days from the start of the research activity at SISSA, Italian and EU candidates and non-EU citizens resident in Italy will have to submit a valid ID and fill out the following documents:

1) affidavit attesting birth, citizenship, place of residence and Italian tax code of the applicant;

2) affidavit attesting the possession of a University Degree and a PhD (only if required by the announcement);

Non-EU citizens authorized to sojourn in Italy owing to conventions between Italy and their own country have to submit the same above-mentioned documents.

Non-EU citizens regularly sojourning in Italy may submit an affidavit according to articles 46 and 47 of Presidential Decree No. 445/2000 exclusively for personal data and events which can be certified and attested by public Italian authorities.

In any other case, the information requested in points 1) and 2) of this article must be notified by means of an affidavit and plain copies of the relevant documents within 30 days from the beginning of the research activity at SISSA. However, within 60 days from the beginning of their research activity winners have to submit certificates and declarations issued by the foreign competent authorities, accompanied by an Italian translation authenticated by the Italian Consulate abroad. The School reserves the right to verify all affidavits.

Should the winner refuse the position, not accept it or fail to submit the above-mentioned documents on time, the research fellowship may be offered to the next eligible candidate in the classification list, following the authorization granted by the Director, at the express request of the Area Coordinator or the scientist responsible for the research activity.

The starting date of the fellowship shall be agreed with the Area Coordinator or with the scientist responsible for the research project.

**Should the financial coverage not be guaranteed by the funding body, SISSA reserves the right not to activate the fellowships. The start of the contracts will therefore be subject to verification of the necessary financial coverage.**

Art.9 Fellowship holders undertake to carry out the research activity as foreseen in the contract and in accordance with the research program of the Area.

The research activity is carried out in the frame of the research project for which the applicant has been selected. Every year fellowship holders must

submit a report to the Area Council on the activity carried out in the previous year. In case of major non-compliance the contract can be terminated by decision of the School Senate and upon a reasoned proposal of the Area Council, having heard the researcher concerned.

The contract is automatically resolved in the following cases:

- unjustified delay or failure to start the research activity;
- unjustified suspension of the activity for more than 15 days;
- breach of the incompatibilities established by the current Rules for the awarding of research fellowship in SISSA;
- negative evaluation of the research activity expressed by the Area Council.

An authorized absence of up to 30 days a year does not require the fellowship to be suspended or the absence to be made up at a later date.

Fellowship holders wishing to resign must give a notice of at least 30 days, in which case no penalty shall be applied by SISSA. Failure to do so shall result in a penalty involving the recovery or the failure to pay the salary for the period of notice not given. The 30 days' notice shall not be applied during the first 30 days of research activity.

SISSA shall reserve the right to terminate the contract if the external funding becomes unavailable. In this case SISSA shall give the fellowship holder at least a 60 days' notice. Failure to do so shall result in the payment to the research fellowship holder of an amount equal to the period of notice not given.

**Art.10** The total duration of the research fellowship including the renewals must not exceed 6 years with the same fellow. To this end, the time in which the candidate was holder of a research fellowship and enrolled in PhD courses (without scholarship) is not taken into account for a period not exceeding the legal duration of the PhD program.

In accordance with the Italian Law No. 240/10, in its former version prior to Law No. 79 of 29.06.2022, candidates cannot be awarded research fellowships or temporary researcher contracts with public, private or online universities, nor with other institutions as specified in art. 22, par. 1 of Law No. 240/10 for a period exceeding 12 years, whether consecutive or not. To this end, the periods of absence due to maternity leave or state of illness are not taken into account.

The renewal of the research fellowship is decided by the School Academic Senate and, as for the financial coverage, by the Board of Directors, on the

basis of an evaluation of the research activity carried out by the fellowship holder and the state of the art of the research program, upon request of the scientist responsible for the research activity.

Art.11 All matters regarding data processing and protection are in accordance with the Italian Legislative Decree No. 196/2003 dated 30.06.2003, as amended by Legislative Decree No. 101 dated 10.08.2018, that transposes Regulation (EU) 2016/679 (GDPR). All the data provided to this administration will be processed for the sole purposes connected with and instrumental to the selection procedure and the eventual drawing up and management of the contract.

THE DIRECTOR  
Prof. Andrea Romanino  
(Italian version signed digitally)

## ANNEX 1 Physics Area

### Public selection based on qualifications

Title of the research activity: **“Development and application of dimensionality reduction and optimal data compression techniques, applied to cosmological data and in particular to simulations and data of the cosmological signal produced by the hydrogen line at 21cm”**

Fields of the research activity: The research activity will focus on the development and application of dimensionality reduction and optimal data compression techniques, applied to cosmological data and in particular to simulations and data of the cosmological signal produced by the hydrogen line at 21cm. The areas of interest include simulation-based inference with optimal data summaries; comparison of data distributions in high-dimensional spaces; unsupervised data compression for inclusion in neural networks, especially neural ratio estimation, neural posterior, and related fields; optimal encoding with neural networks and experience in applying the aforementioned techniques in the field of the 21 cm cosmic signal.

Scientist responsables for projects: prof. Roberto Trotta and prof. Alessandro Laio;  
Scientist responsables fot research activity: prof. Roberto Trotta;  
Members of the research group: Alessandro Laio, Guido Sanguinetti, Sebastian Goldt; Dr Chiara Moretti, Andre Scaffidi, Gabriella Contardo.

Area 02 – Physics

Public selection sector: 02/A2 – Theoretical Physics for fundamental interactions  
Relevant academic scientific sector: FIS/02 – Theoretical Physics, mathematical models and methods

Duration of the research fellowship: 24 months

Gross remuneration per year: € 28.560

### **Minimum requirements for admission to the selection procedure:**

University degree: Master's degree in Physics, Astronomy or related fields

Doctoral degree in: Physics, Astronomy, or related fields, or Data science/computer science. The title is compulsory at start of contract

Proven experience: Advanced programming techniques HPC, cluster enviroments, data analysis and statistics, deep learning, machine learning, data analysis from various sources in cosmology and/or astroparticle physics.

Evaluation criteria:

PhD: up to 10 points

University degree: up to 5 points

Published works and other research products: up to 25 points

Further post-lauream diplomas: up to 5 points

Other titles: up to 15 points

TOTAL: up to 60 points

The submission of two reference letters is recommended. The letters shall be uploaded on the PICA portal by the referees/supervisors indicated by the candidate in the application.

**The online application and submission procedure shall be completed by 26 July 2024, 11:59 p.m. CEST (Rome time). The reference letters shall be uploaded on the PICA platform by the candidate's referees/supervisors by **2 August 2024, 1:00 p.m. CEST (Rome time)**.**

The research activity shall be carried out for the purposes of the projects described below, and the financial coverage is guaranteed by the School funds assigned to the Physics Area up to EUR 24,336.00 (gross yearly amount), and the remaining cost shall be covered by the following project:

- For 3 months by the project R\_H2020\_INFRAEDI\_FISI\_Baroni\_0500; H2020-INFRAEDI-2018- 824143 Acronyme:"MaX". European Data Infrastructure. Full title: "MAterials design at the eXascale. European Centre of Excellence in materials modelling, simulations, and design" - Prof. Baroni; CUP: G96C18000260006;
- For 11 months by the project R\_PNRR\_CN\_HPC\_FISI\_Baroni\_0814; PNRR Mission 4, Component 2, Investment 1.4\_CN\_00000013\_CN-HPC: National Centre for HPC, Big Data and Quantum Computing - spoke 7 - Financing institution: European Union – NextGenerationEU - Prof. Baroni; CUP: G93C22000600001;
- For 10 months by the project A\_SISSA\_PRO3\_FISI\_Trotta\_0751- Programmazione triennale 2021/2023 (DM n.2503 dd. 09/12/2019) Programma congiunto Scuole: progetto dal titolo "Data Science methods for MultiMessenger Astrophysics & Multi-Survey Cosmology" - Prof. Trotta; CUP: G95F21001980006;

A contribution towards relocation expenses in Trieste is envisioned for the successful candidate if resident abroad (in the EU or outside the EU). The costs will be covered by the project R\_ALTRO\_INAF\_IFPU\_DirIFPU\_0499 – Amount charged by the School funds assigned to the Physics Area.

Given the resolutions of the Academic Senate and the Board of Directors of SISSA dated February 20th and February 27<sup>th</sup> 2024 respectively, EU and non-EU foreign research fellows are entitled to a reimbursement of the costs incurred for their Italian health insurance up to a maximum of € 2,000.00. A reimbursement is also foreseen for a medical travel insurance covering the trip to Trieste at the start of the contract.