Prot. n. 4462 - III/6 del 25/02/2020 - UOR: 80925 - Rep. n. 153/2020

SISSA
Scuola Internazionale Superiore di Studi Avanzati

Prot. n: 4462 - III/6 N. 153

Oggetto: Concorso per titoli e colloquio per il conferimento di una borsa di studio finanziata dal Progetto "Big Data for Black hole Evolution Studies" (BiD4BEST) - Marie Sklodowska-Curie Innovative Training Networks, nell'ambito del corso di "Philosophiae Doctor" (Ph.D) in Astrofisica e Cosmologia per l'anno accademico 2020/21.

Il Direttore

VISTO il D.M. 45 del 08.02.2013 "Regolamento recante modalità di accreditamento delle sedi e dei corsi di dottorato e criteri per la istituzione dei corsi di dottorato da parte degli enti accreditati";
VISTI gli artt. 23, 24, 25 e 26 dello Statuto della Scuola pubblicato sulla G.U. no. 36 del 13.02.2012;
VISTO il Regolamento dei corsi di Ph.D della Scuola;
VISTE le delibere del Senato Accademico del 17.09.2019 e del Consiglio di Amministrazione del 24.09.2019 in cui si è preso atto della concessione del finanziamento per il progetto MSCA ITN "BiD4BEST" dando mandato al Direttore a firmare tutti gli atti necessari per l'erogazione del finanziamento e la gestione del progetto;
VISTA la necessità di dover emanare il bando di concorso in tempo utile per effettuare la selezione nei tempi previsti dal Consorzio;

DECRETA

Art. 1

Nell'ambito del progetto "Big Data for Black hole Evolution Studies" (BiD4BEST) - Marie Sklodowska-Curie Innovative Training Networks, la Scuola Internazionale Superiore di Studi Avanzati bandisce un concorso per titoli e colloquio per il conferimento di una borsa di studio nell'ambito del corso di "Philosophiae Doctor" (Ph.D) in Astrofisica e Cosmologia per l'anno accademico 2020/21.

Art. 2

I requisiti di ammissione, i tempi e le modalità di espletamento delle procedure concorsuali sono specificati nell'allegato bando di concorso che costituisce parte integrante del presente decreto.

Art. 3

Il presente decreto verrà portato a ratifica degli Organi competenti alla prima seduta utile.

Trieste, 25 FEB. 2020

Il Direttore
(Prof. Stefano Ruffo)

ri

Segreteria Didattica ed Allievi

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MAI PER SEGUIR VIRTUTE E CANOSCENZA · SISSA ·

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Big Data for Black hole Evolution Studies
(BiD4BEST)
Marie Sklodowska-Curie Innovative Training Networks, Early Stage Researcher (H2020-MSCA-ITN-2019)
Astrophysics and Cosmology PhD course, Physics Area

Deadline for applications: 31st March 2020 – 13.00 hrs.
Expected starting date: October, 1st 2020
Supervisor: Prof. Andrea Lapi
Job duration: 36 months

Main research fields: *Astrophysics, Cosmology, Data Science*

Job and Project
The job consists in a full-time position for a (Marie Sklodowska-Curie Innovative Training Networks) Early Stage Researcher (ESR) to work in the Astrophysics and Cosmology group, Physics Area at the International School for Advanced Studies (SISSA, Trieste, Italy) under the supervision of Prof. Andrea LAPI, to develop a project titled "*Advanced phenomenological models to probe the coevolution of massive galaxies and supermassive black holes through cosmic times*". The rationale of the project is to investigate in a cosmological context the connection between the growth of the stellar and supermassive black hole components in galaxies through cosmic times, via continuity equation and sub-halo clustering and abundance matching techniques. The main goals of the project are: to obtain statistical determination of the supermassive black hole and stellar mass functions of active and quiescent galaxies at different redshifts with different input light curves and Eddington ratio distributions; to predict the mean relation between black hole accretion rate and star formation rate as a function of stellar mass and cosmic time; to compare such outcomes with multiwavelength samples of active galactic nuclei at different epochs, luminosities, obscuration levels, and host galaxy properties.

Network
The job is inserted in the framework of **BiD4BEST** (Big Data for Black hole Evolution Studies; GA 860744; Coordinator: Dr. Francesco Shankar, University of Southampton), a Horizon-2020 Marie Sklodowska-Curie Innovative Training Network (MSCA-ITN-ETN) that offers an innovative and intersectoral research training program for 13 Ph.D. students in one of the most visible areas of astrophysical research: the formation and evolution of supermassive black holes in galaxies. A coordinated research training effort in this field has been established

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to mobilize the community in Europe and prepare a core group of young scientists in anticipation of new observational data in the early/mid 2020s from future space missions with strong European involvement. These data will have the quality and volume to yield transformational science on the evolution of black holes in galaxies, as long as the necessary expertise and synergies among observations, theory and data analytics within the European astronomy community. BiD4BEST brings together leading scientists in observational and theoretical studies of black holes and galaxies, industrial experts in cutting-edge big-data technologies, and professionals in science dissemination. The doctoral research projects available in the network combine state-of-the-art observations, numerical simulations and innovative analytic tools to compare theory with observations and shed light on the physics of black hole formation in the context of galaxy evolution. The training on expertise from different research areas (observational astronomy, theoretical astrophysics) and sectors (academic, industrial) will be achieved by carefully designed secondments, mixed doctoral supervisory committees (academia, industry), coordinated events for team communication and interaction, as well as network-wide courses on astrophysics and transferable skills. The proposed research training program aspires to generate individuals that in addition to academic competences, master big-data analytics and have the capacity to apply these technologies to solve problems in different sectors (research, industry, non-academic) by developing innovative products and services. Further information can be found at
https://wwwmpa.mpa-garching.mpg.de/~kdolag/BiD4BEST/index.html
https://cordis.europa.eu/project/id/860744

The ITN-wide EURAXESS advertisement can be found at
https://euraxess.ec.europa.eu/jobs/486901

Working place, supervisor, and secondments

The project will be carried on under the supervision of Prof. Andrea Lapi, within the Astrophysics and Cosmology group at SISSA-Scuola Internazionale Superiore di Studi Avanzati, located in Via Bonomea 265, 34136 Trieste, Italy. SISSA is a scientific center of excellence within the national and international academic scene, with focus on three main areas: Physics, Mathematics and Neuroscience. SISSA features 80 professors, about 100 post-docs, 300 Ph.D. students and 110 technical administrative staff members. SISSA offers top facilities for research, such as High-Performance Computing via the recently upgraded supercomputer "Ulysses" with a processing power of 34 million hours a year. SISSA has leading roles in large international collaborations, and constitutes a research network with the other scientific institutions in the area, including the International Centre for Theoretical

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Physics (ICTP), the National Institute for Nuclear Physics (INFN), and the Astronomical Observatory of Trieste (INAF-OATs). SISSA has also drawn up about 150 collaboration agreements with the world's leading schools and research institutes. SISSA holds the top position among Italian scientific institutes in terms of research grants obtained in relation to the number of researchers and professors. The SISSA Media and Communication Unit will provide support for, and offer training on best practices for dissemination and public outreach.

The Astrophysics and Cosmology group has been one of the first to be established in SISSA, and has awarded more than 150 Ph.D. titles in about 40 years. The group comprises 10 staff members, 6 postdoc and 20 Ph.D. students. Active lines of research include early universe and CMB data analysis, stellar astrophysics, galaxy formation and evolution, high-energy and multi-messenger astrophysics, dark matter and dark energy, gravitation theory and gravitational waves, galaxy clusters and large-scale structures, astrochemistry and astrobiology, computational astrophysics.

Prof. Andrea Lapi obtained his Ph.D. Degree in 2004 at Univ. of Rome "Tor Vergata". Since 2015 he is associate professor at SISSA (Trieste, Italy), and since 2018 he is the Head of the Astrophysics and Cosmology Group and coordinator of the corresponding Ph.D. He has supervised the Ph.D. Thesis of about 20 students so far. He has published more than 100 papers on refereed international journal with high-impact factors. He has a longstanding expertise in theoretical and phenomenological models of galaxy formation and evolution. In the past he worked on the thermodynamics of the intra-cluster medium, statistics of dark matter halos via excursion set formalism, interpretation of submm/far-IR data from the Herschel satellite, kinematical modeling of spiral galaxies, models of cosmic reionization and their use as a probe of dark matter microphysics. His current research also involves cross-correlation studies between CMB lensing and galaxy surveys, efficient buildup of simulated halo and galaxy catalogues as a preparatory work for Euclid and SKA, cosmological rates of gravitational waves from stellar compact binaries in view of the current LIGO/Virgo detector and of the next-generation Einstein telescope, and the formation of black hole seeds from intermediate/extreme mass ratio in-spirals in the perspective of the future LISA science.

The position will also allow the ESR to spend secondments (typically a few months each, and no more than 11 months in total) at BASF to learn advanced Machine Learning techniques, at Univ. of Durham to compare models with X-ray/IR selected AGN in star-forming galaxies, and at MPG to confront models with multiwavelength AGN samples.

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Candidate profile

The candidate ESR can be of any nationality and is required to have a master degree in Astrophysics, Physics or related fields giving access to Ph.D. school and NOT to have any kind of Ph.D. degree. Previous research experience (which must be no longer than 4 years) although appreciated, is not mandatory. Willingness to travel internationally for the purpose of research, training and dissemination/outreach is mandatory.

Eligibility requirements

ESR appointments are full time fixed term for 36 months. The researcher will commit to work exclusively for the action. There are strict eligibility rules associated with the recruitment of ESR in Marie Sklodowska -Curie Innovative Training Networks, and these are:

Career: At the date of recruitment, the ESR must have a master degree giving access to Ph.D., shall be in the first 4 years (full-time equivalent research experience) of their research careers and have not been awarded a doctoral degree. Previous research experience, especially in extragalactic astrophysics and galaxy evolution is appreciated but is not mandatory. A Ph.D. degree in any field is not compatible with this ESR position.

Mobility: Trans-national mobility is an essential eligibility condition of Marie Sklodowska-Curie Training Networks. The ESR must not have resided or carried out his/her main activity (work, studies etc.) in Italy for more than 12 months in the 3 years immediately prior to the recruitment date. Compulsory national service and/or short stays such as holidays are not taken into account. Applicants must be prepared for periods of secondments (see above).

Language: A good knowledge of spoken and written English is required and will be evaluated during the selection process.

If these criteria are not fulfilled, the applications will be rejected. Candidates matching the required profile will be interviewed. Candidates that do not fulfill the mobility condition are encouraged to look in the network webpage for other open positions within the network.

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How to apply

Candidates should apply through https://pica.cineca.it/sissa/ by 31 March 2020 – 13.00 hrs. Italian time - and should provide:

- An application form duly completed.
- A Curriculum Vitae (CV) including previous technical and scientific experiences with a list of publications (if any) and/or participation to scientific meetings and research expertise.
- A letter of motivation, including research interests and the reasons for applying for this program;
- Undergraduate level certificates, including university grades and the detailed list of university courses with grades. Copies of any other scientific publication that the candidate believes significant are also welcome.
- The applicant must also provide two or more reference letters.

Evaluation and interview

The selection process will consist of two different selection phases and will be based on:

1. CVs and qualifications;
2. Interview.

After the first selection phase, based on the CVs and qualifications, only the admitted candidates will be contacted for the second selection step. Candidates will be interviewed by a committee that includes at least two BiD4BEST members. The interview, aiming to assess the skills, the motivation and the fluency in English, will take place in SISSA or in remote via Skype. Those candidates who will pass both the selection phases, will be ranked. The first candidate in ranking will be offered the position. **The process is expected to end by 31 May 2020.** If, for any reason, the selected candidate should decline the offer or will fail to comply with the requirements for taking up the position, the next in the classification list will be offered the position.

At SISSA, we value diversity and equality. SISSA recognizes that employees may wish to have working patterns that fit with their caring responsibilities or work-life balance. Due consideration will also be given to applicants who have had career breaks for reasons including maternity, paternity or adoption leave, disability or illness.

Rights and responsibilities of researchers participating in Marie Sklodowska-Curie Actions

The European Charter for Researchers is a set of general principles and

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requirements which specify the roles, responsibilities and entitlements of both researchers and the employers and/or funders of researchers. The aim of the Charter is to ensure that the nature of the relationship between researchers and employers or funders is conducive to successful performance in generating, transferring, sharing and disseminating knowledge and technological development and to the career development of the researchers.

It is mandatory for applicants to read and understand the detailed information regarding the rights and responsibilities of researchers engaged in a Marie Sklodowska -Curie Innovative Training Network. The European Charter for researchers can be accessed at
https://euraxess.ec.europa.eu/jobs/charter/code

Employment contract and remuneration
The selected candidate will be appointed under a 36-months full-time employment contract according to the Italian national legislation, also in terms of social security and fiscal matters. The remuneration will be compliant with the rules of the H2020-MSCA-ITN-2019, as by the Marie Sklodowska-Curie Innovative Training Networks 2019, 'European Union Contribution and Applicable Rates'. The gross amount per year of the allowances (including contributions to be paid by the fellow and by SISSA administration) is composed by *living allowance*: (€ 40,966), the *mobility allowance* (€ 7,200) and, if eligible, the *family allowance* (€ 3,000). These gross amounts include all compulsory deductions under national applicable legislation (taxes depend on the country of the host institution). The contract includes funds for all the travel expenses needed for the successful development of the PhD thesis (meetings, trainings, workshops, observations, collaborations, etc.).

Personal Data
Any personal data will be processed in accordance with the General Data Protection Regulation 679/2016 EU (GDPR) on the Protection of Individuals.

Trieste, 25 FEB. 2020

The Director
(Prof. Stefano Ruffo)

ri

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