Final resolution

Distinguished researcher position under the framework of the Beatriz Galindo programme 2018

The Resolution of 17th April 2019 of the University of the Balearic Islands made public the call with reference **BEAGAL18/00148** (junior classification) under the framework of the Beatriz Galindo Programme corresponding to the call published in Order ECD/365/2018 of 23rd March.

The term for applications and submitting documentation ran from 24th April to 24th May 2019, both inclusive.

Purpose and nature of the call.

The purpose of this call was to attract internationally experienced research talent in order to promote the recruitment and training of human talent in research, as well as their mobility in sectors that have a strategic national interest, and to promote the quality and competitiveness of teaching and/or research staff at Spanish universities.

Specifically, it is a position at the University of the Balearic Islands (UIB) for a distinguished researcher in the scientific field of physics and space science. Responsibilities involve conducting research in gravitational physics and teaching computational physics. This position shall be assigned to the Institute of Applied Computing & Community Code (IAC^3). The focus of the Institute is based on the synergies of three different research groups (Astrophysics, Relativity, and Image Processing). Their common ground for research is the development of advanced numerical codes for simulating systems of differential equations.

The contract shall last for four (4) years. The gross salary associated with the contract shall be 45,000.00 euro per annum as per the format set out in article 26.b) of the call.

The goal of this distinguished researcher position, offered under the framework of the Beatriz Galindo programme, is to raise the competitiveness and impact of research generated by the UIB at an international level; expand upon the activities carried out by the research group that has actively participated in the LIGO Scientific Collaboration; and create new collaborative efforts within the Spanish astrophysics, astroparticle physics, and fundamental physics communities that not only endorse Spain's participation in gravitational wave astronomy, but also promote the development of technologies for future detectors. Over the four years of this contract, it is hoped that the LIGO and VIRGO gravitational wave detectors reach their designed levels of sensitivity and that hundreds of signals will be detected. This will have profound implications for our understanding of the universe and our verification of the theory of general relativity. Furthermore, the studies carried out over this period of time will be relevant for the creation of future detectors, both on Earth and for the special LISA mission, which will study sources such as supermassive black holes or cosmological gravitational waves from the very early universe.

This call complied with the principles of proper advertising, competition, and objectivity and was carried out in accordance with Order ECD/365/2018 of 23rd

March, which establishes and defines the terms for awarding Beatriz Galindo grants (Official State Gazette [BOE] no. 85 of 7th April 2018).

These activities are financed by the Ministry of Science, Innovation and Universities and are co-financed by the UIB.

For its part, on 19th February 2018 the UIB registered the *Declaration of commitment by the Universitat de les Illes Balears (UIB) to the Principles of "The European Charter for Researchers" and "The Code of Conduct for the Recruitment of Researchers"* with the European Commission as a necessary step towards being awarded HRS4R acknowledgement, which enables quality and efficient management of the human resources dedicated to research—one of the explicit purposes of this call and one of the UIB's unequivocal intentions.

Selection of lecturers and/or researchers, and the specific profile.

As per what is set out in article 15 of Order ECD/365/2018 of 23rd March, the following aspects were taken into account when selecting candidates:

- Candidates (lecturers and/or researchers) had to hold a doctoral degree.
- Lecturers and/or researchers must have worked overseas, entirely or in part, as a professional and have been lecturers, researchers and/or team coordinators at an overseas university or R&D&i centre explicitly recognised as such in that country.
- Candidates must have been able to accredit having, at most, seven years of professional teaching and research experience abroad in order to qualify for a Beatriz Galindo junior award. In both instances, the calculation of these years would start from the candidates having been awarded their doctoral degree.
- Candidates must have accredited their lecturer and/or researcher backgrounds when submitting their applications.
- Lecturers and/or researchers who are currently beneficiaries of a similar grant could not apply for the positions allocated to the university.
- Candidates had to have post-doctoral experience in the field of gravitational wave physics, as well as in the astrophysics of sources of gravitational waves or cosmology directly applied to this field, as per the research duties described hereafter.

The profile for the position was as follows:

A) *Teaching profile:*

The teaching programme shall correspond to courses in the **Computational physics** module that comprises part of the bachelor's degree programme in physics, as well as the master's degree programme in advanced physics and applied mathematics (MFMA), both of which are offered at the UIB. The module in the bachelor's degree programme includes two subjects: "Computer-assisted physics" and "Computational physics". The MFMA programme addresses various matters of applied computation in different knowledge areas, as well as techniques for mass data processing.

In "Computer-assisted physics" students learn to write programs in a scientific programming language (e.g., Python, C, or Fortran); use programs for symbolic computation (e.g., Mathematica) and tools for analysing and creating graphic representations of scientific data; and numerically solve algebraic equations,

interpolation, differentiation and integration, while using computer processing to handle simple problems.

The "Computational physics" course examines the characteristics of differential equations seen in other courses and explores the numerical techniques needed to solve them at a level that considers the advanced formulation of problems and how to solve them efficiently, developing the ability to construct related computational models. Contents include: numerically solving ordinary differential equations and partial differential equations; introduction to discretisation in finite differences; convergence tests; consistency and stability; and the study of elliptical, parabolic, and hyperbolic equations and their application to standard physics problems.

The "Massive data processing techniques" course on the MFMA programme focuses on the knowledge and advanced application of various probabilistic, statistical and data mining techniques to actual analysis problems in both time series and images, as well as their interpretation in probabilistic terms. The course also covers the study of computationally efficient algorithms with Monte Carlo and machine learning techniques.

The UIB has been distinguished as a Campus of International Excellence; figuring into this consideration is the "Physics, Computation, and Applications" (http://www.e-mta.eu/) line of research which includes internationally recognised, top-tier research groups. The purpose of this teaching programme is to provide solid multidisciplinary training that focuses not only on the underlying physics, but on the computational methods that can later be applied in many different fields.

B) Research and knowledge transfer profile:

The researcher shall be a member of the Physics Department at the UIB and of the IAC3 (Institute for Applied Computing & Community Code). The IAC3 seeks to create synergies between projects involving large scale computing applied to differential equations and the analysis of observational data, and areas of application such as computational astrophysics, gravitational wave data analysis, satellite image processing and fluid dynamics. The IAC3 and its lines of research form part of the backbone for the research area in "Physics, Computation, and Applications," one of four lines of research that make up the e-MTA campus of excellence project at the UIB.

The goal of the research project shall be to broaden the scope of these activities and substantially increase the contributions, albeit not exclusively, to the future of gravitational wave physics and the ongoing work within the European scientific community towards next generation instruments, in particular the LISA space mission scheduled for launch by the ESA in the early 2030s, and the ground-based Einstein Telescope (ET), in whose design the UIB played a role and which is expected to be included in the ESFRI 2020 roadmap.

The selected candidate shall carry out research that expands upon the capabilities already present at the IAC3 regarding computational and theoretical problems with a direct application to this scientific project: modelling gravitational wave signals from compact objects; data analysis algorithms to detect transient or continuous sources; characterisation of noise in time series; image processing; exascale computing or machine learning algorithms for modelling or analysing data; testing general relativity, and astrophysical and cosmological models with gravitational wave or multi-messenger signals.

The planned *transfer of knowledge* comprises two complementary activities:

I) Algorithms used in high performance computing and data analysis have applications in other areas, e.g. some of the code developed by IAC3 researchers is used in medical applications.
Members of the IAC3 already experienced in knowledge transfer (patents) will support the researcher in finding applications for the algorithms developed.

II) Due to the technical innovation needed to develop future detectors (optical, materials), the researcher will actively support the key goal of establishing and enhancing technological advances for the ET and LISA in Spain and involving other scientists inside and outside the IAC3.

Submission and formalisation of applications.

The documentation submitted by persons applying to the position was done so via the form made available on the Ministry of Education, Culture and Sport website.

Applications had to contain at least the following information:

a) Teaching programme.

b) Research and knowledge transfer programme.

c) Curriculum vitae that includes a list of pre- and post-doctoral positions and current or recent links with overseas universities or research centres.

d) A statement explaining the benefits the university will see from the teaching programme and the research and knowledge transfer programme.

Consideration of applications.

Applications were assessed by an expert panel designated by the Secretary General for Universities as per what is set out in article 18.2 of Order ECD/365/2018 of 23rd March which establishes and defines the terms for awarding Beatriz Galindo grants. The International Panel of Experts has submitted their selection proposal as follows:

Selected candidate:

Reference	ID document	Selection score
BGP18/00126	Y4126735C	9.25

In turn, a ranked list of positively evaluated candidates who will serve as alternates for the person selected has been drafted. The list of alternates is as follows:

Reference	ID document	Selection score
BGP18/00235	Z3022696	9
BGP18/00239	CHC17V72F	8.3
BGP18/00228	43168614Y	8.2
BGP18/00083	Y2115876M	7.9
BGP18/00045	N469993	7.15
BGP18/00124	C3MXK11P9	7

A period of ten working days was established from the day following publication hereof so that the interested parties may present any contentions they deem appropriate. This Vice-Chancellor is not aware of any contentions and is therefore publishing the final resolution.

VIII. Final rule.

The present resolution and all of the administrative proceedings that derive from it may be challenged or contested regarding the points and in the manner established by Law 39/2015 of 1st October on Common Administrative Procedures for Public Administrations.

Palma, 1st October 2019

Pro Vice-Chancellor for Research and Internationalisation,

Enrique García Riaza