

RESOLUTION TO CALL FOR A BEATRIZ GALINDO SENIOR RESEARCH POSITION IN THE THEORETICAL PHYSICS DEPARTMENT AT UNIVERSIDAD AUTÓNOMA DE MADRID (BEAGAL18/00097)

Universidad Autónoma de Madrid offers a position for a senior researcher within the **Beatriz Galindo Programme (Orden ECD/365/2018, of Secretaría General de Universidades at the Ministerio de Ciencia, Innovación y Universidades)**. The main goal of this Programme is to attract and retain research talent from abroad in an attempt to reinforce the excellence and competitiveness of faculty members in Spanish Public Universities.

All details of the Beatriz Galindo Call can be found at:

<http://www.culturaydeporte.gob.es/servicios-al-ciudadano-mecd/en/catalogo/general/educacion/277089/ficha.html>

BASIC INFORMATION

1. **Title:** BEATRIZ GALINDO SENIOR RESEARCH POSITION AT THE THEORETICAL PHYSICS DEPARTMENT- UNIVERSIDAD AUTÓNOMA DE MADRID

2. **Candidate profile:** Senior

Required Education Level: PhD

Years of experience at a foreign institution: At least 7 years of postdoctoral experience*

*The date of reference to determine the duration of the stay at a foreign institution will be May 24th 2019.

PROFILE

We require a candidate that undertakes both research and teaching at a level allowing the training of the next student generation for which a bonding between the academic and non- academic sector is of greatest relevance. Therefore, the Beatriz Galindo candidate should comply with the following requirements:

1. Intention to continue his/her professional career at UAM even after the Beatriz Galindo period.
2. Research experience in the field of fundamental physics, proven and renown at an international level.
3. Leadership qualities, i.e. proven experience in leading research teams. ERC projects will be highly regarded.
4. Internationally connected to other research groups; established European and/or international profile.
5. Experience in supervising Master and PhD students.

6. Teaching experience at the level of recognized universities.

Teaching profile:

The candidate should be an exceptional teacher with a great interest for innovation able to teach several of the different theoretical and laboratory courses of the Physics (and its related) Bachelor and the two specialties of MSc in Theoretical Physics with the appropriate expertise and skillfulness.

Researcher and Transfer Profile:

In addition to the general points listed above, the candidate should also fulfill the following requirements:

- Outstanding CV and leadership in any of the research areas of the Theoretical
- Physics Department, preferentially complementing the existing fields.
- Proven track record of attracting external research funds and its administration.
- Demonstrated ability of attracting talented researchers, also in relation to the non-academic sector.
- Substantial experience in training young researchers and/or technologists.

All details about the teaching project, research project and knowledge transfer project requested by the University can be found in Annex 1.

3. Research field

Physics

4. Type of Contract

- Full time contract for 4 years
- Contract to be signed within 2 months from the date of resolution of the selection process.
- Salary: 90.000€/year including social costs.

Stabilization of the 'Beatriz Galindo' distinguished researcher within the academic staff of the University, at the end of the contract:

Within the fourth year and upon positive evaluation, UAM will open a call for a permanent position with the academic profile of the distinguished Beatriz Galindo researcher.

More details about the procedure of evaluation and stabilization can be found in Annex 2.

5. Submission of candidatures

Candidates must use the form available at:

<http://www.educacionyfp.gob.es/mecd/servicios-al-ciudadano->

mecd/catalogo/general/educacion/277089/ficha/277089-2018-fase2.HTML

Applications must include, at least, the following information:

- a) Teaching project proposed by the candidate that must take into account the requirements of the University (Annex 1).
- b) Research project and knowledge transfer project proposed by the candidate that must take into account the requirements of the University (Annex 1).
- c) Curriculum vitae of the candidate, including all predoctoral and postdoctoral positions and current or recent relations with foreign universities or research institutions.
- d) Report of the expected impact and return to the University of the teaching, research and knowledge transfer project proposed by the candidate.

Candidatures must be submitted in English.

Application Deadline: From April 24th, 2019 at 8 a.m. to May 24rd, 2019 at 17 p.m (Spanish time)

6. Provisional list of admitted and excluded candidatures from the selection process

At the end of the application submission period, applicants whose applications are incomplete or contain correctable errors will be asked to remedy the deficiencies or to submit the necessary documents within a maximum of ten business days. If the applicant fails to do so, it will be understood that the application has been withdrawn, pursuant to Article 68 of Law 39/2015 of 1 October 2015 on Common Administrative Procedures for Public Administrations.

7. Evaluation of candidatures

Candidatures will be evaluated by the international panel of experts appointed by the Secretaría General de Universidades of the Ministerio de Ciencia, Innovación y Universidades with a score between 0 and 10 points according to the following criteria:

- a) Teaching project, up to 2.5 points.
 - 1º Quality of the teaching project, up to 1.25 points
 - 2º Programming of the teaching project, up to 1.25 points.
- b) Research Project, up to 2.5 points.
 - 1º Quality of the research project, up to 1.25 points.

- 2º Programming of the research project, up to 1.25 points.
- c) Knowledge transfer project, up to 2.5 points.
 - 1º Quality of the knowledge transfer project, up to 1.25 points.
 - 2º Programming of the knowledge transfer project, up to 1.25 points.
- d) Impact and return for the University of the teaching, research, and knowledge transfer project, up to 2.5 points.
 - 1º Return of the teaching project, up to 1.25 points. 2º Return of the research project, up to 0.75 points.
 - 3º Return of the knowledge transfer project, up to 0.5 points.

Important: To evaluate all these criteria the curriculum vitae of the candidate will be considered.

8. Hiring University & Offer Posting Contact

Details University: Universidad Autónoma de Madrid

Department: Department of Theoretical Physics at the Faculty of Sciences

Address: C/ Francisco Tomás y Valiente, 7 Campus de Cantoblanco, UAM 28049 Madrid

9. Incompatibilities

The regime of incompatibilities of the contract is established in the articles 19 and 21 of the Orden ECD/365/2018, of Secretaría General de Universidades at the Ministerio de Ciencia, Innovación y Universidades.

10. Publication of provisional resolution

The provisional selected candidate and alternates will be published on the University official website and on the electronic services of the Secretaría General de Universidades at the Ministerio de Ciencia, Innovación y Universidades.

Beginning the day after the list is published, candidates will have ten business days to present arguments for reconsideration of the evaluation.

11. Publication of the resolution

The decision containing the successful candidate and a reserve list will be published on the University official website and on the electronic services of the Secretaría General de Universidades at the Ministerio de Ciencia, Innovación y Universidades.

Against this decision, interested parties may appeal for reconsideration within a period of one month before the University, or appeal to the Contentious-Administrative Chamber of the Supreme Court of Justice of Madrid within a period of two months. These time limits shall commence on the day following the publication of the decision. All these procedures are in accordance with Spanish Laws on the Common Administrative Procedure of the Public Administration and Contentious-Administrative Jurisdiction.

Madrid, 23 de abril de 2019

Fdo: Rafael Garesse Alarcón
Rector

Annex 1: Teaching project and research and knowledge transfer project presented by the University and selected in this call

1. Teaching project

The Theoretical Physics Department has amply demonstrated its teaching excellence. Its official postgraduate program has been awarded the prestigious 'mention of quality' from the Ministry of Education and Science (MEC). Both PhD programs from the Department, Theoretical Physics and Astrophysics received this award since its implementation as well as the mention towards the excellence of the Campus of International Excellence (CEI) UAM+CSIC. The postgraduate program has its own quality assurance system (within the internal quality assurance system of UAM's Science Faculty).

The incorporation of the Beatriz Galindo candidate will increase the attractiveness of the (post-) graduate degrees and improve the employability of its students. One project in this direction, which the department aimed at promoting for a long time but has not been able to due to lack of human resources, is the development of the *Theoretical Physics Department's Teaching Laboratory* (TL) focused on our research work. This involves the improvement of the existing Teaching Laboratory of Astrophysics (TLA) and the creation of a Teaching Laboratory for Computation and Data Science (TLC&DS), this latter extending the existing Data Processing Center UAM-LCG2 to teaching. This center at present gives service to the Theoretical Physics Department in what concerns the development of databases and computational algorithms, modeling, simulations, as well as massive parallel super computation and the GRID.

The Beatriz Galindo candidate shall further optimize the deployment of the existing installations of the TLA for teaching purposes. This affects both the undergraduate degree ("Trabajo Fin de Grado Experimental" - TFGE, Astrophysics & Cosmology, Physics of the Cosmos) and the MSc in Theoretical Physics (Observational Techniques, MSc thesis, and other related courses taught in the specialty 'Astrophysics & Physics of the Cosmos'). These installations include first and foremost the telescope 'Jerónimo Muñoz' (located on the roof one of the Theoretical Physics Department buildings), but it also requires the renovation of all related facilities. The revised TLA envisioned here will then allow for several teaching innovations: practical observations of the sky with last generation instruments for photometry and spectroscopy at the teaching level; fitting of new detectors for cosmic rays; utilization of the TLA for the TFGE and MSc theses.

As for the TLC&DS, it affects different courses in the undergraduate Physics degree ("Computación" and "Trabajo fin de Grado Experimental") as well as to the whole teaching in Computing and Data Processing in the Theoretical Physics Department Master degrees. The teaching innovations envisaged here consist of practical training in (super) computing and Data Science techniques that are in the forefront of research activity in the last years. The databases (either in science or technology) at work when the current students acquire their professional status are expected to be huge, of the order of exabytes. No specific hardware new installations are required to develop the TLC&DS, just the availability of devices working as terminals of the computing machines already placed at the Data Processing Center UAM-LCG2. Given the multidisciplinary character of teaching at the Theoretical Physics Department, it could happen that the successful BEATRIZ GALINDO candidate can cover just a selected part of the topics

described above, within his/her expertise and skillfulness. However, he/she should be prepared to assume a leading and coordination task within the Teaching Laboratory of the Theoretical Physics Department.

The following work plan is being proposed:

Milestone 1: Approval of renovation plan for Teaching laboratory-Theoretical Physics Department

Milestone 2: Adjustment of installations for being used as teaching facilities for the undergraduate and MSc degrees

Milestone 3: Organization of maintenance and teaching team

Milestone 4: Incorporation of TL-Theoretical Physics Department activities into the syllabus of the Faculty of Science

Quality of the Teaching Project

- Viability plan. From a point of view of cost and teaching load, the project is viable with the attracted funds based on the BEATRIZ GALINDO grant. Chronogram: Milestone 1, first year; Milestones 2 and 3, the first 18 months; Milestone 4, second year.
- Criteria of evaluation for Milestone achievement. Milestone 1: minutes of the executive meetings for approval procedure. Milestone 2: Periodic financial reports. Milestone 3: Adjustment of the contents and competences related to TLC&DS and TLA in the Bachelor and MSc courses as indicated above. Depending upon the impact from the changes introduced, modification requests of the related official Degrees issued by the UAM may need to be considered. Milestone 4: evaluation of the quality of those modifications in the official Bachelor and MSC by the Quality Committees of the different Degrees. Particular emphasis will be devoted to data on: improvement on the student demand, student satisfaction level, performance indicators, percentage of degrees awarded, monitoring of their employability.
- Links to the goals of CEI UAM+CSIC. The proposed teaching projects are along the strategic lines for "Mathematics and Theoretical Physics" defined in the "International Campus of Excellence": strengthening of the Department's official Postgraduate studies within the CEI; internationalization helping to promote the implementation of bilingual degrees as it is strongly pursued by the UAM with its so-called "plan DOING"; synergies with the "European Higher Education Area"; increase of students employability; increase of success ratio in European calls, H2020 or the like, for International Training Networks.

2. Research project and knowledge transfer

Research Project

Research at the Theoretical Physics Department involves: Elementary Particle Physics (both theoretical and experimental), Nuclear Physics, Astronomy and Cosmology, that in the Spanish Higher Education System administratively correspond to separate knowledge areas. The expertise of the prospective candidate should expedite some of them, according to his/her profile and skills, potentially adding to this multidisciplinary even new fields at the intersection of technology and fundamental research, which is crucial for the growth of the Theoretical Physics Department. This includes the synergy of the current Theoretical Physics Department research areas with 'Data Science'.

Many of the fundamental enigmas about the basic laws of nature revolve about the origin

of the masses of particles. They are generally attributed to the mechanism of the breaking of the electro-weak symmetry and the physics of the Higgs boson discovered by the large Particle collider (LHC). Therefore, an understanding of the LHC data is of key relevance for such studies and that of other possible theories beyond the standard model of fundamental interactions. Another important aspect of the origin of the masses is the so-called flavor problem, i.e. the strange pattern that the masses of the so far discovered fundamental particles present themselves in three generations, each heavier than the previous one. In the hadronic sector, the study of this problem requires very precise calculations by means of numerical simulations. In the leptonic sector one refers to Neutrino physics and the unsolved problem of (the mixing of) their masses, something only possible to explain when going beyond the standard model of particle physics and possibly related to the asymmetry of matter/anti-matter in the Universe.

In the field of astronomy and cosmology, the analysis of the new and exhaustive mapping of billions of stars in the Milky Way and millions of galaxies in the Universe will lead to a great breakthrough in the research of the Theoretical Physics Department shedding light into the great mysteries in this sector. These include the nature of dark matter of which we have observational evidence but no explanation as far as the standard model of particle physics is concerned, and the study of dark energy that is responsible for the accelerated expansion of the observed Universe (and even less understood than dark matter). Further, observations of the cosmic microwave background radiation indicate that the Universe already experienced another period of accelerated expansion (called Inflation) only fractions of a second after the Big Bang. Apprehending this very early phase of the Universe is also crucial for a comprehensive understanding of the fundamental laws of the cosmos. But the recent discovery of gravitational waves has just opened a new window on the Universe allowing us to not only obtain information via photons but also via 'ripples' in space going as far back as the phase of Inflation. At the crossroads of stellar physics and galaxies, the formation and evolution of globular clusters (especially in the Local Universe) provides an unprecedented link between astrophysics and cosmology. Substantial funding and observations with the largest available telescopes are being dedicated to this, also in order to study one of the most energetic phenomena in the Universe,

i.e. supernovae explosions, and their relevance for the formation of the elements of the period table.

Knowledge Transfer

Besides of aforementioned research advancements, this project aims at a qualitative and quantitative leap in the training of PhDs in the Theoretical Physics Department. Given the nature of the inter-disciplinary science and its relation to technology, graduates will either be able to pursue postdoctoral research positions in top-ranked Universities across the globe or leave academia for a career in the industry sector. The first is guaranteed by the very nature of the research project and the profile of the Beatriz Galindo candidate; the second will be achieved by additional participation of the students in Mobility and Knowledge Transfer Actions through the corresponding existing Schools, and/or through contacts with the non-academic sector, where students will act as Knowledge Transfer carriers. Contacts will possibly be provided by the Theoretical Physics Department and/or the Beatriz Galindo candidate. In that regards, we also expect an increase in successful MSCA-ITN application from the Theoretical Physics Department within the H2020 program (and/or its successor).

This aspect of the project will follow the recommendations and principles for the innovative formation of PhDs in Europe (Salzburg, http://www.eua.be/Libraries/publications-homepage-list/Doctoral-Education_Taking-Salzburg-Forward): science excellency; opening towards industry and other sectors where employability is foreseen; transfer of knowledge and capacity.

The project further contemplates contributions in some of the following fields: (1) Development of instrumentation and scientific software applicable to the non-academic sector. (2) Commercial applications for the development of 'Big Data' and data mining, respectively. (3) Visualisation software with multi-disciplinary application in other fields (such as medicine and meteorology), but also in the private sector. (4) Participation in outreach activities and generation of related products. All this guarantees an important transfer of knowledge.

In the past years, the Theoretical Physics Department has already demonstrated an exceptional contribution to such communication and transmission of knowledge to external actors, but only the incorporation of a Beatriz Galindo researcher and with the requested profile will allow the Theoretical Physics Department to continue being a leader in this area. All of the aforementioned research areas and open questions are more than adequate and well suited for a transfer and they all will lead to multi- and inter-disciplinary applications.

Annex 2: Procedure for stabilization of the 'Beatriz Galindo' distinguished researcher within the academic staff of the University

Universidad Autónoma de Madrid (UAM) has the firm determination to incorporate the selected researcher into the Academic Staff of the University once the Beatriz Galindo contract is over. Within the fourth year and upon positive evaluation and accreditation by ANECA, UAM will open a call for a permanent full professor position with the academic profile of the distinguished Beatriz Galindo researcher.

As far as the aforementioned evaluation process is concerned, article 13 of the Beatriz Galindo Call (BOE-A-2018-4779) establishes a follow-up of the researchers' activity by an international panel of experts who will evaluate it taking into account the Annual Reports that the Universities must submit, and that will aim at certifying the achieved objectives. Each of the individual proposals will constitute an obligatory reference to evaluate the performance of the corresponding distinguished researcher, especially at the end of the third year of the contract. However, we understand it is necessary to identify also some broad criteria and indicators that the UAM will use in the preparation of these 'Annual Reports', increasingly demanding throughout the contract period; namely:

- Leadership and relevance of the research activity - reflected by abundant top-quality scientific contributions produced by its own research group or, otherwise, by a recognizable subgroup within a broader research group.
- Capacity to attract external resources - obtaining funds in the international arena or, at least, drawing up competitive proposals in those programmes.
- Outstanding role in the scientific community in its field of knowledge - visible activity development as editor or reviewer of scientific journals, as national and international expert, as invited lecturer, as member of scientific societies, as recipient of scientific awards or honours, etc.
- Active role at different university degrees - participation in projects of teaching innovation, design of teaching activities, supervision of doctoral theses, etc.
- Communication and transmission of knowledge to external actors - design and participation of 'open day' activities, knowledge dissemination...
- The researcher shall demonstrate a proven record of various tasks in the academic community (organizing conferences, editing publications, undertaking high-level academic evaluation tasks and holding significant positions in scientific organizations).