LaCaixa 2020 PhD Position @BCAM

Project title / Job position title:

Mathematical Physics

Research Project / Research Group Description.

PhD position in Mathematical Physics.

- **Objective:** At the interface between Mathematics and Physics is the so-called Mathematical Physics that at BCAM is represented by the research lines in Quantum Mechanics, Statistical Physics and Singularity Theory & Algebraic Geometry.

- **Applications:** Our methods could apply to either quantum transport or cryptography and string theory.

Specific research PhD project thesis

- **Singularities in Algebraic Geometry and/or symplectic topology.** Advisor: J. Fernandez de Bobadilla. The team focuses in Singularities and Algebraic Geometry from a inter-disciplinary perspective (algebraic, topological, symplectic or Hodge Theoretical methods). He will focus on a topic in the field according with his thematic preference and abilities. Possibilities include Lipschitz Geometry of Singularities, Floer Homology of Milnor fibrations, Geometric Representation Theory, Sheaf and Hodge Theoretic aspects of singularities.

- **Mathematical Description of Quantum Many-Particle Systems.** Advisor: Jean-Bernard Bru. Description: The aim of the thesis is to study the mathematical properties of large quantum systems via, for instance, (Brocket-Wegner) flow equations. The project mainly belongs to functional analysis (semigroup theory, spectral theorem, etc.) and the theory of operator algebras (von Neumann and C*-algebras), in relation with quantum mechanics.
BCAM is a world-class research center in the field of Applied Mathematics located in Bilbao (Spain). It obtained the Severo Ochoa Center of Excellence award in 2013 and 2018 given by the Spanish Ministry of Science, Innovation and Universities. BCAM is part of the ERCOM European Research Centers on Mathematics networks. BCAM has endorsed the Charter & Code in 2008 and has been awarded the HR Excellence in research Logo in 2016.

The candidate will be part of the Mathematical Physics research area at BCAM.

The candidate must have solid knowledge and experience.

The research environment is international and open to national and international collaborations, the candidate must have willingness to team working and traveling. Requirements:

- Master degree (preferable in Mathematics, Physics, Engineering or Computer Science).
- Applicants must have an excellent academic record.

Skills:

- Good communication and interpersonal skills.
- Ability to effectively communicate and present research ideas to researchers with different background (e.g., mathematicians and engineers as well as employs of forest service).
- Ability to clearly present and publish research outcomes in spoken (talks) and written (papers) form.
- Good command of spoken and written English.

Additionally, in terms of transferable & complementary skills, BCAM is carrying out the Action Plan within Human Resources Strategy for Researchers (HRS4R) BCAM action plan available here https://bit.ly/2MH1R9S; so, the fellow will benefit of this training program composed by: Leadership, Ethic and Research, Effective Communication/Teamwork, Gender Balance, Research Integrity, Citizenship Science, etc. The fellow will receive all the needed support from BCAM to be fully integrated in the group and in the center.
INPhINIT Offer, eligibility requirements, evaluation and selection process

Incoming: https://obrasociallacaixa.org/en/investigacion-y-becas/programa-de-becas-de-posgrado/inphinit/incoming

Retaining: https://obrasociallacaixa.org/en/investigacion-y-becas/programa-de-becas-de-posgrado/inphinit/retaining

How to Apply

1. Click in https://candidate.lacaixafellowships.org/login, Click in “New Users” – Please register your application and fill in all the personal data requested by the page for the creation of a new user.

2. Once you create the profile, you will receive a confirmation email and by clicking on the link you will be redirected to a page that tells you that your user is correctly completed.
3. Once you enter the platform with your user, the following screen will appear with some of your data and to choose the mode: Incoming or retaining:

4. Afterwards, you will be shown a page with all your data previously entered, and you will have to upload your passport, ID card and contact information:
5. After hitting the Save and Continue button, the following screen will appear in which you must enter the following data, choose the position you want and accept the 3 boxes below:

![Image of the screen with the form to fill out the information about prospective doctoral studies, including fields for field of study, country, chosen center, province, city, and position, along with options for the ethical principles that the project must fulfill.]
6. Below, on that same page, you choose the first option of the Physical sciences, Mathematics and Engineering Panel:
7. After giving to the button Save and Continue, fill in the Statement of purpose you give to Save and Continue:

8. From there, you will have to fill in the rest of the pages: Reference Letters, CV, Bachelor Studies, Other studies (if you have them), Academic records referring to higher studies relevant to the fellowship, Language required according to the programme terms and conditions, Language certificate, etc.

9. Once you have filled in all the fields you must click on FINISH and your application will be registered.