LaCaixa 2021 PhD Position @BCAM

Project title / Job position title:

**Computational Mathematics**

Research Project / Research Group Description.

**PhD position in Computational Mathematics**

- **Objective:** To develop new mathematical methods, robust numerical schemes and software to solve complex and large-scale real-life problems on massively parallel computers.
- **Applications:** CFD applied to complex fluids, biomedicine, microfluidics, rheology, chemical processing, oceanography, aeronautics, naval architecture and acoustics; design and use of deep neural networks in the field of CFD.

Specific research PhD project thesis:

- **Numerical modelling of complex fluids. Advisor: M. Ellero.** The accurate simulation of the flow of complex fluids, e.g. particles-polymer, is of paramount importance in many industrial processes including composite-polymer manufacturing, extrusion, micromixing or 3D printing. We will explore new purely Lagrangian viscoelastic models based on accurate integro-differential formulations applied to the Smoothed Particle Hydrodynamics technique.

- **Numerical modelling of pedestrian flow. Advisor: M. Ellero.** Particle-based computational simulations offer a solution to increase the safety of pedestrians at mass events. Computational simulations allow a scientific analysis on how pedestrian crowd dynamics will be impacted by architectural configurations and/or infrastructure modifications. This project aims to design a realistic particle-based simulation of pedestrians flow for urban planning.

- **Deep Neural Networks for Structural Health Monitoring of offshore structures.** Advisor: V. Nava. Early detection of failures or evaluation of the health status of offshore structures can reduce drastically the operation and maintenance costs. We aim at solving real time inversion problems via the design of Deep Neural Network architectures to analyse the health status of offshore structures (oil and gas, offshore wind, other purposes) and detect potentially critical failures at early stage of subsystems.

- **Efficient multi-axis path-planning for quality inspection of free-form surfaces.** Advisor: M. Barton. Quality control is a fundamental part of any manufacturing pipeline and efficient motion planning algorithms speed up the whole manufacturing process. We aim to study motions of specific multi-axis serial robots and design path-planning algorithms for contact and/or scanning-based inspections of complex free-form geometries.
Job Position description.

**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** [http://www.ercom.org](http://www.ercom.org) 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 **Computational Mathematics** research area at BCAM.

The candidate must have solid knowledge and experience. Moreover, the research requires knowledges in Computational mathematics.

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 (Applied 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, physicists and engineers).
- 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](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](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](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](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:
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.