Project title / Job position title:
Ph.D. Fellowship in the Mathematical Design of Complex Materials

Research Project / Research Group Description.
Some of the most spectacular and useful advances in the recent years technology are based on the use of novel materials with complicated microstructure. Among these are: liquid crystals, nematic elastomers, polymeric fluids, to name just a few. These are some of the special materials used in our phones, computers, cars, and even implants in human bodies.

Despite the impressive technological applications these materials are very poorly understood at a basic, fundamental level. Their models are based on rather simple extensions of models for the simpler materials and an overall unitary framework and approach for studying them is missing. The necessity for a general framework is not just a theoretical issue but the key to developing genuinely new materials and unlock the true potential of the existing ones.

The research student will form part of a group aiming to contribute to this understanding of the new materials and their design, using rigorous mathematics. The mathematical tools involved in this exciting scientific adventure will be rather diverse, involving optimisation and calculus of variations, geometry and topology, continuum mechanics and partial differential equations.

Job Position description.
The Ph.D. student will work on problems involving extensions of models of liquid crystals in the Q-tensor theory, namely colloids, that is mixtures of liquid crystals with various small scale dense materials.

Requirements:
- Master degree (preferable in Applied Mathematics, with a solid understanding of the rigorous methods for studying partial differential equations).
- The candidate must have his/her Master Degree completed before the incorporation.
- 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).
- Ability to clearly present and publish research outcomes in spoken (talks) and written (papers) form.
- Good command of spoken and written English.

Group Leader:
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**INPhINIT Offer:**

INPhINIT targets the most motivated PhD candidates by addressing the research areas in which Spain excels: **Bio and Health Sciences, Technology, Physics, Engineering and Mathematics.** INPhINIT recruits per call **57 Early-Stage Researchers of any nationality**, who enjoy a **3-year employment contract at the Research Centre of their choice** among those selected and awarded by the Spanish Ministry of Economy and Competitiveness ("Severo Ochoa" centres of excellence and "Maria de Maeztu" units of excellence) and the Spanish Ministry of Health ("Carlos III centres of excellence"). In addition, researchers establish a **personal career development plan** including trasnational, intersectoral and interdisciplinary mobility opportunities, and attend a full range of **complementary training courses and workshops.** "la Caixa" Foundation will **select international candidates.** Subsequently, the selected candidates, will propose the Research Centre and the predoctoral position in which he/she would like to do the research project. If there is agreement between the Centre, the supervisor (predoctoral researcher who presented the position) and the candidate, the fellowship will be awarded to the candidate.

**Fellowship provisions:**

- **3-years contract**
- **Funding per fellow:** 115,092 euros  
  - **104,400 euros (34,800 euros per year)** including salary, employee social security contribution, income taxes and all compulsory employers’ contributions.  
  - **10,692 euros (3,564 euros per year)** for research costs such as conferences and workshops attendance, short-stays, consumables and intellectual property costs, among others.  
- **PhD Award of 7,500 euros** will be granted to researchers that submit their thesis within 6 months after the end of the fellowship.  
- **Complementary training programme:**  
  - Technology Transfer and Entrepreneurship workshops by Oxentia.  
  - Professional and Career Development sessions by Vitae.  
  - High - quality academic and industrial secondments.  
  - Participation in outreach and social events.
How to Apply

1. Click in [https://hosts.lacaixafellowships.org/finder](https://hosts.lacaixafellowships.org/finder), click in RESEARCH CENTRE and choose “Basque Center for Applied Mathematics - BCAM”

2. Click in “SEARCH” and the displayable will list the positions offered
3. Click in the selected PhD Offer and click in “START THE APPLICATION”

4. The system will open a new window with the application website https://www.lacaixafellowships.org/index.aspx. Click in “Please register” for new applicants.
5. After the registration, the system will send to you the confirmation email and the link to access into the system. Now you are in the position to access into the application system. Please choose **INPhINIT: Doctorate in Spanish Research Centre of Excellence**

6. Now you are in the position to fill the application form, upload the required documents and choose the project thesis. To choose the project thesis, click in “Studies to be Pursued”, choose the centre and the position.
Eligibility requirements

- At the publication date of the final list of selected candidates (29 May 2018), candidates must be in the first four years (full-time equivalent research experience) of their research careers and not yet have been awarded a doctoral degree.
- At the time of recruitment, candidates must comply with one of the following options:
  - To have completed the studies that lead to an official Spanish (or from another country of the European Higher Education Area) university degree awarding 300 ECTS credits, of which at least 60 ECTS credits must correspond to master level.
  - To have completed a degree in a non-Spanish university not adapted to the European Higher Education Area that gives access to doctoral studies. The verification of an equivalent level of studies to the ones mentioned above will be made by the university when the admission procedure starts.
- **Mobility Rule**: Candidates must not have resided or carried out their main activity (work, studies, etc.) in Spain for more than 12 months in the 3 years immediately prior to the publication date of the final list of selected candidates (29 May 2018). Short stays such as holidays will not be taken into account when calculating the mobility requirement.
- Demonstrable level of **English** (B2 or higher).

Evaluation and selection process

INPhINIT aims to recruit excellent Early-Stage Researchers with very solid theoretical backgrounds, with curiosity and ambition; with incipient skills to express themselves clearly and defend their ideas with creativity, independence and originality. Researchers may be focused on the academic side or be more industry-oriented. The evaluation criteria and scores defined to achieve this goal are:

**PHASE 1 - REMOTE EVALUATION:**
- **Academic record and Curriculum Vitae (weight 50%)**: academic and/or professional curriculum in relation to the stage of the candidate’s career; **Motivation and statement of purpose (weight 30%)**: the originality, innovation and potential impact of the proposed project, and the choice of the Research Centre will be assessed;
- **Letters of reference (weight 20%)**: reference letters supporting the candidacy will be assessed taking into account the specificity of the content with regard to the candidate’s project as well as the profile of the people who sign them.

**PHASE 2 - FACE-TO-FACE SELECTION:**
- **Candidate’s potential (weight 40%)**: in order to have a general perception of the candidate’s potential, experts will pay attention to “soft” skills, ability to present easily a complex reasoning, team working; and capabilities such as...
independent reasoning, originality, entrepreneurship, leadership, among others.

- **Motivation and statement of purpose (weight 30%)**: experts will assess the impact of the project for the candidate and the society; project innovation, originality and feasibility; and candidate’s capabilities with regard to the scope of the project. **Academic background and theoretical fundamentals (weight 30%)**: experts will assess the consistency of the candidate’s academic background and CV in the area chosen to carry out the PhD.

According to the number of applications received, there may be a pre-selection phase based on the final academic marks obtained for the Bachelor studies.