Fellow R11: Super-resolution and advanced microscopy, with machine learning as a tool to aid diagnosis of rare diseases

Closed position

Supervisor: Dr. M. Roldán
Institution: Fundació Sant Joan de Déu (**FSJD**), Barcelona, Spain
Duration: 36 months
PhD program: Doctoral School in Optical Engineering
Research group: Research Programme Precision Medicine in Rare Diseases
Secondments (short visits) at: Georg-August-Universität Göttingen (**UGOE**, Germany), Universitat Politècnica de Catalunya (**UPC**, Spain) and company **Abberior Instruments GmbH** (Germany)
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Objectives

To extract quantitative disease biomarkers from super-resolution images from fibroblasts and muscle tissues, and develop machine learning (ML) algorithms that can aid diagnosis. This will be useful to study the mechanisms of rare diseases (such as muscular dystrophies, neurogenetic and blood diseases). Super-resolution fluorescence microscopy (Stimulated Emission Depletion Microscopy and computational super-resolution) will be used to analyse fibroblasts and muscle tissues from patients suffering rare diseases. Advanced microscopy outcomes will be combined with DL to improve the ability to extract quantitative information from photon-limited images.

What is offered

To work within an interdisciplinary environment with a close-to-the-clinic approach, receiving training from leading experts in super-resolution and rare diseases in a full-time Ph.D. position for 36 months, in which living and mobility costs will be fully covered with a gross salary of 33,421.35 € per year.

Required skills

We are actively searching for an enthusiastic candidate who holds a degree in **biomedical engineering**, **physical sciences**, **computer science**, or a closely related field. The applicant must have **proficiency in optical and fluorescence microscopy**, programming languages, with a particular emphasis on **Python and Matlab**, as well as a solid **familiarity with deep learning frameworks**, including **Tensorflow**, **Keras**, and **Pytorch**. Furthermore, the candidate should have knowledge in image analysis software such as Image J/Fiji and/or Imaris, and possess the ability to leverage deep learning tools for tasks such as image classification using deep learning algorithms.

Additional skills

We highly value additional skills such as proficiency in sample handling and preparation and knowledge in the field of health sciences. Strong teamwork skills and adaptability are also qualities that we consider valuable assets in potential candidates.