Fellow R9: Machine learning algorithms for advanced Super-resolution Optical Fluctuation Imaging (SOFI)

Closed position

Supervisor: Prof. Jörg Enderlein
Institution: Georg-August-Universität Göttingen (**UGOE**), Göttingen, Germany
Duration: 36 months
PhD program: Göttingen Graduate School for Neurosciences, Biophysics and Molecular Biosciences
Research group: Third Institute of Physics | Enderlein Group
Secondments (short visits) at: company **Abberior Instruments GmbH** (Germany), Politechnika Gdańska (**PG**, Poland) and Fundació Sant Joan de Déu (**FSJD**, Spain).
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Objectives

To develop new machine learning (ML) computational tools to increase computational speed and improve performance achieving maximum resolution, contrast and quality of the final super-resolved optical fluctuation imaging (SOFI) images while obtaining 3D information. In a first step, high-quality experimental SOFI data will be generated. This involves selecting and characterizing optimal luminescent labels and buffer conditions suitable for SOFI (high photostability, optimal stochastic intensity blinking properties). A large number of organic dyes, fluorescent proteins, nanocrystals and the recently introduced carbon nanodots will be considered. In a second step, new algorithmic approaches for SOFI analysis will be explored. This will be based on self-learning multilayer neural network (NN) topologies, and here the tremendous recent advances with such methods for the analysis of stochastic optical reconstruction microscopy (STORM) data will be used, in particular single-molecule localization based super-resolution microscopy.

What is offered

To work within an interdisciplinary environment, receiving training from leading experts in super-resolution microscopy 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 33,114.20 € per year.

Required skills

We are seeking an enthusiastic candidate that has **a strong foundation in both biomedical sciences** (ideally with a **master in biochemistry/biomedicine**); a **strong interest in super-resolution microscopy** and **data analysis**, **excellent computational skills** and **interest in physical optics.** The applicant must have **proficiency in cell biology**, **fluorescence microscopy/spectroscopy**, and **computing with Matlab/Python.**

Additional skills

Excellent communication skills in English, and experience in data visualization using a wide range of open-source tools.