

Ústav přístrojové techniky AV ČR, v. v. i.
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Job Title: Postdoc

Position available from: Summer 2019, negotiable start date

Category: Academic / Research

Development and application of optical imaging methods for multimode fiber-based endoscopes.

We are seeking a post-doc to join our ~€7m research project Gate2 μ , to work on developing imaging methods for multimode fiber endoscopes for minimally invasive deep tissue imaging.

Project description

Imaging at several millimetres depth in tissue, while maintaining the sub-micron resolution available in standard light microscopes, requires new types of endoscopes. Multimode fibers have shown promise as flexible endoscopes, and by using advanced adaptive optics we can overcome the phase offsets between the propagation modes in the fiber, which scramble the image. In this project we develop imaging methods for such multimode fiber endoscopes.

The successful candidate will work under the supervision of Dr. Johanna Trägårdh, who is the head of the work-package which is focused on imaging with chemical contrast and implementation of advanced imaging methods. In this work package, we have recently started to develop Coherent Anti-Stokes Raman Scattering (CARS) imaging through a multimode fiber. We have also investigated the frequency dependent light transmission in graded index fibers, with the aim to allow delivery of femtosecond pulses with a specific chirp to the imaging area. We now want to push this research further, towards multimodal label-free non-linear imaging in tissue. This has potential use in diagnosing tumors in situ without performing a biopsy.

Examples of projects:

- Developing better epi-detection schemes for CARS through multimode fibers. This could involve testing if SRS (Stimulated Raman Scattering) is a more suitable candidate for the imaging.
- Developing light-sheet microscopy for non-linear imaging.
- Investigating properties of high NA fibers.
- Diagnosing tumors using CARS imaging through a fiber endoscope.

The Gate2 μ project, also known as "Holographic endoscopy for in vivo applications" is co-founded from the European Regional Development Fund, The Ministry of Education, Youth and Sports of the Czech Republic and the Institute of Scientific instruments of the CAS. The project combines expertise in wave-front shaping technologies, fibre optics, and bio-imaging with expertise in neuroscience and immunology, in an effort to introduce new imaging modalities deep inside living organisms. The research is carried out by a team of, currently, 14 people. The group is located in newly refurbished premises of the Institute of Scientific Instruments, featuring a spacious optics laboratory, access to mechanical workshops, a small-animal facility and further support from skilled IT and administrative departments. The institute additionally carries out research in the fields of electron microscopy, microphotonics, high power laser applications (cutting, welding), biomedical imaging (NMR, signal processing) and coherent optics for metrology.

Further information about the group and the ISI can be found at: <http://isibrno.cz/en/complex-photonics>

Person specification:



EVROPSKÁ UNIE
Evropské strukturální a investiční fondy
Operační program Výzkum, vývoj a vzdělávání



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Candidates should have extensive research expertise in the general area of photonics, preferably with experience in optical imaging or spectroscopic methods and instrument construction. A track record in bio-imaging would be useful.

Essential:

- PhD in physics or similar with a focus on experimental optics or imaging
- Expertise in imaging, microscopy or spectroscopy.
- Very good experimental skills
- Experience with building optical setups
- Ability to work independently as well as in teams
- Good communication skills
- Very good English in speech and understanding.
- Interest in working on a cross disciplinary project with biology researchers.

Desirable:

- Experience in bioimaging, or Raman and fluorescence imaging.
- Experience with complex instrument construction
- Knowledge of programming for instrument control (Labview / Matlab / Python /...)
- Experience in one or more of the fields adaptive optics, ultrafast optics or non-linear imaging
- Evidence of high quality research outputs as lead author.

The postdoc position is offered for the duration of three years.

Responsibilities:

- Undertake assigned research activities
- Contribute to publications in high quality research journals
- Collaborate with the members of the other teams/work-packages, who are working on modelling fiber propagation, technology development and *in vivo* imaging.
- Present work at local and international conferences.
- Assist with project administration

Application Requirements:

Applicants must include with their application:

- Cover letter outlining the candidate's suitability for the role.
- Curriculum Vitae, including overview of past research activities
- Names and contact details of at least two referees.

If you prefer us not to contact the referees until after a potential interview, please indicate this.

Contacts:

Informal inquiries can be directed to Johanna Trägårdh, johanna@isibrno.cz.

Closing Date: May 30th 2019, but the position is open until filled, and late applications can be accepted.

