Programme de Formation

All-optical Control of Brain Functioning with Optogenetics and Multi-Photon Microscopy - ENGLISH Course

Organisation

Durée : 59 heures

Mode d'organisation : Présentiel

Contenu pédagogique

Public visé

Neurophysiologists, physicists (researchers, PhD students or engineers)

Objectifs pédagogiques

- Learn how to choose the most suitable combination of actuators and reporters, illumination methods and targeting strategy for each specific application
- Acquire the skills and technologies required to design and build up an all-optical system for optical control of neuronal circuits

Description

Lectures

- Introduction to optogenetics
- Wave front shaping and liquid crystal matrix
- Viral vector design
- Computer generated holography
- Temporal focusing
- Three-dimensional light patterning and temporal focusing
- Two-photon optogenetics: scanning, spiral scanning, parallel illumination: examples and comparison among the different approaches
- All-optical interrogation of brain circuits
- Voltage and calcium imaging
- 2P Miniscope for two-photon imaging in freely moving mice
- Two-photon all-optical circuits manipulation in freely moving mice
- Patterned voltage and calcium imaging
- Three photon imaging and optogenetics
- Mesoscopy and large scale holography

Practical courses (in small rotating groups of 7 attendees max with 2 trainers per group)

- How to build up a holographic optical set-up (optical design and software)
- In vitro and in vivo all-optical manipulation of neuronal circuits
- Two-photon all-optical circuits manipulation in freely moving mice
- Two-photon scanless voltage imaging
- Projects from applicants (practical): proposition of projects by the attendees and discussion on their feasibility

Prérequis

Attendees should have a strong background in neurosciences or in cell biology or in optical microscopy. To adapt the programme to trainees' expectations, we invite the attendees to download and fill out the survey from our web site and submit it when performing the pre-registration.

Modalités pédagogiques

Lectures (23 h), workshops (28 h) and presentations of projects (8 h)

Moyens et supports pédagogiques

Files in PDF format will be made available to the trainee.

Modalités d'évaluation et de suivi

Ongoing formative assessments throughout the course. A certificate of completion is issued at the end of the training.

Informations sur l'admission

Admission to this training programme is granted following a review of the application file by the academic team. Applications are examined in the order in which *complete* files are received, provided that the applicant's academic and professional background matches the learning objectives of the programme and subject to availability of places.

To assess whether your profile is suitable for the programme, we kindly ask you to submit a motivation letter to Valentina Emiliani and Eirini Papagiakoumou, no later than **four weeks before the start of the training**.

Please note that **incomplete applications cannot be reviewed** by the academic team.

Informations sur l'accessibilité

Our organisation is committed to ensuring inclusive and equitable access to its training programmes, whether delivered online or in person, for all participants, including people with disabilities. A dedicated accessibility contact is available to assess individual needs and, where possible, implement appropriate pedagogical, technical and organisational adjustments.