

Scientific and technical environment of the training course



Institut de la vision
<http://www.institut-vision.org/fr>

COURSE DIRECTORS

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LOCATION

PARIS (75)

ORGANISATION

5 days
 Training course in english
 From 7 to 20 attendees

TRAINING FEES

2500 Euros

AT THE END OF THE TRAINING COURSE

Satisfaction survey from trainees
 A certificate of attendance is delivered.

COURSE DATE

Ref. 18 269 : from monday 08/10/2018
 to friday 12/10/2018

January	February	March	April
May	June	July	August
Sept.	Oct. 18 269	Nov.	Dec.

Optical control of brain functioning with optogenetics and wave front shaping

NEW

OBJECTIVES

- Be able to choose the most suitable combination of actuator, illumination methods and targeting strategy for each specific application
- Learn the skills and technologies required to design and build up an optical system for optical control of neuronal circuits

AUDIENCE

Neurophysiologists, physicists (researchers, PhD students or engineers)

PRE-REQUIREMENT

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

TRAINING PROGRAMME

Lectures

- Introduction: optogenetics and uncaging
- Opsin photo-cycle modeling
- Wave front shaping and liquid crystal matrix
- Computer generated holography
- Generalized phase contrast
- Temporal focusing
- Three dimensional light patterning and temporal focusing
- Two-photon optogenetics: scanning, spiral scanning, parallel illumination: examples and comparison among the different approaches
- How to build up an holographic optical set-up
- All-optical interrogation of brain circuits
- Patterned voltage and calcium imaging
- Viral vector design
- Optogenetics and vision; optogenetics and audition

Practical courses (in small rotating groups of 7 participants max with 2 trainers by group)

- How to build up an holographic optical set up (optical design and software)
- In vitro 2P patterned photostimulation
- In vitro 2P functional imaging and patterned photostimulation
- Projects from applicants (practical): proposition of projects by the participants and discussion on feasibility

Lectures (19h), workshops (12h) and presentations of projects (8h)

Detailed program available from our web site

SPEAKERS

V. Emiliani, E. Papagiakoumou, N. Accanto, E. Ronzitti, D. Dalkara, C. Wyart, D. Tanese, D. di Gregorio, G. Dugué, S. Picaud (researchers), D. Oron (researcher, Weizmann Institute) and P. Hagemann (PR, Institut für experimentelle Biophysik, Berlin)

PROGRAM : "Optical control of brain functioning with optogenetics and wave front shaping"

Monday 8th October 2018

- 9:00 h-10:00 h *Welcome and opening remarks*
Valentina Emiliani & Eirini Papagiakoumou
- 10:00 h-12:00 h **Lecture:** *Introduction to optogenetics and uncaging*
Guillaume Dugué, David di Gregorio
- 12:00 h-13:00 h **Lecture:** *Opsin photo-cycle modeling (Peter Heigemann)* *Welcome and opening remarks*
Peter Hegemann

13:00 h-14:00 h Lunch

- 14:00 h-15:00 h **Lecture:** *Wave front shaping and liquid crystal matrix*
Emiliano Ronzitti
- 15:00 h-16:00 h **Lecture:** *Computer generated holography*
Valentina Emiliani
- 16:00 h-17:00 h **Lecture:** *Generalized phase contrast method*
Eirini Papagiakoumou
- 17:00 h-18:00 h **Lecture:** *Temporal focussing*
Dan Oron

Tuesday 9th October 2018

- 9:00 h-10:00 h **Lecture:** *Three dimensional light patterning and temporal focusing*
Nicolo Accanto
- 10:00 h-12:00 h **Lecture:** *2P optogenetics: scanning, spiral scanning, parallel illumination: examples and comparison among the different approaches*
Valentina Emiliani
- 12:00 h-13:00 h **Lecture:** *How to build up a holographic set up*
Emiliano Ronzitti

13:00 h-14:00 h Lunch

- 14:00 h-18:00 h **Practical 1:** *Building up an holographic microscope (E. Ronzitti, V. De Sars)*
- Practical 2:** *In vitro 2P patterned photostimulation (V. Zampini)*
- Practical 3:** *In vitro 2P functional imaging and patterned photostimulation (D.Tanese, C. Wyart)*

Wednesday 11th October 2018

- 9:00 h-11:00 h **Lecture:** *All optical interrogation of brain*
Claire Wyart & Eirini Papagiakoumou
- 11:00 h-12:00 h **Lecture:** *Patterned voltage and Calcium imaging*
Dimitri Tanese

12:00 h-13:00 h **Lecture:** *Viral vector design*
Deniz Dalkara

13:00 h-14:00 h **Lunch**

14:00 h-18:00 h **Practical 1:** *Building up an holographic microscope* (E. Ronzitti, V. De Sars)

Practical 2: *In vitro 2P patterned photostimulation* (V. Zampini)

Practical 3: *In vitro 2P functional imaging and patterned photostimulation* (D.Tanese, C. Wyart)

Thursday 12th October 2018

9:00 h-11:00 h **Lecture:** *Optogenetics and vision*
Serge Picaud

11:00 h-13:00 h **Lecture:** *Optogenetics and audition*
Tobias Moser

13:00 h-14:00 h **Lunch**

14:00 h-18:00 h **Practical 1:** *Building up an holographic microscope* (E. Ronzitti, V. De Sars)

Practical 2: *In vitro 2P patterned photostimulation* (V. Zampini)

Practical 3: *In vitro 2P functional imaging and patterned photostimulation* (D.Tanese, C. Wyart)

Friday 13th October 2018

9:00 h-13:00 h **Presentation of results from practical courses**

13:00 h-14:00 h **Lunch**

14:00 h-18:00 h **Presentation of participants projects**