Workshops: Descriptions and Instructions

Journées de Rencontre Imabio 2026

Supported by

Ce travail a bénéficié d'une aide de l'État au titre de France 2030 (PhOM - Graduate School Physique) portant la référence ANR-11-IDEX-0003.

Contents

1 Zone A: Laboratoire d'Optique et Biosciences - Ecole Polytechnique

Access to the laboratory is restricted to badge holders only. A member of the laboratory staff will be present on site, in front of Building 84, to welcome participants 15 minutes before the scheduled start time of the workshop.
Lab web site: https://lob.ip-paris.fr/
Location of the laboratory on Google Maps : https://maps.app.goo.gl/Ki7xxc2cHSnkur536
For those who wish to come by public transport from Paris: RER B to Gare Massy Palaiseau, then bus 46.06 to"Polytechnique Lozère", "Ferme de la Vauve" or "Place Marguerite Perey", then 5min walk.
For those coming by car, you can park at the following parking area (please be careful of the bollards): https://maps.app.goo.gl/d9msd1UpRx9Dtwcu6, then 5min walk.
You can then reach ENS Paris-Saclay using the 46.06 bus to "Moulon".

Workshop A1: Polarization-resolved SHG : acquisition and data processing

Led by Gaël Latour, Marie-Claire Schanne-Klein, Vaky Abdelsayed and Laura Paggi

This workshop will present polarization-resolved SHG (p-SHG) from a theoretical and practical perspective. This modality allows accessing to collagen orientation and local disorder at the micrometer scale. After a short introduction on the theoretical principle, the custom-built microscope will be presented with experimental considerations and data acquisition. Finally, the data processing will be presented to obtain orientation and local disorder information. Gaël Latour, Marie-Claire Schanne-Klein

Workshop A2: Chromatic multiphoton serial microscopy (CHROMS)

Led by Pierre Mahou and Solène Prudhomme

This workshop will present the CHROMS (Chromatic Multiphon Serial Microscopy) platform designed to map entire organs, such as mouse brains. This platform includes a vibratome integrated into a two-photon microscope in order to automatically perform serial section imaging on large volumes. During this workshop, we will review, from a theoretical and practical perspective, some key experimental aspects of this technique: how to mount the sample, how to perform imaging, cutting, and digital fusion between sections in order to obtain a continuous reconstruction of the sample without artifacts.

Workshop A3: Two-photon excited fluorescence lifetime metabolic imaging

Led by Chiara Stringari, Xiaotong Yuan and Ilse Chauvet

Cellular metabolism is crucial for understanding health and disease and for improving diagnostics and therapies. Label-free optical metabolic imaging using Fluorescence Lifetime Microscopy (FLIM) of endogenous NAD(P)H provides non-destructive, high-resolution information about metabolic activity and cellular heterogeneity. This workshop introduces a standardized framework for acquiring, calibrating, and analyzing FLIM data using phasor analysis, highlighting best practices and emphasizing the importance of calibration, signal-to-noise considerations, and potential biases in data interpretation.

Workshop A6: Detection and classification in large images with AI

Led by Anatole Chessel and Marion Giraud

In this workshop we will see some recent methods for object detection and classification from large microscopy volume. In particular we will explore the use of biapy[1], an open source library and application that streamlines the use of common deep-learning workflows for a large variety of bioimage analysis tasks, as well as self-supervised learning via the DINO family of pretrained models. The workshop will consist of notebooks in python that participants could follow on their own machine.

[1] https://biapy.readthedocs.io/en/latest/

2 Zone A: Laboratoire Charles Fabry - Institut d'Optique

Meeting point: reception of Institut d'Optique Graduate School building, 2 avenue Augustin Fresnel, Palaiseau.
For those who wish to come by public transport from Paris: RER B to Gare Massy Palaiseau, then bus 46.06 to "Place Marguerite Perey", then 5min walk.
For those coming by car, you can park at the small parking area in front of the building.
You can then reach ENS Paris-Saclay using the 46.06 bus to "Moulon".

Workshop A4: In vivo speckle imaging of blood microcirculation

Led by Frédéric Pain

Dynamic correlation spectroscopy (DCS) allows to characterize motion in scattering media by measuring decorrelation times. The workshop will involve preparing and characterizing scattering solutions with controlled optical properties and viscosity to demonstrate the ability of the DCS method to extract quantitative information under Brownian motion conditions.

Workshop A5: Optical tweezers and FRET fluorescence microscopy for the mechanical study of living cells

Led by Nathalie Westbrook

Optical tweezers can apply a controlled force on the adhesion sites of living cells using polystyrene beads. The workshop will involve preparing samples of beads measuring a few microns, trapping them with a focused laser, and measuring the stiffness of the trap by applying a rapid movement to the trap (step response method) via an acousto-optic deflector—a method faster than the traditional approach based on spectral analysis of Brownian motion. This method will be applied to verify the increase in stiffness with laser power or its dependence on bead diameter.

3 Zone B: I2BC, Imagerie-Gif - CNRS Gif-sur-Yvette

Meeting point: Institut de biologie intégrative de la cellule (I2BC), Bâtiment 21, porte A, Campus du CNRS, Avenue de la terrasse, Gif sur Yvette.
Location of the laboratory on Google Maps: https://maps.app.goo.gl/iJdzZeazzRzpD9M6A
It is a 15-minute walk from the 'Gif-sur-Yvette' train station (RER line B).
You can then reach ENS Paris-Saclay using the 46.11 bus.

Workshop B1: Microscopie corrélative : SIM - Microscopie électronique

Led by Claire Boulogne, Valérie Nicolas and Romain Le Bars

Light microscopy allows proteins of interest to be localized with subcellular resolution of approximately 120 nm using structured illumination microscopy (SIM). The use of reporter proteins or labeling approaches enables the localization of objects of interest with an extremely high degree of specificity. Concurrently, electron microscopy facilitates observation of the entire cellular and subcellular environment with a resolution of approximately ten nanometers. Correlating these two approaches enables the identification of the signal of interest within the context of the other cellular constituents. In this workshop, a workflow will be presented for correlating a high-resolution photonic imaging approach using Lattice SIM (Elyra7 - Zeiss) and a scanning electron microscopy approach (FIB-SEM - Zeiss) on the same biological sample. The following aspects will be examined: sample preparation, the two imaging modalities, the technique for transferring samples from one setup to another, and the post-acquisition image overlap.

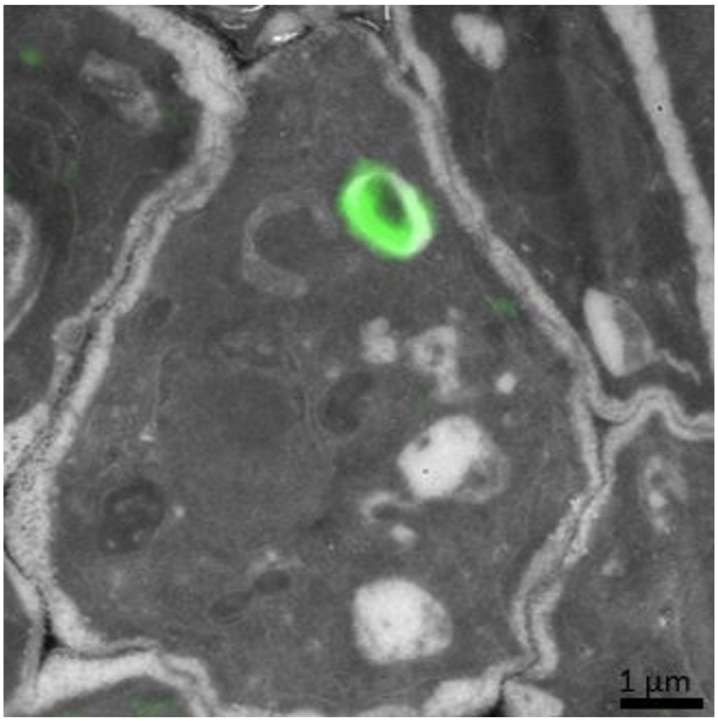

Figure 1: Representative image from correlative light and electron microscopy to indentify the location of GFP-ATG8, labeling the autophagosomal membrane (Confocal & TEM)

4 Zone C: ENS Paris-Saclay

Meeting points:

- Thursday: Alain Aspect Lecture Hall
- Friday: ENS Paris-Saclay main entrance.

Workshop C1: High-Speed 6D Tracking of Nanoparticles via Digital Holography and Second-Harmonic Generation

Led by François Marquier

This workshop presents an experimental framework for the high-bandwidth tracking of nanoparticle position and orientation with nanometric precision. The setup utilizes digital holography implemented via a Digital Micromirror Device (DMD) combined with Second-Harmonic Generation (SHG) signal analysis. This dual approach enables the real-time reconstruction of complex trajectories and rotational dynamics at high sampling rate.

Workshop C2: mesoSPIM

Led by Maxence Frétaud and Manon Mehraz

The mesoSPIM project is a unique international initiative in the field of light-sheet microscopy dedicated to large-scale imaging of cleared centimeter-sized samples with sub-cellular resolution. This open-source, cost-effective system matches the performance and complete commercial systems. During the workshop, we will present the functioning and specificities of the mesoSPIM, and present a large amount of pre-processed biological samples such as common zebrafish and mouse organs but also entire common carp and rainbow trout.

5 Zone C: Bâtiment Henri-Moissan - Université Paris-Saclay

Meeting Point :
Location of the Henri Moissan Building: https://maps.app.goo.gl/AaSgDh1SpPAka6Ew5
This place is a 10-minute walk from ENS Paris-Saclay (seminar venue).
How to get to the MIPSIT Facility & Henri Moissan (HM) building (map of the different buildings, public transport, and car access): https://www.pharmacie.universite-paris-saclay.fr/faculte/venir-la-faculte-de-pharmacie
The MIPSIT Facility is located on level 0 of the HM1 Research building (in green on the map in the previous link).
Access to the laboratory is restricted to badge holders only.
A member of the IPSIT staff will be present on site, in front of Building HM1 (under the footbridge between HM2 and HM1 : https://maps.app.goo.gl/g44G1DShHbxmjUfc7), to welcome participants 15 minutes before the scheduled start time of the workshop.

Workshop C3: Advanced STED Nanoscopy: Implementation of Adaptive Optics and Illumination Strategies

Led by Séverine Domenichini

This workshop provides a technical overview of the Abberior Instruments MIRAVA Polyscope, which is part of the MIPSIT platform (UMS-IPSIT). We will demonstrate how the integration of adaptive optics and adaptive illumination protocols optimizes 2D/3D STED imaging. The session will focus on two critical challenges: mitigating depth-dependent aberrations to maintain spatial resolution in thick samples, and repetitive super-resolved imaging of live cell.

6 Zone C: ISMO - Université Paris-Saclay

Meeting Point : reception of the ISMO building (bât 520)
Location of ISMO: https://www.ismo.universite-paris-saclay.fr/acces/
This place is a 15-minute walk from ENS Paris-Saclay (seminar venue).
For those who wish to come by public transport from Paris: RER B to Gare Massy Palaiseau, then bus 46.06 to "Université Paris-Saclay", then 10min walk.
For those coming by car, you can park in the vicinity of the building.

Workshop C4: Adaptive optics light-sheet microscopy for in vivo imaging

Led by Alexandra Fragola

This workshop presents the contribution of adaptive optics fluorescence microscopy to deep biological imaging. Tissue inhomogeneities distort the light wavefront, thereby degrading contrast, resolution and sensitivity. Adaptive optics, originally developed for astronomy, can correct these optical aberrations by measuring and correcting the wavefront using phase modulators such as deformable mirrors. The workshop will introduce the physical principles and main implementation strategies in microscopy, along with their respective advantages and limitations. A concrete example will be presented in light sheet microscopy for imaging zebrafish embryos.

Workshop C5: Fast Widefield FLIM Imaging

Led by Sandrine Lévêque-Fort, Lea Brito

Recent advances in SPAD array technologies enable fast, widefield fluorescence lifetime imaging (FLIM) with single-photon sensitivity. This workshop will introduce FLIM principles and highlight the performance of next-generation SPAD arrays for time-resolved imaging over large fields of view. The session will cover system implementation, acquisition strategies, and lifetime reconstruction methods along with key practical considerations. Applications in dynamic biological imaging will be presented.

Workshop C6: Live-cell SMLM

Led by Eva Pinto, Sandrine Lévêque-Fort The development of new fluorescent probes capable of switching from an OFF to an ON state without the need for imaging buffers enables the observation of structures in living cells. This workshop will present the properties of these new probes, including JF630b, as well as their conditions of use. Different acquisition modalities will be discussed, along with strategies for reconstructing dynamic structures.

Workshop C7: Deep SMLM (ModLoc)

Led by Abigail Illand, Sandrine Lévêque-Fort

This workshop will present the ModLoc technique developed in the laboratory, which enables encoding the axial position of single molecules using temporally varying structured illumination. This approach allows imaging of samples with an axial precision below 10 nm and to image in depth with uniform precision. The workshop will provide a detailed presentation of the custom-built experimental setup, and different acquisition schemes will be demonstrated.

7 Zone C8: Bâtiment hbar - Université Paris-Saclay

Bâtiment 625 (Hbar), Orsay. 5 minutes walk from ENS Paris-Saclay.
Location of the building: https://maps.app.goo.gl/dtPEaAu65uyJmPwW6
Meeting point: entrance hall of the building at 4:00PM.
In case of delay: the workshop will take place on the 4th floor in Room 404.

Workshop C8: Hands-on Implementation of Full-Field OCT (FF-OCT)

Led by Gaël Latour

This educational session provides six dedicated experimental stations for the assembly and alignment of a Full-Field Optical Coherence Tomography (FF-OCT) system. Participants may opt for a full build-up from discrete components or work with pre-aligned sub-assemblies to focus on specific interferometric principles and signal acquisition.