

## Training School “Live Cell Imaging”

The “Live Cell Imaging” training school is aimed at students of the Innovative Training Network (ITN) "TubInTrain" and is organized by the Department of Neurobiology together with the Integrated Bioimaging Facility (iBiOs) of the University of Osnabrück. The aim of the training school is to teach ITN students to apply innovative imaging applications in living cells to solve questions related to the function of microtubules and microtubule-modulating proteins and drugs.

The program is divided into three modules, with an emphasis on cells (day 1), tissue (day 2) and analysis of image data (day 3). Each module consists of a theoretical block in the morning with live lectures by experts in the respective field, followed by a block of practical applications in the afternoon in which a typical experiment is carried out through an interactive live stream demonstration. In each block there is enough time for virtual coffee breaks with the possibility of informal discussions and the exchange of information. On the third day, application demonstrations (virtual poster presentation) are carried out by students who use a typical live cell imaging technique for their project.

Due to COVID-19 restrictions, the course must take place in an online format using the video conference system of the University of Osnabrück (Big Blue Button).

I would like to thank everyone who helped organize and teach the course, especially Dr. Rainer Kurre und Dr. Michael Holtmannspötter (iBiOs, Osnabrück), Dr. Lidia Bakota (Department of Neurobiology, Osnabrück), Dr. Sara Barozzi and Dr. Dario Parazzoli (Imaging Unit at the IFOM, Milano), and Christian Conze, Marina Rierola, Ahmed Soliman and Nataliya Trushina (PhD students at the Department of Neurobiology, Osnabrück).

I am looking forward to an exciting and inspiring training school!

Osnabrück, March 2021

Prof. Dr. Roland Brandt  
Head of the Department of Neurobiology  
University of Osnabrück

**Coordinators:** Roland Brandt (Department of Neurobiology, UOS), Lidia Bakota (Department of Neurobiology, UOS), Rainer Kurre (Rainer Kurre, Integrated Bioimaging Facility at Osnabrück University (iBiOs))

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**Online access for the training school:**

<https://webconf.uni-osnabrueck.de/b/pro-ttw-mjd-kbb>, Access Code: 961362

**Teaching Material:**

<https://www.neurobiologie.uni-osnabrueck.de/index.php?cat=Teaching&page=Teaching%20Materials>

## **Program:**

### **Monday, March 22, 2021: Live cell imaging - Cells**

#### **Morning - Theory:**

9:00 am: Introduction to the meeting and the day (Roland Brandt, Department of Neurobiology, UOS).

9:15 am: Theoretical lecture 1: Microscopy and live cell imaging – an introduction (Sara Barozzi, Imaging Unit at the FIRC Institute of Molecular Oncology (IFOM), Milano).

10:15 am: Virtual coffee break/informal discussions.

10:30 am: Theoretical lecture 2: Principles of single molecule imaging: Methods and dyes for substoichiometric labelling (Rainer Kurre, Integrated Bioimaging Facility at Osnabrück University (iBiOs)).

11:30 am: Virtual coffee break/informal discussions.

11:45 am: Theoretical lecture 3: Single molecule tracking (SMT) of cytoskeletal proteins employing TIRF microscopy (Roland Brandt, Department of Neurobiology, UOS).

12:45 am: Virtual coffee break/informal discussions.

#### **Afternoon - Practical applications:**

Experiment: Single molecule tracking (SMT) of tau/tubulin by TIRF microscopy (Rainer Kurre, Integrated Bioimaging Facility at Osnabrück University (iBiOs), and Christian Conze, Department of Neurobiology, UOS).

2 pm: Briefing for the practical part.

2:20 pm: Live stream demonstration of a typical experiment.

4:00 pm: Virtual coffee break.

4:15 pm: Debriefing of the experiment and discussion of experimental strategies.

## **Tuesday, March 23, 2021: Live cell imaging – Tissue**

### **Morning - Theory:**

9:00 am: Introduction to the day (Roland Brandt, Department of Neurobiology, UOS).

9:15 am: Theoretical lecture 4: Laser scanning and multiphoton microscopy – an introduction (Dario Parazzoli, Imaging Unit at the FIRC Institute of Molecular Oncology (IFOM), Milano).

10:15 am: Virtual coffee break/informal discussions.

10:30 am: Theoretical lecture 5: Principles of light sheet microscopy (Rainer Kurre, Integrated Bioimaging Facility at Osnabrück University (iBiOs)).

11:30 am: Virtual coffee break/informal discussions.

11:45 am: Theoretical lecture 6: Preparation of tissue culture for live cell microscopy and virus-mediated expression of fluorescent proteins (Lidia Bakota, Department of Neurobiology, UOS).

12:45 am: Virtual coffee break/informal discussions.

### **Afternoon - Practical applications:**

Experiment: Light sheet microscopy of kinesin in organotypic brain slice (Michael Holtmannspoetter, Integrated Bioimaging Facility at Osnabrück University (iBiOs), and Marina Rierola, Department of Neurobiology, UOS)

2 pm: Briefing for the practical part.

2:20 pm: Live stream demonstration of a typical experiment.

4:00 pm: Virtual coffee break.

4:15 pm: Debriefing of the experiment and discussion of experimental strategies.

## **Wednesday, March 24, 2021: Analysis of image data**

### **Morning - Theory:**

9:00 am: Introduction to the day (Roland Brandt, Department of Neurobiology, UOS).

9:15 am: Application demonstration 1 (virtual poster presentation): Nataliya Trushina/Christian Conze (Department of Neurobiology, UOS): “Fluorescence decay after photoactivation (FDAP) of tau and tubulin.

9:45 am: Application demonstration 2 (virtual poster presentation): Marina Rierola (Department of Neurobiology, UOS): “Tracking of motor proteins in organotypic hippocampal slices”

10:15 am: Virtual coffee break/informal discussions.

10:30 am: Theoretical lecture 7: FDAP data analysis and modelling (Roland Brandt, Department of Neurobiology, UOS).

11:30 am: Virtual coffee break/informal discussions.

11:45 am: Theoretical lecture 8: Analysis and interpretation of single molecule data. (Rainer Kurre, Integrated Bioimaging Facility at Osnabrück University (iBiOs)).

12:45 am: Virtual coffee break/informal discussions.

### **Afternoon - Practical applications:**

Experiment: Fluorescence decay after photoactivation (FDAP) of tau-microtubule interaction (Ahmed Soliman and Christian Conze (Department of Neurobiology, UOS)).

2 pm: Briefing for the practical part.

2:20 pm: Live stream demonstration of a typical experiment.

4:00 pm: Virtual coffee break.

4:15 pm: Debriefing of the experiment and discussion of experimental strategies.

5 pm: Final remarks and closing of the training school (Roland Brandt, Department of Neurobiology, UOS).

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