

# Single Molecule Microscopy and Manipulation

18. – 22.10. 2021  
Practical course at BIOCEV,  
Průmyslová 595, Vestec



## Preliminary Programme

Monday, Oct 18.

08:45 – 09:00 Registration

09:00 – 09:10 Welcome and organizational details

Aleš Benda

09:10 – 10:00 Introduction to principles of single molecule fluorescence detection and correlation analysis

Dalibor Pánek

10:00 – 11:00 Methods of fluorescence correlation analysis on confocal microscopes

Aleš Benda

11:00 – 11:20 Coffee Break

11:20 – 12:20 Advanced FCS methods – focus on molecular diffusion in membranes

Aleš Benda

12:20 – 13:10 Lunch

13:10 – 13:30 Introduction to DNA-PAINT single molecule localization microscopy

Marie Olšinová

13:30 – 14:35 Introduction of the participants (3 min about yourself and your research)

14:35 – 14:55 Coffee break – Hands-on group assignment

14:55 – 15:25 Biological motivation for single molecule imaging – cytoskeleton and molecular motors

Valerie Siahhaan, Ján Sabó

15:25 – 16:15 Introduction to TIRF microscopy and optical tweezers, kymography and single molecule tracking

Valerie Siahhaan, Ján Sabó

16:15 – 16:35 Correlative optical tweezers – single molecule imaging approach

Valerie Siahhaan, Ján Sabó

16:35 – 17:30 Get together (beer and snacks) – Meeting Room L1.015 / short lab tour at IMCF

Tuesday, Oct 19. – Friday, Oct 22.

Groups 1 – 3 (regular participants)

09:00 – 12:30 Hands-on session - part I.

Around 10:45 Coffee break 15 min

12:30 – 13:30 Lunch

13:30 – 17:00 Hands-on session - part II.

Around 15:15 Coffee break 15 min

Group E1 (Erasmus students – 1. group)

09:00 – 12:00 Hands-on session

Around 10:30 Coffee break 15 min

12:00 – 13:00 Lunch

Group E2 (Erasmus students – 2. group)

12:00 – 13:00 Lunch (optional)

13:00 – 16:00 Hands-on session

Around 14:30 Coffee break 15 min

	groups E1, E2	group 1	group 2	group 3
Tuesday, Oct 19.	FCS	TIRF	SMLM	Opt. Tweezers
Wednesday, Oct 20.	TIRF	SMLM	Opt. Tweezers	FCS
Thursday, Oct 21.	SMLM	Opt. Tweezers	FCS	TIRF
Friday, Oct 22.	Opt. Tweezers	FCS	TIRF	SMLM

### FCS (Fluorescence Correlation Spectroscopy)

Aleš Benda

Optimizing point FCS measurements in solution; Point FCS and line-scan FCS measurements in double-labelled membranes; FCS analysis; STED-FCS

### TIRF (Total Internal Reflection Microscopy)

Roman Podhájecký

TIRF imaging and single particle tracking of kinesin motors walking along microtubules (1D)

### SMLM (Single Molecule Localization Microscopy)

Dalibor Pánek, Marie Olšinová

SMLM: DNA-PAINT; Imaging FCS

### Optical Tweezers

Daria Khuntsariya

Manipulating single microtubule; Visualizing binding of microtubule-associated proteins; Measurement of the strain in the microtubule lattice due to binding

The course is supported by the National Infrastructure for Biological and Medical Imaging (Czech-Biolmaging, Ministry of Education, Youth and Sports – Large Research Infrastructure, LM2018129).