

# Single Molecule Microscopy and Manipulation

10. – 14.10. 2022  
Practical course at BIOCEV,  
Průmyslová 595, Vestec



## Programme

### Monday, Oct 10.

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  
Eliška Macíčková

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  
Marcus Braun

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

16:15 – 16:35 Waveguide-based TIRF for precise sample illumination in high  
resolution microscopy  
Jaroslav Icha (Interference)

16:35 – 16:55 Correlative optical tweezers – single molecule imaging approach  
Valerie Siahaan

16:55 – 18:00 Get together (pizza time) – Meeting Room L1.015

## Tuesday, Oct 11. – Friday, Oct 14.

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 1	Group 2	Group 3	Group 4
Tuesday, Oct 11.	FCS	TIRF	SMLM	Opt. Tweezers
Wednesday, Oct 12.	TIRF	SMLM	Opt. Tweezers	FCS
Thursday, Oct 13.	SMLM	Opt. Tweezers	FCS	TIRF
Friday, Oct 14.	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)

Manjari Prakash

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

### SMLM (Single Molecule Localization Microscopy)

Dalibor Pánek, Eliška Macíčková

SMLM: DNA-PAINT

### Optical Tweezers

Roman Podhájecký

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

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