Please register to the meeting

Biotech Faculty HALF-day of a microscopist

21st of February, launching at 10.00

Please register to the meeting by sending an email to: michal.majkowski@uwr.edu.pl.

Registration deadline is 14.02.25.

The registration is needed to estimate the size of a required lecture room (… and, what is more crucial, estimate the amount of coffee/tea/cookies…).

BTW just two volunteers are needed to help with the grocery stuff…. just contact Michal Majkowski if you wish to help, thanks.

No certificates will be given, the meeting language is English.

Biotech Faculty participants: please bring your own mugs and plates.

Program:

10.00 – 10.40 **Grzegorz Chodaczek**

Immunotherapy Research Group at Łukasiewicz Research Network - PORT Polish Center of Technology Development

Układ immunologiczny w akcji, czyli co możemy zobaczyć dzięki mikroskopii przyżyciowej

The Immune system at work or what can we see with intravital microscopy

/the lecture will be delivered in English/

Dynamiczna interakcja komórek układu odpornościowego z otaczającym mikrośrodowiskiem odgrywa kluczową rolę w odpowiedzi immunologicznej, zarówno w warunkach fizjologicznych, jak i patologicznych, np. w nowotworach. Przyżyciowa mikroskopia konfokalna i dwufotonowa stanowią obecnie złoty standard w obrazowaniu in vivo, umożliwiając wysokorozdzielcze śledzenie ruchliwości i wzajemnych oddziaływań komórek układu odpornościowego w tkankach. Podczas wykładu zaprezentowane zostaną przykłady badań wykorzystujących tę technikę w celu wizualizacji i analizy zachowania wybranych typów komórek immunologicznych w różnych modelach.

10.40 – 11.10 **Katarzyna Sokołowska**

Department of Plant Development Biology, Faculty of Biological Sciences

Gentle, volumetric scanning at high resolution using Lattice Lightsheet microscopy

Our Laboratory of Lattice Lightsheet Microscopy at the Faculty of Biological Sciences is the only place in Poland where the Lattice Lightsheet 7 (LL7) system has been installed. The LL7 provides fast, three-dimensional visualization of various biological samples with minimal phototoxicity and reduced photobleaching. Our system enables deep scanning (up to 200 µm) in a wide field at tissue, cellular and subcellular levels. It can be used for both living and fixed specimens, and enables imaging for single-cell analyses as well as for comprehensive imaging of whole tissues and smaller organs.

11.10 – 11.40 **Joanna Grzyb**

Laboratory of Biophysics, Faculty of Biotechnology

Studying the movements within a plant cell

Here, I will focus shortly on two projects, that are studying movement within a plant cell. First, I'm using RFP-tagged UVR3 protein, localized in Nicotiana tabacum nuclei. This protein is a blue-light activated photolyase, repairing UV-induced DNA lesions. We are trying to find which factor drives the protein to the exact damage site, if it leaves chromatin after repair and if not - is the movement restricted to a specific chromosome or not.

Staying in the plant cell, we also study movement of its main organelle, chloroplasts. They move in response to a light stimuli, adapting to low or high light. Although confocal microscopy is not among most convenient methods to study chloroplast movement, it is the only one that gives straightforward answer in the case of plants with smaller chloroplasts or cells with reduced chloroplast number. Here, we are comparing the low and high light response of WT Arabidopsis thaliana plants and the albino GERALT mutant.

11.40 – 12.00 Coffee break

12.00 – 12.25 **Joanna Hołówka**

Laboratory of Molecular Microbiology, Faculty of Biotechnology

Super-resolution microscopy: How to track single particles of bacterial proteins?

Single Molecule Localization Microscopy (SMLM) is a powerful super-resolution imaging technique that surpasses the diffraction limit of light, achieving resolutions as fine as 10-20 nm. By isolating and precisely localizing individual fluorescent molecules through cycles of activation, imaging, and photobleaching, SMLM enables the detailed visualization of

subcellular structures. Moreover, it provides a means to track single particles of bacterial proteins, allowing for characterization of changes in protein mobility induced e.g., by binding to DNA, interactions with cellular structures, or exposure to inhibitors.

12.25 – 12. 50 **Antonina Mazur**

Laboratory of Cell Pathology, Faculty of Biotechnology

Wanting to see more

Reasoning of the necessity of using high-resolution microscopy to answer important biological questions. STED and SIM2 images of stained cells will be presented. Additionally, a few words will be given on TIRF imaging.

12.50 – 13.20 **Michał Majkowski**

Faculty of Biotechnology

Almost everything you ever wanted to know about colocalization

Basic as well as complex colocalization methods will be shortly described and illustrated with examples.

13.20 – 13.40 Coffee break

13.40 – 14.10 **Magdalena Chmielewska**

Amphibian Biology Group, Department of Evolutionary Biology and Conservation of Vertebrates, Faculty of Biological Sciences

Mechanism of programmed DNA elimination in vertebrate development studied with various microscopic techniques

Our Amphibian Biology Group specializes in the study of non-model frog species that are interspecies hybrids, aiming to enhance our understanding of vertebrate developmental biology, as well as evolutionary and conservation biology.

Our research encompasses multiple levels of in-depth analysis of germline cells, including genome inheritance through molecular cytogenetics techniques such as FISH and CGH. We also investigate cellular processes involved in genome rearrangement using histology, transmission electron microscopy (TEM), immunofluorescence (IF), confocal microscopy, and lattice light-sheet microscopy.

To achieve these objectives, we employ a diverse range of methodologies, including paraffin and cryo-sectioning, whole-mount gonad preparations, cell smears, and primary tissue culture techniques.

14.10 – 14.35 **Aleksandra Chorążewska**

Laboratory of Medical Biotechnology, Faculty of Biotechnology

HCS research using a library of inhibitors and high- throughput Opera Phenix Plus microscope - towards precise delivery of cytotoxic drugs to cancer cell

The main topic of the research is focused on identifying endocytosis pathways in pancreatic cells and finding chemical compounds, that can influence that process – in both ways: promote and inhibit. After designing and optimizing the HCS protocols HCS screen was conducted with a library of inhibitors. The results obtained make it possible to attempt a rational modulation of endocytosis toward precise delivery of drugs to cells.

14.35 – 15.00 **Mikołaj Domagalski and Katarzyna Pietraszek – Gremplewicz**

Laboratory of Cell Pathology, Faculty of Biotechnology

Complex diagnostic of eukaryotic cell behaviour

We will present multiple tools for live and fixed cell analysis. We will focus on the study of the processes connected with migration and invasion of mono- and co-cultured cancer cells. Additionally, the application of high content screening microscope to quantify intracellular structures will be discussed.