3 – 6 June 2025

EMBL Advanced Training Centre and Imaging Centre

INDUSTRY AND COMMUNITY ROOM

ABSTRACTS

WORKSHOP 2

WEDNESDAY | 4 JUNE | 15:50 – 16:50

Abbelight

High-Throughput STORM Imaging with Abbelight's SAFe System Featuring ASTER Illumination

Presenter(s):

Yashar Rouzbahani - Abbelight, France

Dassine Zouaoui - Abbelight, France

Unlocking More Data through Expanded Fields of View in SMLMS ingle Molecule Localization Microscopy (SMLM), including techniques like STORM, has transformed the way we explore biological systems, offering 10 to 20 times increase in spatial resolution of conventional light microscopy. This enables the visualization of molecular structures and spatial organization at the nanoscale, far beyond the diffraction barrier. Despite these advantages, many SMLM workflows remain limited by narrow fields of view and time-intensive acquisitions, constraints that reduce throughput and hinder large scale analysis.

In this workshop, we present Abbelight's high throughput STORM imaging workflow based on the SAFe system, which features ASTER illumination, a proprietary flat field excitation technology embedded in the illumination module of the SAFe platform. This integrated approach allows users to perform SMLM across ultra-wide fields of view while maintaining uniform excitation and precise single molecule localization throughout the entire imaging area. Unlike conventional Gaussian beam profiles that introduce intensity variation across the field, ASTER delivers homogeneous excitation, ensuring consistent fluorophore activation from center to edge. This enables high resolution STORM imaging at fields of view up to 150 µm × 150 µm using a 100X objective and 230 µm × 230 µm using a 60X objective, a significant expansion over standard size of 50 µm. The result: more cells per frame, higher statistical power, and data rich acquisitions that open the door to population level insights and rare event detection.

We will cover:

• Scaling the SMLM field of view: from 50 µm to 230 µm

• How larger FOVs increase data volume, cell counts, and biological outcomes

Schedule

10 min Introduction to STORM imaging

10 min Introduction to Abbelight Safe MN 360 and ASTER technology

25 min STOTM multi-color imaging with different FOV size

15 min Summary of the workshop & Questions

Abberior Instruments

Abberior STED-MINFLUX Workshop: Biological Imaging Across Scales

Presenter(s):

Bastian Klußmann-Fricke - Abberior Instruments GmbH, Göttingen

Clara-Marie Gürth - Abberior Instruments GmbH, Göttingen

Ulf Matti - Abberior Instruments GmbH, Göttingen

Biological samples span a vast range of sizes, from millimetre-scale organisms and tissues to nanometre-sized single molecules. Investigating these diverse samples necessitates a suite of optical microscopy functionalities. This includes large fields of view and high working distances for macroscopic specimens, optical compensation for thick tissues, and high resolution for subcellular and in vitro studies. Traditionally, these requirements demanded multiple specialized microscopes. The MIRAVA POLYSCOPE overcomes this limitation by integrating confocal, MATRIX, STED, and MINFLUX modalities into a single versatile platform.

Investigating the nuclear pore complex (NPC) at various levels of detail perfectly illustrates the need for a wide range of microscopy modalities. Confocal microscopy can reveal its cellular-level organization, while super-resolution techniques like STED and MINFLUX unveil its detailed macromolecular arrangement. To highlight the MIRAVA POLYSCOPE's comprehensive features, we will focus on the NPC as a prime example.

This workshop offers participants a unique opportunity to learn how to investigate a single biological structure across several orders of magnitude, spanning from diffraction-limited overviews to true molecular insights. Through hands-on demonstrations on the abberior MIRAVA POLYSCOPE, we will showcase how confocal, STED, and MINFLUX imaging can be strategically employed to answer different questions about the NPC at corresponding scales and resolutions.

Abberior Instruments

Abberior MINFLUX Workshop: 3D and 2 Colour MINFLUX Nanoscopy

Presenter(s):

Ulf Matti - Abberior Instruments GmbH, Göttingen

Clara-Marie Gürth - Abberior Instruments GmbH, Göttingen

Bastian Klußmann-Fricke - Abberior Instruments GmbH, Göttingen

Achieving molecular-scale imaging of protein complexes has long been a goal in the life sciences. MINFLUX nanoscopy addresses this challenge by precisely localizing single fluorophores through sequential fluorescence readout at defined positions surrounding the molecule. The use of a donut-shaped excitation beam enables localization with exceptional precision while minimizing photon requirements and thereby surpasses limits of other super-resolution techniques. Previously, such high-performance microscopy remained largely accessible only to specialized optics experts.

Here, we present the MINFLUX microscope built upon a conventional fluorescence microscope stand, providing this powerful technique for a broader range of users. This system seamlessly integrates ultra-high localization precision with standard experimental workflows, empowering non-experts to readily apply MINFLUX. We demonstrate its capabilities by visualizing intricate structures, such as the nuclear pore complex (NPC), at the nanoscale in three dimensions. Furthermore, through the labelling of different components within this complex, we achieve nanoscale resolution in two colours.

This workshop will provide participants with practical insights into the 3D analysis of biological structures using MINFLUX. We will showcase how two-colour MINFLUX experiments enable the detailed investigation of spatial relationships between different proteins at the nanoscopic level.

Applied Scientific Instrumentation

Fast volumetric imaging with the ASI single-objective light sheet

Presenter(s):

Brian Hake - Applied Scientific Instrumentation

The single-objective light sheet geometry – known in the literature as OPM, SCAPE, SOPi, eSPIM, and SOLS – enables 4D fluorescence imaging of biological samples at high speed and low light dose with conventional sample mounting. In collaboration with Leica Microsystems, ASI first made this transformative technology commercially available in December 2022 with a 40x cell biology configuration designed for imaging cells, tissue cultures, and small organoids at subcellular resolution. We have continued to expand the product line by the addition of a 20x neuroscience configuration with a larger field of view, well-suited to image larger organoids, expanded tissue, and small organisms.

In this geometry, a single sample-facing objective is used for both light sheet illumination and detection, freeing up the sample space compared to other light sheet geometries. In OPM mode, stage scanning and tiling can be performed by moving the sample through the light sheet with an ASI scan-optimized stage allowing for high throughput scanning of extended samples or multi-well plates. In SCAPE mode, the illumination light sheet and detection plane are scanned together at the sample using a galvo (~1ms flyback), and the stationary descanned image is captured by a camera. This scheme allows volumetric imaging at camera-limited frame rates with negligible bleaching and excellent optical sectioning.

This ASI microscope system is flexible, affordable, and easily customized to fit your needs. Data acquisition is supported in Micro-Manager and the system is compatible with most all major laser launches containing a single mode fiber output (400-750 nm) and sCMOS cameras.

In this workshop we will share a brief overview of the technology and currently available systems, as well as an update on recent developments. We also have a functioning system nearby that will be available for viewing during the meeting – come by to learn more!

Bruker / Luxendo GmbH

Vutara VXL – Volumetric- and 3D-Single-Molecule-Localization Microscopy

Presenter(s):

Dr. Clemens Schneider, Bruker Fluorescence Microscopy, Germany

Modern fluorescence microscopy applications need to be performed in natural environments of the structures of interests. This requires using large samples, like tissue slices, organoids/spheroids or whole model organisms. One of the main limitations of most SML microscopes is their weak ability to image structures deeper than a few nm away from the coverslip.

Engineered with simplicity and functionality in mind, the Bruker Vutara VXL system is different, as it uses robust widefield illumination together with our patented Biplane detection. With this combination entire volumes in up to 50 µm depth inside the sample can be resolved in 3D with 25 nm resolution (or better). The comprehensive analysis pipeline in the SRX software provides insights into the 3D-distribution of the detected molecules within cells in their native environment.

Carl Zeiss Microscopy Deutschland GmbH

Unlocking the Future of Imaging with ZEISS Lattice SIM 3

Presenter(s):

Dr. Christine Strasser, Carl Zeiss AG, Switzerland

Cellular processes are complex yet delicate. Therefore, we require an imaging solution that is gentle but allows visualization of finer details. The ZEISS Lattice SIM 3 represents a significant advancement in imaging such multicellular samples, designed to address the evolving needs of researchers studying developing organisms, organoids, 3D cell cultures, and intricate tissue sections. This system is optimized for objectives ranging from 10× to 40×, ensuring the capture of finer details critical to biological research.

Key features include the integration of SIM Apotome technology, which facilitates rapid optical sectioning through Leap Mode, delivering high-quality images with a remarkable speed of 85 fr/s. The Lattice SIM 3 offers a large field of view while allowing access to smaller regions of interest, enabling near-isotropic resolution in large volumes and gentle super-resolution imaging.

Additionally, Burst Mode enhances time-lapse imaging, allowing researchers to monitor dynamic changes over time with clarity. The innovative Lattice SIM imaging and SIM² image reconstruction techniques enable resolution of structures down to an impressive 140 nm.

The seamless integration of arivis software further enhances the imaging system, providing advanced image analysis tools for sophisticated particle and cell tracking. This combination empowers researchers to transform their data into actionable insights, yielding faster and more accurate results while streamlining workflows. The ZEISS Lattice SIM 3 maintains compatibility with standard dyes and fluorescent proteins, offering flexibility for simultaneous two-colour imaging with clean channel separation.

In summary, the ZEISS Lattice SIM 3 not only elevates research capabilities but also unlocks new dimensions in imaging, paving the way for future discoveries in the field.

Chip NanoImaging

Ultra-Large-Field-of-View Imaging Using Innovative Photonic Chip Technology

Presenter(s):

Merete Storflor - Chip NanoImaging, Norway

Luis Villegas - Chip NanoImaging, Norway

Jon Kristian Hagene - Chip NanoImaging, Norway

Explore the full complexity of biological processes with the largest uniform field of view available. Chip NanoImaging offers multi-channel TIRF imaging at the millimeter scale, delivering exceptional signal-to-noise performance through high refractive index contrast. Our multimode waveguide technology is seamlessly integrated into the sample carrier, providing tight light confinement, high intensity, and a flat illumination profile - ideal for super-resolution imaging. Our bio-compatible carriers are well-suited for both live and fixed cell imaging as well as for use with tissue sections. Further, our landmarked carriers enable robust correlative microscopy workflows. The system also integrates EPI fluorescence with advanced post-processing tools for 2D/ 3D deconvolution, along with GPU-accelerated reconstruction software for single-molecule localization microscopy (SMLM) data. Its versatility makes it ideally suited for studying membrane dynamics and drug interactions with precision and ease.

Join our workshop and experience how advanced photonic chip-based TIRF increases the power of imaging techniques like SMLM - by allowing for super-resolution imaging across ultra-large fields of view. For those interested, we can also demonstrate on-chip histology. We will also showcase our user-friendly reconstruction software, designed to efficiently reconstruct large datasets, ensuring a seamless and high-performance imaging workflow.

Community room workshop

Automatic power measurement and stability assessment for any microscope with SmartLPM

Presenter(s):

Arne Fallisch - University of Freiburg Life Imaging Center - Germany

In this session QUAREP-LiMi WG1 will introduce SmartLPM, a new tool for illumination power and stability assessment compatible with any microscope [1]. To ensure imaging reproducibility, it is not only necessary to measure the illumination power, but also its stability along different time scales and its response to set intensities (linearity). Carried out manually these checks are both time consuming and prone to introducing errors. The QUAREP-LiMi automatic tools provide uniform means for acquisition, data organization and analysis conforming the FAIR principles [2].

Using scripting capabilities available at some microscopy suites the QUAREP-LiMi Tool Kit [3] provides convenient system-specific tools for unsupervised testing. However, until now this approach was a limiting factor for many microscopes, where scripting interfaces are not available.

Instead of controlling the microscope, the new SmartLPM[4] tool reads and classifies optical powers directly. This is done by identifying signature pauses in the illumination sequence and correcting the spectral response in real time. After configuring the experiment appropriately at the microscope (e.g. a sequence of power ramps for linearity assessment) the operator describes these test conditions in the SmartLPM graphical interface. These instructions can be saved and reloaded for later use.

While system specific tools for light power and stability assessment can be conveniently integrated in microscope software, SmartLPM provides the same functionality where this is not possible. In order to cover every scenario all these tools are being incorporated to the QUAREP-LiMiToolKit.

We will show SmartLPM and the QUAREP-LiMiTool Kit in parallel community room sessions.

References:

[1]https://www.protocols.io/workspaces/quarep-limi/publications

[2]https://www.go-fair.org/fair-principles/

[3]https://github.com/QUAREP-LiMi/QUAREP-LiMi-Tool-Kit

[4]https://github.com/QUAREP-LiMi/SmartLPM

Community room workshop

Bioimaging data organization in OMERO

Presenter(s):

Tom Boissonnet - Heinrich Heine UniversitÃ¤t - Germany

Christian Schmidt - DKFZ German Cancer Research Center - Germany

OMERO (Open Microscopy Environment Remote Objects) is a well-established open-source software platform designed to manage and visualize microscopy data in a collaborative online environment.1In OMERO, data is organized utilizing “Projects” and “Datasets” tied to the underlying database. However, these organizational levels are frequently confused with a hierarchical folder structure that researchers are familiar with from classical file systems. As a consequence, users find it challenging to organize a growing body of uploaded data within a seemingly limited two-folder hierarchy. In this workshop, we demonstrate strategies for properly leveraging OMERO’s object-oriented storage by utilizing tags for data organization (Schmidt et al., 2023). We explain how matching datasets to biological replicates significantly reduces the effort required to organize data through an easy-to-adopt practical data management workflow. Thus, researchers can obtain an even more versatile “folder-like” structure that benefits data findability and data utilization in downstream processing and analysis. In addition, we will showcase the latest features of OMERO.figure, the OMERO plugin that enables the creation of publication-ready figures with OMERO-hosted data, complying with QUAREP checklists for microscopy data publication (Schmied et al., 2024), with minimal effort.

Schmied, C., Nelson, M.S., Avilov, S. et al. (2024) Community-developed checklists for publishing images and image analyses. Nat Methods 21, 170–181 .

Schmidt, C., Bortolomeazzi, M., Boissonnet, T., et al. (2023) I3D:bio's OMERO training material: Re-usable, adjustable, multi-purpose slides for local user training. Zenodo. https://doi.org/10.5281/zenodo.8323588

1 https://www.openmicroscopy.org/omero/

CrestOptics

Lattice SIM across scales: breaking the diffraction limit barrier in Z-depth

Presenter(s):

Francesco Bacchi - Business Development Manager EMEA, CrestOptics Spa

Deep tissue imaging in complex biological samples is often limited by diffraction and scattering, particularly hindering the visualization of subcellular structures in the axial (Z) dimension. This workshop demonstrates the application of CrestOptics' DeepSIM, a lattice-based structured illumination microscopy technique, to overcome these limitations and achieve enhanced Z-depth resolution across diverse biological scales. We will present data showcasing DeepSIM's capabilities in resolving intricate subcellular details in HeLa cells, visualizing deep cellular architecture in cleared mouse brain tissue, and mapping the complex morphology and interactions of astrocytes. The results highlight DeepSIM's potential for providing new insights into fundamental biological processes, from cellular dynamics to tissue organization, across various model systems.

CSR Biotech

The New Frontier of Super-Resolution: Label-Free Meets SIM for Live-Cell Imaging

Presenter(s):

Christiaan Stuut - CSR Biotech, Heidelberg, Germany

Jinqing Wang - CSR Biotech, Guangzhou, China

Shutang Zeng - CSR Biotech, Guangzhou, China

This workshop offers a glimpse into the next generation of live-cell imaging with an in-depth introduction to the revolutionary SIM-Supreme system, uniquely integrating super-resolution Structured Illumination Microscopy (SIM) with label-free, quantitative 3D Optical Diffraction Tomography (ODT).

We will delve into the principles of ODT, explaining how this powerful technique utilizes refractive index measurements to generate label-free 3D visualizations of cellular structures and dynamics with exceptional contrast and minimal phototoxicity. Discover how ODT can provide complementary information to fluorescence-based methods, enabling long-term, non-invasive studies and intrinsic contrast of cellular components.

We are excited to offer a remote demonstration of the SIM-Supreme's integrated capabilities. Witness firsthand how the SIM-Supreme seamlessly combines super-resolution SIM and label-free ODT within the intuitive IMAGER software. We will showcase real-time data acquisition and processing, highlighting the synchronized workflows for both modalities and demonstrating the powerful potential for correlative studies.

This workshop is ideal for researchers interested in the future of live-cell imaging and the potential of combining super-resolution fluorescence microscopy with label-free 3D tomography. Join us to learn about the innovative SIM-Supreme and witness the power of a unified multi-modality workflow within the IMAGER software.

EVIDENT Europe GmbH

Best-in-class S/N ratio and acquisition speed for LSM – FV4000 with SilVIR™ Detectors

Presenter(s):

Björn Sieberer - Evident Europ GmbH

Join us at ELMI 2025 for an exclusive EVIDENT workshop showcasing the FLUOVIEW FV4000, our advanced laser scanning microscope solution, designed to meet the evolving needs of imaging core facilities. This session will provide a deep dive into the cutting-edge technologies that define the FV4000.

Experience firsthand the revolutionary SilVIR™ detectors, which set new benchmarks in sensitivity, dynamic range, and signal-to-noise performance, ensuring exceptional imaging quality even in the most challenging applications. Learn how the FV4000's high-speed scanning capabilities, adaptive AI-driven noise reduction, and seamless integration with advanced imaging modalities empower researchers to push the boundaries of confocal microscopy.

Whether you are looking to enhance your facility's imaging workflows or explore the latest developments in laser scanning microscopy, this workshop will provide valuable insights into how the FV4000 continues to redefine the standards of confocal imaging.

Leica Microsystems

TauSTED Xtend – gentle nanoscopy to observe the dynamics of life

Presenter(s):

Julia Roberti - Leica Microsystems, Germany

Luis Alvarez - Leica Microsystems, Germany

Ulf Schwarz - Leica Microsystems, Germany

Using STED (Stimulated Emission Depletion) Microscopy, researchers have realized the visualization of intracellular structures at the nanoscale, unveiling insights into the structural-function relationship of biological processes such as cell signalling, gene expression, and protein synthesis.

However, the light dose levels applied in Super-Resolution Microscopy to achieve the required temporal and nanoscopic scale, are often incompatible with preserving the viability of the specimen. TauSTED Xtend pushes beyond the limits of intensity-based and gated STED, allowing for superior resolution and image quality at lower light dose.

In this workshop, we will demonstrate how TauSTED Xtend enables gentle live cell imaging at the nanoscale using different probes and labels in living cells. We will show that TauSTED Xtend delivers cutting-edge resolution and image quality at low light dose, key to accessing fast nanoscale dynamics of cellular processes.

References

L. A. J. Alvarez, U. Schwarz, L. Friedrich, J. Fölling, F. Hecht, and M. J. Roberti (2020). Pushing STED beyond its limits with TauSTED. Nat Methods. Doi: d42473-021-00241-0

Lyncée Tec

Fast, Label-Free, Live-Cell Analysis with Digital Holographic Microscopy

Presenter(s):

Benjamin Rappaz

Head of Life Sciences

Lyncée Tec, Lausannne, Switzerland

Digital Holographic Microscopes (DHM®) by Lyncée Tec offers a fast, label-free, noninvasive imaging approach based on quantitative phase measurements. This technique enables real-time monitoring of living cells, providing metrics such as cell morphology, dry mass, and intracellular dynamics without the need for exogenous labels or dyes. Thus, allowing to quantify cell health status and ongoing bioprocesses without perturbing your cells.

In this workshop, we will present the principles and key applications of DHM® in life sciences:

Quantitative analysis of morphology, proliferation, and cytotoxic responses

Applications for high-content screening and long-term live-cell monitoring

4D tracking of live cells

The system offers multi-objective support (2.5x to 100x), a large field of view (up to 1.3 mm at 5x), and fast acquisition speeds (up to 194 fps), allowing robust and scalable live-cell imaging. DHM® can also be correlated with fluorescence for simultaneous recording and correlative studies.

Case studies and live demonstrations will illustrate how DHM® enables reproducible, high-throughput analysis of cellular processes, with minimal perturbation to the biological system. The session is intended for researchers seeking robust, quantitative, and label-free imaging methods for live-cell studies.

More info:

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Märzhäuser Wetzlar GmbH & Co. KG

Automated micropositioning – Agility meets precision

Presenter(s):

Martin Schmeid - Märzhäuser Wetzlar GmbH & Co. KG

Automated micropositioning combines ultimate precision with dynamic agility, opening up new possibilities in microscopy, robotics, and semiconductor technology.

This contribution highlights recent developments in automated fine positioning, where advanced sensor technology, intelligent control systems, and compact actuators form a synergistic unit. By combining high repeatability with rapid responsiveness, modern systems enable efficient and reliable handling in the submicrometer range – even under demanding environmental conditions. Applications and challenges in both research and industry are discussed using practical examples.

Nikon Europe B.V.

Advances in Automated imaging with Eclipse Ji and X-Light V3

Presenter(s):

Subash Chinnaraj - Nikon Europe B.V., Netherlands

Lisa Sanchez - Nikon Europe B.V., Netherlands

Herman Fennema - Nikon Europe B.V., Netherlands

The growing adoption of 3D samples in microscopy and High Content Screening presents unique challenges, including increased experimental time, higher data storage requirements, difficulties in experimental setup, inconsistencies in locating samples and effective optical sectioning. During the workshop, we will demonstrate how these challenges are addressed through the integration of the Eclipse Ji with the X-Light V3 Spinning-Disk Confocal System, including:

Enhanced ease of use with sample detection, autofocus, and automated light path configuration.

Advanced and intelligent assays with fully automated imaging and analysis workflows utilizing NIS-Elements JOBS and General Analysis (GA3).

Simplified fluorescence slide scanning with a graphical user interface (GUI) for sample detection and scanning.

NIS-Elements Smart Experiments:

Furthermore, we will present the latest developments in Smart Experiments, a high-content screening module within NIS-Elements designed to significantly reduce experiment time and improve efficiency.

These developments address key challenges, including optimizing time-lapse assays, enhancing data quality when imaging uneven well plate bottoms, and streamlining multi-plate assay workflows.

ONI

From Basics to brilliance. Using the ONI Nanoimager with the Discovery Kit: dSTORM in cells – The ultimate kit to prepare your samples for super-resolution with ease.

Presenter(s):

Dr. rer. nat. Nensi Alivodej - Field Application Scientist, EU - nalivodej@oni.bio

Pip Timmins - Sales Executive - phillipa@oni.bio

From Basics to brilliance. Using the ONI Nanoimager with the Discovery Kit: dSTORM in cells – The ultimate kit to prepare your samples for super-resolution with ease.

The Nanoimager is a compact and state-of-the-art microscope, offering quantitative analysis for localization-based imaging (dSTORM and PALM), single-particle tracking and single-molecule FRET. The Nanoimager is designed to operate on a standard lab bench and has a footprint smaller than a piece of A4 paper, making it more accessible to researchers.

The ONI Discovery Kit™ for dSTORM imaging provides a modular workflow for immunofluorescent labeling in cultured cells, which allows you to confidently detect extra and intracellular proteins in two channels with 20 nm resolution and high sensitivity in your own samples. You provide the cells and custom antibodies, we provide the rest!

This workshop is intended for people who are looking to brush up on their knowledge of dSTORM and push their research further. Workshop attendees will receive a 10% discount voucher to be redeemed against the purchase of a Discovery Kit.

Oxford Instruments

When Seeing Fails and Objective (Lens) Truths Prevail: Linking Microscope Quality Control Metrics to More Precise Biological Readouts

Presenter(s):

Geraint Wilde - Oxford Instruments

How much do optical component variations in the microscope affect common biological imaging assays? What are the impacts of these detectable variations on the repeatability and/or reproducibility of microscopy experimental results, and under what conditions do they really matter when observing a biological phenomenon?

The efforts of the QUAREP-LiMi consortium have established a rigorous and standardized approach to microscope quality control and have clearly highlighted large differences in optical performance between not only different types of microscopy technology, but also between identical microscope models using the same optics.

Building on this drive towards light microscopy standardization, we designed a set of experiments where different objective lenses are used to image the exact same field of view on the same microscope platform and thereby demonstrate the direct correlation between a measured quality control metric using a calibration sample and an image measurement on a real biological sample that depends on the metric's magnitude. We show how subtle yet quantifiable differences in a biological sample's sub-cellular component volumes, cross-channel colocalization, and cross-field of view intensities - which are difficult to ascertain by eye from the images - are directly relatable to measurable differences in point spread function (PSF), chromatic aberration, and field illumination uniformity obtained with each objective lens.

Our study illustrates how ascertaining a clear understanding of the microscope quality and performance metrics facilitates a better comparison and reproducibility of inter-microscope experiments with increased confidence. Seeing is not always believing.

PhaseView

Ultra-thin Light Sheet Microscopy Providing Multi-user Experience Combined with Automated Multi-scale Imaging Capabilities

Presenter(s):

Igor Lyuboshenko - PHASEVIEW

Alpha3 Facility Edition is an automated light sheet microscope designed for imaging facilities and research laboratories. It integrates key technologies to deliver ultra-thin light sheet thickness and a multi-user experience, from rapid sample screening to high-resolution image acquisition of fixed or live samples and whole cleared specimens. The system offers a seamless multi-scale imaging experience for diverse applications, enabling multiple users to observe the same sample at various scales without compromising imaging resolution.

As a fully automated system, the Alpha3 Facility Edition configures itself when changing magnification, allowing users to focus on capturing images. It recovers all settings and calibration parameters, providing a personalized multi-user and multi-application experience. Intelligent illuminators coupled to a wide-field detection microscope ensure maximum homogeneous light coverage for both small and large samples. Illumination from both sides simultaneously covers the maximum area of the sample. Observation is possible through oculars and with a camera.

The system features an extended working distance and objectives with high numerical aperture, providing a very thin optical section with optimized sharpness. It allows varying the orientation of the sample sectioning plane within the specimen, maintaining homogeneous image sharpness over the entire field of view. It automatically configures lenses for illumination and detection, optimizing image quality and ensuring excellent colocalization of images acquired with multi-wavelength light beams, thanks to the dynamic focusing module.Alpha3 Facility Edition offers advanced capabilities in light sheet microscopy, providing a versatile and automated solution for multi-user environments and diverse imaging applications. You are welcome to join us to explore these innovative features and discuss potential collaboration opportunities to further advance your research.

PicoQuant GmbH

Performing ISM-FLIM with Luminosa`s PDA-23 detection add-on

Presenter(s):

Isabel Gross - PicoQuant GmbH, Germany

Mathias Bayer - PicoQuant GmbH, Germany

Recently, high-performance SPAD-arrays featuring few tens of pixels have become available. Combining these with suitable multi-channel TCSPC-devices enables time-resolved Image Scanning Microscopy (ISM). ISM enhances the spatial resolution and increases image contrast compared to standard confocal imaging. FLIM can provide additional functional information as well as extended marker multiplexing using lifetime contrast. So both technologies complement each other.

In this workshop we will show how the PDA23 SPAD Array is implemented in Luminosa. The newly released software NovaISM enables the analysis of ISM-FLIM images acquired with the PDA-23 Add-On of the Luminosa microscope. Image scanning microscopy (ISM) with a SPAD array detector achieves resolution enhancements of about 1.5 to 1.7 times in comparison to standard confocal images, in combination with deconvolution. Even for 2d-recordings/data the contrast of the ISM-FLIM images is enhanced significantly by rejecting the out-of focus light. Such rejection enhances not only the signal-to-noise-ratio, but also the lifetime contrast of the FLIM images. These benefits enable either faster image acquisition or gentler imaging of live samples.

Rapp OptoElectronic GmbH

Automating Photomanipulation Experiments with RAPP OptoElectronic Devices Using Adaptive Feedback Microscopy

Presenter(s):

Dr. Aliaksandr Halavatyi - EMBL Heidelberg, Germany

Dr. Manuel Gunkel - EMBL Heidelberg, Germany

Dr. Anja Zimmermann - RAPP OptoElectronic GmbH, Germany

Photomanipulation is an important technique in microscopy: it is essential for studying molecular kinetics and interactions, modulating live sample properties via optogenetics, laser ablation and more. For these types of experiments, specialized photomanipulation devices are required to meet specific needs, such as photomanipulation during imaging, complex illumination patterns or specific light sources. RAPP OptoElectronic (RAPP) devices are designed to fulfill these requirements and can be integrated with various microscope types.

Automation is vital to enhance throughput and ensure unbiased selection of photomanipulated regions. Such workflows are implemented with Adaptive Feedback Microscopy technology, where each image is analyzed in real-time by a preconfigured routine to identify target areas. Once analysis is complete, the appropriate photomanipulation action is initiated.

In this workshop, we will showcase the Adaptive Feedback Microscopy pipeline using a RAPP UGA-42 FireFly device on an Evident FluoView 3000 confocal microscope. We will demonstrate fully automated photoactivation of a specific cell subpopulation identified through cellular phenotype profiling. This workflow builds on the AutoMicTools toolbox for Fiji, developed at the Advanced Light Microscopy Facility (ALMF) at EMBL Heidelberg.

The techniques presented can be adapted for various applications and microscopes equipped with RAPP devices. All RAPP devices are controlled via SysCon software, allowing a unified programming interface for photomanipulation. The modular architecture of AutoMicTools enables the integration of project-specific analysis routines and additional imaging, analysis and photomanipulation steps as needed.

See you in the workshop to discuss your potential applications and the minimal requirements for adapting the protocol to other microscope setups.

Thermo Fisher Scientific

Leveraging Amira Software's AI capabilities for advanced image analysis and optical image segmentation

Presenter(s):

Sarawuth Wantha - Amira Software - Thermo Fisher Scientific

It is crucial for scientists and imaging experts to comprehend complex biological structures through image visualization and analysis. Imaging data serves as a valuable tool for understanding cellular architecture and processes. However, analyzing data from multiple imaging systems and modalities can be a challenging endeavor. Each experimental setup presents unique challenges, and multi-scale dynamic processes necessitate the detection of objects of various sizes, ranging from diffraction-limited particles to entire cells. Identifying and quantifying sub-cellular structures within datasets, which may contain anywhere from a few dozen to tens of thousands of objects, can be overwhelming.

Given the growing need for advanced analytical tools, researchers require image processing software that enables fast, high-quality visualization, effective processing, and accurate data analysis to expedite their workflows.

Thermo Scientific Amira Software is a powerful, comprehensive, and versatile solution designed for visualizing, segmenting, and understanding life science and biomedical images. It allows researchers to explore complex biological data in 3D, which would be impossible to fully comprehend with 2D images alone.

Amira Software empowers researchers to gain a deeper understanding of their image data. With its user-friendly interface and comprehensive tools, users can streamline their workflows and dedicate more time to advancing the field of optical imaging. The intuitive, flexible, and customizable "visual programming" workflow ensures accurate and reliable results.

Enhancing its segmentation capabilities, Amira Software now incorporates artificial intelligence for imaging and analysis applications. AI methods, such as deep learning, have proven to be powerful tools for improving resolution, reducing noise, and automating segmentation. The integration of AI-based deep learning represents a significant advancement for Amira Software solutions. This approach ensures that your analysis is repeatable across specimens, making future image segmentation independent of manual processing or user-based variability often encountered in manual annotation tasks.

Tomocube Inc.

Holotomography : the next imaging breakthrough is unlabeled

Presenter(s):

Bruno Combettes - Tomocube Europe, Germany

Daniel Ghete - Tomocube Europe, Germany

"No stains. No labels. Just truth. See what you've been missing."

Label-free holotomography is redefining the way we explore live cells in 3D. By harnessing refractive index as intrinsic contrast, this cutting-edge technique enables high-resolution, quantitative imaging without the need for fluorescent dyes or stains. This workshop will introduce the fundamentals of holotomography, showcase applications in live-cell and tumoroid imaging, and provide insights into how it can complement your existing microscopy toolbox.

Whether you're managing an imaging facility or looking for new approaches in your research, this is your chance to discover the full potential of label-free imaging.

The showcased setup integrates holotomography with the CrestOptics spinning disk confocal module, giving you the best of both worlds — intrinsic contrast and molecular specificity, all in real time. Holotomography reveals structure and dynamics without labels. Spinning disk confocal adds molecular context with high-speed fluorescence imaging. Together, they offer a unique correlative approach — where cellular truth meets targeted insight.

그들은 함께 Cellular Truth가 목표 통찰력을 충족시키는 독특한 상관 접근법을 제공합니다.

Visitron Systems GmbH

VisiTIRF Orbital-110 ISO RingTIRF illumination with new "Ultra Flat Homogenizer Technology"

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The new Visitron VS-Orbital-110 IsoTIRF tackles these limitations by providing a flat intensity profile whilst maintaining an optimal focusing of the laser beam at the sample plane. This new design was used to enhance the uniformity of laser illumination for the Ring-TIRF technology offering an even evanescent field illumination of large areas and allowing for high-sensitivity imaging of living cells, without the need for mathematical shading correction.

We offering two different input optics either with higher laser throughput or with better uniformity. We are improving the uniformity from about 80% down to 5% - 12% roll-off values between 405nm to 640nm laser illumination measured at the FOV of a sCMOS Prime (18.8mm diagonal). In addition, the IsoTIRF offers the largest field of view in the TIRF market at over 22mm.