

Microscopy Imaging Center (MIC)

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Prof. Britta Engelhardt
 President and Representative of the Medical Faculty

Prof. Michael Stoffel
 Representative of the Vetsuisse Faculty

Prof. Olivier Pertz
 Representative of the Faculty of Science

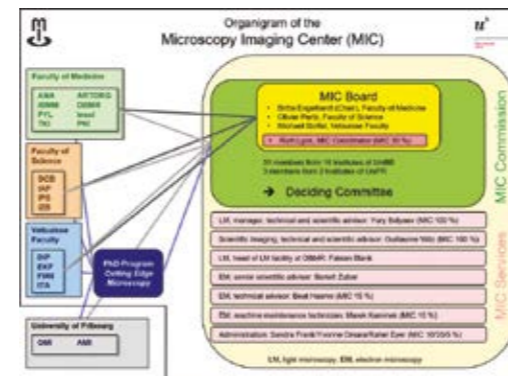
PD Dr. Ruth Lyck
 MIC coordinator (30 %)

Dr. Guillaume Witz
 Biolmaging and BigData

Dr. Yury Belyaev
 Light Microscopy

Structure

The MIC was founded in 2005 and has since developed into the University of Bern's center of excellence for high-end microscopy in the life sciences. Experts in microscopy from the Medical, Science and Vetsuisse Faculties of the University of Bern and from the University of Fribourg have joined forces to support high-end microscopy and image analysis. In 2019 the MIC Commission, which is the directive panel, involved 32 representatives. Currently, the MIC oversees 60 instruments including 48 light microscopes, 9 electron microscopes, two atomic force microscopy systems and one micro computed tomography (micro-CT) instrument. In 2019, this equipment was used by 341 researchers.



Profile

- Mission. Expert knowledge and technical support. Implementation of new technologies. Central access to microscopy. Teaching, events and services.
- Teaching and events. Lecture series on Advanced Microscopy. MIC workshops and MIC trainings. PhD program Cutting Edge Microscopy (CEM). In 2019, the MIC organized a 3-day summer school, a 2-day visit of the European Molecular Biology Laboratory (EMBL), Heidelberg, Germany, a Mini-Symposium on Multi-Dimensional Image Processing, the MIC Research Day and the MIC Symposium on Machine Learning in Imaging.
- Portfolio. From live imaging of whole organisms to organs, cells and subcellular dynamics. High throughput setups. From 2D to 5D and from the mesoscopic scale to the ultrastructural level. Light microscopy, electron microscopy, micro computed tomography and atomic force microscopy.
- Service. Software for image analysis. Image data handling and processing. Sample preparation. Introduction into microscope operation. Bimonthly newsletter for visibility and information about microscopy related activities in Bern, Switzerland and abroad.
- Internal activities. The MIC Commission convened at four regular meetings and one retreat.
- External partners. Swiss Society for Optics and Microscopy (SSOM). Life Sciences Switzerland (LS2), Intersection Microscopy. Scientific Volume Imaging b.v. (SVI). Swiss Microscopy and Imaging Core Facility Network. Science IT Support Unit of the University of Bern

Highlights



MIC Research Day on 3 July 2019

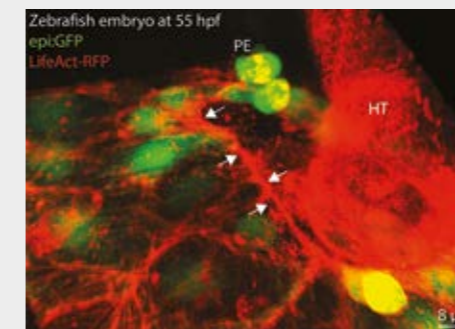
This yearly event promotes networking of researchers of the University of Bern using microscopy. The keynote speaker Prof. Nicolas Thomas explained advanced imaging for material sampling on Mars. PD Dr. Fabian Blank and Dr. Guillaume Witz informed about MIC-services. Various researchers of University of Bern presented their microscopy applications.

MIC Symposium on 29 November 2019

In 2019, MIC has selected the hot topic "Machine Learning in Imaging" as the theme of the MIC symposium. The scientific committee formed by Prof. Inti Zlobek, Prof. Raphael Sznitman, Prof. Mauricio Reyes and Dr. Guillaume Witz prepared a well-balanced and highly informative program which attracted more than 230 participants from Switzerland and abroad. Topics covered included most recent advances in the application of machine learning to various imaging modalities such as ultrasound, electron microscopy and light microscopy.



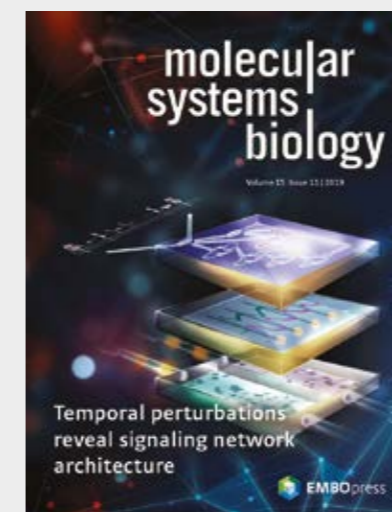
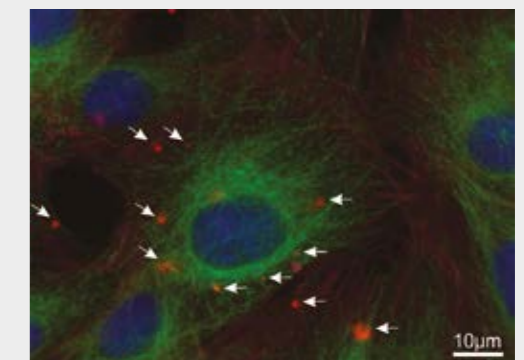
Research highlight Medical Faculty



In vivo imaging of the developing zebrafish heart. Confocal microscope Zeiss LSM880 airy scan. Red color, LifeAct-RFP, labels F-actin. Green, epi:GFP, expressed in dorsal pericardium (DP) and proepicardium (PE). The PE protrudes close to the inflow tract (IFT) of the heart tube (HT). Actin filaments (white arrows) are involved in the cellular dynamics of PE formation. Research group of Prof. Nadia Mercader.
 Published in Development 2019, doi: 10.1242/dev.174961.

Research highlight Vetsuisse Faculty

Metabolic response of rat brain capillary endothelial cells to nanoparticles used in laser-assisted tissue soldering. Microscope Zeiss Axio Imager Z1. Red, internalized polymer-coated fluorescent nanoparticles (white arrows). Green, mitochondrial fusion protein optic atrophy 1 (OPA1). Blue, cell nuclei (DAPI). Purple, cytoskeleton (phalloidin). Research group of Prof. Meike Mevissen.
 Published in Toxicology and Applied Pharmacology 2019, doi: 10.1016/j.taap.2019.114800.



Research highlight Science Faculty

Programmable microfluidic circuits to stimulate living cells with pulses of growth factors applied at different frequencies and concentrations. Live cell imaging using genetically encoded biosensors to measure the activation dynamics of the MAP kinase ERK at the single cell level. Measuring ERK activity dynamics in response to dynamic perturbations and growth factors is combined with mathematical modelling. Such a quantitative and predictive model of MAPK signaling provides a novel understanding on how to target this important pathway in health and disease. Research group of Prof. Olivier Pertz.
 Published in Embopress 2019, doi.org/10.15252/msb.20198947.