Programme PhD / Postdoc course
Advanced Optical Microscopy
2021

Monday, June 7, 2021

Time	Item	Link recording
09.00 – 09.15	*Welcome and brief overview of the course* *LIVE STREAM* Marc van Zandvoort Dept. Molecular Cell Biology, Maastricht University Medical Center	
09.15 – 10.15	*Basics of Microscopy* *LIVE STREAM LECTURE - DISCUSSION* Marc van Zandvoort Dept. Molecular Cell Biology, Maastricht University Medical Center	
10.15 – 10.45	*Break*	
10.45 – 13.00	*Practical course 1: Bright field microscopy, a hands-on course* LIVE STREAM PRACTICAL - DISCUSSION Jos Broers / Dimitris Kapsokalyvas Dept. Molecular Cell Biology, Maastricht University Medical Center	
13.00 – 14.30	*Break*	
14.30 – 15.30	*Fluorescence microscopy* *LIVE STREAM LECTURE - DISCUSSION* Marc van Zandvoort Dept. Molecular Cell Biology, Maastricht University Medical Center	

Tuesday, June 8, 2021

Time	Item	Link recording
09.00 – 10.00	*Confocal Microscopy* *LIVE STREAM LECTURE - DISCUSSION* Marc van Zandvoort Dept. Molecular Cell Biology, Maastricht University Medical Center	
10.00 – 11.00	*Light sheet microscopy (SPIM)* *LIVE STREAM LECTURE - DISCUSSION* Sebastian Kant Uniklinik RWTH Aachen – Institut für Molekulare und Zelluläre Anatomie	
11.00 – 11.15	*Break*	
11.15 – 12.15	*Two-photon laser microscopy for the three-dimensional study of tissues* *LIVE STREAM LECTURE - DISCUSSION* Marc van Zandvoort Dept. Molecular Cell Biology, Maastricht University Medical Center	
12.15 – 13.00	*Break*	
13.00 – 14.00	*Raman Microscopy* LIVE STREAM LECTURE - DISCUSSION Giuditta Perversi Chemistry, Maastricht Science Program	
14.15 – 15.30	*Practical course 3: Fluorescence/Confocal Microscopy Demonstration* ONLINE DEMONSTRATION Dimitris Kapsokalyvas / J Broers Dept. Molecular Cell Biology, Maastricht University Medical Center	

Wednesday, June 9, 2021

Time	Item	Link recording
09.00 – 10.00	*Super-resolution Microscopy* LIVE STREAM LECTURE - DISCUSSION Dimitris Kapsokalyvas Dept. Molecular Cell Biology, Maastricht University Medical Center	
10.00 – 11.00	*High throughput and high content cellular analysis for systems biology* LIVE STREAM LECTURE - DISCUSSION Winnok De Vos Antwerp University	
11.00 – 11.15	Break	
11.15 – 12.15	*STED Microscopy* LIVE STREAM LECTURE – DISCUSSION Dimitris Kapsokalyvas Dept. Molecular Cell Biology, Maastricht University Medical Center	
12.15 – 13.00	*Break*	
13.00 – 14.00	*Practical course 6: Raman confocal microscopy* ONLINE DEMONSTRATION AT DSM GELEEN Giuditta Perversi Chemistry, Maastricht Science Program	
14.00 – 14.30	Break	
14.30 – 16.00	Practical course 5: Two-photon microscopy demonstration ONLINE DEMONSTRATION Dimitris Kapsokalyvas Dept. Molecular Cell Biology, Maastricht University Medical Center	

Thursday, June 10, 2021

Time	Item	Link recording
09.00 – 09.45	*Staining* LIVE STREAM - DISCUSSION Timo Rademakers MERLN, Maastricht University Medical Center	
09.45 – 10.00	*Break*	
10.00 – 11.00	*3D image restoration and imaging pitfalls* *LIVE STREAM - DISCUSSION* Gitta Hamel Scientific Volume Imaging bv	
11.00 – 11.15	*Break*	
11.15 – 13.15	Workshop Image processing Huygens ONLINE WORKSHOP Gitta Hamel Scientific Volume Imaging bv	
13.15 – 14.00	*Break*	
14.00 – 16.00	*Practical course 5: STED Hands-on* ONLINE DEMONSTRATION Dimitris Kapsokalyvas Dept. Molecular Cell Biology, Maastricht University Medical Center	
16.00 – 16.15	*Wrap-up closing the loop*	

Maastricht Microscopy Meeting (M^3) on Advanced Optical Microscopy
Friday, June 11, 2021

Attendance mandatory for course participants

10.00 – 10.10	Welcome by **Marc van Zandvoort** Dept. of Molecular Cell Biology, Maastricht University Medical Center
10.10 – 10.55	**Ludwig Dubois** Dept. of Precision Medicine, Maastricht University Medical Center *Non-invasive imaging from bench to bedside: a role for optical imaging?*
10.55 – 11.40	**Andreas Walter** BioImaging Austria *Correlated Multimodality Imaging Across Scales And Institutes*
11.40 – 12.25	**Birgit Plochberger** Dept. of Medical Engineering, University of Applied Sciences Upper Austria, Linz *Touch and watch protein-lipid or lipid-lipid interaction - The combined strength of force and light*
13.45 – 14.30	**Benjamin Balluff** Maastricht MultiModal Molecular Imaging institute (M4I), Maastricht University Medical Center *The value of Microscopic Information in Mass Spectrometry Imaging*
14.30 – 15.15	**Anna Sartori-Rupp** Institut Pasteur, Paris *Correlative cryo-microscopy: a tool for investigating cellular systems at nanometer resolution*
15.15 – 16.00	**Eva Pereiro** Experiments Divison, Mistral beamline, Barcelona *Locating specific structures, molecules or events in cells by correlative cryo 3D X-ray imaging*
16.00 - 16.45	Closure

Participation is free, but please note that registration is obligatory. You can register by sending an e-mail, including your name and department, to the secretary of Molecular Cell Biology, Maastricht University Medical Center.
Email secr-mcb@maastrichtuniversity.nl

Title : Non-invasive imaging from bench to bedside: a role for optical imaging?
By Dr. Ludwig Dubois

I graduated as Master in the Biomedical Science in 2003 at the Catholic University of Leuven (KUL), Belgium. I obtained my PhD in Medical Sciences from the Department of Radiation Oncology at Maastricht University, The Netherlands, in 2010 with the subject: "Noninvasive imaging of tumor hypoxia, hypoxia response and drug delivery: a bridge towards individualized patient treatment", under the supervision of Prof. Dr. P. Lambin and Prof. Dr. B.G. Wouters. Following my PhD I worked as a postdoctoral fellow and biology staff member at Maastro Lab and since then as team leader of translational imaging and therapy studies in the Department of Radiation Oncology. In 2014 I was appointed Assistant Professor and in 2017 Associate Professor at Maastricht University. I have also completed several postgraduate courses on radiation protection and imaging and am licensed to work with experimental animals (Art. 9 certificate) and with radioactivity (Stralingshygiëne Niv. 5b). In 2013 I obtained the ICH-GCP certificate (renewed in 2017) allowing me to perform clinical research. Currently, I am deputy head of The M-Lab, Department of Precision Medicine at Maastricht University.

I (co-)authored >100 peer-reviewed scientific publications (h-index 26 – Web of Sciences, 31 – Google Scholar), 2 patents (WO2011098610 and WO2012087115) and have contributed to scientific meetings (with more than 110 first/senior author abstracts). I have authored more than 60 ethically approved animal studies. I am principal or co-investigator on research grants from national (>M€ 4.5), European (k€ 500), international (k$ 200) and company (k€ 510) supporting bodies. I have obtained funding from the KWF, the main Dutch funding agency within cancer research, the Worldwide Cancer Research, previously known as AICR as well as from the private sector (Boehringer, Varian).

My main areas of interest are directed towards translational research in radiation biology with a focus on small animal functional imaging of hypoxia and therapies directed to hypoxia and its downstream targets. For my work in the field of imaging and targeting tumor hypoxia, I was awarded the ESTRO-Varian Juliana Denekamp Award at the 14th International Wolfsberg meeting (2015) on Molecular Radiation Biology/Oncology. I have a recent interest in preclinical radiation-induced healthy tissue toxicity, the combination of radiation with targeted immunotherapy and preclinical dose painting based on FDG, hypoxia or drug accumulation using a small animal irradiator. I am a member of ESTRO (European Society for Therapeutic Radiology and Oncology), SMI (Society for Molecular Imaging), NVRB (Dutch Society for Radiation Biology) and EACR (European Association for Cancer Research). In the last 5 years I was a participant in the European Union 7th Framework Project - Metoxia (2010–14), in the H2020 ITN – Radiate and currently I am co-coordinating the H2020 ITN - THERADNET. This, and previous framework projects, have resulted in a thriving network of long-term collaborations with many international partners, leading to many shared peer-reviewed publications. Nationally, I have collaborations with several Dutch universities, while locally, several collaborations to enhance preclinical non-invasive research have been set up.

I have supervised >30 Masters students and am currently co-promotor of 20 PhD students (12 completed) and am also responsible for the daily supervision of 2 technicians. I am involved as coordinator, planning group member, lecturer, tutor or supervisor in several education block within the medicine and biomedical science track. I am also invited lecturer at the University of Hasselt. In 2015 I obtained my University Teaching Qualification and in 2016 my English level C2 certificate. I am mentor in the biomedical science track and in medicine ITM track.

Title : Correlated Multimodality Imaging Across Scales And Institutes
By Dr. Andreas Walter

Dr. Andreas Walter studied physics and biophysics at the University of Heidelberg and in Sankt Petersburg on a Baden-Wuerttemberg Scholarship. He spent his research career developing and applying various imaging techniques for life sciences, including fluorescence, super-resolution, cryo-light, transmission electron and scanning electron microscopy, and correlative soft x-ray tomography. After his tenure as a guest scientist at EMBL in Jan Ellenberg's lab to study chromatin organization with fluorescence microscopy-based methods, he did his PhD at the Max Planck Institute of Biophysics in Frankfurt in Werner Kuehlbrandt's lab on method development in electron microscopy. He finished his studies with distinction (summa con laude).

Dr. Walter received a DFG (Deutsche Forschungsgemeinschaft) Fellowship to continue his research in imaging at the University of California San Francisco and at Lawrence Berkeley National Lab to correlate soft x-ray tomography and cryo-light microscopy. He is a fellow of the German Scholars Organization. Dr. Walter started his new position as the Director of Austrian BioImaging (CMI) in October 2016. Currently, he is also Chair of the COST Action COMULIS ('Correlated Multimodal Imaging in Life Sciences') with 36 participating countries. He has substantial expertise in leadership of diverse networks and in management of research infrastructures. He is coordinating more than 35 facilities and research groups for preclinical and biological imaging to develop and establish novel multimodal imaging pipelines and to offer these imaging workflows as a service to international scientists from academia or industry. Austrian BioImaging explicitly goes beyond Correlated Light and Electron Microscopy (CLEM) or preclinical hybrid imaging – and hence significantly advances the field of correlated imaging with truly holistic approaches including data handling strategies.

Title: Touch and watch protein-lipid or lipid-lipid interaction - The combined strength of force and light
By prof. (FH) Dr. DI Birgit Plochberger

Prof. (FH) Dr. DI Birgit Plochberger is a professor at the University of Applied Sciences Upper Austria in Linz. She is group leader of the biophysics group with focus on single-molecule and super resolution techniques for two and three-dimensional imaging and surface structuring. Birgit studied technical physics as an undergraduate student and obtained her PhD in Biophysics at the Johannes Kepler University Linz/Austria. Her research is focused on the interface between medical biology and nanoscience. Current research emphasizes atherosclerosis research and drug delivery systems. She developed the instrumentation for the nanoscopic delivery of substances to living biological cells, and the simultaneous optical detection of cargo transfer in an innovative and competitive environment in the group of Prof. Schütz & Prof. Hinterdorfer. Besides, she joined different laboratories in Europe to gain deeper insight into membrane biophysics and biophysical methods. After her stay abroad at the Arizona State University in the group of Prof. Lindsay she was granted a university assistant position at the Vienna University of Technology. Since September 2014 she received a professorship for Medical Engineering at the University of Applied Sciences Upper Austria and is president of the Biophysics Austria.

Title: The value of Microscopic Information in Mass Spectrometry Imaging
By Dr. Benjamin Balluff

Benjamin Balluff is Assistant Professor for Imaging Bioinformatics at the Maastricht MultiModal Molecular Imaging Institute, Maastricht University, Netherlands. He did his Ph.D. at the Institute of Pathology of the Helmholtz Zentrum München, Germany, on the application of mass spectrometry imaging (MSI) in cancer research. Later, at the Center of Proteomics and Metabolomics, Leiden University Medical Center, he focused on the computational analysis of MSI datasets for the study of intratumor heterogeneity.

Title: Correlative cryo-microscopy: a tool for investigating cellular systems at nanometer resolution.
By Dr. Anna Sartori-Rupp

I currently work as a research engineer at the Ultrastructural BioImaging (UBI) of Institut Pasteur in Paris, France, where I am in charge of collaborative scientific projects involving high resolution cryo-tomography, cryo-CLEM & image analysis applied to the study of cellular systems including host-pathogens interactions. In particular, my research interests focus on developing new approaches and workflows for 3D (cryo-)CLEM.

After obtaining a PhD in Physics at Imperial College, London, UK, I turned towards the world of Microscopy. During my first PostDoc at Institut Curie, Paris, I focused on fluorescent videomicroscopy used to model DNA migration in viscous polymer matrices. I was then hired as a PostDoc in the renowned group of Prof. Baumeister at the Max Planck Institute for Biochemistry in Munich, where I successfully established a novel approach, the correlation between fluorescent microscopy in cryogenic conditions and cryo-electron tomography (cryo-CLEM) that was based on my original development of the first cryo-stage for cryo-fluorescence microscopy. In 2007 I joined the Imaging platform of Institut Pasteur where I develop novel strategies/workflows for CLEM focused on cryogenic applications in 3D, including cryo-focused ion beam (cryo-FIB) and cryo-lamellae.

Ultrastructural BioImaging (UBI)
Institut Pasteur
28 rue du Dr Roux
75015 Paris, France
Tel: +33-(0)1-45.68.87.10

Title: Locating specific structures, molecules or events in cells by correlative cryo 3D X-ray imaging.
By Dr. Eva Pereiro

After my PhD using X-ray imaging techniques in Material Sciences at the European Synchrotron Radiation Facility (Grenoble, France), I focused on using X-ray imaging techniques applied to biological samples. At ALBA, the Spanish synchrotron, we designed and built a dedicated beamline for cryo soft X-ray tomography of cells and we are now focusing on cryo correlative approaches using X-ray fluorescence or super resolution on the same cell.