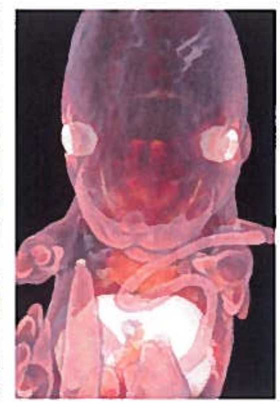
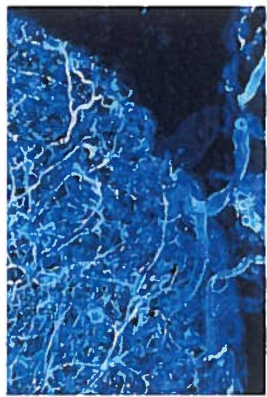
1st LightSheet Fluorescence Microscopy International Conference

& 6th LSFM International workshop

BARCELONA 25-26 SEPT. 2014

Organizers

Supported by

14:45-16:35 Mesoscopic Imaging (chair: Julien Colombelli)

- **14:45-15:15 (P. 35)** Hans-Ulrich DODT [INVITED], Vienna University of Technology and Center forBrain Research. **"Imaging of cleared biological samples with the Ultramicroscope".**
- **15:15-15:35 (P. 36)** Jun Abe, University of Bern **"Tissue-wide visualization of CD8+ T cell activation in reactive lymph nodes by selective plane illumination microscopy".**
- **15:35-15:55 (P. 37)** Philippe Laissue, University of Essex **"Live morphology and development of reef-building corals using light sheet fluorescence microscopy".**
- **15:55-16:15 (P. 38)** Meike Lawin, TU Ilmenau **"Implementation of Bessel Beam Illumination for sTSLIM".**
- **16:15-16:35 (P. 39)** Jürgen Mayer, Centre for Genomic Regulation (CRG) **"OPTiSPIM: Integrating Optical Projection Tomography in Light Sheet Microscopy".**

16:35-17:00 **Coffee break, sponsored by**

17:00-19:10 Super-resolution and single Molecules (chair: Francesca Cella)

- **17:00-17:30 (P. 41)** Alberto DIASPRO [INVITED], Italian Institute of Technology, Genoa **"IML-2PE-SPIM ...what else?"**
- **17:30-17:50 (P. 42)** Jan-Hendrik Spille, University of Bonn **"Augmenting single molecule tracking data by a real-time feedback loop".**
- **17:50-18:10 (P. 43)** Jean-Claude Vial, CNRS **"STED-SPIM microscopy made simple".**
- **18:10-18:30 (P. 44)** Leila Muresan, CAIC, University of Cambridge **"Localization of DHPSF response via steerable filters (with applications to super-resolution light-sheet microscopy)".**
- **18:30-18:50 (P. 45)** Remi Galland, MechanoBiology Institute **"soSPIM: single objective Selective Plane Illumination for 3D high- and super-resolution imaging of biological structures".**
- **18:50-19:10 (P. 46)** Bo-Jui Chang, Buchmann Institute for Molecular Life Sciences, Goethe University **"Coherent structured illumination adds super resolution to Light Sheet-Based Fluorescence Microscopy".**

19:10 **Welcome drink (venue)**

20:00 Meeting point at the conference venue to take bus to go for dinner

20:30 **Dinner in Restaurant Can Travi Nou, sponsored by**

00:00 Bus back to the venue and end of Day 1.

Prof. Ernst Stelzer
Institute of Cell Biology and Neuroscience (BMLS), Frankfurt, Germany.

Prof. Hans-Ulrich Dodt
Section for Bioelectronics, TU Vienna, Austria.

Prof. Alberto Diaspro
Italian Institute of Technology, Genoa, Italy.

Dr. Jan Huisken
Max Plank Institute of Molecular Cell Biology and Genetics, Dresden, Germany

Prof. Scott Fraser
Depts of Biomedical Engineering & of Biological Science, Univ. of Southern California, United States.

Dr. Chris Dunsby
Faculty of Natural Sciences, Dept of Physics, Imperial college, London, United Kingdom.

Imaging of cleared biological samples with the Ultramicroscope

Hans-Ulrich Dodt[1,2], Klaus Becker[1,2], Christian Hahn[1,2], Nina Jährling[1,2], Saiedeh Saghafi[1]

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(2) Center for Brain Research, Medical University of Vienna, 1090 Vienna, Austria.

In the last years we have developed an Ultramicroscope (light-sheet microscope) for visualizing neuronal networks in whole cleared brains. In the Ultramicroscope whole cleared brains are illuminated with a sheet of light and the optical sections are used for 3D reconstructions. This approach allows one to employ also low power, wide field objectives for imaging of large samples. By clearing neuronal tissue with organic solvents after dehydration, we could visulalize GFP-labelled neuronal networks in the whole brain. Casting mouse brains and spinals cords in a special resin allows one to store the preparations for a long time and makes the GFP unbleachable.
Our and other clearing solutions have non standard refractive indices. Due to a heavy refractive index mismatch imaging in these solutions with e.g. air or water immersion objectives gives therefore suboptimal results. We thus developed special objective devices that allow refractive index matched imaging. We show that high resolution imaging through 10 mm clearing medium is possible.
Furthermore we substantially increased the axial resolution of our light-sheet microscope by developing completely new optics for light sheet generation. These optics create an extremely thin light sheet by the use of a Powell- and several aspheric lenses. As light sheet thickness determines the axial resolution it is of pivotal importance for the performance of the light-sheet microscope. The light sheet described here is static and will thus in future allow combination with other microscopic techniques which need constant nonscanned illumination. Examples for the application of the ultramicroscope are given.

References

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