

Photonics West

2019

# TECHNICAL PROGRAM

**Conferences and Courses**

2-7 February 2019

**BIOS Expo**

2-3 January 2019

**Photonics West Exhibition**

5-7 February 2019

The Moscone Center  
San Francisco, USA

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# CONFERENCE 10865

LOCATION: ROOM 206 (SOUTH LEVEL TWO)

Monday–Tuesday 4–5 February 2019 • Proceedings of SPIE Vol. 10865

## Neural Imaging and Sensing 2019

**Conference Chairs:** Qingming Luo, Huazhong Univ. of Science and Technology (China); Jun Ding, Stanford School of Medicine (USA); Ling Fu, Huazhong Univ. of Science and Technology (China)

**Program Committee:** Robert R. Alfano, The City College of New York (USA); David A. Boas, Massachusetts General Hospital (USA); Shih-Chi Chen, The Chinese Univ. of Hong Kong (Hong Kong, China); Yu Chen, Univ. of Maryland, College Park (USA); Javier DeFelipe, Univ. Politécnica de Madrid (Spain); Hongwei Dong, Univ. of California, Los Angeles (USA); Congwu Du, Stony Brook Univ. (USA); Beop-Min Kim, Korea Univ. (Korea, Republic of); Byungkook Lim, Univ. of California, San Diego (USA); Francesco Saverio Pavone, European Lab. for Non-linear Spectroscopy (Italy); Darcy S. Peterka, Columbia Univ. (USA); Kambiz Pourrezaei, Drexel Univ. (USA); Claus-Peter Richter, Northwestern Univ. (USA); Anna W. Roe, Zhejiang Univ. (China); Shy Shoham, Technion-Israel Institute of Technology (Israel); Shaoqun Zeng, Huazhong Univ. of Science and Technology (China); Oxana V. Semyachkina-Glushkovskaya, Saratov State Univ. (Russian Federation); Pengcheng Li, HUST-Suzhou Institute for Brainmatics (China)

### MONDAY 4 FEBRUARY

#### SESSION 1

LOCATION: ROOM 206 (SOUTH LEVEL TWO) ..... MON 8:40 AM TO 10:10 AM

#### Microscopy I

Session Chair: Shy Shoham, NYU Langone Health (USA)

8:40 am: **High-speed high-resolution in vivo imaging of the brain** (*Invited Paper*), Na Ji, Univ. of California, Berkeley (USA) ..... [10865-1]

9:10 am: **Parallel 3D confocal imaging system with compound adaptive objective lens for imaging of retina**, Guoqiang Li, The Ohio State Univ. (USA) and Florida International Univ. (USA); Cuixia Dai, Shanghai Institute of Technology (USA); Andrew Fischer, The Ohio State Univ. (USA); Kevin Park, Univ. of Miami (USA); Wei Li, National Eye Institute (USA) ..... [10865-2]

9:30 am: **Longer wavelength label-free confocal imaging of deep mouse brain in vivo**, Fei Xia, Chunyan Wu, David Sinfeld, Bo Li, Cornell Univ. (USA); Yifan Qin, Harbin Institute of Technology (China) and Cornell Univ. (USA); Chris Xu, Cornell Univ. (USA) ..... [10865-3]

9:50 am: **Processing big data in high-resolution 3D microscopy of brain samples**, Giacomo Mazzamuto, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy); Ludovico Silvestri, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) and Istituto Nazionale di Ottica, Consiglio Nazionale delle Ricerche (Italy); Francesco Orsini, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) and Univ. degli Studi di Firenze (Italy); Irene Costantini, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) and Istituto Nazionale di Ottica, Consiglio Nazionale delle Ricerche (Italy); Paolo Frascioni, Univ. degli Studi di Firenze (Italy); Matteo Roffilli, Bioretics srl (Italy); Francesco Saverio Pavone, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy) and Istituto Nazionale di Ottica, Consiglio Nazionale delle Ricerche (Italy) ..... [10865-4]

Coffee Break ..... Mon 10:10 am to 10:40 am

#### SESSION 2

LOCATION: ROOM 206 (SOUTH LEVEL TWO) ..... MON 10:40 AM TO 12:10 PM

#### Light Sheet and OCT

Session Chair: Francesco Saverio Pavone, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy)

10:40 am: **Fast nearly isotropic imaging of drosophila and mouse brains by ultramicroscopy** (*Invited Paper*), Hans-Ulrich Dodt, Saiedeh Saghafi, Klaus Becker, Technische Univ. Wien (Austria); Christian Hahn, Medizinische Univ. Wien (Austria); Marko Pende, Inna Sabdyusheva-Litschauer, Massih Foroughipour, Technische Univ. Wien (Austria) ..... [10865-6]

11:10 am: **Simultaneous optical imaging and manipulation of the whole-brain neuronal activities in behaving zebrafish larvae**, Zhenfei Jiao, Huazhong Univ. of Science and Technology (China); Chunfeng Shang, Yufan Wang, Institute of Neuroscience (China); Zhe Yang, Huazhong Univ. of Science and Technology (China); Chen Yang, Funing Li, Jinze Xie, Jiulin Du, Institute of Neuroscience (China); Ling Fu, Huazhong Univ. of Science and Technology (China) ..... [10865-7]

11:30 am: **Lattice light sheet microscopy and photo-stimulation in brain slices**, Mathieu Ducros, Univ. de Bordeaux (France) and CNRS (France) and INSERM (France); Angela Getz, Misa Arizono, Valeria Pecoraro, Institut Interdisciplinaire des Neurosciences, Univ. de Bordeaux (France) and CNRS (France); Monica Fernandez Monreal, Univ. de Bordeaux (France) and CNRS (France) and INSERM (France); Valentin Nägerl, Daniel Choquet, Institut Interdisciplinaire des Neurosciences, Univ. de Bordeaux (France) and CNRS (France) ..... [10865-8]

11:50 am: **All-reflective 1.7 microns swept-source optical coherence tomography for imaging of thick brain sections**, Shau Poh Chong, Zhen Yu Ko, Nanguang Chen, National Univ. of Singapore (Singapore) ..... [10865-9]

Lunch Break ..... Mon 12:10 pm to 1:50 pm

#### SESSION 3

LOCATION: ROOM 206 (SOUTH LEVEL TWO) ..... MON 1:50 PM TO 3:20 PM

#### Functional Imaging

Session Chair: Ling Fu, Huazhong Univ. of Science and Technology (China)

1:50 pm: **Bioorthogonal vibrational imaging of metabolic activities in brain** (*Invited Paper*), Lingyan Shi, Wei Min, Columbia Univ. (USA) ..... [10865-10]

2:20 pm: **High-precision tomographic registration of laser speckle contrast images from rodent brains**, Dene Ringuette, Philippe P. Monnier, Peter L. Carlen, Ofer Levi, Univ. of Toronto (Canada) ..... [10865-11]

2:40 pm: **Evaluation of a transparent cranial implant for multi-wavelength intrinsic optical signal imaging**, Nami Davoodzadeh, Univ. of California, Riverside (USA); Mildred S. Cano-Velázquez, Instituto de Investigaciones en Materiales, Univ. Nacional Autónoma de México (Mexico); David L. Halaney, Carrie R. Jonak, Devin K. Binder, Guillermo Aguilar, Univ. of California, Riverside (USA) ..... [10865-12]

3:00 pm: **Retinotopy with frequency domain high-density functional diffuse optical tomography**, Mattheos Doulgarakis-Kontoudis, The Univ. of Birmingham (United Kingdom); Adam T. Eggebrecht, Washington Univ. School of Medicine in St. Louis (USA); Hamid Dehghani, The Univ. of Birmingham (United Kingdom) ..... [10865-13]

Coffee Break ..... Mon 3:20 pm to 3:50 pm

Time: 8:40 AM - 9:10 AM

Author(s): Na Ji, Univ. of California, Berkeley (United States)

[Add To My Schedule](#) **Parallel 3D confocal imaging system with compound adaptive objective lens for imaging of retina**

Paper 10865-2

Time: 9:10 AM - 9:30 AM

Author(s): Guoqiang Li, The Ohio State Univ. (United States), Florida International Univ. (United States); Cuixia Dai, Shanghai Institute of Technology (United States); Andrew Fischer, The Ohio State Univ. (United States); Kevin Park, Univ. of Miami (United States); Wei Li, National Eye Institute (United States)

[Add To My Schedule](#) **In vivo label-free confocal imaging of adult mouse brain up to 1.3-mm depth with NIR-II illumination**

Paper 10865-3

Time: 9:30 AM - 9:50 AM


Author(s): Fei Xia, Chunyan Wu, David Sinefeld, Bo Li, Cornell Univ. (United States); Yifan Qin, Harbin Institute of Technology (China), Cornell Univ. (United States); Chris Xu, Cornell Univ. (United States)

[Add To My Schedule](#) **Processing big data in high-resolution 3D microscopy of brain samples**

Paper 10865-4

Time: 9:50 AM - 10:10 AM

Author(s): Giacomo Mazzamuto, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy); Ludovico Silvestri, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy), Istituto Nazionale di Ottica, Consiglio Nazionale delle Ricerche (Italy); Francesco Orsini, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy), Univ. degli Studi di Firenze (Italy); Irene Costantini, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy), Istituto Nazionale di Ottica, Consiglio Nazionale delle Ricerche (Italy); Paolo Frasconi, Univ. degli Studi di Firenze (Italy); Matteo Roffilli, Bioretics srl (Italy); Francesco Saverio Pavone, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy), Istituto Nazionale di Ottica, Consiglio Nazionale delle Ricerche (Italy)

[Add To My Schedule](#) **Coffee Break 10:10 AM - 10:40 AM****Session 2:  
Light Sheet and OCT**

Monday 4 February 2019

10:40 AM - 12:10 PM

Location: Room 206 (South Level Two)

Session Chair: Francesco Saverio Pavone, LENS - Lab. Europeo di Spettroscopie Non-Lineari (Italy)

**Fast nearly isotropic imaging of drosophila and mouse brains by ultramicroscopy (Invited Paper)**

Paper 10865-6

Time: 10:40 AM - 11:10 AM

Author(s): Hans-Ulrich Dodt, Saiedeh Saghafi, Klaus Becker, Technische Univ. Wien (Austria); Christian Hahn, Medizinische Univ. Wien (Austria); Marko Pende, Inna Sabdyusheva-Litschauer, Massih Foroughipour, Technische Univ. Wien (Austria)

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A method for fast nearly isotropic imaging of drosophila and mouse brains is described. We used ultramicroscopy employing very thin light sheets with a considerably increased Rayleigh range. By using these light sheets in our ultramicroscope fast 3D imaging of whole mouse brains with objectives with a large field of view was possible. The light sheets used were essentially non-Gaussian generated by new optics we developed. Besides mouse brains we also imaged whole cleared drosophilae with cellular resolution of their brains. Also the neuronal system in the whole body could be studied by dual view imaging of the cleared specimens.

**Simultaneous optical imaging and manipulation of the whole-brain neuronal activities in behaving zebrafish larvae**

Paper 10865-7

Time: 11:10 AM - 11:30 AM


Author(s): Zhenfei Jiao, Huazhong Univ. of Science and Technology (China); Chunfeng Shang, Yufan Wang, Institute of Neuroscience (China); Zhe Yang, Huazhong Univ. of Science and Technology (China); Chen Yang, Funing Li, Jinze Xie, Jiulin Du, Institute of Neuroscience (China); Ling Fu, Huazhong Univ. of Science and Technology (China)

[Add To My Schedule](#) **Lattice light sheet microscopy and photo-stimulation in brain slices**

Paper 10865-8

Time: 11:30 AM - 11:50 AM

Author(s): Mathieu Ducros, Univ. de Bordeaux (France), CNRS (France), INSERM (France); Angela Getz, Misa Arizono, Valeria Pecoraro, Institut Interdisciplinaire des Neurosciences, Univ. de Bordeaux (France), CNRS (France); Monica Fernandez Monreal, Univ. de Bordeaux (France), CNRS (France), INSERM (France); Mathieu Letellier, Institut Interdisciplinaire des Neurosciences (France); Valentin Nägerl, Daniel Choquet, Institut Interdisciplinaire des Neurosciences, Univ. de Bordeaux (France), CNRS (France)

[Add To My Schedule](#) **All-reflective 1.7 microns swept-source optical coherence tomography for imaging of thick brain sections**

Paper 10865-9

Time: 11:50 AM - 12:10 PM

Author(s): Shau Poh Chong, Zhen Yu Ko, Nanguang Chen, National Univ. of Singapore (Singapore)

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