



## **Program and Abstract Book**

24. International Workshop on

# **Single Molecule Spectroscopy and Super-resolution Microscopy in the Life Sciences**

Berlin, Germany

September 12-14, 2018



PICOQUANT

# Program

## Wednesday, September 12

12:00 - 13:00 Registration and collection of workshop material

13:00 - 13:15 Rainer Erdmann, Berlin, Germany, Opening Remarks

Session: Super-resolution microscopy 1

Chair: Jiji Chen

13:15 - 13:45 Suliana Manley, *Lausanne, Switzerland (Invited Talk)*  
High throughput localization microscopy for structural determination

13:45 - 14:05 Maximiliaan Huisman, *Worcester, United States (Student Award)*  
Multi-color cryo-fluorescence microscopy

14:05 - 14:25 Christos Karathanasis, *Frankfurt, Germany (Student Award)*  
Counting protein subunits in membrane clusters using single-molecule localization microscopy

14:25 - 14:45 Alexey Chizhik, *Göttingen, Germany*  
MIET: when nanometer axial resolution is a standard

14:45 - 15:05 Marina S Dietz, *Frankfurt, Germany*  
Single-molecule imaging of the MET receptor tyrosine kinase reveals pre-dimerization and membrane dynamics

15:05 - 15:40 COFFEE BREAK

Session: Super-resolution microscopy 2

Chair: Suliana Manley

15:40 - 16:10 Jiji Chen, *Bethesda, United States (Invited Talk)*  
3D Single molecule imaging of transcription factor in live cell

16:10 - 16:40 Johan Paulsson, *Boston, United States, (Invited Talk)*  
Life-changing single molecule events

16:40 - 17:00 Jan Bergstrand, *Stockholm, Sweden (Student Award)*  
Fluorescence Nanoscopy Mapping of Protein Storage and Distribution in Platelets Following Activation by Tumor Cells

17:00 - 17:20 Nina S. Deussner, *Frankfurt, Germany (Student Award)*  
Correlative single-molecule FRET and DNA-PAINT imaging

17:20 - 17:40 Carlas Smith, *Delft, Netherlands*  
High precision wave-front control in point spread function engineering for single emitter localization!

17:40 - 18:00 Alex Oppermann, *Aachen, Germany (Student Award)*  
Superresolution microscopy of soft, thermo-responsive microgels on solid substrates

18:30 WELCOME RECEPTION

## Thursday, September 13

Session: Methods and techniques 1

Chair: Nicolas Plachta

- 09:00 - 09:35 Jérôme Wenger, *Marseille, France (Invited Talk)*  
Nanophotonic structures to enhance single molecule fluorescence detection
- 09:35 - 09:55 Guillermo Pedro Acuna, *Rostock, Germany*  
Towards single molecule fluorescence for diagnostics with smartphone-based microscopy
- 09:55 - 10:15 Marcelle König, *Berlin, Germany*  
Mapping Molecules Quantitatively in Confocal Fluorescence Microscopy
- 10:15 - 10:35 Frederike Erb, *Ulm, Germany (Student Award)*  
Creating custom laser pulse schemes with the PicoQuant SEPIA Driver
- 10:35 - 11:10 COFFEE BREAK and PRODUCT DEMONSTRATION

Session: FCS

Chair: Jérôme Wenger

- 11:10 - 11:40 Jerker Widengren, *Stockholm, Sweden (Invited Talk)*  
Fluorescence fluctuation and super-resolution techniques - fundamental biomolecular studies and towards clinical diagnostics
- 11:40 - 12:00 Jan Sykora, *Prague, Czech Republic*  
Conformational dynamics of haloalkane dehalogenase enzyme monitored by PET-FCS
- 12:00 - 12:20 Rhys Dowler, *Berlin, Germany*  
Enhancing FCS through Rapid Scanning and Pattern Matching
- 12:20 - 12:40 Johan Tornmalm, *Stockholm, Sweden (Student Award)*  
Transient State Monitoring of Cellular Autofluorescence
- 12:40 - 12:50 GROUP PICTURE
- 12:50 - 14:00 LUNCH BREAK

Session: FLIM

Chair: Jerker Widengren

- 14:00 - 14:30 Nicolas Plachta, *Singapore, Singapore (Invited Talk)*  
Imaging the molecular and cell dynamics that pattern the early mouse embryo
- 14:30 - 14:50 Fabian Port, *Ulm, Germany (Student Award)*  
Metal Induced Energy Transfer reveals nanostructure of an integrin based focal adhesion complex

14:50 - 15:10	Max J. Schnepf, <i>Dresden, Germany (Student Award)</i> Coherent radiative processes in coupled colloidal nanoantennas as building blocks for large-scale self-assembly
15:10 - 15:30	Soheil Mojiri, <i>Göttingen, Germany (Student Award)</i> Three-dimensional localization of single molecules using sm-MIET and defocused imaging
15:30 - 15:50	Adai Colom, <i>Geneva, Switzerland</i> FLIM and Fast-FLIM: New method to measure lipid membrane properties in vivo
15:50 - 16:00	COFFEE BREAK
16:00 - 18:30	POSTER SESSION and PRODUCT DEMONSTRATION 16:00 – 17:15 odd poster numbers 17:15 – 18:30 even poster numbers
20:00 - 23:00	DINNER

## Friday, September 14

Session: Methods and techniques 2

Chair: Hannes Neuweiler

9:00 - 09:35	Maria F. Garcia-Parajo, <i>Castelldefels (Barcelona), Spain (Invited Talk)</i> Spatiotemporal organization of biological membranes using nanophotonic tools
09:35 - 09:55	Giorgio Tortarolo, <i>Genoa, Italy (Student Award)</i> Point-scanning microscopy with single-photon detector array
09:55 - 10:15	Jochem H. Smit, <i>Groningen, Netherlands (Student Award)</i> On the impact of competing intra- and intermolecular triplet-state quenching on photobleaching and photoswitching kinetics of organic fluorophores
10:15 - 10:35	Johan Hummert, <i>Heidelberg, Germany</i> Fluorescent switches for improved imaging
10:35 - 11:10	COFFEE BREAK

- 11:10 - 11:40 Hannes Neuweiler, *Würzburg, Germany (Invited Talk)*  
Probing Chaperone Dynamics Using Photoinduced Electron Transfer  
Fluorescence Quenching
- 11:40 - 12:00 Erik D. Holmstrom, *Zurich, Switzerland*  
Conformational Dimensions and Dynamics of Unstructured Single-stranded  
Nucleic Acids
- 12:00 - 12:20 André Dathe, *Jena, Germany (Student Award)*  
Single-molecule FRET analysis of enzyme conformations and diffusion of  
nanostructures in a confocal ABELtrap
- 12:20 - 12:40 Julian Folz, *Duesseldorf, Germany (Student Award)*  
Accuracy in FRET measurements concerning technical and methodical  
aspects
- 12:40 - 13:00 Salina Quack, *Ulm, Germany (Student Award)*  
Insights into the structure of chromatin remodeler Chd1 bound to a  
nucleosome from single-molecule experiments
- 13:00 - 14:20 LUNCH BREAK

- 14:20 - 14:50 Christian Eggeling, *Jena, Germany (Invited Talk)*  
Challenges and potentials – experiences from super-resolution microscopy  
in biomedical research
- 14:50 - 15:10 Dr. Elke Heibisch, *Lund, Sweden*  
STED Nanoscopy of Interfaces and Interactions between Nanostructure  
Arrays and Living Cells
- 15:10 - 15:30 Iztok Urbančič, *Oxford, United Kingdom*  
Advanced STED micro(spectro)scopy of the membrane organisation of  
T-cells
- 15:30 - 15:50 Jong-Chan Lee, *Daegu, Korea, Republic Of*  
Background-free super-resolution STED microscopy using light polarization  
switching
- 15:50 - 16:10 Hagen Hofmann, *Rehovot, Israel*  
Noise suppression in protein networks by structural disorder
- 16:10 - 16:20 STUDENT AWARD PRESENTATION
- 16:20 - 16:30 CONCLUDING REMARKS by Jerker Widengren
- 16:30 END OF WORKSHOP

<b>Presenter</b>	<b>Title</b>
Acuna, Guillermo Pedro	Towards single molecule fluorescence for diagnostics with smartphone-based microscopy
Bergstrand, Jan	Fluorescence Nanoscopy Mapping of Protein Storage and Distribution in Platelets Following Activation by Tumor Cells
Chen, Jiji	3D Single molecule imaging of transcription factor in live cell
Chizhik, Alexey	MIET: when nanometer axial resolution is a standard
Colom, Adai	FLIM and Fast-FLIM: New method to measure lipid membrane properties in vivo
Dathe, André	Single-molecule FRET analysis of enzyme conformations and diffusion of nanostructures in a confocal ABELtrap
Deussner, Nina S.	Correlative single-molecule FRET and DNA-PAINT imaging
Dietz, Marina S	Single-molecule imaging of the MET receptor tyrosine kinase reveals pre-dimerization and membrane dynamics
Dowler, Rhys	Enhancing FCS through Rapid Scanning and Pattern Matching
Eggeling, Christian	Challenges and potentials – experiences from super-resolution microscopy in biomedical research
Erb, Frederike	Creating custom laser pulse schemes with the PicoQuant SEPIA Driver
Folz, Julian	Accuracy in FRET measurements concerning technical and methodical aspects
Garcia-Parajo, Maria F.	Spatiotemporal organization of biological membranes using nanophotonic tools
Hebisch, Dr. Elke	STED Nanoscopy of Interfaces and Interactions between Nanostructure Arrays and Living Cells
Hofmann, Hagen	Noise suppression in protein networks by structural disorder
Holmstrom, Erik D.	Conformational Dimensions and Dynamics of Unstructured Single-stranded Nucleic Acids
Huisman, Maximiliaan	Multi-color cryo-fluorescence microscopy
Hummert, Johan	Fluorescent switches for improved imaging
Karathanasis, Christos	Counting protein subunits in membrane clusters using single-molecule localization microscopy
König, Marcelle	Mapping Molecules Quantitatively in Confocal Fluorescence Microscopy
Lee, Jong-Chan	Background-free super-resolution STED microscopy using light polarization switching

<b>Presenter</b>	<b>Title</b>
Manley, Suliana	High throughput localization microscopy for structural determination
Mojiri, Soheil	Three-dimensional localization of single molecules using sm-MIET and defocused imaging
Neuweiler, Hannes	Probing Chaperone Dynamics Using Photoinduced Electron Transfer Fluorescence Quenching
Oppermann, Alex	Superresolution microscopy of soft, thermo-responsive microgels on solid substrates
Plachta, Nicolas	Imaging the molecular and cell dynamics that pattern the early mouse embryo
Port, Fabian	Metal Induced Energy Transfer reveals nanostructure of an integrin based focal adhesion complex
Quack, Salina	Insights into the structure of chromatin remodeler Chd1 bound to a nucleosome from single-molecule experiments
Schnepf, Max J.	Coherent radiative processes in coupled colloidal nanoantennas as building blocks for large-scale self-assembly
Smit, Jochem H.	On the impact of competing intra- and intermolecular triplet-state quenching on photobleaching and photoswitching kinetics of organic fluorophores
Smith, Carlas	High precision wave-front control in point spread function engineering for single emitter localization!
Sykora, Jan	Conformational dynamics of haloalkane dehalogenase enzyme monitored by PET-FCS
Tornmalm, Johan	Transient State Monitoring of Cellular Autofluorescence
Tortarolo, Giorgio	Point-scanning microscopy with single-photon detector array
Urbančič, Iztok	Advanced STED micro(spectro)scopy of the membrane organisation of T-cells
Wenger, Jérôme	Nanophotonic structures to enhance single molecule fluorescence detection
Widengren, Jerker	Fluorescence fluctuation and super-resolution techniques - fundamental biomolecular studies and towards clinical diagnostics

**Poster presentations**  
(In alphabetical order)

<b>Presenter</b>	<b>Presentation time</b>	<b>Poster #</b>	<b>Title</b>
Agam, Ganesh	16:00 - 17:15	P1	Folding pathway of a two-domain protein studied with single molecule three-color FRET.
Berlage, Caroline	17:15 - 18:30	P2	Molecular Counting by Photon Statistics in Confocal Fluorescence Imaging
Chizhik, Alexey I.	16:00 - 17:15	P3	Carbon dots: a new label for super-resolution imaging
Chizhik, Alexey I.	17:15 - 18:30	P4	Plasmonic Nanocavity: a new Tool for Absolute Fluorescence Quantum Yield Measurement in a Complex Nanoscopic System
Cnossen, Jelmer	16:00 - 17:15	P5	An Automated Bayesian Pipeline for Rapid Analysis of Single-Molecule Binding Data
Cuéllar-Cruz, Mayra	17:15 - 18:30	P6	Biomineralization of Pb (II) and Hg (II) sulfides obtain in four species of Candida and their characterization by different chemical techniques
Cury, Luiz A.	16:00 - 17:15	P7	Fluorescent and phosphorescent multiple conformational steady-states from small domains of organic derivative phenazine type molecules
Deng, Chunchu	17:15 - 18:30	P8	Characterization of defective axonal transport of RNA-protein complexes in spinal muscular atrophy
Fuchs, Adrian	16:00 - 17:15	P9	Multi-modal imaging based on single-molecule fluorescence and coherent Raman microscopy
Ghosh, Arindam	17:15 - 18:30	P10	Single-molecule Graphene-Induced Energy Transfer: Optically Measuring Distances at the Ångström Scale
Pisfil, Mariano Gonzalez	16:00 - 17:15	P11	Multi-Species Diffusion Studies in Membranes Utilizing Scanning FCS and Super-Resolution Microscopy
Goßler, Fabian R.	17:15 - 18:30	P12	Large scale studies of strong plasmon-exciton interactions in nanocube-to-metallic film coupled cavities
Gratton, Enrico	16:00 - 17:15	P13	Comprehensive correlation analysis (CCA) for super-resolution dynamic fingerprinting of cellular compartments using the Zeiss Airyscan detector



<b>Presenter</b>	<b>Presentation time</b>	<b>Poster #</b>	<b>Title</b>
Hummert, Johan	17:15 - 18:30	P14	Counting molecules in cellular samples with high fluorescent background
Isbaner, Sebastian	16:00 - 17:15	P15	Superresolution Upgrade for Confocal Spinning Disk Systems
Jang, Hongje	17:15 - 18:30	P16	Rapid three-dimensional imaging of chemotaxis in Dictyostelium discoideum
Kacenauskaite, Laura	16:00 - 17:15	P17	Bright, long fluorescence lifetime fluorophores for bioimaging and single molecule detection
Katti, Aditya	17:15 - 18:30	P18	Measuring rotational diffusion of fluorophores in polyacrylamide (PAA) gels using Fluorescence Correlation Spectroscopy (FCS) with polarization detection
Lau, Lukas	16:00 - 17:15	P19	Combining imaging FCCS with alternating laser excitation
Manela, Rakia	17:15 - 18:30	P20	Dynamics of the unfolded state of a large protein
Martinez-Gamez, Ma Alejandrina	16:00 - 17:15	P21	Nanocrystals of CdPbS synthesized in Candida species characterized by fluorescence measurements
Mayer, Benjamin	17:15 - 18:30	P22	SMTracker - a novel program for easy single molecule tracking data analyses - and its application
Melching, Willem	16:00 - 17:15	P23	Using B-Splines to create higher order PSF models
Moradi, Mehri	17:15 - 18:30	P24	Characterization of defective local protein synthesis of presynaptic active zone components in Spinal Muscular Atrophy (SMA)
Nettels, Daniel	16:00 - 17:15	P25	A proline switch explains kinetic heterogeneity in a coupled folding and binding reaction
Öztekin, Filiz	17:15 - 18:30	P26	Time Resolved Fluorescence Technique for Swelling Process in pH Sensitive Hydrogels
Oleksiievets, Nazar	16:00 - 17:15	P27	Probing Lipid Diffusion in Curved Membranes with Fluorescence Microscopy

<b>Presenter</b>	<b>Presentation time</b>	<b>Poster #</b>	<b>Title</b>
Prokazov, Yury	17:15 - 18:30	P28	Metal induced energy transfer with wide-field microscopy
Sandberg, Elin	16:00 - 17:15	P29	Two-photon scanning transient state (TRAST) imaging/spectroscopy of NADH
Sen, Saptaswa	17:15 - 18:30	P30	Fluorescent probes for sensing membrane fluidity
Sharma, Akshita	16:00 - 17:15	P31	Leaflet-dependent diffusion in lipid bilayers using Metal-Induced Energy Transfer Fluorescence Lifetime Correlation Spectroscopy (MIET-FLCS)
Sýkora, Jan	17:15 - 18:30	P32	Mobility of G protein-coupled receptors in cells – effect of various factors
Thiele, Jan Christoph	16:00 - 17:15	P33	Polymer brushes in motion – measuring flow with nanometre resolution
Vala, Milan	17:15 - 18:30	P34	Correlation of interferometric (iSCAT) and atomic force (AFM) microscopies for quantitative imaging of dynamical biophysical systems

Organized by

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