



27. International Workshop on

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

Berlin, Germany

September 7 - 9, 2022



www.single-molecules.org

PICOQUANT

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Program

as of September 9, 2022

Wednesday, September 7

09:30 - 10:30 REGISTRATION

10:30 - 10:45 **Rainer Erdmann**, Berlin, Germany
Opening Remarks

Session: Super-resolution microscopy

chair: Rainer Erdmann

10:45 - 11:15 **Mike Heilemann**, *Frankfurt, Germany (Invited Talk)*
Integrative Super-Resolution Fluorescence Microscopy For Structural Cell Biology

11:15 - 11:45 **Dong Li**, *Beijing, China (Invited Talk, virtual)*
Multi-modality structured illumination super-resolution microscopy development and applications

11:45 - 12:05 **Fernando D. Stefani**, *Buenos Aires, Argentina*
An alternative to MINFLUX that enables nanometre resolution in a confocal microscope

12:05 - 12:25 **Shannan Foylan**, *Glasgow, United Kingdom (Student Award)*
MesoTIRF: a novel Total Internal Reflection Fluorescence illuminator for axial super-resolution imaging on the mesoscale

12:25 - 12:45 **Michael Isselstein**, *Planegg-Martinsried, Germany (Student Award)*
Linker Molecules Convert Commercial Fluorophores into Tailored Functional probes during Bio-Labeling

Poster flash talk session 1

chair: Marcelle König

12:45 – 13:05 Presenters: **Jan-Erik Bredfeldt**, **Ignacio Izeddin**, **Mehrta Shirzadian Yazd**, **Liangxuan Wang**

13:05 - 14:15 LUNCH BREAK

Session: Young stars and news from the community

chair: Rainer Erdmann

14:15 - 14:20 **Rainer Erdmann**, Berlin, Germany
Introduction

14:20 - 14:50 **Viktorija Glembockyte**, *Munich, Germany (Invited Talk)*
DNA origami tools for single molecule sensing

- 14:50 - 15:10 **Oliver Stach**, *Zürich, Switzerland (Student Award)*
Dissecting the complex dynamics of protein-RNA interactions with single-molecule fluorescence
- 15:10 - 15:30 **Aleksandra Bednarz**, *Aarhus, Denmark (Student Award)*
Ion-mediated structural integrity and reconfigurability of DNA origami molecular breadboards
- Poster flash talk session 2 chair: Marcelle König
- 15:30 - 15:50 Presenters: **Jiří Junek, Sarojini Mahajan, Elizabete Ruppeka Rupeika, Chiara Schirripa Spagnolo**
- 15:50 - 16:20 **Evangelos Sisamakakis and Felix Koberling**, *Berlin, Germany*
Luminosa - a new confocal microscope covering the needs of the expanding community of single molecule fluorescence
- 16:20 - 16:25 VOTING STUDENT AWARD
- 16:25 - 16:45 COFFEE BREAK
- 16:45 - 19:00 GET TOGETHER with POSTERS (SESSION 1, ODD NUMBERS)
and LUMINOSA

Thursday, September 8

- Session: FLIM chair: Mike Heilemann
- 09:00 - 09:35 **Sophie Brasselet**, *Marseille, France (Invited Talk)*
Imaging of proteins' organization in 3D using Single Molecule Orientation and Localization Microscopy (SMOLM)
- 09:35 - 09:55 **Marta Pilz**, *Warsaw, Poland*
Method to measure drug uptake time into living cells on the ultrashort timescale
- 09:55 - 10:15 **German Chiarelli**, *Fribourg, Switzerland (Student Award)*
Super-resolved FRET imaging by confocal fluorescence-lifetime single-molecule localization microscopy
- 10:15 - 10:35 **Johannes Wieland**, *Ulm, Germany (Student Award)*
Fluorescence lifetime imaging and electron microscopy: a correlative approach

10:35 - 10:45 GROUP PICTURE

10:45 - 11:20 COFFEE BREAK and PRODUCT EXHIBITION

Session: Instrumentation

chair: Sophie Brasselet

11:20 - 11:50 **Gail McConnell**, *Glasgow, United Kingdom (Invited Talk)*
Prospects for single molecule mesoscopy with the Mesolens

11:50 - 12:10 **Jörg Enderlein**, *Göttingen, Germany*
Nanocavity-based electric charge measurements of biomolecules in solution

12:10 - 12:30 **Gabriel Moya**, *Munich, Germany (Student Award)*
Compact and versatile 3D-printed microscopy platform (CAV-3D-MP)

12:30 - 12:50 **Barbora Špačková**, *Prague, Czech Republic*
Potential of Nanofluidic Scattering Microscopy in quantitative imaging of single biomolecules

Poster flash talk session 3

chair: Felix Koberling

12:50 - 13:10 Presenters: **Aleksandra K. Adamczyk, Felix Erichson, Maria Loidolt-Krüger, Mirjam Kümmerlin, Samuel Naudi-Fabra**

13:10 - 14:40 LUNCH BREAK and DEMOS LUMINOSA

Session: Biological Applications 1

chair: Gail McConnell

14:40 - 15:10 **Ulrike Endesfelder**, *Bonn, Germany (Invited Talk)*
Visualizing cellular life: From single cell imaging to in vivo single-molecule biochemistry and (micro-)biology

15:10 - 15:30 **Jessica Angulo-Capel**, *Castelldefels, Spain (Student Award)*
Spatiotemporal dynamics of secretory proteins in the Golgi apparatus

15:30 - 15:50 **Hendrik Sietlaff**, *Singapore, Singapore*
Quantifying and Mapping Intranuclear Dynamics of Human SWI/SNF Chromatin Remodelers in Single Living Cells

15:50 - 16:10 **Bosong Ji**, *München, Germany (Student Award)*
SmFRET and real-time dynamic behaviour of Endonucleases IV under DNA tension

Poster flash talk session 4

chair: Felix Koberling

- 16:10 - 16:30 Presenters: **Bryan Bogin, Agnes Koerfer, Tobias Starling, Matthew Steinsaltz**
- 16:30 - 16:35 VOTING STUDENT AWARD
- 16:35 - 16:50 COFFEE BREAK
- 16:50 - 18:45 POSTER SESSION 2 (EVEN NUMBERS) and PRODUCT EXHIBITION
- 19:30 - 22:30 DINNER

Friday, September 9

Session: Correlation Spectroscopy

chair: David Walt

- 9:00 - 09:35 **Stefan Jakobs, Göttingen, Germany (Invited Talk)**
Focusing on Mitochondria
- 09:35 - 09:55 **Zunhao Wang, Braunschweig, Germany (Student Award)**
Surface-controlled adsorption of plasmonic DNA origami nanostructures for single-molecule detection using polar surface array substrates
- 09:55 - 10:15 **Nicola J. Fairbairn, Glasgow, United Kingdom (Student Award)**
Measuring exciton-exciton annihilation in polyfluorene using time-resolved photon antibunching
- 10:15 - 10:35 **Hendrik Utzat, Mountain View, United States**
Interferometric Photon-Correlation Tools for Spectral Diffusion Measurements of Emerging Single-Photon Emitters
- 10:35 - 11:10 COFFEE BREAK and PRODUCT EXHIBITION

Session: Biological Applications 2

chair: Stefan Jakobs

- 11:10 - 11:40 **David R. Walt, Boston, United States (Invited Talk)**
Precision Medicine by Counting Single Molecules
- 11:40 - 12:00 **Cindy Close, Munich, Germany (Student Award)**
Docking-Site-Mediated Photostabilization for Super-Resolution Imaging
- 12:00 - 12:20 **Donald Cameron, Stockholm, Sweden**
Regulation of Topoisomerase 2 α activity via condensate formation and oncogenic activation by MYC

- 12:20 - 12:40 **Jörg Fitter**, *Aachen, Germany*
 Brightness-gated two-color coincidence detection: a single-molecule tool for characterizing biological processes and high affinity bi-molecular binding
- 12:40 - 13:00 **Kamila Nurmakova**, *New Haven, United States (Student Award)*
 Using Fluorescence Correlation Spectroscopy To Characterize Interactions Between Apolipoprotein E and Amyloid-beta Oligomers
- 13:00 - 13:05 VOTING STUDENT AWARD
- 13:05 - 14:35 LUNCH BREAK and DEMOS LUMINOSA
- Session: FRET chair: Viktorija Glembockyte
- 14:35 - 15:05 **Enrico Gratton**, *Irvine, United States (Invited Talk, virtual)*
 Single cell physiological characterization in living tissue. Determination of cell fate
- 15:05 - 15:25 **Michael Börsch**, *Jena, Germany*
 ATP-dependent subunit rotation of single FoF1-ATP synthase trapped in solution
- 15:25 - 15:45 **Michael Schlierf**, *Dresden, Germany*
 An open-source framework for automated large throughput single-molecule FRET spectroscopy
- 15:45 - 16:05 **Paul David Harris**, *Jerusalem, Israel*
 Multi-parameter photon by photon hidden Markov modeling for confocal FRET and PIFE
- 16:05 - 16:15 STUDENT AWARD CEREMONY
- 16:15 Concluding Remarks by Don Lamb
- END OF WORKSHOP

Overview:

Oral, Flash Talk and Poster Presentations

Oral presentations

(in alphabetical order, as of August 29)

Presenter	Title
Angulo-Capel, Jessica	Spatiotemporal dynamics of secretory proteins in the Golgi apparatus
Bednarz, Aleksandra	Ion-mediated structural integrity and reconfigurability of DNA origami molecular breadboards
Börsch, Michael	ATP-dependent subunit rotation of single F_0F_1 -ATP synthase trapped in solution
Brasselet, Sophie	Imaging of proteins' organization in 3D using Single Molecule Orientation and Localization Microscopy (SMOLM)
Cameron, Donald	Regulation of Topoisomerase 2 α activity via condensate formation and oncogenic activation by MYC
Chiarelli, German	Super-resolved FRET imaging by confocal fluorescence-lifetime single-molecule localization microscopy
Close, Cindy	Docking-Site-Mediated Photostabilization for Super-Resolution Imaging
Enderlein, Jörg	Nanocavity-based electric charge measurements of biomolecules in solution
Endesfelder, Ulrike	Visualizing cellular life: From single cell imaging to in vivo single-molecule biochemistry and (micro-)biology
Fairbairn, Nicola J.	Measuring exciton-exciton annihilation in polyfluorene using time-resolved photon antibunching
Fitter, Jörg	Brightness-gated two-color coincidence detection: a single-molecule tool for characterizing biological processes and high affinity bi-molecular binding
Foylan, Shannan	MesoTIRF: a novel Total Internal Reflection Fluorescence illuminator for axial super-resolution imaging on the mesoscale
Glembockyte, Viktorija	DNA origami tools for single molecule sensing
Gratton, Enrico	Single cell physiological characterization in living tissue. Determination of cell fate
Harris, Paul David	Multi-parameter photon by photon hidden Markov modeling for confocal FRET and PIFE
Heilemann, Mike	Integrative Super-Resolution Fluorescence Microscopy For Structural Cell Biology

Presenter	Title
Isselstein, Michael	Linker Molecules Convert Commercial Fluorophores into Tailored Functional probes during Bio-Labeling
Jakobs, Stefan	Focusing on Mitochondria
Ji, Bosong	SmFRET and real-time dynamic behaviour of Endonucleases IV under DNA tension
Li, Dong	Multi-modality structured illumination super-resolution microscopy development and applications
McConnell, Gail	Prospects for single molecule mesoscopy with the Mesolens
Moya, Gabriel	Compact and versatile 3D-printed microscopy platform (CAV-3D-MP)
Nurmakova, Kamila	Using Fluorescence Correlation Spectroscopy To Characterize Interactions Between Apolipoprotein E and Amyloid-beta Oligomers
Pilz, Marta	Method to measure drug uptake time into living cells on the ultrashort timescale
Schlierf, Michael	An open-source framework for automated large throughput single-molecule FRET spectroscopy
Sielaff, Hendrik	Quantifying and Mapping Intranuclear Dynamics of Human SWI/SNF Chromatin Remodelers in Single Living Cells
Sisamakís, Evangelos	Luminosa - a new confocal microscope covering the needs of the expanding community of single molecule fluorescence
Špačková, Barbora	Potential of Nanofluidic Scattering Microscopy in quantitative imaging of single biomolecules
Stach, Oliver	Dissecting the complex dynamics of protein-RNA interactions with single-molecule fluorescence
Stefani, Fernando D.	An alternative to MINFLUX that enables nanometre resolution in a confocal microscope
Utzat, Hendrik	Interferometric Photon-Correlation Tools for Spectral Diffusion Measurements of Emerging Single-Photon Emitters
Walt, David R.	Precision Medicine by Counting Single Molecules

Presenter	Title
Wang, Zunhao	Surface-controlled adsorption of plasmonic DNA origami nanostructures for single-molecule detection using polar surface array substrates
Wieland, Johannes	Fluorescence lifetime imaging and electron microscopy: a correlative approach

Poster flash talks

(in alphabetical order, as of August 29)

Presenter	Session	No.	Title
Adamczyk, Aleksandra K.	THU, session 3	P28F	Orientation control of single molecules in DNA origami
Bogin, Bryan A.	THU, session 4	P4F	Studying the sizes and kinetics of oligomer formation on the surface of micelles using fluorescence correlation spectroscopy
Bredfeldt, Jan-Erik	WED, session 1	P5F	Optical sectioning for STED nanoscopy with two-photon photoactivation of silicon rhodamines in the visible range
Erichson, Felix	THU, session 3	P10F	FRET-assisted RNA modeling
Izeddin, Ignacio	WED, session 1	P15F	Event-based sensor for fast and dense single-molecule localization microscopy
Junek, Jiří	WED, session 2	P17F	Random Temporal Signals (RATS) Method for Fluorescence Lifetime Imaging
Koerfer, Agnes	THU, session 4	P18F	A new Analysis Approach to study non-Brownian diffusion in Biomembranes with temporal Image Correlation Spectroscopy
Kümmerlin, Mirjam	THU, session 3	P20F	Bleaching-resistant single-molecule fluorescence and FRET monitoring based on fluorophore exchange via transient DNA binding
Loidolt-Krüger, Maria	THU, session 3	P22F	Fast analysis with minimal user interaction in Fluorescence Lifetime Imaging
Mahajan, Sarojini	WED, session 2	P23F	Single-molecule localization microscopy on plasmonic nanoparticles
Naudi-Fabra, Samuel	THU, session 3	P24F	Quantitative description of intrinsically disordered proteins using single-molecule FRET, NMR and SAXS
Rupeika, Elizabete Ruppeka	WED, session 2	P25F	Fluorocode: Optical mapping for metagenomic profiling
Spagnolo, Chiara Schirripa	WED, session 2	P29F	Two-colour single-particle tracking from its experimental to computational aspects to unveil biomolecules interactions

Presenter	Session	No.	Title
Yazd, Mehrta Shirzadian	WED, session 1	P31F	Designing efficient MINFLUX schemes
Starling, Tobias	THU, session 4	P32F	Live-Cell Fluorescence Lifetime Imaging Microscopy Multiplexing Using Genetically Encodable Fluorescent Proteins to Characterize the HIV-1 Virological Synapse and Cell-Cell fusion in live cells.
Steinsaltz, Matthew	THU, session 4	P34F	Spectroscopic Observations of p53 DNA-Binding Domain Aggregation
Wang, Liangxuan	WED, session 1	P35F	Monitoring and controlling tautomerization of single hypericin molecules in a tunable optical $\lambda/2$ microcavity

Poster presentations

(in alphabetical order, as of September 5)

Presenter	Session	No.	Title
Adamczyk, Aleksandra K.	THU	P28F	Orientation control of single molecules in DNA origami
Arfman, Kasper	THU	P2	Microfluidic Force Spectroscopy
Aznauryan, Mikayel CANCELLED	WED	P3	RNA binding by human translation initiation factor 4B
Bogin, Bryan A.	THU	P4F	Studying the sizes and kinetics of oligomer formation on the surface of micelles using fluorescence correlation spectroscopy
Bredfeldt, Jan-Erik	WED	P5F	Optical sectioning for STED nanoscopy with two-photon photoactivation of silicon rhodamines in the visible range
Buschmann, Volker	THU	P6	Integration of a Superconducting Nanowire Detector into a Confocal Microscope for TRPL-Mapping: Sensitivity and Time Resolution
Cabriel, Clement	WED	P7	Single-molecule super-resolution imaging with microfabricated 3D substrates for 3D cell culture
Dasgupta, Anindita	THU	P8	Effect of spectral shift of organic dyes in STED and STED-FCS microscopy
Erichson, Felix	THU	P10F	FRET-assisted RNA modeling
Gensch, Thomas CANCELLED	WED	P9	Revealing the oligomerization of Channelrhodopsin-2 in the cell membrane with single-molecule localization microscopy.
Gomes, Gregory-Neal	WED	P11	Structural Characterization of Pathological and Protective Isoforms of ApoE in the Presence of Lipids
Hajj, Bassam	THU	P12	Selective volumetric excitation and imaging for single molecule localization microscopy
Han, Zhongying	WED	P13	Conformational Changes in the Glutamine Binding Protein are Driven by Protein-Ligand Interactions

Presenter	Session	No.	Title
Harrison, Carl	THU	P14	Looking at core planar polarity formations using SMLM super-resolution microscopy
Hummert, Johan	THU	P38	Next generation SPAD image sensors and lasers for widefield time domain FLIM
Izeddin, Ignacio	WED	P15F	Event-based sensor for fast and dense single-molecule localization microscopy
Jana, Sankar	THU	P16	Interaction between linear pNIPAM and Nile Red studied with FCS and TCSPC
Junek, Jiří	WED	P17F	Random Temporal Signals (RATS) Method for Fluorescence Lifetime Imaging
Kanellopoulos, Kostas	WED	P19	Prospect of Single-Molecule Absorption Spectroscopy with Nanomechanical Photothermal Sensing
Koerfer, Agnes	THU	P18F	A new Analysis Approach to study non-Brownian diffusion in Biomembranes with temporal Image Correlation Spectroscopy
Kümmerlin, Mirjam	THU	P20F	Bleaching-resistant single-molecule fluorescence and FRET monitoring based on fluorophore exchange via transient DNA binding
Loidolt-Krüger, Maria	THU	P22F	Fast analysis with minimal user interaction in Fluorescence Lifetime Imaging
Loidolt-Krüger, Maria	WED	P21	An easy and reliable way to perform single molecule FRET measurements
Mahajan, Sarojini	WED	P23F	Single-molecule localization microscopy on plasmonic nanoparticles
Naudi-Fabra, Samuel	THU	P24F	Quantitative description of intrinsically disordered proteins using single-molecule FRET, NMR and SAXS
Radmacher, Niels	THU	P26	Fluorescence Lifetime Image Scanning Microscopy

Presenter	Session	No.	Title
Reinhard, Sebastian	WED	P27	<i>ReCSA</i> : Recursive compressed sensing artificial intelligence for confocal lifetime localization microscopy
Rupeika, Elizabete Ruppeka	WED	P25F	Fluorocode: Optical mapping for metagenomic profiling
Spagnolo, Chiara Schirripa	WED	P29F	Two-colour single-particle tracking from its experimental to computational aspects to unveil biomolecules interactions
Schumann, Vanessa	THU	P30	From <i>in vitro</i> transcription to biophotonic assays: a complete RNA production line including RNA labeling
Yazd, Mehrta Shirzadian	WED	P31F	Designing efficient MINFLUX schemes
Starling, Tobias	THU	P32F	Live-Cell Fluorescence Lifetime Imaging Microscopy Multiplexing Using Genetically Encodable Fluorescent Proteins to Characterize the HIV-1 Virological Synapse and Cell-Cell fusion in live cells.
Steinsaltz, Matthew	THU	P34F	Spectroscopic Observations of p53 DNA-Binding Domain Aggregation
Tinning, Peter W.	WED	P33	Optimizing photoswitching performance of organic dyes for SMLM through a single MEMS mirror
Wang, Liangxuan	WED	P35F	Monitoring and controlling tautomerization of single hypericin molecules in a tunable optical $\lambda/2$ microcavity
Yadav, Aditya	THU	P36	Bovine Serum Albumin-Conjugated Red Emissive Gold Nanocluster as a Fluorescent Nanoprobe for Super-resolution Microscopy
Yang, Anxiong	WED	P37	ms-sALEX-TIRF microscopy for the detection of single molecule dynamics down to milliseconds
Zhamkochyan, Simon	WED	P1	Advanced Radio Frequency Timing Apparatus: Technique and Applications