

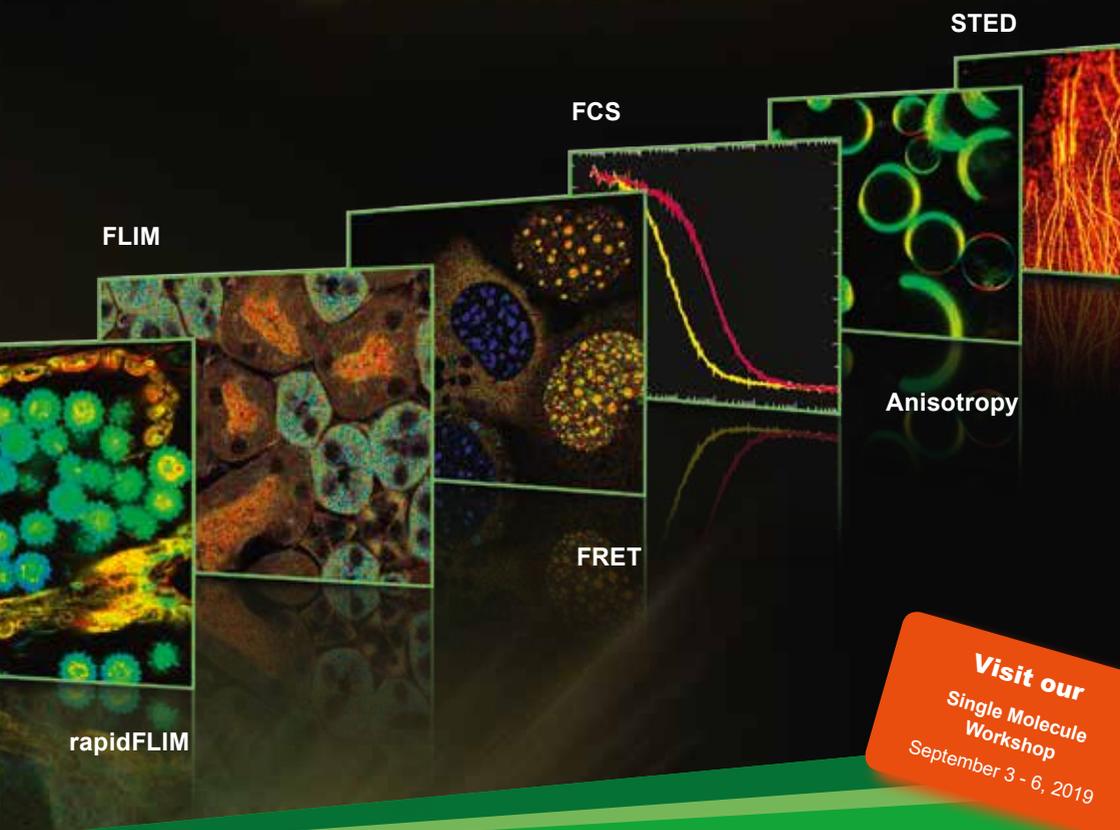
PHYSICS OF LIVING SYSTEMS

*International Meeting
of the Physics of Living Systems
Student Research Network*

8–11 July 2019 — Munich

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Am Klopferspitz 18

82152 Martinsried near Munich

ORGANIZERS

Prof. Don Lamb and

Prof. Philip Tinnefeld

(LMU Munich, Center for NanoScience)

Team:

Dr. Susanne Hennig (CeNS), Claudia Leonhardt (CeNS), Silke Leuze-Bütün (MPI of Biochemistry), Gabriela Milia (SFB1032), and Marilena Pinto (SFB1032)



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USEFUL INFORMATION

WLAN: MPIB

Please sign the form for WLAN guest access at the registration desk. You will receive a personal login and password.

In addition, eduroam WLAN is available at the MPI.

Detailed information about the program, participants and abstracts can be found in the web-based event App:
<https://lineupr.com/cens/ipols-2019-munich>



No download in the App store required. Just enter the URL or scan the QR code.

Lunch is offered in the MPI canteen from 11:30 am until 2:00 pm. No credit cards accepted (cash only).

Monday, July 8

- 8:30 am** **Registration**
-
- 9:15 am** **Welcome**
Don Lamb, Philip Tinnefeld, Krastan Blagoev
-
- 9:30 am -** **Max Planck Society (Chair: Don Lamb)**
11:00 am *Joachim P. Spatz, MPI for Medical Research: Mechanism in Collective Organizations of Living and Synthetic Cells*
Ralf Jungmann, MPI of Biochemistry/LMU: Super-resolution Microscopy with DNA Molecules: Towards Localizomics
Anna-Lena Cost, MPI of Biochemistry: Mechanical Loading of Desmosomes Depends on the Magnitude and Orientation of External Stress
Henri Franquelim, MPI of Biochemistry: Strategies to design membrane domain-sensing DNA origami
-
- 11:00 am** **Coffee break**
-
- 11:30 am -** **LMU Munich and Technische Universität Munich (Chair: Joachim Rädler)**
1:00 pm *Friedrich Simmel, TUM: Molecular communication between synthetic cell-scale compartments*
Vanessa Trauschke, LMU: Investigation of Hsp70 function with in organello single-molecule FRET
Katarzyna Tych, TUM: Unravelling the Mechanics of a Molecular Chaperone
Manon Wigbers, LMU: Hierarchical self-organization: How starfish oocytes read and modify a spatial map of their own cell shape
Viktorija Glembockyte, LMU: Advancing Single-molecule Fluorescence Applications with DNA Origami Nanoantennas
-
- 1:00 pm** **Lunch break**
-

2:15 pm - 3:00 pm	Emory University (Chair: Friedrich Simmel) <i>Khalid Salaita</i> : Development of Nanoparticle-based Force Sensors and Actuators Towards Understanding the Role of Mechanics in Cell Biology <i>Josuan Calderon</i> : Decoding Behavior from Neural Recordings <i>Catalina Rivera</i> : Inferring phenomenological models of First Passage Processes <i>Astrid Prinz</i> : Solution spaces in living and model neurons and circuits
3:00 pm- 3:30 pm	Northeastern University (Chair: Friedrich Simmel) <i>Herbert Levine</i> : Stochastic tumor-immune co-evolution <i>Max Bi</i> : Mechanical heterogeneity in tissues promotes rigidity and controls cellular invasion
3:30 pm	Poster flash talks: poster 1-26
4:00 pm	Coffee break
4:30 pm- 6:00 pm	CNRS (Chair: Theo Lohmüller) <i>Luca Ciandrini</i> : Understanding sequence determinants of mRNA translation from ribosome and polysome profiling <i>Viviana Claveria</i> : The “Truth” about the two scales heterogeneities in the stress-free shape of red blood cells membrane <i>Temple Douglas</i> : Biophysics of <i>C. albicans</i> and epithelial cell interaction <i>Jacopo Marchi</i> : Multi-lineage evolution in viral populations driven by host immune systems <i>Alan Mills</i> : Assembly of Nanoscale 3D DNA Objects <i>Matteo Paloni</i> : Atomistic detail of inter and intramolecular interactions of a phase-separating protein by atomistic simulations
6:00 pm - 6:30 pm	Poster flash talks: poster 27-51; 104
6:30 pm - 8:30 pm	Poster session 1 and welcome reception Posters 1-51; 104

Tuesday, July 9

9:00 am - **MPI of Biochemistry** (Chair: Erwin Frey)

9:30 am *Petra Schwille*: Is there a “Hydrogen Atom” of biology?

9:30 am - **University of Maryland** (Chair: Erwin Frey)

11:00 am *Garegin Papoian*: Towards Simulating Eukaryotic Cells from the Fundamental Physico-Chemical Principles

Qin Ni: Rapid Treadmilling and Myosin Motors Synergistically Induce Formation of Ring-like Actomyosin Structures

David Garcia: A New Model for Single-Molecule Tracking

Analysis of Transcription Factor Dynamics

Zachary Smith: Investigating the DFG flip of Abl Kinase using SGOOP

Sarthak Chandra: The Surprising Effects of Dimensionality on the Transition to Flocking of Animal Groups

Qixin Yang: Guidance of Actin Polymerization Dynamics with Electric Fields and Nanotopography across Cell Types

Wolfgang Losert: Physical Guidance of Cytoskeletal Dynamics

11:00 am **Coffee break**

11:30 am - **University of Cambridge** (Chair: Tim Liedl)

12:45 pm *Viola Introini*: Elevated tension of red blood cells protects against *Plasmodium falciparum* invasion: from single cell host/pathogen live imaging to resistance in human populations

Alexander Ohmann: Synthetic membrane protein mimics built from DNA

Tuomas Knowles: Protein self-assembly and misassembly

12:45 pm - **UnConference: Short presentation of topics**

1:00 pm

1:00 pm **Lunch break**

2:30 pm - **Georgia Institute of Technology** (Chair: Oliver Thorn-Seshold)
4:00 pm *JC Gumbart*: Adaptation of the *Escherichia coli* cell envelope to mechanical stress
Peter Yunker: Cellular packing and the evolution of multicellularity
Simon Sponberg: Millisecond scale coordination and control in a nearly complete motor program
Daniel Goldman: Geometric phase and dimensionality reduction in locomoting living systems
Joshua Weitz: Microbes Get Sick Too: Toward Ecosystem-aware Bacteriophage Therapy

4:00 pm **Coffee break**

4:30 pm - **Harvard University** (Chair: Ralf Jungmann)
5:15 pm *Jamilla Akhund-Zade*: Characterizing evolutionary strategies in wild *Drosophila* thermal preference via high resolution temporal sampling and broad geographic collections
Paul Dieterle: Neutrophil Swarming and the Diffusive Relay Motif
Albert Lin: Ensemble representation of odors in *C. elegans*

5:15 pm - **John Hopkins University** (Chair: Ralf Jungmann)
5:45 pm *Taekjip Ha*: Sequence-dependence of deformability revealed through genome-scale DNA cyclization kinetics

6:00 pm - **UnConference**
7:00 pm Sessions and topics will be announced on Tuesday

7:30 pm **Conference Dinner (registered participants only)**
(Gasthaus Erdinger Weißbräu, Heiglhofstraße 13, Großhadern)

Wednesday, July 10

9:00 am - **Princeton University** (Chair: Chase Broedersz)
10:30 am *Robert Austin*: The Entangled State of Cancer Giant Cells
Bernardo Gouveia: Mean field organization of branching microtubules
Jim Wu: Niche-neutral transition in Lotka-Volterra model with demographic noise
Cassidy Yang: Geometries and dynamics of dewetting droplets in an active nematic system
Ben Weiner: Motif Sequences and the Statistical Physics of Intracellular Phase Separation
Thomas Gregor: How the physics of enhancers shapes development

10:30 am **Coffee break**

11:00 am - **University of Illinois Urbana-Champaign** (Chair: Jan Lipfert)
12:30 pm *Zan Luthey-Schulten*: Probing nature's nano-machines with single-molecule techniques
Nigel Goldenfeld: Topological scaling laws and the statistical mechanics of evolutionary trees
Caitlin Davis: Protein Folding in Single-Cells of Living Zebrafish
Zane Thornburg: Modelling the Cell Cycle of a Minimal Cell
Kush Coshic: Resolving the Structure of Viral Genomes with Atomic Precision

12:30 pm **Group Picture**

2:30 pm -
≈ 4:00 pm

Guided City Tour (registered participants only)

Meeting Point: Marienplatz, Fischbrunnen

Transportation: underground line U6 to Marienplatz

2:30 pm -
≈ 5:00 pm

Guided Bike City Tour (registered participants only)

Meeting Point: Marienplatz, Fischbrunnen

Transportation: underground line U6 to Marienplatz

Bikes will be provided by the guides at Marienplatz.

2:45 pm -
≈ 5:30 pm

Roof Climb at the Olympic Stadium (registered participants only)

Meeting Point: Subway stop Olympiazentrum

Transportation: underground lines U6/U3 to Olympiazentrum

Participants will walk together from subway stop "Olympiazentrum" to the Olympic stadium

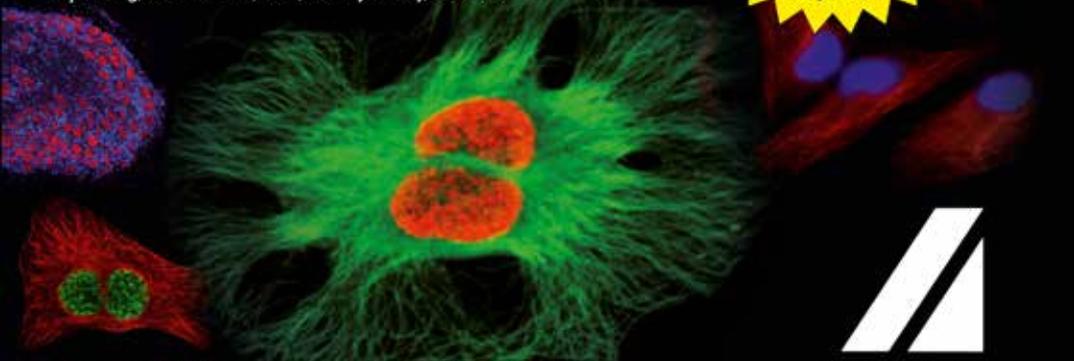
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Thursday, July 11

9:00 am - **Yale University** (Chair: tba)
10:30 am *Bara Badwan*: Direction-Selectivity and the Emergence of Opponency
Mary Lou Bailey: Investigating dynamic chromatin states in a model cell organism
Kevin Hu: Optimized single-molecule switching nanoscope for simultaneous multi-color imaging
Ben Machta: Energetic and Informational Bounds on Biological Function

10:30 am **Coffee break**

10:55 am - **Poster flash talks: posters 52-76**
11:20 pm

11:20 am - **The University of Texas at Austin** (Chair: tba)
12:05 pm *Dave Thirumalai*: Introduction
Irakli Gudavadze: Bacterial swarming: Motion under extreme forces?
Wade Zeno: Molecular Mechanisms of Membrane Curvature Sensing by Intrinsically Disordered Proteins
Rohit Satija: Generalized Langevin Equation as a Model for Barrier Crossing in Biomolecular Folding
Sumit Sinha: Spatial Theory of Intratumor Heterogeneity in exogenous cancer

12:05 pm - **Poster flash talks: posters 77-103**
12:30 pm

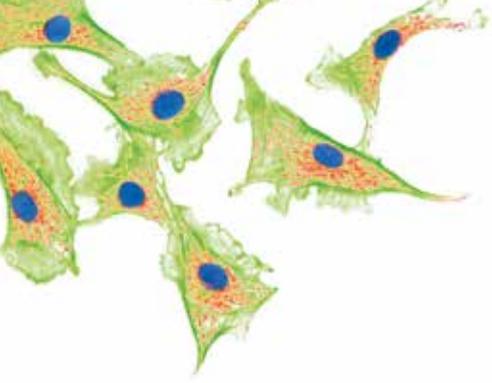
12:30 pm - **Poster session 2 with finger food**
2:30 pm Posters 52-103

2:30 pm - **Rice University** (Chair: Hermann Gaub)
4:00 pm *Federico Bocci*: Taking tumour invasion up a Notch: a 'window of aggressiveness' coordinated by cell-cell signaling
Alena Klindziuk: Theoretical Investigation of Transcriptional Bursting: a Multi-State Approach
Andrei Gasic: Critical phenomena in the temperature-pressure-crowding phase diagram of a protein
Kaitlin Knapp: Quantitative Kinetic Modeling of In Vitro Amyloid Aggregation
José Onuchic: Protein sequence coevolution, energy landscapes and their connections to protein structure, folding and function

4:00 pm **Coffee break**

4:30 pm - **LMU Munich** (Chair: Philip Tinnefeld)
6:00 pm *Chase Broedersz*: Dynamics of confined cell migration
Hermann Gaub: Molecular Mechanisms of Extreme Mechanostability in Protein Complexes
Joel Ryan: Physical behaviour of epigenetic modifiers Tet1 and Tet2 in embryonic stem cell nuclei
Oliver Thorn-Seshold: Optically manipulated chemical reagents to control biophysics in cells and animals

6:00 pm **Wrap-up**
Don Lamb and Philip Tinnefeld

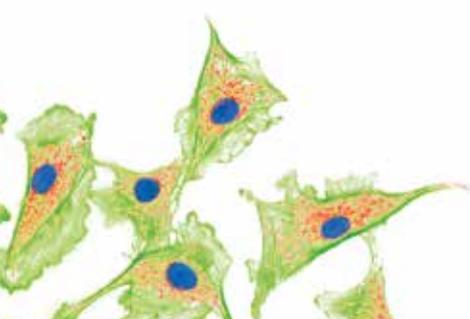


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POSTER SESSION 1: MONDAY, JULY 8

No.	Last name	First name	Poster
1	Abreu	Clare	Simple models provide powerful insight into microbial community composition
2	Agam	Ganesh	Conformational dynamics in protein folding probed with single molecule FRET
3	Alexander	Symone	Ultrafast motion of the slingshot spider powered by a 3-D elastic web
4	Anyoha	Rockwell	Comparative Ethomics: The Morphological Problem
5	Atanasov	Gjorgji	Evaluation of CA-4 benzothiazolone derivatives biological activity against tumor cell lines
6	Bakhtiari	Layla	A New Method for Investigating how the Mechanical Properties of Biofilms Hinder Phagocytosis by Immune Cells
7	Barth	Anders	Studying complex biomolecular dynamics by single-molecule FRET
8	Bartnik	Kira	A DNA origami platform for single-molecule FRET detection of DNA double-strand break repair
9	Bauer	Magnus	Structural and mechanistic insights into mechanoactivation of focal adhesion kinase
10	Baumann	Kevin	Clathrin-inspired DNA self-assembly for responsive coating and stabilization of liposomes
11	Bavik	Linnea	Evolution of Phenotype-Based Cooperation
12	Bergeler	Silke	Can a flux-based mechanism explain protein cluster positioning in a three-dimensional cell geometry?
13	Bertosin	Eva	Cryo-EM driven design of DNA mechanisms and machines
14	Bobrovnikov	Dmitriy	Investigating DNA Helicase Unwinding Dynamics at the Single Nucleotide Level
15	Bonomo	Melia	Modularity and Flexibility Quantify Unique Perceptions of Music and Speech in the Human Brain
16	Bridges	Kate	Developing a computational pipeline to elucidate cell-cell communication in the melanoma tumor microenvironment from scRNA-seq data

No.	Last name	First name	Poster
17	Britt	Madolyn	The osmotic survival and the mechanism of fast osmolyte exchange in bacteria
18	Brugger	Manuel	Orchestrating cells on a chip: employing surface acoustic waves towards the formation of neural networks
19	Büber Ochmann	Ece Sarah	DNA Nanotechnology for Membrane Sensing
20	Bull	Abby	Electrotaxis and actin wave dynamics across cell types
21	Chen	Albert	Retinal Direction-Selective Responses to Emergent Motion Enhance Position Estimation
22	Close Pfeiffer	Cindy Martina	Diagnostic Assay in a DNA Origami Nanoantenna for Single Molecule Based Detection of <i>Klebsiella</i> DNA
23	Coleman	Seth	Single-Cell Experiments and Phenomenological Modeling Towards Understanding the Role of Viral Copy Number in the Lambda Cell-Fate Decision
24	Cottle	W. Taylor	Real-Time Measurement of Molecular Tension during Cell Adhesion and Migration Using Multiplexed Differential Analysis of Tension Gauge Tethers
25	Danaf	Nader	Ultrasensitive Fluorescence Methodologies for Exploration of the Cellular and Nano Worlds
26	Danovski Dyankova	Georgi Teodora	CellTool: an open source software combining bio-image analysis and mathematical modeling
27	Dass	Mihir	Nano and MicroSwimmers enabled through DNA Nanotechnology
28	Day	Thomas	Robustness in evolutionary paths to large size for early multicellular organisms
29	Diaz	Kelimar	Comparative undulatory locomotion in structured environments
30	Dupic	Thomas	Predicting the Diversity of Immune Receptor Repertoires
31	Färber	Nicolas	Shear flow dependent membrane permeability
32	Fischer	Lisa	Nanoscale Organization of Talin
33	Floyd	Carlos	Entropy Production Across Scales in Actomyosin Networks

No.	Last name	First name	Poster
34	Fruleux	Antoine	Long range growth correlations in tissues
35	Fu	Meifang	Vesicle deformation and transportation driven by MinDE dynamic pattern
104	Galbraith	Madeline	Effect of Including Noise in Notch Signaling Pathway
36	Gau	Jeff	Energetic consequences of material heterogeneities in a deformable exoskeletal shell
37	Giunta	Giovanni	Design principles for the optimal arrangement of consecutive enzymes
38	Grabenhorst	Lennart	Single-molecule FRET experiments with μ s time resolution
39	Grigas	Alex	Decoy Detection of Computational Protein Designs
40	Hawkins	John	High-throughput benchmarking of engineered CRISPR-Cas nucleases
41	He	Guanhua	Investigating the magic number effect in silico and in vivo
42	Heinrich	Matt	Growth Dynamics and Cell Cycle in Expanding Tissues
43	Holm	Thorge	Supercontinuum Lasers as a Universal Tool in Bioimaging Applications
44	Hoyer	Maria	Dimer arrangement and monomer flattening determine actin filament formation
45	Hristova	Rossitsa	Deregulated levels of RUVBL1 protein induce transcription dependent replication stress
46	Jeong	Jiyoun (JJ)	Single-molecule Biophysics of DNA Cyclization
47	Jötten	Anna	Blood group dependent stability of <i>P. falciparum</i> infected red blood cell aggregates in capillaries
48	Kamenac	Andrej	Enzyme Activity at Lipid Membranes - Correlation of Activity and Membrane State of an intrinsically water soluble Enzyme
49	Karita	Yuya	Evolutionary and ecological dynamics in micro populations
50	Keilmann	Fritz	Infrared Nanoscopy of Alive Biological Cells
51	Kellner	Anna	DNA mechanotechnology to investigate the role of PD1 biophysics in T cells

POSTER SESSION 2: THURSDAY, JULY 11

No.	Last name	First name	Poster
52	Kluger	Carleen	Single Molecule Mechanics of Receptor-Ligand Systems under Force
53	Knapp	Kaitlin	Quantitative Kinetic Modeling of In Vitro Amyloid Aggregation
54	Ko	Hungtang	Active contraction of the fire ant raft
55	Kremser	Stephan	Programmable pattern formation in cellular systems with local signaling
56	Kuo	Katie	Interrogating working models of bacterial outer membrane protein biogenesis by the BAM complex
57	Lak	Aidin	Magnetic tweezing of molecular motors using single magnetic nanoparticles
58	Leung	Chung Yin (Joey)	Modeling the Control of Bacterial Infections by Combinations of Phage, Commensals, and Host Immunity
59	Li	Xinzhi	Mechanical heterogeneity in tissues promotes rigidity and controls cellular invasion
60	Lipfert	Jan	Unraveling Mechanoactivation of Von Willebrand Factor by Magnetic Tweezers Force Spectroscopy
61	Litschel	Thomas	Encapsulating MinDE Oscillations in Giant Unilamellar Vesicles
62	Matulis	Catherine	Investigating Contrast Responses in Early Visual Neurons
63	McKenzie-Smith	Grace	Unsupervised quantification of social interaction in bumblebees
64	Mehrabiani	Kareem	Predicting Actin Interfaces using Coevolution and Structure Based Models
65	Merino Salomon	Adrian	Cell division mimicry: traps for deforming giant unilamellar vesicles
66	Mieskes	Frank	Following Conformational Changes in Freely Diffusing Molecules: Combining 3D Orbital Tracking with FRET
67	Milles	Lukas	Molecular mechanisms of extreme mechanostabilities in pathogen adhesion proteins

No.	Last name	First name	Poster
68	Mochrie	Simon	Organization and dynamics of chromatin
69	Nunley	Hayden	Generating Cell Fate Patterns via Mechanical Stress in Human Stem Cells
70	Panagaki	Fani	Understanding the molecular mechanisms regulating the mechanosensitive focal adhesion protein zyxin
71	Pang	Yui Tik	Folding mechanism of β -helical passenger domains from a bacterial autotransporter
72	Ploetz	Evelyn	Multi-modal chemical imaging with single-molecule sensitivity
73	Pritzl	Stefanie	Trans-membrane fluorescence enhancement by carbon dots: ionic interactions and energy transfer
74	Ramm	Beatrice	Molecular Transport by a Propagating Diffusion Barrier
75	Redford	Steven	Activity as a control parameter for directed transport in actin liquid crystals
76	Rocchetti Yaadav	Sara Renukka	DNA origami-based nano-positioners for distance-dependent energy transfer to graphene
77	Rodriguez Gonzalez	Rogelio	Quantitative Models of Phage-Antibiotics Combination Therapy
78	Romeo	Nicolas	A simple model of collective fluid transport in developing eggs
79	Rouches	Mason	Connecting 2D Membrane Domains to 3D Droplet Formation
80	Rovó	Petra	Protein aggregation on the interface of solid and solution
81	Ryan	Michael	Protein Binding Kinetics on DNA Plectonemes
82	Ryoo	David	Distribution of mechanical stress in the bacterial cell envelope
83	Schaffer	Sophia	Multi Geometry Calibration of a Cellular Potts Model
84	Schaffner	Taylor	Coupling signaling cascades to membrane criticality
85	Schnitzler	Lukas	Influence of artificial „fluctuations“ on enzyme activity induced by surface acoustic waves

No.	Last name	First name	Poster
86	Schüder	Florian	Multiplexed 3D super-resolution imaging of whole cells using spinning disk confocal microscopy and DNA-PAINT
87	Sedlak	Steffen	Direction Matters: Unbinding Mechanics of Streptavidin/Biotin
88	Selbach Trofymchuk	Florian Kateryna	Fluorescence Sensing Assays Based on DNA Origami Nanoantennas
89	Selvakumar	Hemaa	Spatiotemporal dynamics of phage interactions with Pseudomonas biofilms
90	Shippo	Catharine	Mechanism of micrometer-long charge and energy transport in microbial nanowires
92	Steinbach	Gabi	Competitive interactions that facilitate coexistence?? The microbial world knows how!
93	Takaki	Ryota	Energetics and information flow of dimeric motor
94	Tekant	Melis	Tuning self organized biochemical patterns by dynamic mechanical deformation
95	Treado	Jack	Hard sphere interactions in protein cores
96	Tune	Travis	Predicting macroscopic function from nanometer scale structural differences in muscle
97	Valverde Mendez	Diana	3D particle diffusion in Escherichia coli
98	Villard	Catherine	Merge and cooperate, or how axons travel over long distances
99	Wagh	Kaustubh	Actin dynamics and organization at the T cell immune synapse: Role of the signaling protein BCL10
100	Wang	Yixiang	In vivo properties of spontaneous activity in developing auditory midbrain
101	Westerhausen	Christoph	Correlation of uptake and release of cells and vesicles with shear flow and membrane state
102	Willner	Elena-Ma- rie	Functionalization of viral capsid mimics from DNA
103	Kraus	Yvonne	Robust, GFP-orthogonal photoswitches for cell biology: Pharmaceutical microtubule inhibitors based on styrylbenzothiazoles

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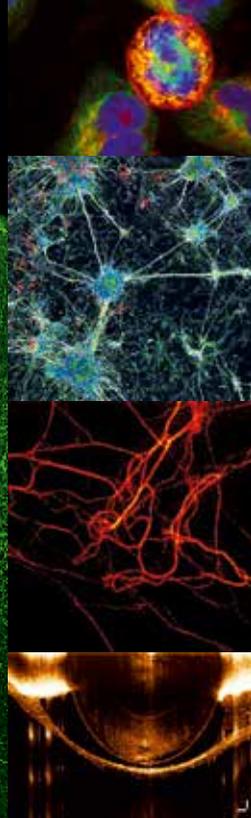
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