

# PROGRAM

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**Monday, July 21**

**Deutsches Museum, Ehrensaal**

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9:15 am -

**Welcome**

10:55 am

*Bernd Huber*, President Ludwig-Maximilians-Universität (LMU) Munich

*Don Lamb*, LMU Munich

**LMU Munich**

*Erwin Frey*: Pattern Formation and Collective Phenomena in Biological Systems

*Dieter Braun*: Probing Molecular Evolution, Cellular Kinetics and Biomolecule Binding with Microthermal Gradients

*Ulrike Gaul*: Systems Biology of Gene Regulation: Dissecting the Core Promoter

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**Coffee break**

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11:20 am-

**Technische Universität Munich**

12:35 pm

*Matthias Rief*: Mechanics of Single Protein Molecules

**Max Planck Institute of Biochemistry**

*Elena Conti*: Visualizing the Cellular Machines that Degrade RNA Molecules

*Wolfgang Baumeister*: Electron-Cryomicroscopy: From Molecules to Cells

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**Lunch break**

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2:00 pm-

**Graduate Students Munich**

3:00 pm

*Jean-Philippe Sobczak*: Investigating DNA Nanostructure Self-Assembly

*Johannes Nübler*: Including Softness in the Adsorption of Large Molecules on DNA Exhibits New Physics

*Frauke Mickler*: “Smart” Nanoparticles for Drug and Gene Delivery to Cancer Cells

*Fabian Wehnekamp*: 3D Real-Time Orbital Tracking in Zebrafish Embryos: High Spatiotemporal Analysis of Mitochondrial Dynamics in Neurons

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3:15 pm-

**Physics of Living Systems - Establishing International Ties**

4:15 pm

(Panel Discussion)

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**Coffee break**

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4:45 pm-

**CNRS, France**

6:30 pm

*Vladimir Lorman*: Physical Modeling of Viral Assembly

*Emmanuel Margeat*: Structural Dynamics of Single Metabotropic Glutamate Receptors Dimers

*Saurabh Raj*: Single-Molecule Study of Ded1 Helicases Using a Hairpin Substrate

*Selma Dahmane*: Structural Analysis of Tetraspanin Assemblies during HIV-1 Budding Using Correlative AFM-Single Molecule Localization Microscopy

*Joachim Rambeau*: Modeling Non-Equilibrium Gene Expression Fluctuations during Nutrient Shifts

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7:00 pm-

**Physik und Leben - Der Magnetsinn des Zugvogels** (*Public talk by Klaus Schulten*)

7:45 pm

(For non German-speaking participants, there will be a short introduction about the Center for New Technologies ZNT at the Deutsches Museum and time to visit the ZNT)

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8:00 pm

**Welcome reception**

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Tuesday, July 22

Lecture Hall H030, Schellingstr. 4, LMU Physics Department

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8:30 am - University of Maryland  
10:15 am Dave Thirumalai: Stepping Kinetics of Myosin Motors: Moving Forward, Backward, and Foot Stomping  
Wolfgang Losert: Dynamic Contact Guidance of Migrating Cells  
Arpita Upadhyaya: Forcing it on: the Dynamics of Signaling Activation in Immune Cells  
Rachel Lee: Quantifying Collective Cell Migration during Cancer Progression  
David Winogradoff: The Acetylation Landscape of the H4 Histone Tail  
Huong Vu: All-atom Simulation of a Full Kinesin Docking Process  
Christina Ketchum: Actin Dynamics and Calcium Signaling in B Cells Respond to Surface Topography

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Coffee break

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10:45 am - Princeton University  
12:30 pm Thomas Gregor: Precision and Reproducibility in Development  
Eric Smith: From Genome to Form: Measuring a Simple Mathematical Input-Output Relation for a 250-bp regulatory DNA Element in the *Drosophila* Embryo  
Sophie Zhang: Comparing Fungal Foraging Strategies via Simulation  
Nikolay Ouzounov: The Effect of MreB Polymer Biophysics on *Escherichia coli* Cell Shape  
Marina Feric: Nuclear Actin Counters Gravity during Cell Growth  
Farzan Beroz: Physical Limits to Biomechanical Sensing

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Lunch break

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1:30 pm Poster session: A - McGuinness

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2:30 pm - Georgia Institute of Technology  
4:15 pm Harold Kim: Probing Elastic Limit of DNA Bending  
Flavio Fenton: Mapping the Complex Spatiotemporal Dynamics of Electrical Activations in the Heart  
Curtis Balusek: Simulations of an Outer-Membrane Transporter in a Realistic Environment  
Patrick Chang: Bottlebrush Swollen Pericellular Matrix Mediates Particle Transport to Cell by Size and Charge  
Bradford Taylor: A Hitchhiker's Guide to Coinfection: Ecology and Evolution of Virophage  
Henry Astley: Cybernetic Sidewinders: Modulation of Orthogonal Body Waves Enables Versatile Maneuverability  
Patricia Yang: Duration of Urination Does not Change with Body Size

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Coffee break

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4:45 pm - National University of Singapore  
6:30 pm Chen Chen: An Introduction to Cryo-Electron Tomography  
Lu Gan: Applications of Electron Cryotomography  
Utkur Mirsaidov: Nanoscale Dynamics in Ultrathin Liquids Visualized with TEM  
Nirmalya Bag: Imaging Fluorescence Correlation Spectroscopy Investigates Biomolecular Dynamics and Organization in 2D and 3D  
Sin Yi Lee: Regulation of Bacterial DNA Packaging in Stationary Phase by Competitive DNA Binding of Dps and IHF

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8:00 pm Conference dinner (Augustiner Restaurant, Neuhauser Str. 27 - Weißer Saal, first floor)

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Wednesday, July 23

Lecture Hall H030, Schellingstr. 4, LMU Physics Department

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8:30 am - **Harvard University**

10:15 am *Erel Levine*: Pathogen Avoidance by Worms as a Collective Behavior

*Evgeni Frenkel*: Competitive Coexistence on Shared Resources Evolves due to Crowded Growth

*Matthew Berck*: Reconstructing and Visualizing the First Relay of the *Drosophila* Larva Olfactory System

*Lucy Eunju Lee*: Gene Regulatory Network Modeling Dynamic Host-Pathogen Interaction of

*Caenorhabditis elegans* and *Pseudomonas aeruginosa*

*Alyssa Wilson*: Quantifying Synaptic Reorganization in the Developing Cerebellum Using Serial-Section Scanning Electron Microscopy Data

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Coffee break

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10:45 am - **Weizmann Institute of Science / Ben-Gurion University of the Negev**

12:30 pm *Eyal Nir*: Fast and Efficient DNA Based Molecular Motors Assisted by Microfluidics and Single-Molecule Fluorescence

*Ed Bayer*: Cellulosomes – A Structurally Robust Multi-Protein Platform for Broad Nanotechnological Application

*Constantin Schöler*: Ultrastable Cellulosome-Adhesion Complex Tightens under Load

*Anders Barth*: Conformational Dynamics in Designer Cellulosomes Studied by Single-Pair FRET with MFD-PIE

*Dan Bracha*: Direct Observations on Protein-DNA Interactions in Dense and Segregated DNA Phases

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Lunch & cultural program

2:00 pm - **Guided City Tour**

4:00 pm *Meeting Point: Marienplatz, Fischbrunnen*

Transportation: underground lines U3 and U6 to Marienplatz

2:00 pm - **Guided Bike City Tour**

≈ 5:00 pm *Meeting Point: Marienplatz, Fischbrunnen*

Transportation: underground lines U3 and U6 to Marienplatz

*Bikes will be provided by the guides at Marienplatz.*

1:30 pm - **Isar Rafting Tour Lenggries - Bad Tölz**

≈ 8:00 pm *Meeting Point: Schellingstr. 4, lobby*

Transportation: underground lines U3/U6 to Odeonsplatz, change to U4/U5 to Munich main station,

Regional train (BOB): departure from Munich 2:05 pm (platform 27-36), arrival in Lenggries 3:11 pm

Departure from Bad Tölz 6:48 pm/7:48 pm/8:48 pm, arrival in Munich 7:54 pm/8:54 pm/9:54 pm

*BOB tickets will be provided.*

*Please wear casual clothes and shoes that can cope with some splash water. Spare shoes are recommended.*

*Soft drinks and beer can be purchased on the rafting boats, but you might want to bring a snack with you.*

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Thursday, July 24

Lecture Hall H030, Schellingstr. 4, LMU Physics Department

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8:30 am - Rice University

10:15 am *Herbert Levine*: Introduction

*José N. Onuchic*: The Energy Landscape for Protein Folding and Biomolecular Machines

*Ryan Hayes*: Reduced Model Captures Mg<sup>2+</sup> Dependence of the RNA Free Energy Landscape

*Herbert Levine*: Chemotaxis in *Dictyostelium*– Using Physical Models to Decipher the Mechanisms

*Jingchen Feng*: Alignment and Nonlinear Elasticity in Biopolymer Gels

*Rajeesh Balagam*: Role of Mechanical Interactions in Self-Organization of Bacteria in Biofilms

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Coffee break

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10:45 am - Yale University

12:30 pm *Simon Mochrie*: Nucleosome Unwinding and Rewinding: Free Energy Landscapes, First Passages, and Time-Resolved Transition Paths

*Yu Lin*: Quantification and Optimization of Image Quality for Single-Molecule Switching Nanoscopy at High Speeds

*Jun Long*: Bifurcation in the Biased Random Walk of *E. coli*

*Peter Koo*: A Maximum Likelihood Approach to Extract Underlying Diffusive States from Single Particle Trajectories of Rho GTPase in Live Cells

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Lunch break

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1:30 pm Poster session: Milles - Z

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2:30 pm - Universidade Federal do Rio de Janeiro

4:15 pm *Jerson Silva*: The Network Research at the National Institute of Science and Technology for Structural Biology and Bioimaging (INBEB)

*Danielly Ferraz da Costa*: Prion-like Aggregation of p53 Tumor Suppressor Protein: New Targets for Anticancer Drugs

*Guilherme A. P. de Oliveira*: “Push and Pull” Hypothesis to Unify the Physical and Chemical Unfolding of Proteins

*Fernanda Tovar-Moll*: Imaging Brain Connectivity and Plasticity

*Mônica Santos de Freitas*: Structural Characterization of Transthyretin Protein Misfolding by Solidstate NMR

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Coffee break

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4:45 am - University of Illinois at Urbana-Champaign

6:30 pm *Taekjip Ha*: Surprising Physics of DNA and Potential Roles in Gene Regulation

*Klaus Schulten*: The Photosynthetic Membrane of Purple Bacteria - A Clockwork of Proteins and Processes

*Jaya Yodh*: Next Generation Biophysics Training at University of Illinois at Urbana-Champaign

*John Cole*: Spatially-Resolved Metabolic Cooperativity within Dense Bacterial Colonies

*Neil Kim*: Revealing Real-Time, *In Vivo* Transposable Element Dynamics at both Single Cell and Population Level

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6:30 pm Conclusions

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