Nanoengineering for Mechanobiology 2024

Mechanobiology of Molecular and Cellular Systems

3-7 March 2024 Camogli, Genova, Italy

Program

Sponsors and Supporters

3/3/2024

15:00 - 17:00 Hotel Hall

- Registration

17:00 - 19:50 Salone a Mare

Opening session

- Organising committee, *Introduction*
- Xavier Trepat [Institute for Bioengineering of Catalonia; Barcelona, Spain] *Engineering epithelial shape and migration from the bottom up*
- Sylvain Gabriele [University of Mons, Belgium] *Mechanical memory of confined migration*
- ICAPPIC [Sponsor talk]

SIBPA Hatice Holuigue [Università degli Studi di Milano, Italy] *Native extracellular matrix probes to target patient and tissue-specific cell microenvironment interactions by force spectroscopy*

- Patrizia Romani [Department of Molecular Medicine, University of Padua, Italy] *Mitochondria as a unifying hub coordinating metabolism and nuclear gene expression in response to ECM mechanics*
- Carmen Martinez Fernandez [ICFO, Barcelona, Spain] *Time-sharing optical tweezer microrheology reveals the compartmentalized subcellular mechanics during development and age*

20:00 at the Terrace Welcome buffet

The Venue		
Hotel Cenobio dei Dogi Via N. Cuneo, 34 Camogli, Genova, Italy www.cenobio.it	*Getting by train:* National trains stop at: **Camogli San Fruttuoso** 3 min walking distance from the hotel entrance www.trenitalia.com	*From the Genova airport :* A free shuttle connects the terminal to the train station **Sestri Ponente** where a train calling at Camogli S.Fruttuoso runs every hour; trip duration 1h; cost 4,50€
		

4/3/2024

9:00 - 13:00 Salone a Mare

Nanomechanics and Mechanosensing

- Julia Cordero [University of Glasgow, UK] *Mechanobiology of gut/vascular interactions during intestinal regeneration*
- Marco Capitanio [University of Florence, Italy] *Revealing mechanosensitivity of cellular adhesion complexes by high-speed optical manipulation and imaging*
- Sandra Citi [University of Geneva, Switzerland] *Regulation of Tight Junction and Apical Membrane Mechanics: The Role the ZO-1-Cingulin Cytoskeletal Tether and g-actin*

Coffee Break, at the bar

- Alba Diz-Munoz [European Molecular Biology Lab (EMBL), Heidelberg, Germany] *More than the sum: how a composite interface governs function*
- Luca Puricelli [Area Science Park, Trieste, Italy] *Extracellular vesicles, cells and mutual interactions: an AFM-based mechanobiology point of view*
- Impetux [Sponsor talk]
- Carmelo Ferrai [University Medical Center Gottingen (UMG), Germany] *Nanotopography modulates cell identity in mouse Embryonic Stem Cells by rewiring chromatin structure*

13:00 -14:00 Lunch break (green badges: lunch served at the restaurant)

14:00 - 16:00 Sala Antares and Sala Dogi

- Poster session

16:00 - 20:00 Salone a mare

Cellular mechanobiology and mechanotransduction

- Anthony Hyman [Max Plank Institute of Molecular Cell Biology and Genetics, Dresden, Germany] *Phase separation in cell physiology and disease*
- Giuseppe Ciccone [University of Glasgow, UK] *Matrix viscoelasticity coupled with dimensionality controls epithelial cell migration*
- Seungkuk Ahn [ETH Zurich, Department of Biosystems Science and Engineering] *Engineering biomimetic multi-component fibrillar extracellular matrices to modulate tissue-specific cell response from a single cell adhesion to organoids*

Coffee Break at the bar

- Ellie Tzima [Radcliffe Department of Medicine, University of Oxford, UK] *Guiding Mechanical Cues in Atherosclerosis*
- Olivia Johnson-Love [University of Strathclyde, Glasgow, UK] *Unveiling the relationship between mechanical, morphological and nuclear changes in cells subject to nanovibrational stimulation*
- Leslie Yeo [Royal Melbourne Institute of Technolog, Australia] *High-Frequency Nanomechanostimulation: A New Nanoscopic Tool for Cellular Modulation*
- Dunja Alexandra Al-Nuaimi [ETH Zurich, Switzerland] *Hydrostatic pressure drives sprouting angiogenesis via adherens junction remodeling and YAP signaling*

20:30 Dinner (green badges: dinner served at the restaurant)

5/3/2024

9:00-13:00 Salone a mare

Modelling mechanobiology

- Frank Julicher [Max Planck Institute for the Physics of Complex Systems, Dresden, Germany] *Shaping tissues by active processes*
- Neus Sanfeliu [ICFO, Barcelona, Spain] *Liquid-to-solid phase transition of MEC-2 condensates is required for mechanotransduction during touch*
- Leonardo Barzaghi [IFOM, Milano, Italy] *Tissue fluidification in pathophysiology: contact percolation sets phase transition and genetic rewiring in heterogeneous breast cancers*

Coffee Break at the bar

- Daniele Panozzo [Courant Institute of Mathematical Sciences, New York University, US] *Robust Geometry Processing for Physical Simulation in Microscopy and Biomechanics*
- Benjamin M. Friedrich [Physics of Life, TU Dresden, Germany] *Tension-driven myofibril self-assembly*
- CellSense [Sponsor talk]
- Raphael Jakob [ETHZ, Switzerland] *Stronger adhesion to the substrate contributes to increased fragility of senescent endothelial monolayers*

13:00 -14:00 Lunch break (green badges: lunch served at the restaurant)

14:00-15:00 Sala Cassiopea and Sala Syrius

Round table discussions (parallel)

- Raghavendra Palankar [Associate Editor Nature Nanotechnology] *The inner workings of the editorial processes*
- Timo Nazari-Shafti [Charité hospital, Berlin, Germany] and Aldo Ferrari [Hylomorph, Zurich, Switzerland] *The regulatory landscape for medical devices and the path to market*

15:00 - 16:30 Sala Antares and Sala Dogi

- Poster session

6/3/2024

9:00-13:00 Salone a mare

Collective cellular processes

- Benjamin M. Geiger [Weizmann Institute of Science, Rehovot, Israel] *Mechanical interplay between cells and the microenvironment, associated with cancer invasion and immunotherapy*
- Francesco Pasqualini [University of Pavia] *Mechanobiology and Morphogenesis: New Tools for an Old Problem*
- Eulashini Chuntharpursat-Bon [University of Leeds] *Mechanosensing at endothelial cell junctions*

Coffee Break at the bar

- Prisca Liberali [Friedrich Miescher Institute for Biomedical Research, Basel, Switzerland]
- Davide Battistessa [Fondazione IRCCS Istituto Nazionale dei Tumori] *Peritoneal Metastasis-derived Extracellular Matrix Proteins Regulate the Tumor Microenvironment Leading to an Impairment of the Immune Cells Antitumor Activity*
- Nanosurf [Sponsor talk]
- Jacopo Di Russo [RWTH Aachen University & DWI Leibniz Institute for Interactive Materials] *Mesoscale Epithelial Mechanobiology and Cellular Interfaces*

13:00 -14:00 Lunch break (green badges: lunch served at the restaurant)

14:00 - 16:00 Sala Antares and Sala Dogi

- Poster session

16:00 - 20:00 Salone a mare

Organoids and multicellular systems

- Matthias Lutolf [Institute of Human Biology and Swiss Federal Institute of Technology (EPFL) Lausanne, Switzerland] *Deciphering the role of the extracellular matrix in intestinal organoid development*
- Emanuela Jacchetti [Politecnico di Milano, Italy] *Epithelial to Mesenchymal Transition modulation in breast cancer cells: a frontier for new investigation approaches*
- Gabriela Da Silva Andre [Macromolecular Engineering Lab, ETH Zurich] *Replacement of tumor xenograft mouse models by biophysically and molecularly defined 3D in vitro systems*

Coffee Break at the bar

EMBO Barbara Treutlein [ETH Zurich, Basel, Switzerland]

- Bruker [Sponsor talk]
- Akanksha Jain [D-BSSE, ETH-Zurich] *Morpho-mechanics of human early brain organoid development*
- Manola Moretti [Laboratory for Nanomedicine, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia] *Ultrashort self-assembling peptide hydrogels: AFM microscopy and Raman spectroscopy perspective on their mechanical and adhesive properties*

20:30 Dinner (green badges: dinner served at the restaurant)

7/3/2024

9:00 - 12:30 Salone a mare

Closing session

Verena Ruprecht [Centre for Genomic Regulation, Barcelona, Spain] *Nuclear mechanotransduction and stress adaptability*

- Enrico Klotzsch [Humboldt Universitat zu Berlin, Germany] *Lymphocyte mechano-regulation for immunotherapies*
- Ali Shahrokhtash [Aarhus University, Interdiciplinary Nanoscience Center] *Nanopatterned DNA Tension Probes Reveal Size-Dependent B Cell Activation and Mechanical Threshold at the Nanoscale*

Coffee Break at th ebar

- Matthieu Piel [Institut Curie, Paris, France] *New tools to understand the mechanics of the cell at large deformations*
- Stefania Saporito [Italian Institute of Technology, Italy] *Role of spatiotemporal-controlled morpho-physical cues in the regulation of focal adhesion dynamics and cytoskeleton remodelling of adipose stem cells*
- Roel Kooi [Eindhoven University of Technology, The Netherlands] *A Magnetic Artificial Cilia Platform for Studying Dynamic Mechanotransduction*

12:45 Lunch (green badges: lunch served at the restaurant)

Organising Committee	Institutional partners
Daniel Müller ETH Zürich Switzerland **Costanza Giampietro** EMPA Dübendorf Switzerland **Aldo Ferrari** Hylomorph AG Switzerland **Massimo Vassalli** University of Glasgow United Kingdoms	The Company of Biologists EMBO SIBPA Società Italiana di Biofisica Pura e Applicata