

# Physics of Life 2025



## Tuesday 25 March

8:30 AM - 9:00 AM	Studio One	Arrival Tea/Coffee and Pastries
9:00 AM - 9:45 AM	Auditorium	<b>Keynote Speaker L Mahadevan:</b> Evolutionary tales of biological shape: bodies, guts and beaks
9:45 AM - 10:15 AM	Studio One	<b>Morning Break</b>
10:15 AM - 12:15 PM	Auditorium	<b>Imaging and Single Molecule Biology</b> <b>10:15 AM - 10:45 AM Sandrine Leveque-Fort:</b> Alternative intrinsic properties of single molecule emission for enhanced super-resolution microscopy <b>10:45 AM - 11:00 AM Sophie Theis:</b> Quantifying 3D cell shape and cell organisation during myotome formation <b>11:00 AM - 11:15 AM Christian Bortolini:</b> Complement-mediated killing of Escherichia coli by mechanical destabilisation of the cell envelope <b>11:15 AM - 11:30 AM Erin Cutts:</b> Single-molecule visualisation of human topoisomerase 2a decatenation reveals substrate requirements <b>11:30 AM - 11:45 AM Alice Attenborough:</b> Using whispering gallery modes to monitor single-enzyme turnover events of NanoLuc <b>11:45 AM - 12:15 PM Chris Dunsby:</b> High-speed and high-content 3D light-sheet fluorescence microscopy

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	Queen A Queen's Suite	<p><b>Patterns, Waves, Transport, Collective Phenomena and Microswimmers</b></p> <p><b>10:15 AM - 10:45 AM Kirsty Wan:</b> Pattern formation and wave propagation in ciliated organisms</p> <p><b>10:45 AM - 11:00 AM Tianxiang Ma:</b> Hidden Spatiotemporal Biomechanics underlying Multicellular Coherent Motions</p> <p><b>11:00 AM - 11:15 AM Viridiana Carmona Sosa:</b> How is the swimming of exogenous microorganisms affected by the beating of cilia?</p> <p><b>11:15 AM - 11:30 AM Cedric Stefens:</b> Mesoscopic multiphoton calcium imaging reveals a confluence of overlapping avalanches with varying distance to criticality and distinct roles</p> <p><b>11:30 AM - 11:45 AM Joseph Knight:</b> The physics of a microbial railway network</p> <p><b>11:45 AM - 12:15 PM Nir Gov:</b> Modelling how lamellipodia-driven cells maintain persistent migration and interact with external barriers</p>
	Queen B Queen's Suite	<p><b>Biomolecular Assemblies and Condensates</b></p> <p><b>10:15 AM - 10:45 AM Janet Kumita:</b> Designing synthetic biomolecular condensates for specific client protein recruitment to facilitate protein degradation</p> <p><b>10:45 AM - 11:00 AM Nicola Galvanetto:</b> Mesoscale properties of biomolecular condensates emerge from nanoscale dynamics</p> <p><b>11:00 AM - 11:15 AM Andres R. Tejedor:</b> Modelling of aberrant phase transitions in biomolecular condensates via multiscale molecular simulations</p> <p><b>11:15 AM - 11:30 AM Ruth Veevers:</b> Controlled liquid-liquid phase separation via the simulation-guided, targeted engineering of the RNA-binding protein PARCL</p> <p><b>11:30 AM - 11:45 AM Rebecca Chandler-Bostock:</b> RNA virus genome structure determination by X-Ray Footprinting</p> <p><b>11:45 AM - 12:15 PM Halim Kusumaatmaja:</b> Biomolecular Condensates and Surface Tension Phenomena</p>
12:15 PM - 1:15 PM	Studio One	<b>Lunch</b>
12:45 PM - 1:05 PM	Auditorium	<p><b>Lunchtime Talk: The Royal Microscopical Society in 2025</b></p> <p><b>Sali Davis, Chief Executive, RMS</b></p>

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	Queen A Queen's Suite	<b>Lunchtime Talk: Maximising the Benefits of IOP Membership</b> Matthew Lovell, Member Operations Manager, IOP
	Queen B Queen's Suite	<b>Lunchtime Talk: Flow Induced Dispersion Analysis, Fidabio</b> Joanne M Walter, Strategic Accounts Director Fida Biosystems ApS, Fidabio
1:15 PM - 2:00 PM	Auditorium	<b>Keynote Speaker Aleksandra Walczak:</b> How personalised is your immune repertoire?
	Auditorium	<b>Physics of the Nucleus</b> 2:15 – 2:45 PM <b>Rosana Colleparado Guevara:</b> Physicochemical regulation of chromatin phase transitions 2:45 PM - 3:00 PM <b>Jack Shepherd:</b> Generating and measuring DNA plectonemes with COMBI-Tweez 3:00 PM - 3:15 PM <b>Andrew Stannard:</b> Measuring homologous pairing using synthetic DNA scissors 3:15 PM - 3:30 PM <b>Giada Forte:</b> Investigating the relationship between chromatin structure and dynamics 3:30 PM - 3:45 PM <b>Alia Dos Santos:</b> Ultrastructure of protein complexes in the nucleus of human sperm cells revealed by cryo-ET 3:45 PM - 4:15 PM <b>Davide Marenduzzo:</b> HiP-HoP: predictive polymer modelling of 3D structure and transcription in human chromatin
2:15 PM - 4:15 PM	Queen A Queen's Suite	<b>Clocks, Timers and Cell Cycle Dynamics</b> 2:15 PM - 2:45 PM <b>Andrew Charles Oates:</b> Timers, clocks and echoes in embryonic development 2:45 PM - 3:00 PM <b>Veronica Biga:</b> Interactions between HES1 and HES5 give rise to dynamic diversity in spinal cord neural progenitors 3:00 PM - 3:15 PM <b>Alastair Phelan:</b> Optimising the signal in cell cycle analysis by dual labelling experiments 3:15 PM - 3:30 PM <b>Govind Menon:</b> Transcriptional control mechanisms with different dynamical characteristics combine to enable flexible response to complex environmental signals 3:30 PM - 3:45 PM <b>Haeun Sun:</b> NREM-REM cycle model with incorporation of thermodynamics 3:45 PM - 4:15 PM <b>Nancy Papalopulu:</b> NGN3 oscillatory expression controls the timing of human pancreatic endocrine differentiation

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	Queen B Queen's Suite	<p><b>Engineering Tissues and Organoids and Biohybrids</b></p> <p><b>2:15 PM - 2:45 PM Manuel Salmeron-Sanchez:</b> Engineered viscoelasticity in cell microenvironments</p> <p><b>2:45 PM - 3:00 PM Athullya Baby:</b> Investigating the influence of mechanical stresses on ciliary dynamics using advanced in vitro airway models</p> <p><b>3:00 PM - 3:15 PM Benedikt Hartl:</b> Evolutionary implications of self-assembling cybernetic materials with collective problem-solving intelligence at multiple scales</p> <p><b>3:15 PM - 3:30 PM Nicola Pellicciotta:</b> Microscopic transport powered by swimming bacteria and applications in biohybrid micro-robotics.</p> <p><b>3:30 PM - 3:45 PM Sebastian W. Krauss:</b> Exploring DNA linkers for biomimetic cell adhesion of red blood cells</p> <p><b>3:45 PM - 4:15 PM Yuval Elani:</b> Engineering symbiosis between living cells and synthetic cell compartments</p>
4:15 PM - 4:45 PM	Studio One	<b>Afternoon Break</b>
4:45 PM - 5:30 PM	Auditorium	<p><b>Keynote Speaker Nathalie Balaban:</b> A statistical physics approach to bacteria under strong perturbations</p> <p><b>Sponsor talk by Alice Pyne:</b> The Henry Royce Institute - Shared facilities to support innovation</p>
5:30 PM - 7:30 PM	Studio One	<b>Poster Session 2, Drinks Reception and Exhibition</b>