

Topical Research Meeting on Physical Principles of Biological and Active Systems

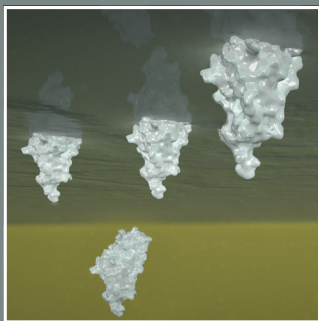
6–7 January 2016
University of Edinburgh, UK
ppbio.iopconfs.org



Programme

Wednesday 6 January

09:00	<i>Arrival and registration</i>
09:30	(Keynote) Glass and jamming transitions in biological tissues Cristina Marchetti, Syracuse University, US
10:15	(Keynote) Upside down and inside out: the biomechanics of cell sheet folding Ray Goldstein, University of Cambridge, UK
11:00	<i>Refreshment break</i>
Focus session: physics of bacteria and antimicrobial resistance Chair: Dr Bartek Waclaw	
11:30	Bacterial growth in the presence of antibiotics or multiple carbon substrates Rutger Hermsen, Utrecht University, the Netherlands
12:00	Investigating the role of structural dynamics in antimicrobial resistance with ultrafast 2D-IR spectroscopy Neil Hunt, University of Strathclyde, UK
12:15	Aerotaxis in bacterial turbulence Vicente Fernandez, ETH Zurich, Switzerland
12:30	Exploiting the emergent cytoelectric properties of microbes using dielectrophoresis to isolate and characterise drug-resistant organisms Lorenzo D'Amico, Baylor College of Medicine, US
12:45	Single-cell microscopy of Escherichia coli challenged with sublethal antibiotic concentrations shows changes in chromosome compaction Michal Wlodarski, University of Cambridge, UK
13:00	<i>Lunch</i>
14:00	(Keynote) One day in the life of a one-dimensional organism Joel Stavans, Weizmann Institute of Science, Israel
14:45	(Keynote) Tracing the cellular basis of epidermal maintenance and cancer Ben Simons, University of Cambridge, UK
15:30	<i>Refreshment break</i>
Focus session: subcellular statistical physics Chair: Professor Martin Evans	
16:00	Disordered actomyosin contracts in unexpected ways Martin Lenz, LPTMS - CNRS, France
16:30	Modelling protein biosynthesis: what can we learn from the exclusion process Juraj Szavits-Nossan, University of Edinburgh, UK
16:45	Intrinsic limits to gene regulation by global crosstalk Tamar Friedlander, Institute of Science and Technology (IST) Austria, Austria
17:00	Steric effects lead to reaction-diffusion actin bundle sculpting in filopodia Ulrich Dobramysl, University of Cambridge, UK



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17:15	Dynamics and precision of mouse neural tube patterning Marcin Zagorski, Institute of Science and Technology (IST) Austria
17:30	<i>Informal discussion</i>
19:00	<i>Coaches depart from conference venue</i> Meeting point: Pollock Halls Main Reception Centre
19:30	Conference dinner <i>Rainy Hall</i>

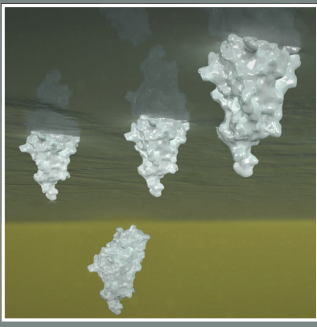
Thursday 7 January

09:00	<i>Informal discussion</i>
09:30	(Keynote) The emergent collective behaviour of bacteria under stress Robert Austin, Princeton University, US
10:15	(Keynote) Quantifying the determinants of evolutionary dynamics leading to drug resistance Tobias Bollenbach, Institute of Science and Technology (IST) Austria
11:00	<i>Refreshment break</i>

Focus session: collective dynamics of motile organisms

Chair: Professor Davide Marenduzzo

11:30	Particle entrainment dominates the interaction of microalgae with micron-sized objects Marco Polin, University of Warwick, UK
12:00	Fluid-mediated collective phenomena in suspensions of microswimmers Joakim Stenhammar, Lund University, Sweden
12:15	Microswimmers in oscillatory shear flows: a tale of unexpected resonances Ottavio Croze, University of Cambridge, UK
12:30	Polar and nematic swarms on curved surfaces Silke Henkes, University of Aberdeen, UK
12:45	Periodic motion of a circularly confined active nematic Michael Juniper, Brandeis University, UK
13:00	<i>Lunch</i>
14:00	(Keynote) Active droplets and cell motility Rhoda Hawkins, University of Sheffield, UK
14:45	(Keynote) Physics of epithelial tissues Jean-François Joanny, Institut Curie, France
15:30	<i>Refreshment break</i>
16:00	Close of conference, departure



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Poster programme

P.01 Physical parameters of metachronal waves in healthy and diseased human airway epithelium

Maurizio Chioccioli, University of Cambridge, UK

P.02 The role of THz modes of vibration in DNA organisation and gene expression

Peter Weightman, University of Liverpool, UK

P.03 Pattern formation and clustering in chemorepulsive active colloids

Benno Liebchen, University of Edinburgh, UK

P.04 Assessing collective dynamics of motile cilia in human airway cells

Luigi Feriani, University of Cambridge, UK

P.05 Evolutionary accessibility of fitness landscapes with multiple alleles

Marcin Zagorski, Institute of Science and Technology (IST) Austria/
Institute of Physics UJ, Poland

P.06 Formation of gyrotactic algal plumes in Poiseuille flow

Di Jin, University of Cambridge, UK

P.07 Viscoelastic and elastomeric active matter: linear instability and nonlinear dynamics

Ewan Hemingway, Durham University, UK

P.08 High frequency magnetic field effect on e.coli

Pablo Villegas Molina, Instituto Politecnico Nacional, Mexico

P.09 Motility of active fluid drops on surfaces

Diana Khoromskaia, University of Warwick, UK

P.10 Entropic forces and FtsZ filaments

Erick Martins Ratamero, University of Warwick, UK

P.11 TRAMS: A TRI-Axial Microscope System for tracking three-dimensional locomotion of the microswimmer *Caenorhabditis elegans*

Robert Holbrook, University of Leeds, UK

P.12 Entropic elasticity and dynamics of bacterial chromosomes: a simulation perspective

Maria Carolina Pereira, University of Edinburgh, UK

P.13 A continuum model of *Caenorhabditis elegans* locomotion for characterising passive material properties

Thomas Ranner, University of Leeds, UK

P.14 Spontaneous rotation of active droplets with surface anchoring

Ana Fialho, University of Edinburgh, UK

P.15 Digital inline holographic microscopy; an innovative method for exploring the swimming patterns used by micro-organisms, including: halophilic archaea

Katie Thornton, University of York, UK

P.16 Building an artificial cornea: modelling stem cell activity and cell migration in the eye

Kaja Kostanjevec, University of Aberdeen, UK

P.17 A growing 2D bacterial microcolony as a “Hubble active nematic”

Matthew Blow, University of Edinburgh, UK

P.18 Polymer dynamics in viscoelastic active baths

Hans Vandebroek, Hasselt University, Belgium

P.19 Changing the diet of *Bacillus subtilis*: a phenomenological model of single cell adaptation

Joachim Rambeau, University of Cambridge, UK

P.20 Crowding and collective behaviour of molecular motors

Neil Jenkins, University of Warwick, UK

P.21 The role of abnormal inhibitory transmission at the gap junctions of cardiac cells in fibrillation

Guillaume Attuel, INRIA, France

P.22 Stochasticity in gene expression: a few models solvable by geometric construction

Anna Ochab-Marcinek, Polish Academy of Sciences, Poland

P.23 Coulomb blockade in biological ion channels

Peter McClintock, Lancaster University, UK

P.24 Target search by proteins on coiled DNA

Michael Andersen Lomholt, University of Southern Denmark, Denmark

P.25 Assessing surface motility on adhesive and non-adhesive surfaces

Alessandro Carabelli, University of Nottingham, UK

P.26 Modelling asymmetry, flip-flop and external fields in a phase-separating lipid bilayer

John Williamson, Georgetown University, US

P.27 Stochastic proofreading mechanism alleviates crosstalk in transcriptional regulation

Sarah Anhala Cepeda Humerez, Institute of Science and Technology (IST) Austria

P.28 A modular view of gene regulatory networks: universal attenuators and feedback loops

Dianbo Liu, University of Dundee, UK

P.29 Control over phase synchronisation in rotor models of motile cilia

Armando Maestro, University of Cambridge, UK

P.30 Analysis of adhered *Staphylococcus Epidermidis* to model surfaces by XPS and AFM

Radhika Bava, University of Chester, UK