

The 2016 Maxwell Society Cumberland Lodge Weekend

"The Physics of Life"

Friday 26 February 2016

18:00	Arrival
18:30	Bar/informal reception
19:15	Dinner
20:15	Welcome & Introduction to weekend <i>Maxwell Society Rep, Carla Molteni & Chris Lorenz</i>
20:30	Session 1 Rosalind Franklin, Photograph 51 and the Double Helix: X-ray studies of DNA at King's <i>Prof. Brian Sutton (King's College London)</i>
22:00	Social time

Saturday 27 February 2016

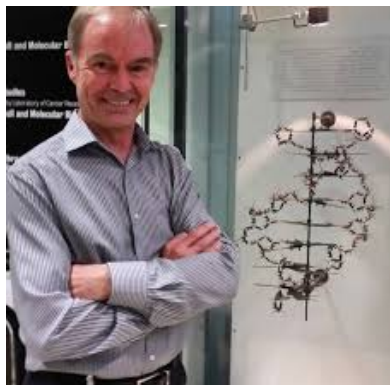
8:15	Breakfast
9:00	Session 2 Detecting the Earth's magnetic field: how do birds know which way to fly? <i>Dr. Charlotte Dodson (Imperial College London)</i>
10:30	Coffee
11:00	Session 3 Bacterial non-stick coatings: waterproofing the biofilm <i>Prof. Cait MacPhee (University of Edinburgh)</i>
13:00	Lunch Free afternoon
16:00	Tea
16:30	Session 4 Shapes of the living <i>Prof. Fabrizio Cleri (University of Lille)</i>
18:00	Bar
19:15	Dinner
20:30	Session 5 Is olfaction a quantum effect? The physics of molecular recognition in smell and in disease. <i>Dr. Jenny Brookes (University College London)</i>
22:00	Quiz

Sunday 28 February 2016

9:00 (until 9:45)	Breakfast
10:15	Departure for those attending Matins at Royal Chapel
10:30	Coffee
11:00	For those not going to chapel, we will arrange an alternative activity
13:00	Lunch
14:00	Session 6 Can molecular simulations help us understand how nerve cells in the brain communicate? <i>Prof. Carla Molteni (King's College London)</i>
15:30	Tea
16:00	Departure

Prof. Brian Sutton

Brian Sutton is Professor of Molecular Biophysics and Head of Structural Biology at King's College London. He studied chemistry at Oxford University and then trained in X-ray crystallography for his doctorate, investigating the structures of



biological macromolecules including enzymes responsible for antibiotic resistance, and antibodies. He was a Royal Society University Research Fellow in Oxford from 1983, before moving to King's College London in 1987, where he began to apply X-ray crystallography to elucidate the structure and function of antibodies involved in allergic diseases, in particular asthma, as well as in auto-immune diseases such as rheumatoid arthritis. The aim of his research is to develop new therapeutic agents based upon a detailed knowledge of molecular structure at atomic

resolution. He is a founder member of the Medical Research Council & Asthma UK Centre in Allergic Mechanisms of Asthma. The title, Professor of Molecular Biophysics, reflects the synthesis of chemical, biological and physical science that X-ray crystallography, and his research, encompasses. He is based at the Guy's Hospital Campus of King's College London in the Randall Division of Cell & Molecular Biophysics, which traces its history back to the MRC Biophysics Unit in which Rosalind Franklin and Maurice Wilkins worked on DNA under its first Director, John Randall. In 2015, Brian was scientific advisor to the West End production of Anna Ziegler's play *Photograph 51*.

Dr. Charlotte Dodson

As an undergraduate Charlotte Dodson read Natural Sciences at the University of Cambridge, specialising in Biochemistry in final year and doing her project in computational NMR. On graduating she vowed she would never go into a lab again, and so worked out of science for five years on project management, contracts, travel and diary management for a short list of elite international Classical musicians. Ultimately she realised that she missed lots of things about science and the way of thinking it requires, so she returned to university to study for a PhD in Biophysics (protein folding) at the MRC Centre for Protein Engineering / University of Cambridge. Charlotte's research after her PhD has included measuring the physical properties of proteins from the biological side at the Institute of Cancer Research (energetics, inhibition and kinetics of catalysis by a class of molecules called as protein kinases) and from the physical side in University of Oxford (the phenomenon of magnetoreception). In 2011 Charlotte left Oxford to start her own lab at Imperial, where she work at the interface of the physical and biological sciences. Currently her focus is on using single molecule spectroscopy to measure conformational change in protein kinases.



Prof. Cait MacPhee

Cait MacPhee is Professor of Biological Physics in the School of Physics and Astronomy at the University of Edinburgh. She is expert in the characterization of protein aggregation and self-assembly phenomena. Cait's research interests lie

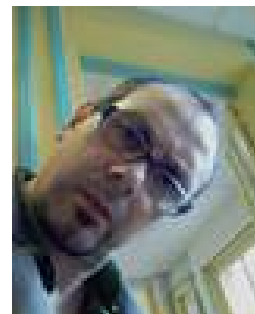


in the application of physical methods to the understanding of biomolecules, illuminating the fundamental processes underlying the self-assembly of amyloid-like fibrils, the use of fibrillar architectures as components in novel materials, and the behaviour of proteins at interfaces. Cait was previously Founding Director of two spinout companies, and in addition to fundamental research she conducts industrially-focused research projects. Cait is also interested in the factors that influence whether girls develop an interest in science. Recognising that an interest in science – or lack thereof –

develops in the early years, she works closely with primary school teachers to develop their confidence in teaching science. For this work she was awarded a CBE in the New Years Honours list in 2016. Cait tweets as @sciorama.

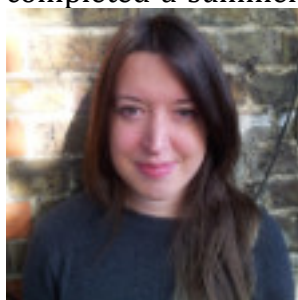
Prof. Fabrizio Cleri

Fabrizio Cleri, born in Amelia (Italy) in 1959, obtained the title of Doctor in Physics from the University of Perugia (Italy) in 1984, and the Habilitation in Physics from the University "L. Pasteur" of Strasbourg in 2005. Formerly holder of the "International Chair" of Region Nord-Pas de Calais, he is currently Full Professor (1st class) at the Department of Physics of the University of Lille I, and leader of the CNRS group "Nanomaterials and Soft Matter". In 2009 he launched, and currently acts as Director of, the Master School "Biophysics and Medical Physics", officially recognised by the French Government - Ministry of Public Health. He acted as scientific advisor for the Region-NPC government, and as monitor/expert in various EU research programs. He is an Associate Editor of "Applied Physics Letters", and of the "European Physical Journal E: Soft Matter and Biophysics". Fabrizio was a visiting professor at MIT in Boston (1993); at the Argonne National Laboratory in Chicago (1995-98); at the Institute of Theoretical Physics of UCSB (1997-98); at the Rensselaer Polytechnic in Troy, New York (2003); and at the Institute of Industrial Sciences, University of Tokyo (2007-08).



Dr. Jenny Brookes

Jenny Brookes is an alumna of King's College London (KCL), where from 2001-2004, she read joint honours Physics and Philosophy. During this time she completed a summer internship with Prof. Gordon Davies looking at defects in silicon and won the Perkin-Elmer prize in second year practical physics. Then in 2004-2008 she moved to University College London (UCL) and into theoretical/computational physics where she completed a Masters and a PhD under the supervision of Prof. Marshall Stoneham and Dr Andrew Horsfield. During this time she won the departmental prize for "Outstanding Postgraduate Research in Condensed Matter and Materials Physics" for her thesis "A microscopic model of signal transduction mechanisms: olfaction". In June 2009 she was awarded a Sir Henry Wellcome post-doctoral Fellowship that was an exciting opportunity to pursue her research in the physics of smell and a wider remit of ligand (drug) – protein (receptor) interactions and signalling mechanisms. During this fellowship she worked in Biomedical Engineering at MIT with Prof. Shuguang Zhang and in Chemistry and Chemical Biology at Harvard with Prof. Alan Aspuru-Guzik. In 2014 she returned to UCL and the London Centre for Nanotechnology (LCN) to work with Prof. Rachel McKendry within the i-sense:<https://www.i-sense.org.uk/> which is an £11 million pound EPSRC/IRC funded venture to develop early warning systems for infectious disease.



Prof. Carla Molteni

Carla Molteni is Professor of Physics at King's College London, which she joined in 2003, and a member of the *Thomas Young Centre for the Theory and Simulations of Materials*. Previously, she worked at the Max Planck Institut fuer Festoerperforschung in Stuttgart (Germany) and at the Cavendish Laboratory in Cambridge, where she was an EU Human Capital and Mobility Fellow, a New Hall College Research Fellow and an EPSRC Advanced Research Fellow. She obtained her Master and PhD degrees in Physics at the University of Milan (Italy).

Carla works at the interface of physics with chemistry, materials science and biology. In her research, she designs computer experiments to elucidate and predict complex processes in materials and biomolecules at the atomic level. She has published on a wide range of topics from grain boundaries, metal surfaces, polymers and nanocrystals to sugars, photoactive proteins, neuroreceptors and green tea.

Carla is a Fellow of the Institute of Physics and an elected member of the London Physical Society. She has engaged with the wider community, speaking at meetings for the general public, round tables and career events for high school and University students; she has been a NESTA (National Endowment for Science, Technology and the Arts) *Crucible* awardee.

