



# The Science of the Seas

London  
International  
Youth  
Science  
Forum

27 July - 10 August  
**2011**

# The London International Youth Science Forum

Founded in 1959, LIYSF aims to give a deeper insight into science and its applications for the benefit of all mankind; and to develop a greater understanding between young people of all nations.

## Founder Patron:

HRH Prince Philip, Duke of Edinburgh OMKGKT, 1959-1969

## Past Patron:

HRH The Duke of Kent KG, 1983-1988

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Professor Richard O'Kennedy BSc PhD CBIol FIBiol FIBioll (Ireland)

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Dr. Alexis Dimaras PhD  
Dr. Peter Douglas BSc PhD  
Dr. Christopher Finn BSc (hons) MSc PhD  
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Martin Perkins MA Cmath FIMA FRSA MRI  
Prof. Sir John Meurig Thomas FRS  
Prof. Viji Thambyraja BSc PhD LLB MHPEd FRSC CChem  
Prof. Neil Williams

## LIYSF Science Adviser

Dr. Arthur Tarrant PhD F1stD FCIBSE FLL CPhys CEng

*The following countries will be represented this year:*

Australia	England	Indonesia	Mexico	Singapore
Austria	Estonia	Iran	New Zealand	South Africa
Belgium	France	Ireland	Nigeria	Spain
Brazil	Germany	Israel	Northern Ireland	Sweden
Canada	Greece	Italy	Norway	Switzerland
China	Guernsey	Jamaica	Philippines	Taiwan
Croatia	Hong Kong	Japan	Poland	Thailand
Cyprus	Hungary	Kuwait	Portugal	USA
Egypt	India	Luxembourg	Russia	

**LONDON INTERNATIONAL YOUTH SCIENCE FORUM**  
**ROYAL PARADE MEWS**  
**CHISLEHURST**  
**KENT**  
**BR7 6TN**  
**UNITED KINGDOM**

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## The Prime Minister 2010 - Present



10 DOWNING STREET  
LONDON SW1A 2AA  
[www.number10.gov.uk](http://www.number10.gov.uk)

THE PRIME MINISTER

June 2011

I would like to wish all of you attending this year's London International Youth Science Forum an inspiring and productive event.

The future is in your hands. And it will be through your pursuit of science and technology that you will, in time, answer some of the great challenges of our time, and make the discoveries that will define our future.

I hope that you will use your own inspiration and motivation to inspire others around you to recognise not only the wonders of science, but also the opportunities which it opens up. In that way, you can be both ambassadors for your country, and for science.

A handwritten signature in cursive script that reads "David Cameron".

## Class of 2010



## LIYSF Partners

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LIYSF offers its thanks to all those who so generously assisted in the planning and preparation of LIYSF 2011 and in particular to:

The lecturers and speakers whose contribution is invaluable.

The universities, industries and research centres for their generosity in hosting visits to their establishments.

The schools, educational groups, science competitions and foundations worldwide, which select and sponsor overseas participation.

Mr John Needle for his continued support, enthusiasm and consultancy in the preparation of the London International Youth Science Forum.

The schools, colleges and local authorities who nominate candidates from Britain to attend LIYSF and the industrial, commercial and charitable institutions who sponsor their attendance.

Imperial College London for working with LIYSF to provide facilities for plenary and specialist sessions and accommodation.

The European Commission which sponsors the attendance of prize winners from the EU Contest for Young Scientists.

The British Council, for its support and assistance in many countries, where participation is made possible through its involvement.

The George McGowan Memorial Fund for UK schools sponsorship.

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President  
Professor Richard O'Kennedy



It gives me great pleasure, as President, to welcome you to the London International Youth Science Forum 2011.

Science plays a very major part in our lives and, increasingly, issues such as global warming, energy sources with their associated consequences and limitations, communications and media, healthcare and ethics, have, and will confront us with major challenges. These topics require new research and developments that will be your responsibility in the future. How will you address these issues and what approaches will you use? Science by its very nature demands rigorous investigations but the outcomes and their applications have major social and moral aspects.

LIYSF provides a unique opportunity for you to discuss these issues with young scientists from very different backgrounds, cultures and countries. You will learn a great deal from this and you may well find that many of your ideas will be challenged and that your view is incorrect, or at least only one of many. This will be a memorable learning experience and I hope it will benefit you in deciding your career and your future contributions to this world.

At LIYSF you will become part of an ever-growing international community and the friends you will make will be a very important part of your life. As a former participant I can assure you that you will have a great time at the Forum and that the more effort and enthusiasm that you put into it, the more you will get out of it. I look forward to meeting you.

A handwritten signature in black ink that reads 'Richard O'Kennedy'. The signature is written in a cursive, slightly slanted style.

Richard O'Kennedy  
President, London International Youth Science Forum  
Vice-President for Learning Innovation and Professor of Biological Sciences  
Dublin City University

## HALLS OF RESIDENCE



**Imperial College London  
Southside Halls of Residence  
Prince's Gardens  
London SW7 2AZ**

**Hall Host – Sean O'Callaghan**



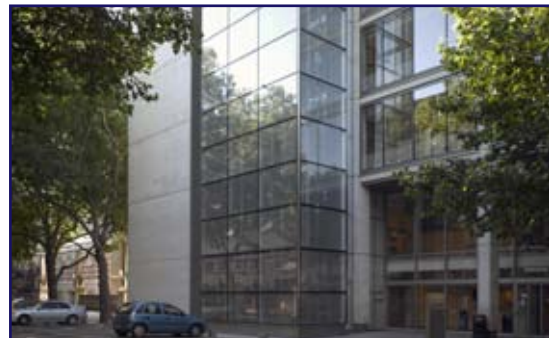
**Imperial College London  
Beit Halls of Residence  
Prince Consort Road  
London SW7 2AZ**

**Hall Host – Joao Vicente**

## PROGRAMME VENUES



**Royal College of Music  
Prince Consort Road  
London SW7 2BS**



**Imperial College London  
Sir Alexander Fleming Building**



**Imperial College London  
The Great Hall**



**Imperial College London  
Student Union**



Director of LIYSF  
Mike Clark

The 2011 theme for LIYSF, "The Science of the Seas", reflects the multidisciplinary nature of this annual event. At a time when so much scientific research is being directed at this global resource relating to energy, nutrition, medicine and conservation, you will have the opportunity over the next two weeks to learn, explore and discuss with your peers from over 45 countries across the globe.

We are again privileged to host LIYSF 2011 at Imperial College London, one of the leading scientific institutions in the world.

Enjoy this year's exciting LIYSF programme: in the lecture halls with our eminent speakers; visiting world class research establishments and organisations; enjoying our rich culture; and - last but by no means least - making new friends from the global science community at LIYSF 2011.

A very warm welcome to Imperial College London and LIYSF 2011.

A handwritten signature in blue ink that reads "Mike Clark".

Mike Clark  
Director of LIYSF

Principal Lectures and Demonstrations

Specialist Seminars

Visits

Social Programme

Optional Visits

**WEDNESDAY 27TH JULY**

Arrivals

Welcome and Orientation in Halls of Residence

**THURSDAY 28TH JULY**

11 00 Opening Ceremony - Britten Theatre - Royal College of Music

14 30 Introductions, Programme, Health and Safety Briefing - The Great Hall, Imperial College London

15 00 Lecture/Demonstration: 'Plagues and People' - Professor Sir Roy Anderson

20 00 Welcome Party - Metric, Imperial College London, Student Union

**FRIDAY 29TH JULY**

09 00 Morning Visits to Research and University Departments

14 30 Lecture/Demonstration: 'Molecules and Murder' - Professor John Nicholson

16 30 Sale of all optional excursions including theatre visits

20 00 The Science Forum Bazaar - Imperial College Student Union

**SATURDAY 30TH JULY**

10 00 Lecture/Demonstration: 'The Magic of Soap Bubbles' - Dr. Cyril Isenberg

14 00 Optional Sightseeing Tour of London

19 30 Student Topics - SAF LT G16 Lecture Theatre

**SUNDAY 31ST JULY**

09 00 Optional Excursion to Stonehenge and Salisbury

20 00 The Great Crossword Treasure Hunt - Imperial College and surrounding area

**MONDAY 1ST AUGUST**

10 00 Specialist Lectures

14 30 Lecture/Demonstration: 'Oceans on Other Worlds' - Professor Andrew Coates

20 00 Lecture/Demonstration: 'The Autopsy: Myth, Legend and Reality' - Dr. Maesha Deheragoda

**TUESDAY 2ND AUGUST**

09 00 Day Visits to Research and Industrial Establishments

## WEDNESDAY 3RD AUGUST

- 10 00 Managing the Warming World - Plenary Sessions and Discussion Groups
- 15 30 Reports / Plenary Session / Headline Theme Agreement
- 20 00 Lecture/Demonstration: 'Aerospace' - Greener by Design - Sir Colin Terry

## THURSDAY 4TH AUGUST

- 09 00 Day Visits to Oxford and Cambridge to include establishment visits and free time
- 20 00 Optional Theatre Visits

## FRIDAY 5TH AUGUST

- 10 00 Specialist Lectures
- 13 30 Lecture/Demonstration: 'Beyond the Cosmic Firewall' - Professor John Ellis
- 15 00 Afternoon Visits to Scientific Museums
- 20 00 International Cabaret at Union Concert Hall, Imperial Student Union

## SATURDAY 6TH AUGUST

- 10 30 Lecture/Demonstration: 'Colour is Fun' - Dr. Arthur Tarrant and Dr. Andrew Hanson
- 15 00 Science Forum Olympics in Ethos Sports Hall
- 20 00 Songs of Home in Activity Space - Imperial College Student Union

## SUNDAY 7TH AUGUST

- 09 00 Optional Excursion to Hampton Court Palace and Windsor
- 20 00 Break-out Group Study Session, Imperial College Student Union

## MONDAY 8TH AUGUST

- 10 00 The Science of the Seas - Plenary Sessions and Discussion Groups
- 15 30 Reports / Plenary Session / Headline Theme Agreement
- 20 00 Optional Theatre Visits

## TUESDAY 9TH AUGUST

- 10 00 Participants Forum
- 14 00 Lecture Demonstration: 'CERN, Particle Accelerators and the LHC Collider' - Dr. Steve Myers
- 16 00 Closing Ceremony
- 20 00 Farewell Party at Metric, Imperial College Student Union

## WEDNESDAY 10TH AUGUST

Departures

# Principal Lectures and Demonstrations

## Key Note Address

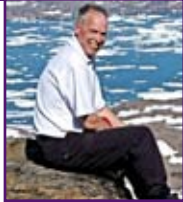


**Professor John Shepherd FRS**

*Ocean Science*

John Shepherd is a Professorial Research Fellow in Earth System Science in the School of Ocean and Earth Science, National Oceanography Centre, University of Southampton, UK. He is a physicist by training and has worked on the transport of pollutants in the atmospheric boundary layer, the dispersion of tracers in the deep ocean, the assessment and control of radioactive waste disposal in the sea, on the assessment and management of marine fish stocks, and most recently on Earth System Modelling and climate change. His current research interests include the natural variability of the climate system on long time-scales and the development of intermediate complexity models of the Earth climate system for the interpretation of the palaeo-climate record.

## Key Note Address



**Professor Ralph Rayner**

*Ocean Science*

This lecture will provide a whistle stop tour of some of the big ocean issues such as the role of the oceans in climate, ocean acidification, exploitation of conventional and renewable energy from the oceans and deep ocean exploration. It will outline the engineering, scientific and technological challenges associated with each of these and the exciting career opportunities that they present for the next generation of marine scientists, technologists and engineers.

Ralph Rayner is Sector Director, Energy and Environment for the BMT Group and is a Professorial Research Fellow at the London School of Economics. He serves as a non executive director for a number of ocean science and technology businesses.

Ralph has a BSc in Biology, an MSc in Underwater Science and Technology and a PhD in Physical Oceanography. Ralph is Vice President of the Institute of Marine Engineering, Science and Technology and a member of the Council of the Society for Underwater Technology. He chairs the Global Ocean Observing System Scientific Steering Committee and is industry outreach coordinator for the United States Integrated Ocean Observing System.

Ralph has authored numerous scientific and technical papers and reports and is Editor-in-Chief of the Journal of Operational Oceanography.

## Welcome Address



**Professor Julia Buckingham DSc, FCGI, FSB**

Julia Buckingham read Zoology at the University of Sheffield. She was appointed to the Chair of Pharmacology at the former Charing Cross and Westminster Medical School in 1987 and joined Imperial College in 1997, at the time of the medical mergers, where she had held the posts of Dean for non-clinical Medicine and Head of the Department of Neuroscience and Mental Health. She is now Pro-Rector for Education and Head of the Centre for Integrative Mammalian Physiology and Pharmacology.

Throughout her career, Julia has been committed to supporting the broader aspects of academic life through work with the research councils, medical charities and learned societies. She is a former President of the British Pharmacological Society and is currently Chairman of the Society for Endocrinology and member of council of the newly formed Society of Biology. Her work has been recognised by the award of several prestigious prizes, most recently, as the first recipient of the AstraZeneca Women in Pharmacology Prize.

## Lecture/Demonstration



**Professor Sir Roy Anderson FRS, FMedSci**

*Plagues and People*

The last few decades have seen the emergence and spread of a number of novel pathogens, including HIV, the SARS virus, BSE and the novel strain H1N1 of influenza A in 2009 and 2010. The lecture will discuss the factors that promote the emergence and spread of pathogens with a special focus on our changing world. Many features of our globally connected world promote both emergence and spread of viruses, bacteria and other pathogens. These include, population growth, air travel, urbanisation and livestock production and sale. The lecture will also discuss how we currently plan to combat plagues with behavioural changes, drugs and vaccines.

Sir Roy is Professor of Infectious Disease Epidemiology in the School of Public Health, Faculty of Medicine, Imperial College London. His recent appointments include Rector of Imperial College London and Chief Scientist at the Ministry of Defence, UK.

Sir Roy has also served as Director of the Wellcome Centre for Parasite Infections and the Wellcome Centre for the Epidemiology of Infectious Disease. He is the author of over 450 scientific articles and has sat on numerous government and international agency committees advising on public health and disease control including the World Health Organisation and UNAIDS.

He currently is a Trustee of the Natural History Museum, London, a Governor of the Institute of Government London, a Member of the Singapore National Research Foundation, a Member of the International Advisory Committee of Thailand National Science and Technology Development Agency, chairs the science advisory board of WHO's Neglected Tropical Diseases programme and is a Member of the Bill and Melinda Gates Grand Challenges advisory board.

Sir Roy was elected Fellow of the Royal Society in 1986, a Founding Fellow of the Academy of Medical Sciences in 1998, a Foreign Associate Member of the Institute of Medicine at the US National Academy of Sciences in 1999 and a Foreign Member of the French Academy of Sciences in 2009. He was knighted in the 2006 Queen's Birthday Honours.

Friday 29th July

**Professor John Nicholson***Molecules and Murder*

This lecture covers the subject of poisons and their use by criminals. It begins by considering the general topic of poisons, including their most frequent mode of action. It goes on to consider specific poisons, and cases in which they appeared, and also how the murderer was brought to justice. A variety of murder cases are described, some of which are very recent, and others of which are more historical, going back to the Victorian era. In all cases, the underlying chemistry of the substance is highlighted, and where possible, its means of detection is described.

John Nicholson is Professor of Biomaterials Chemistry at the University of Greenwich. He has a number of degrees in Chemistry BSc Kingston University, 1977; PhD, London South Bank University, 1981; DSc University of Greenwich, 2011. He spent the initial part of his career at the Laboratory of the Government Chemist, rising to be Head of Materials Research there (1989-94) before leaving to join King's College London. He moved to the University of Greenwich in 2002, where he teaches a variety of courses in chemistry and forensic science. He undertakes research on biomaterials chemistry and has published 170 papers and 4 books in this field.

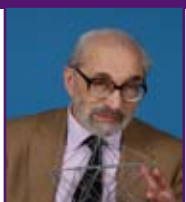
Monday 1st August

**Professor Andrew Coates***Oceans on Other Worlds*

As seen from space, over two thirds of the Earth's surface is covered by ocean. Planetary spacecraft have found evidence for more distant oceans too. At Jupiter, the moons Europa, Ganymede and Callisto have subsurface, saltwater oceans - and at Io a global magma ocean feeds the most active volcanoes in the solar system. At Saturn's moon Titan, an ocean probably lurks well below a surface landscape which includes open, methane lakes - and at Enceladus a fizzy, salty subsurface ocean provides the source of huge plumes discovered by the Cassini mission. Here, we look at the evidence for, and implications of these extra-terrestrial oceans.

Professor Andrew Coates gained a BSc in Physics from UMIST in 1978, and MSc (1979) and D.Phil. (1982) in Plasma Physics from Oxford University. He has been at UCL's Mullard Space Science Laboratory (MSSL) since. He is now Deputy Director and Head of Planetary Science at MSSL. Space mission involvements include Cassini, where he leads the team providing the electron spectrometer, Venus Express, Mars Express and Giotto. He leads the ExoMars PanCam team. Scientific interests include the solar wind interaction with planets and comets, and space instrumentation; he has authored and co-authored over 350 publications.

Saturday 30th July

**Dr. Cyril Isenberg  
Bsc, PhD, IIP***Magic of Soap Bubbles*

Everyone has enjoyed blowing bubbles. The scientific and artistic communities have also been fascinated by films and bubbles, from nuclear physicists to cosmologists and from architects to artists.

This lecture will demonstrate, on a large scale, their vibrational properties, their equilibrium and non-equilibrium surfaces and their colours. Application to solving roadway problems will also be given.

Dr Isenberg is a solid state theoretical physicist. He gained his qualifications and early postdoctoral research experience at King's College, University of London. He subsequently worked as a resident research associate at the Argonne National Laboratory, near Chicago, Illinois, in the USA. However, most of his career was spent on the staff of the Physics Laboratory of the University of Kent at Canterbury, UK.

Monday 1st August

**Dr. Maesha Deheragoda***The Autopsy: Myth, Legend and Reality*

The autopsy is used in many societies to determine a person's cause of death, so that a death certificate can be issued.

They are regularly featured on TV shows such as "CSI", "Silent Witness" and on the News, when they are used to determine the mode of death in murder investigations. As a practicing pathologist, Dr. Deheragoda will be looking at the myths and legends that surround the autopsy and their historical roots. The lecture will be interactive with opportunities for handling instruments commonly used in autopsies. Real life case histories will be used so the audience can play the role of a pathologist in determining the cause of death.

Dr Deheragoda is a specialist registrar in Pathology at the Royal Free Hospital in London. She is also a qualified paediatrician and has a PhD in the molecular pathology of bowel cancer. Her main interest is in the pathology of gastrointestinal cancer. She regularly undertakes public talks on all aspects of pathology including the autopsy and the molecular biology of cancer.

# 13 Principal Lectures and Demonstrations

## Wednesday 3rd August



**Sir Colin Terry**  
**KBE CB DL FREng**

*Aerospace - Greener by Design*

Over the last several years there has been much hype about the alleged poor environmental footprint of Aerospace. This is of particular concern given the huge projected growth in air travel. This presentation aims to set out the facts: comparing the industry with others apparently outside the spotlight, outlining the targets set internationally for improvements but also how this is currently being achieved and will be achieved in the future.

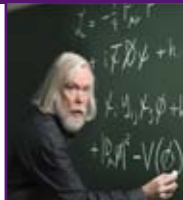
Inter alia, the talk will cover the whole gamut of measures being applied from air vehicle and propulsion design to different methods of air traffic management, bio fuels, payload balance and ground operations.

Sir Colin is an aerospace engineer, a graduate of Imperial College London and at one time was a senior military officer heading up all Royal Air Force UK Engineering and Logistics functions.

Over the last several years he has been a major industrialist chairing Meggitt PLC, an international aerospace company in the FTSE 100 with over 10 000 staff spread between China, through Europe to the West Coast of the USA.

Formerly, he was Chairman of the Engineering Council UK, President of the Royal Aerospace Society and the Council of European Aerospace Societies. He consults for several major international companies, is involved with military veterans' charities, trained Air Cadets for many years and still flies actively as a private pilot.

## Friday 5th August



**Professor John Ellis**

*Beyond The Cosmic Firewall*

John will discuss how experiments at the Large Hadron Collider (LHC) at CERN may reveal what happened in the first fractions of a second of the Big Bang, back when the Universe was full of a very hot plasma. He will discuss the possible origin of matter and of dark matter in the context of such ideas as the Higgs boson, supersymmetry and extra dimensions of space. The LHC experiments will help us answer the metaphysical questions posed by Paul Gauguin in a famous painting: Where do we come from? What are we? Where are we going? in the language of particle physics.

John Ellis is now the Clerk Maxwell Professor of Theoretical Physics at King's College London, having previously been a senior staff scientist at CERN, the European laboratory for particle physics, where he continues as Guest Professor. John's research is concerned with the fundamental building blocks of matter, the elementary particles, and the forces between them. He played a key role in establishing the Standard Model of particle physics, for example by suggesting how the gluon could be discovered and predicting the mass of the top quark. He has also been a pioneer of research at the interface between particle physics and cosmology, notably through his work on the origin of matter and the nature of dark matter.

## Saturday 6th August



**Dr. Arthur Tarrant**  
**Dr. Andrew Hanson**

*Colour is Fun*

In many industries the colour of a product is of vital importance. In digital photography and in transmission of colour images by various media, accurate reproduction of colour is essential. That means that we have to have ways of specifying and measuring colours. But how can you measure colour? It is not a physical quantity like mass or temperature  $\square$  it is a psycho-physical phenomenon.

The lecture will explain basic principles of colour measurement and describe some of the many factors that affect the appearance of colours. Perhaps it will convey something of the delight of the scientist who works in this fascinating field.

Dr Tarrant studied physics at the University of London and first worked at the National Physical Laboratory. Later he worked at the University of Surrey. His main research has been on spectroscopy; daylight and the performance of optical instruments.

Andrew Hanson has been a scientist at the National Physical Laboratory (NPL) for 22 years, measuring optical properties of materials - how light transmits, reflects and is scattered by materials, and how we see it, mostly colour. He built a cat shininess measuring machine. He then managed NPL's Outreach, sharing excitement of science through talks, science festivals, competitions, sponsorship and the media. He's been on TV and radio. One of many high points was measuring the speed of light with a kitchen blender in parkland at midnight. A Chartered Physicist, he has chaired the Colour Group of Great Britain.

## Tuesday 9th August



**Dr. Steve Myers**

*CERN, Particle Accelerators and the LHC Collider*

Steve will give an introduction to CERN, the European Organization for Particle Physics. Steve will also describe why we build accelerators and describe some of the important issues of the Large Hadron Collider (LHC). He will then review the progress made with the performance of the LHC since the first collisions at 3.5TeV on March 30, 2010. Steve will highlight the accelerator physics issues as well as the engineering challenges which must be addressed in order to push the performance. He will also give the plans for the near and longer term future.

Steve was born in Belfast, and educated at the Queen's University of Belfast, where he received a First Class Honours Degree in Electrical and Electronic Engineering. He then completed a Ph.D at Queen's.

He started at CERN in 1972 as Engineer-in-Charge on the operation of the Intersecting Storage Rings Collider (ISR) where he worked for 7 years. From 1979 onwards he spent much of his career working on the Large Electron Positron (LEP). He spent 10 years participating in the design of LEP, then went on to take responsibility for the commissioning. He was in charge of preparing the LEP Collider for physics in the 1990s. He was Project Leader of the LEP upgrade (LEP2) from 1996 until 2000. In 2000 he became Leader of the SPS-LHC (SL) Division, before becoming Head of the Accelerator and Beams (AB) Department in 2003.

In September 2008, he was nominated by the CERN Council as Director of Accelerators and Technology effective from January 2009, responsible for the operation and exploitation of the whole CERN accelerator complex, with particular emphasis on the LHC and for the development of the new projects (CLIC etc.) and technologies. He has been honoured with many awards including honorary doctorates from the University of Geneva and Queen's University Belfast, the IOP Duddell Medal in 2003 and was recipient of the 2010 ACFA/IPAC'10 Achievement prize for outstanding work in the accelerator field (2010). He has been elected a Fellow of both the IOP and the European Physical Society.

## 1st August Specialist Lectures

10 00 - Sir Alexander Fleming Building

### Lecture IA



**Dr. Jochen Guck**

*Do Biological Cells Care About Physics?*

While most current biological research focuses on molecular aspects of cells, Jochen will discuss the relevance of some of their global physical - mechanical and optical - properties. The mechanical properties of cells are largely determined by the cytoskeleton, which is involved in many cell functions and altered in many diseases, including cancer. We exploit this link between deformability and biological function to distinguish between different cells using an optical stretcher. Another example for the importance of physics are the optical properties of cells, specifically in the retina. We have recently shown that there are cellular and nuclear adaptations that improve the light transport through the retina and help to mitigate the disadvantage of its inverted structure.

Dr. Jochen Guck received his PhD in Physics from the University of Texas at Austin in 2001. After five years as group leader in Leipzig, he accepted a Lecturer position at the Cavendish Laboratory in Cambridge, where he is now a Reader in Biophysics. He is part of the Sector for Biological and Soft Systems and involved in the Physics of Medicine initiative. His research centers on exploring the global physical properties of biological cells and tissues, their importance for the cells' function and behaviour with the ultimate goal to impact clinical practice.

### Lecture IC



**Dr. Ivan Dementiev**

*Mendelev's Periodic Law in the Light of Synergetic Information Theory*

Students will be given an overview of the fundamental unity of the processes in information systems and systems of atoms. The lecture will focus on the problem of using the fundamentals of synergetic information theory with a wide range of scientific disciplines. We consider the concept of entropy and negentropy, as well as their relationship. We will show the synthesis of the periodic law of Mendelev and explain the basic properties of matter from the standpoint of synergetic information theory. The lecture allows you to see the fundamental laws of nature and to look at the underlying processes from the perspective of information theory.

Ivan was born in Moscow in 1984. After he finished University of Radio Engineering, Electronics and Automatics in 2007 he started to work as Associate Professor and leading engineer and he received a PhD in Computer Science in 2009. Now he is deputy director of Moscow State Center of Informational Technologies and Associate Dean of Mention University. He is also a leading researcher in the System Modelling and Synergetic Informational Theory.

### Lecture IB



**Dr. Robert Adam  
MA(Cantab), MB BS,  
MRCP(UK)**

*Drugs, Dopamine and Impulsivity*

Ever since humans first evolved, they have sought pleasure or escape through the use of psychoactive substances. It seems that the neurotransmitter, dopamine, plays a vital role in forming a common pathway in the neural circuitry for addiction. In this seminar we will explore the many, varied roles of dopamine so far known in the human brain - including the role of dopamine in conditions such as Parkinson's disease and Schizophrenia. Finally, Robert will introduce the field of neuroeconomics where it seems that dopamine may have a pivotal role in how we make decisions in both health and disease.

Dr Adam is a Specialist Registrar in Neurology, Cambridge University Hospitals NHS Foundation Trust, studied Neuroscience as an undergraduate at Cambridge looking in particular at the effects of caffeine on the frontal lobes. He completed his medical training at University College London and has held various clinical posts both in the UK and at New York University Medical Center, USA. His recent work as a research fellow at the Institute of Neurology, UCL, Queen's Square, used eye movements to investigate impulsive behaviours in various neuropsychiatric conditions and the effects of dopaminergic drugs on healthy volunteers.

### Lecture ID



**Dr. Stacy Williams**

*Beating the Financial Markets*

The analysis of financial markets was once the preserve of economists. Increasingly however, mathematicians and physicists are bringing their skills to bear. Global markets behave as a single, interdependent, highly complex system, and the methods developed by scientists and engineers to model physical systems can be employed. In this seminar we look at how complex systems techniques are used to gain deep insights into financial markets and how they can be applied to make better and more profitable investment decisions.

Stacy Williams is Head of FX Quantitative Strategy at HSBC. He is responsible for quantitative research and the development of systematic trading models and algorithms. Stacy also supervises doctoral research in collaboration with the University of Oxford Centre for Industrial and Applied Mathematics (OCIAM).

# 15 Specialist Lectures/Specialist Study Day

## 1st August Specialist Lectures

10 00 - Sir Alexander Fleming Building

### Lecture 1E



**Dr. Denis Kramer, PhD**

*The Science Behind Materials for Batteries and Fuel Cells*

Batteries and fuel cells are key elements in any future energy scenario. Making them fit for the challenge is largely a quest for advanced functional materials. Therefore, Materials Science is at the core of finding better storage materials and advanced catalysts. This lecture will give an overview of the exciting research going on right now striving for the next generation of battery and fuel cell materials. We will look into processes at the atomic scale affecting the electrochemistry of materials and show how theory and experiment are going hand in hand to rapidly design better materials.

Dr. Denis Kramer received a diploma in engineering from the Applied University of Sciences Zwickau (Germany) and holds a PhD from the Technical University Freiberg (Germany). Denis has worked as a research associate at the Paul Scherrer Institute (Switzerland) investigating mass transport in fuel cells using neutron imaging. As a research fellow at the Massachusetts Institute of Technology (USA), he studied properties of battery materials using First Principles. Currently, Denis is a Lecturer at the University of Southampton (UK) and Research Associate in the Chemistry Department at Imperial College (UK), focusing on predicting properties of nano-catalysts for fuel cells.

### Lecture 1F



**Dr. Helke Hillebrand**

*Technological Roadmaps for Sustainable Agriculture*

Agriculture is a key motor of global economic development. Over the past 25 years agricultural output has grown more rapidly than population, but the main challenge for the agricultural sector remained to simultaneously serve the growing demand for food, feed fuel and fiber in terms of quality and quantity. In the past, the Green Revolution has allowed for a quantum leap in agricultural production globally. However, for the challenges of the 21st Century, further technological advancements will be needed.

Helke studied Biology and Chemistry in Bochum and Paris. She has 15 years of professional experience past PhD. She started out as a plant molecular biologist in the public and private sector. Following her assignment as a Senior Scientist she headed the enabling tool platform of BASF. She led a multidisciplinary team across Europe and North America. Helke joined the BASF Investor Relations Department as a financial spokesperson. Helke participated in and led scientific research projects related to plant physiology and biotechnology, both in academia as an Assistant Professor and later on in industry as a Senior Scientist. Her move in early 2008 to joining EMBL as the Dean of Graduate Studies reflects her pleasure working in general management and on higher education strategies.

## 3rd August Specialist Lectures –Managing the Warming World Specialist Study Day

10 00 - Sir Alexander Fleming Building

### Seminar 3A



**Richard Peagam**

*Material Recovery, Re-use and Recycling*

Projections are that by 2050 the world population will grow by 50%, global economic activity will grow by 500% and global energy and materials use will grow by 300%. Unless economic growth can be dramatically decoupled from resource use and waste generation environmental pressures will increase rapidly (US EPA 2009). It is essential to manage these resources, or materials, and the waste they produce sustainably to reduce environmental pressures and to mitigate the problems caused by their dwindling availability. The group will consider the whole lifecycle of materials, to determine environmental pressures from extraction through production to end-of-life. We will discuss ways to reduce these environmental pressures and to recover traditionally wasted materials to make the whole lifecycle of resources more sustainable.

Richard graduated from University of Wales Bangor with a BSc (Hons) in Zoology with Marine Zoology. In 2007 he graduated with an MSc (DIC) from Imperial College London in Ecology, Evolution and Conservation. During this time he also gained experience working on a conservation project working with Nile crocodiles in Botswana. In 2008 Richard began working for the Environment Business Management Organisation at Hewlett Packard. He started on the PhD programme at the University of Surrey in April 2009, specialising in e-waste and resource recovery.

Participants will work in their topic groups to prepare a plenary report. This day will be moderated by Professor Roland Clift, Emeritus Professor of Environmental Technology and founding Director of the Centre for Environmental Strategy at the University of Surrey; previously a Visiting Professor at Chalmers University; Adjunct Professor at the University of British Columbia; a past member of the Royal Commission on Environmental Pollution and Defra; and a Vice President of Environmental Protection UK.

### Seminar 3B



**Professor Matthew Leach**

*Energy in the Brave New (Low Carbon) World*

The talk will outline the long term challenge for every country of moving towards a low-carbon economy. The key role of the energy sector will be discussed, with the challenge of changing our practices in the use of energy and developing and adopting cleaner sources of energy, including renewables.

Professor Matthew Leach is Director of the Centre for Environmental Strategy at the University of Surrey. A chartered engineer, Matthew holds a bachelors in Mechanical Engineering from the University of Southampton, an MSc in Environmental Technology from Imperial College London and a PhD focussed on Energy Efficiency Policy. Matthew is past Chair of Council of the British Institute of Energy Economics, and Vice President of the Energy Institute.

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### Seminar 3C



**Dr. Steve Pedley**

*The Impact of Climate Change on the Provision of Drinking Water Supply and Sanitation Services*

The global rise in temperature that is predicted to occur over the coming decades will have far reaching consequences for many of the natural cycles that maintain our environment. In the opinion of many experts the water cycle is one of the most sensitive to temperature rise, with the result that some regions will experience significant increases in rainfall whilst others will become much drier.

For this activity we will be considering the impact of climate change, in particular changes in the patterns of rainfall, on water supply and sanitation facilities. Using information about the design, construction, operation and maintenance of different facilities we will assess their relative vulnerability to climate change. We shall then consider the adaptations that can be made to these facilities to reduce their vulnerability. Finally we shall combine these two assessments to develop a matrix that will compare the resilience of different systems to climate change. Matrices of the type that we will produce will be vital to the decision making process that will decide upon the investments in water and sanitation in the future.

Dr. Steve Pedley is a microbiologist with over 25 years experience of research and consultancy work. For the past 13 years he has specialised in water quality, pollution control and public health.

### Seminar 3E



**Dr. Alex Penn**

*Permaculture*

Alex will give an introduction to the theory and applications of permaculture design. Permaculture is a systems-level approach to design of sustainable communities, organisations and agricultural systems, based on applying principles from evolutionary and ecological dynamics in order to design low-maintenance, robust and resilient organisations. Community participation and the combination of ecological, economic and social sustainability are key to this approach. Alex will discuss its connections to new thinking in complexity and evolutionary sciences and illustrate with a broad range of applications from designing community gardens to controlling bacterial communities and to new fields of biological technology.

The lecture will be followed by a workshop session in which people can explore how the design process works. Participants will work in groups to create a permaculture design outline focussed on a particular problem using basic practical, creative design techniques and thinking tools.

Dr Alex Penn works on evolutionary theory and complexity science and their potential contributions to sustainability. As well as basic science she works on the ground applying new science to solving practical problems, from the transition of industrial networks to a low carbon economy, to the regeneration of soil ecosystems in degraded land. She has a PhD in Life Sciences from the University of Sussex, has held a Fellowship at the Collegium Budapest Institute for Advanced Study and is currently a Research Fellow on the Evolution and Resilience of Industrial Ecosystems project at the University of Surrey. Outside her academic work she has been teaching and practising permaculture for many years.

### Seminar 3D



**Dr. Vanesa Magar**

*Impacts of Sea Level Rise and Increased Storminess on our Coasts and on their Management and Defence*

"How come the 1 in 50 year event has already flooded my house two years in succession?"

Explaining the nature of the risk of flooding to those protected by flood defences is one of the major challenges faced by coastal engineering today. Indeed, those designing, commissioning and constructing defences and those insuring assets in the areas protected by flood defences, all need to have a good understanding of the link between a particular structure and the risk associated with it. The philosophy behind sea defence design has changed appreciably since the 1953 North Sea storm flooding that claimed the lives of more than 2000 people.

Dr. Vanesa Magar is a Lecturer in Coastal Engineering at the School of Marine Science and Engineering at the University of Plymouth, UK. Her research interests focus on fluid dynamics, coastal and ocean transport processes, morphodynamics, and long term coastal management and defence. She has taught Hydrodynamics, Coastal Processes, Mathematics and Computing to oceanographers, coastal scientists and engineers.

### Seminar 3F



**Dr. Rocio A. Diaz-Chavez**

*Sustainability Assessment of Bioenergy Projects*

Renewed interest in biofuels has been motivated by different concerns such as high oil prices, energy security and the effects of climate change. Though the use of biomass has many arguments in favour, the possible negative social and environmental implications obscure these positive possibilities.

The potential regions which have the resources to produce sufficiently large amounts of biomass for energy to impact on EU fossil energy demand are Asia, Africa and South America. An integrated production considering better land use for producing food, fibre, fodder and fuel (FFFF) needs to be incorporated.

Dr Rocio A Diaz-Chavez is a Research Fellow at the Centre for Environmental Policy of Imperial College London and MSc tutor for the Distance learning MSc of the Centre for Development, Environment and Policy at SOAS. She received the Young Scientist Award 2010 on Environmental Management from SCOPE (Scientific Committee on Problems of the Environment) from UNESCO.

**5th August Specialist Lectures**

10 00 - Sir Alexander Fleming Building

**Lecture 5A****Mike Minett**

*'Pain Genes' Exploring the Mechanisms of Pain Transduction*

Over one-third of the world's population suffers from persistent or recurrent pain, costing the American public alone approximately £100 billion each year in health care, compensation, and litigation. These pains can last for months or years and reduce the sufferer's quality of life immensely and can lead to secondary symptoms such as anxiety and depression. Our ability to treat these chronic pain states is currently limited, with treatment options that commonly trigger side effects such as nausea, vomiting, drowsiness and in extreme cases hallucinations.

Mendelian heritable pain disorders have provided insights into human pain mechanisms and suggested new analgesic drug targets. By focusing on these individual genes it is possible to dissect the mechanisms that contribute to chronic pain. Specifically targeting drugs against these key gene products may enable us to provide pain relief without affecting normal physiological functions.

Mike graduated in 2007 with a degree in Biomedical Science from the University of East Anglia, Norwich. After graduation he worked briefly for a Cambridge based biotechnology company. In early 2008 he joined Prof. Wood's lab, based at University College London, working as a laboratory technician. In 2009 he joined the London Pain Consortium as a PhD student and has subsequently worked on projects at University College London and the University of Oxford. He is currently in the second year of his PhD, which is exploring the role of SCN9a in hallucinations.

**Lecture 5B****Maurice Brown**

*You Are Talking Air - The Impact of Hydrogen Fuel Technology on Our Future*

The Hydrogen fuel cell has been around since 1839. This relatively obscure but highly valued technology played an important role in powering the United Space programme from the 1960's and still today. The technology holds great promise, as it presents itself as a real alternative to fossil fuel energy. However, the industry will face a tough future ahead of it. Promoters of this energy source must therefore master the learning curve of the energy industry if it is to become a feasible alternative.

Hydrogen fuel cell technology has the potential to radically alter our energy landscape. How does this technology work, what are its applications and what problems does it face as an industry? This seminar will examine these questions and why Hydrogen is an attractive energy alternative.

Maurice Brown was born and raised in Kingston Jamaica where he completed most of his formal education at Campion College and the College of Arts Science and Technology.

He moved to the Netherlands in 1994 and completed his Bachelors degree in International Business Administration and subsequently completed a Master degree in Business Management.

Currently he is lecturer in Finance and Business Strategy at the University of Applied Sciences in Utrecht, The Netherlands and is owner of a small company looking into promoting and exporting to developing countries, which support a sustainable future for our planet.

**Lecture 5C****Jon Taylor**

*Changing Perceptions of Nature*

In one sense, nature is unchanging - mountains are always mountains, and forests are still forests. But the way that people view the world changes across time, across cultures and with changing levels of understanding. Using the experiences of WWF since its creation 50 years ago, this talk will explore some of those changes but also how, as an organisation, we have responded and what that has meant for us in how we communicate and try and influence our target audiences.

Jon Taylor is Climate Change Programme Manager at WWF-UK, where he leads on climate science and international development projects. Jon trained as an ecologist and has an MSc in Biological Computation and an MA in Environment, Policy & Society. Before joining WWF Jon spent 16 years working on conservation and development projects in Africa and Asia as well as in the EU. At various times he has also been a school teacher and a lion keeper.

**Lecture 5D****Dr. Graziella Branduardi-Raymont**

*Space Astronomy*

Scientists in virtually all branches of astronomy make use of instruments in space to learn more about the Universe. This lecture focuses on X-ray and gamma-ray astronomy, explains the basics of how observations are carried out in space; and describes some of the recent results from space observatories built by the European Space Agency (ESA) and NASA. Cosmic X-ray and gamma-ray sources are some of the most energetic, violent and exotic objects in the Universe: the densest stars, around which energy production is more efficient than in nuclear reactors; the hot debris of the explosive death of stars; the still mysterious ways black holes are born in mighty bursts of gamma-rays; they all provide us with clues about the origin and, ultimately, the fate of our Universe.

Graziella has been fascinated by astronomy and space research since Graziella was a teenager, and was fortunate enough to be able to build her career around these interests. After a degree in Physics at the University of Milano, Italy and a PhD. in X-ray Astronomy at University College London (UCL), Graziella spent two years doing research at Harvard University, in Boston, USA, then of the explosive death of stars; the still mysterious ways black holes are born (MSSL), and eventually joined the UCL academic staff.

Graziella's main interest is extragalactic astronomy, which encompasses some of the most energetic, violent and exotic objects in the universe, such as active galaxies and quasars.

## 5th August Specialist Lectures

10 00 - Sir Alexander Fleming Building

### Seminar 5E



**Stephan Priebe**

*Aircraft Aerodynamics*

Modern aircraft benefit from advances in several branches of engineering and the physical sciences, such as materials science, combustion physics, electronics and systems, and aerodynamics. In this lecture, we will discuss a range of topics in aerodynamics: from the fundamental question of how lift is generated and why an aircraft flies (the popularized explanation given in some pilot manuals and popular science books is unsatisfactory) to some more advanced topics such as super and hypersonic aircraft and re-entry vehicles. We will also look at Computational Fluid Dynamics (CFD), which allows the flow about a wing or any other aircraft component to be simulated numerically and which is an important tool in research and design.

Stephan obtained his Master's degree in Aeronautical Engineering from Imperial College in London. During his undergraduate studies, he also spent a year at SUPAERO in Toulouse, France. He is currently studying for his PhD degree at Princeton University, where his research is on the numerical simulation of compressible flows. Stephan was a participant at LIYSF in 2000. He subsequently returned as a member of the Student Staff and was Chief of Staff in 2004.

### Seminar 5F



**Dr. Tom Ingram MB, ChB, MRCP**

*Doctor... Is it my heart?*

In this lecture we will examine one of the world's biggest killers □ ischaemic heart disease, reflecting upon the evolution of our understanding of angina and heart attacks. We will join Mr Smith as he has his heart attack; looking at the pathology behind his presentation, the treatment which he receives and the complications which can occur. Then we will look to the future, on the one hand exploring the exciting therapies of stem cell transplantation and reperfusion injury limitation. However an appreciation will also be given as to why despite the significant advances we have made, the rate of decline in the incidence of heart disease has slowed and may even be on the rise again (especially in the young). The worrying prediction that this could be the first generation to be outlived by their parents should sharpen all of our minds as we enter an uncertain future.

Tom Ingram graduated from the University of Leeds in northern England. He was selected onto the All Wales specialist training programme in Cardiology. Most recently he has been awarded a three year competitive research grant from the British Heart Foundation to look into blood flow characteristics during times of reduced oxygen supply to the heart.

## 8th August Specialist Lectures –“The Science of the Seas” Specialist Study Day

10 00 - Sir Alexander Fleming Building

Participants will work in their topic groups with their seminar leader to discuss their topic in relation to the theme and prepare a plenary report to present at the end of the day. This day will be moderated by Dr. Simon Boxall

### Seminar 8A



**Dr. Simon Boxall**

*Sea Level Science*

Almost 80% of the population of the world lives within 50km of the coast or a tidal estuary. Our relationship with this land-sea interface is essential for industry, tourism and food, but the sea can at times be hostile. From sudden changes in sea level due to tsunamis and storm surges, to longer term changes from climate change. What can we mitigate against them?

Dr. Simon Boxall is a lecturer in Oceanography at the University of Southampton, National Oceanography Centre (UK). He has worked on secondment for projects for UNESCO, The European Union Research Centre, The World Bank, The British Council, The Foreign and Commonwealth Office, and the European Space Agency. Current research varies from oil spills to coastal and fjord dynamics to climate change and the ocean. Simon has been involved in documentaries for C4, Sky, BBC, National Geographic and Discovery. He is the lead scientist for *Cape Farewell* working in the Arctic to highlight the pressing issues of climate change. Dr Boxall has recently initiated new projects focusing on a better understanding of our seas and the environment in India, South America and Russia.

### Seminar 8B



**Dr. Stephanie Henson**

*Ocean Biogeochemistry and Ecosystems*

The oceans support a wealth of life and are critically important in regulating atmospheric carbon dioxide and Earth's climate. In this lecture, we'll examine the life and death of the ocean's most important organisms: phytoplankton. Find out how these tiny plants help to control Earth's climate and the ocean's food web - from the fish in the surface ocean to the mysterious creatures that live on the sea floor. We'll also discuss how scientists study the ocean - from going to sea to observing the oceans from space.

Stephanie Henson is a research fellow at the National Oceanography Centre in Southampton. She completed her PhD at NOC in 2005 and then moved to the US where she worked at the University of Maine and Princeton University, before returning to the UK. Her research centres on the interaction between ocean physics and biology, and uses a mixture of data collected at sea, by satellites and from models.

## 8th August Specialist Lectures – “The Science of the Seas” Specialist Study Day

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### Lecture 8C



#### Dr. Maria-Nefeli Tsaloglou

*Bio-Developments in the Ocean  
Use of Microfluidic Sensors for the  
Detection of Nucleic Acids in the Ocean*

Oceans, together with the atmosphere, form a tightly linked system which influences global climate conditions. Phytoplankton or algae are abundant photosynthetic primary producers at the base of the marine food web in the oceans. Certain types of marine algae can cause harmful algal blooms (HABs) which poison local ecosystems and can lead to major financial losses for fishery, tourism and healthcare industries. In 2005, the total cost in the European Union was estimated at €584 million. As climatic change is affecting global ocean circulation, HABs are becoming increasingly frequent.

Monitoring of HABs necessitates in situ sensors with high temporal and spatial resolution, reliability and accuracy that can withstand long-term deployment. Modern nucleic acid analysis tools combined with microfluidic technology can provide a cost-effective, robust and efficient alternative to current labour intensive identification techniques using microscopy.

Greek-born Nefeli studied in Maroufa School of Athens, Lycée Léonin de Patissia and Athens American College, later studying Biochemistry and Chemistry at the School of Biological Sciences of the University of Southampton. Her Chemistry undergraduate project on Electron Spin Resonance spectroscopy of liquid crystal gels with enhanced properties and their applications in display devices, supervised by Prof. G. R. Luckhurst, was awarded the 2003 Alan Carrington Prize for best undergraduate research project in physical chemistry. In June 2008, she completed her PhD on lipid regulation of enzyme function with Prof. George Attard, and then continued for a short post doc on the effect of liposomes on DNA transcription. She joined the Sensors Development Group in December 2008 on the LabonFoil project.

### Lecture 8E



#### Dr. Jenny Brown

*Hazards in Coastal Seas*

The coast provides a range of important environments such as: urban towns, major cities, harbours, ports, recreational beaches and protected nature reserves; creating homes, livelihoods and leisure activities for millions of people. Understanding present-day and future threats to the coastline is important to enable sustained development and to determine how best to defend assets whilst letting the coastline evolve. Coastal hazards explored in this lecture include: extreme event impact, flooding, erosion, pollution, siltation and climate change. Through observation and numerical modelling improved knowledge is obtained to enable long-term management of risk to life, property and the environment.

Dr. Jenny Brown always had an interest in science, maths and the ocean at school. This led to her studying Physical Oceanography with Maths at Bangor University in 2001. In 2004 she followed this with a Ph.D. in regional sediment transport modelling. Jenny started her professional career in 2007 at the National Oceanography Centre, Liverpool, modelling wave-tide-surge interactions during extreme events. In order to better understand physical processes in coastal seas, Jenny now works extensively with modelling systems of waves, tide, surge, sediment transport and morphological change.

### Lecture 8D



#### Emily Lewis-Brown

*Using the Ocean to Clean up the Climate*

Our ocean is reducing climate change by absorbing CO<sub>2</sub> and heat. Sea ice has been regulating our climate for centuries and the sea bed is trapping vast stores of methane. The ocean has been quietly providing this natural service, for free, for years. Now, as it warms and as CO<sub>2</sub> dissolves into sea water forming carbonic acid, the ocean is changing - in ways which can accelerate climate change. So we must act fast to save our seas and ourselves. The seas hold many secrets for a successful future. In this session we will explore how the ocean regulates the climate and how we may now need to intervene to actively manage the climate to restore the radiative balance to Earth. It will be a fun and interactive session, based on work with youth groups at the UN climate talks.

Emily Lewis-Brown is a natural scientist and conservationist. Specialising originally in dolphin research with Oxford University, she switched to work on climate change research and campaigning 10 years ago. Emily has worked extensively in the NGO sector, including 8 years with WWF where she initiated and led many research projects into the impacts of climate change on marine species and co-authored a publication on the impacts of the oceans on the climate. She is now based at the University of Surrey's Centre for Environmental Strategy, working for the Food Climate Research Network.

### Lecture 8F



#### Dr. John Prytherch

*Measuring Air-Sea CO<sub>2</sub> Exchange*

The ocean plays a dominant role in the Earth's carbon cycle. The rate at which CO<sub>2</sub> exchanges between the ocean and atmosphere is currently very uncertain and direct measurement of the exchange is extremely challenging. A better understanding of this process will help improve predictions of future changes to the Earth System (e.g. climate change and ocean acidification).

This lecture will discuss the motivation and methods for studying air-sea gas exchange. John will try to give a flavour of what it is like to work as a marine scientist, and explore some current research questions.

John Prytherch is a marine physicist specialising in air-sea interaction. He works at the National Oceanography Centre, Southampton where he recently completed his Ph.D. on the direct measurement of turbulent air-sea fluxes in high winds. He previously obtained an M.Res. in Ocean Science from the University of Southampton, and a B.Sc. in Mathematics and Physics from the University of Warwick.

There is an active social calendar with events designed to enable those from around the world to learn about different cultures.

## THURSDAY 28th JULY

20.00 Welcome Party at Metric, Imperial College Student Union.

## FRIDAY 29th JULY

20.00 Science Forum Bazaar in Imperial College Student Union.

## SATURDAY 30th JULY

19.30 Student Topics in LT G16, Sir Alexander Fleming Building, Imperial College.

## SUNDAY 31st JULY

20.00 The Great Crossword Treasure Hunt, Imperial College South Kensington Campus.

## FRIDAY 5th AUGUST

20.00 International Cabaret at Union Concert Hall, Imperial College Student Union.

## SATURDAY 6th AUGUST

20.00 Songs of Home at Imperial College Student Union.

## TUESDAY 9th AUGUST

20.00 Farewell Party at Metric, Imperial College Student Union.

## European Union Contest for Young Scientists



LIYSF offers a varied programme of optional visits. On Friday 29th July at 16.30 tickets will be on sale from LIYSF staff for London sightseeing, Stonehenge and Salisbury visits and three theatre nights. On Monday 1st August at 16.00 tickets will be on sale from LIYSF staff for Hampton Court, Windsor and final theatre nights.

## SATURDAY 30th JULY

13.00 Optional sightseeing tour of London.

## SUNDAY 31st JULY

09.00 Optional excursion to Stonehenge and Salisbury.

## TUESDAY 2nd AUGUST

19.30 Optional theatre visits.

## THURSDAY 4th AUGUST

19.30 Optional theatre visits.

## SUNDAY 7th AUGUST

09.00 Optional excursion to Hampton Court Palace and Windsor.

## MONDAY 8th AUGUST

19.30 Optional theatre visits.

**CREST Awards**  
A British Science Association programme

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## FRIDAY 29TH JULY LONDON VISITS

### 29/01 National Physical Laboratory

UK's principal facility in measurement and materials science. Visit state of the art facilities ensuring accuracy, consistency and innovation in physical measurement.

### 29/02 Imperial College London: Earth Science and Engineering

Part of the Royal School of Mines, where applied aspects of earth science have been taught for more than 150 years. Brings together specialists in geology, geophysics, mineral and energy resources, earth engineering, environmental science and computational modelling.

### 29/03 Zoological Society of London: Veterinary Department

At the heart of ZSL's commitment to animal welfare and conservation. Veterinary Services operates a detailed programme of preventative medicine, supplies vital field support for ZSL's direct conservation action and maintains a comprehensive database of written and photographic clinical records.

### 29/04 Imperial College London, Department of Chemical Engineering

The site of the UK's largest chemical engineering research activity. Expert in mathematical analysis and modelling; and in experimental investigation and measurement.

### 29/05 University College London: Divisions of Biosciences

Brings together internationally competitive cell, developmental and evolutionary biologists. Provides research strategy in the exciting fields of Life Science; research from molecular analysis of cell signalling processes to aesthetics, philosophy, ethics and the history of medical practices in classical times.

### 29/06 Imperial College London: Department of Life Sciences Biochemistry

Aims to understand, at the molecular level, the function of cells as an integrated system, including details of individual components and biological mechanisms that constitute the system.

### 29/07 Imperial College London: Department of Materials

The oldest and largest department of its kind in the UK, conducting research into biomaterials for tissue engineering and regenerative medicine; and bio-nanotechnology for nanostructures and create nano-biomaterials.

### 29/08 Old Operating Theatre and Herb Garret

Original Operating Theatre dating from 1821, with original instruments; find out about surgery before anaesthesia and antiseptics.

## TUESDAY 2ND AUGUST DAY VISITS

### 02/01 Airbus UK, Filton

Core activities at Filton include the design, engineering and support for Airbus wings, fuel systems and landing gear integration. Teams also work on systems, structures, and aerodynamics research, development and test facilities.

### 02/02 Rothamsted Research Centre

A centre of excellence for science in support of sustainable land management and its environmental impact. Research ranges from studies of genetics, biochemistry, cell biology and soil processes to investigations at the ecosystem and landscape scale.

### 02/03 Tilbury Power Station

Discover the science of electricity generation at Tilbury, a coal-fired power station. Tilbury Power Station has the capacity to generate 1,131MW of electricity for the National Grid system, enough power to meet the needs of approximately one million people.

### 02/04 University of Warwick: Electrochemistry & Interfaces/ Electron Microscopy Department

Research focusing on the application of electrochemistry to the understanding of fundamental and industrially significant interfacial chemical processes at the micro to nanoscale. Cryo-capable microscopes enable work with a wide range of sample types including proteins, synthetic nano particles and polymer vesicle preparations.

### 02/05 University College London: Mullard Space Science Laboratory

Exploiting the capabilities of rockets and spacecraft as platforms for scientific instruments it strives to understand our physical environment and our place in the Universe.

### 02/06 University of Kent: Electronics Laboratory

Established research groups within the School include broadband & mobile communications and image processing & vision, while new research activities are developing in the areas of embedded systems and digital media.

### 02/07 National Oceanography Centre

NOCS is based at a purpose-built waterside campus in Southampton and is home to some 520 research scientists, lecturing support and seagoing staff. The Underwater Systems Laboratory at NOCS undertakes research, development, demonstration and evaluation in technology to serve the needs of the UK marine science community.

### 02/08 Jealott's Hill

Jealott's Hill is the largest agricultural research centre in Europe and one of the largest in the industry. The site was founded in 1927 and today employs nearly 800 scientists and support staff who are continuing an 80 year tradition of innovation in agriculture. Many of the world's most important crop protection products were developed here.

### 02/09 Norwich Research Centre

Internationally recognised for the excellence of its research in the plant and microbial sciences, food, health, environmental sciences, computer and information systems and chemistry, Norwich Research Park (NRP) is home to over 30 science and IT based companies.

## THURSDAY 4TH AUGUST OXFORD/CAMBRIDGE VISITS

### 04/C/01 Cambridge University Department of Physics: Cavendish Laboratory

The Cavendish was opened in 1874 as the Laboratory of Physics at the University of Cambridge, one of the first teaching laboratories in England. Visit departments specialising in microelectronics, polymers and colloids, high speed photography and low-temperature physics.

### 04/C/02 Cambridge University: Earth Sciences Department

From geophysics and applied mathematics, geochemistry and sedimentology, petrology and volcanism, palaeontology and evolutionary biology, to the physics and fundamental properties of materials.

### 04/C/03 EMBL - European Bioinformatics Institute

Building on more than 20 years' experience in bioinformatics, the EMBL-EBI maintain the world's most comprehensive range of molecular databases, managing biological data including nucleic acid, protein sequences and macromolecular structures.

### 04/O/01 Oxford University Botanic Garden and the Museum of Natural History

The Botanic Garden acts as a reference collection of 6,000 types of plant: it is the most compact yet diverse collection of plants in the world, and the oldest such garden in Britain. The museum houses the University's zoological, entomological and geological specimens.

### 04/O/02 Culham Centre for Fusion Energy

The UK centre for magnetic confinement fusion research and the home of the major European fusion experiment JET. It has a high technology incubator, Culham Innovation Centre and a technology transfer programme.

### 04/O/03 Pit Rivers Museum

The Museum displays archaeological and ethnographic objects from all parts of the world. It is equally famous for its celebrated displays and its leading role in contemporary research and museum curatorship.

### 04/O/04 Museum of the History of Science - Oxford

The Museum of the History of Science houses an unrivalled collection of historic scientific instruments in the world's oldest surviving purpose-built museum building.

### 05/O/05 University of Oxford - Begbroke Science Park

Begbroke Science Park focuses on the development of an holistic mix of small, technology orientated businesses and academic departments with space demanding research activities on the site. It complements this with a range of facilities and initiatives that encourage and support business - university interactions.

## FRIDAY 5TH AUGUST MUSEUM VISITS

### 5/NHM Natural History Museum

The museum is home to life and earth science specimens comprising some 70 million items within five main collections: Botany, Entomology, Mineralogy, Palaeontology and Zoology. It is also a world-renowned centre of research, specialising in taxonomy, identification and conservation.

### 5/SM Science Museum

The Science Museum has over 300,000 objects in its care, with particular strengths in the history of western science, technology and medicine since 1700. See, touch and experience the major scientific technological and medical advances of the last three hundred years.



**Natural History Museum**



**Science Museum**



Richard Myhill – Conference Director  
Louisa Webb - Conference

### Chief of Staff



**Ojali Negedu**  
UK  
Pharmaceutical Chemist

### Southside Hall



**Sean O'Callaghan**  
Ireland  
University College Cork

### Beit Hall



**Joao Vicente**  
Portugal  
Porto University

### Hosts

### Programme Liaison



**Thomas Gilbertson**  
UK  
University of Southampton



**Maria Esteban**  
Spain  
The University of Edinburgh

**Southside Hall**

**Beit Hall**

**Deputy Hall Hosts**



**Sofia Christou**  
Cyprus  
University of Reading



**Patricia Contreras - Tejada**  
Spain  
Conservatorio Adolfo Salazar

**Chief of Counsell**



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UK  
Reading University



**Helen Peregrine**  
UK  
Cardiff University

**Counsellors**



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Portugal  
Instituto Superior Técnico



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UK  
Northolt High School

**Counsellors**



**David Bonell**  
Spain  
Universitat Autonoma de Barcelona



**Marsha Sudar**  
Australia  
University of Oxford

**Counsellors**



**Hattie Jones**  
UK  
Durham University



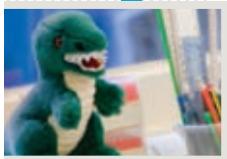
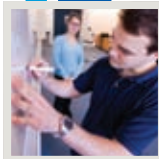
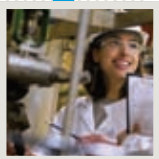
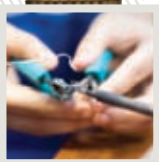
**Emily Goddard**  
UK  
Withington Girls' School

**Counsellors**

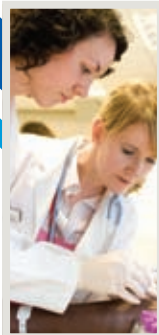


**Aldo Cingolani**  
Italy  
Cosimo Di Giorgi

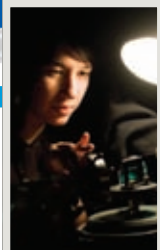
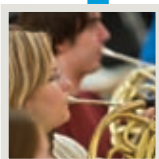
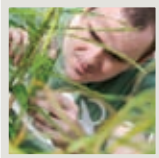
# Imperial College London



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"I remember feeling petrified. However, within two hours of my parents leaving I was sitting in Belt Quad enjoying a beer or two and that was it... the beginning of four great years."  
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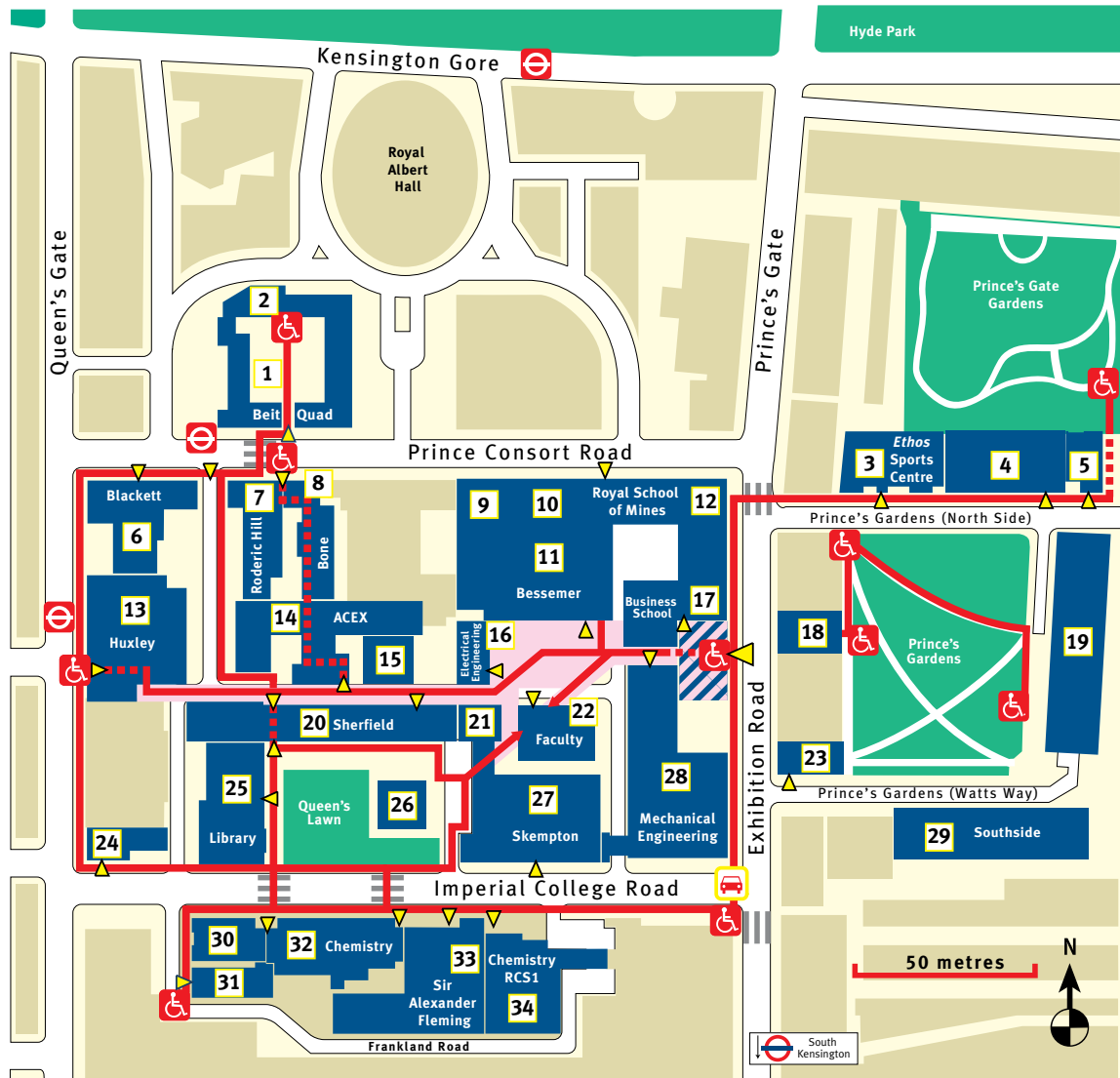
Imperial College London congratulates all participants on a successful 2011 London International Youth Science Forum.

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## Imperial College London

### South Kensington Campus



- Main walkway
- Main entrance
- Accessible route
- South Kensington Underground
- Bus stops
- Building entrances
- Vehicle entrance



Buildings where wheelchair access is not possible at this time

1 Beit Quadrangle	11 Bessemer Building	20 Sherfield Building	27 Skempton Building
2 Imperial College Union	12 Goldsmiths Building	21 Student Hub	28 Mechanical Engineering Building
3 Ethos Sports Centre	13 Huxley Building	22 Conference Office	29 Southside
4 Prince's Gdns, North Side Garden Hall	14 ACE Extension	23 Grantham Institute for Climate Change	30 Wolfson Building
5 Weeks Hall	15 William Penney Laboratory	24 Faculty Building	31 Flowers Building
6 Blackett Laboratory	16 Electrical Engineering	25 58 Prince's Gate	32 Chemistry Building
7 Roderic Hill Building	17 Business School	26 170 Queen's Gate	33 Sir Alexander Fleming Building
8 Bone Building	18 53 Prince's Gate	27 Imperial College and Science Museum Libraries	34 Chemistry RCS1
9 Royal School of Mines	19 Eastside	28 Queen's Tower	
10 Aston Webb			

LIYSF 2012  
Olympic Year  
16th - 30th August  
**2012**



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