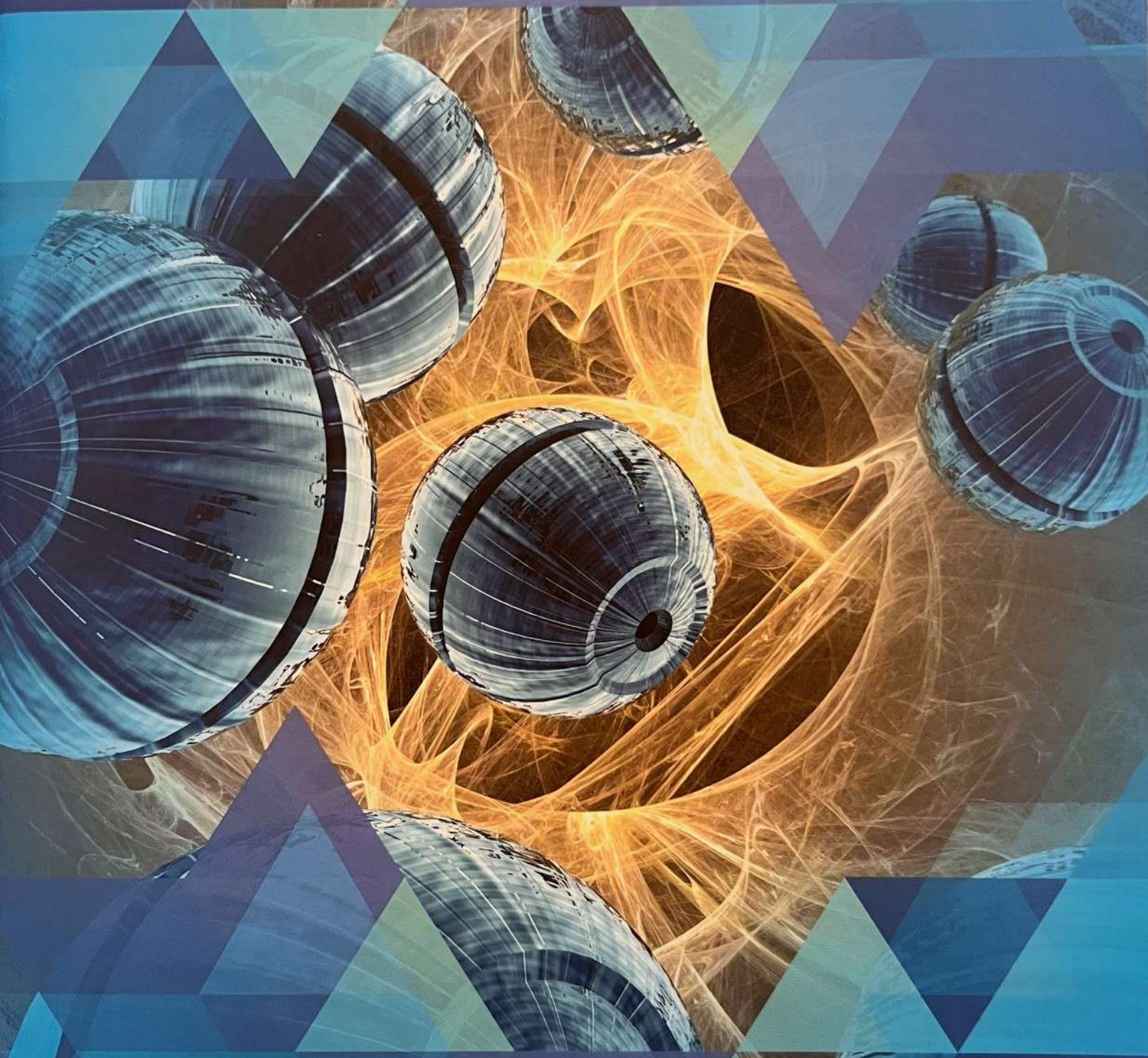
59th LONDON INTERNATIONAL YOUTH SCIENCE FORUM

LIYSF
London International Youth Science Forum



SCIENCE MAKING LIFE BETTER

26TH JULY TO 09TH AUGUST 2017

Under the patronage of
UNESCO

United Nations
Educational, Scientific and
Cultural Organization

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.

President
Professor Richard O'Kennedy Dip FS BSc PhD C.Biol FSB FI.Biol.I (Ireland): 2005 - Present

Chairman
Mr Mike Clark: 2009 - Present

Director
Mr Richard Myhill: 2009 - Present

Founder Patron
HRH Prince Philip, Duke of Edinburgh OM KG 1959-1969

Past Patron
HRH The Duke of Kent KG 1983-1988

Past Presidents
The Rt Hon Lord Nathan 1959-1962
Sir John Cockcroft OM 1963-1967
Sir Lawrence Bragg CH FRS 1968-1969
Dame Kathleen Lonsdale FRS 1970-1971
Prof. Sir Joseph Rotblat KCMG CBE FRS 1972-1974
Prof. Sir Hermann Bondi FRS FRAS 1975-1979
The Rt Hon Lord Ritchie Calder 1980-1982
The Rt Hon Lord Briggs 1983-1986
The Rt Hon Lord Porter OM PRS 1987-1989
Sir John Meurig Thomas FRS 1990-1993
Prof. Brian FG Johnson FRS FRSE FAcad 1994-2004

LONDON INTERNATIONAL YOUTH SCIENCE FORUM

ROYAL PARADE MEWS | CHISLEHURST | BR7 6TN | UK

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THE PRIME MINISTER
2016 - PRESENT

DOWNING STREET
LONDON SW1A 2AA

July 2017

I am delighted to support the 59th London International Youth Science Forum.

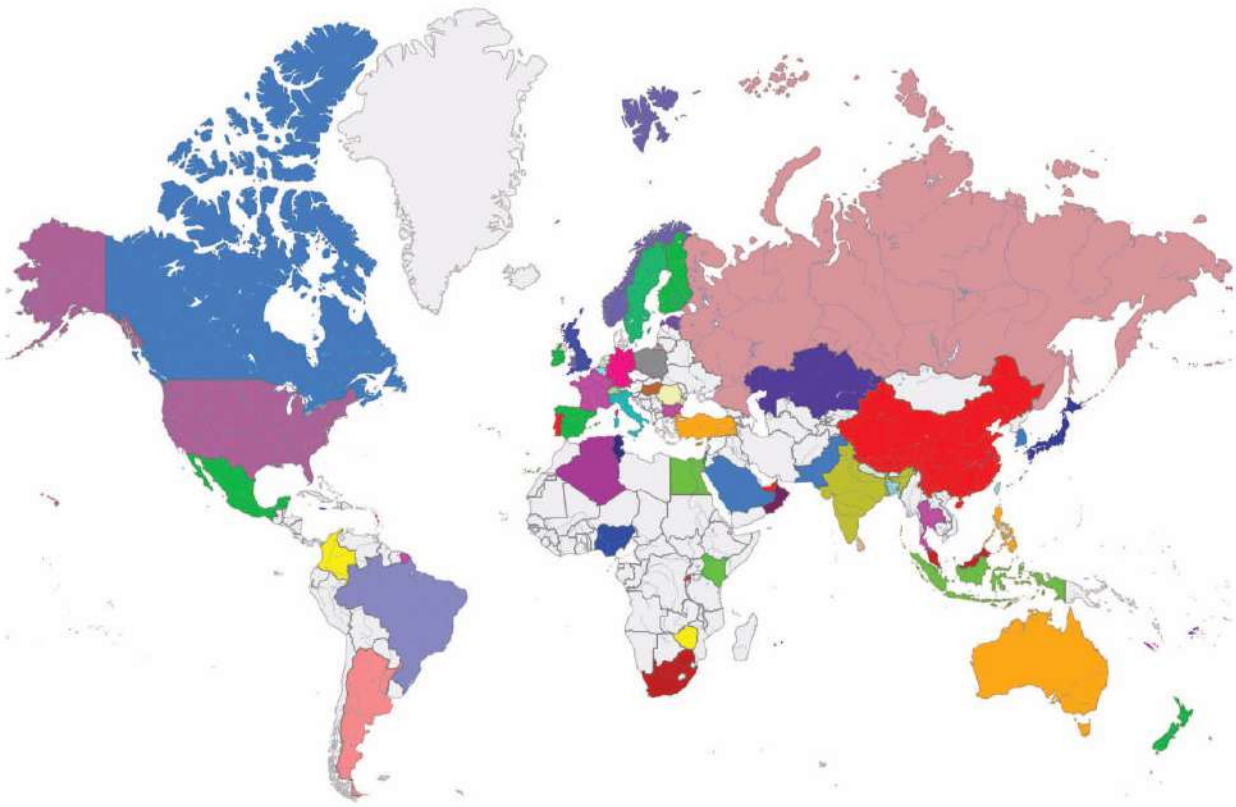
I agree that science makes a huge contribution towards making the world a safer place and was pleased to learn that this year's theme will be 'Science - Making Life Better'.

We want to make the UK the best place in the world to learn science and create a strong STEM workforce. For the UK to reach its full potential, we must draw on all our available talent, improving diversity in the STEM workforce, and inspiring more young people to study STEM subjects.

Events such as LIYSF provide a fantastic platform for young people, from all over the world, to come together and share ideas. I would like to welcome all the participants to the UK for this great event. I hope you enjoy this fantastic experience and make the most of all the opportunities available to you.

Theresa May
The Prime Minister

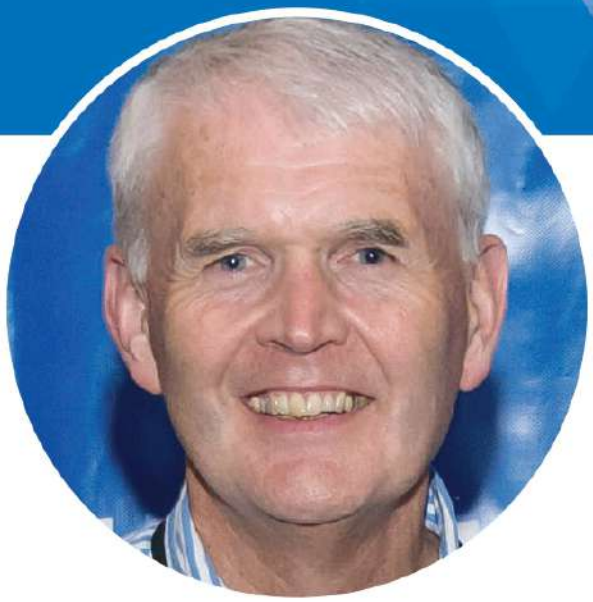
REPRESENTED COUNTRIES



The following 67 countries and territories will be represented this year:

Algeria
Argentina
Australia
Bangladesh
Barbados
Belgium
Brazil
Bulgaria
Canada
Catalonia (Spain)
China
Colombia
Cyprus
Egypt
England
Estonia
Fiji
Finland
France
Germany
Guernsey (UK)
Hong Kong (China)
Hungary
India
Indonesia
Ireland
Israel
Italy
Jamaica
Japan
Kazakhstan
Kenya
Luxembourg
Malaysia
Malta
Mauritius
Mexico
Myanmar
Nepal
Netherlands
New Zealand
Nigeria
Norway
Oman
Pakistan
Phillippines
Poland
Portugal
Romania
Russia
Rwanda
Saudi Arabia
Scotland (UK)
South Africa
South Korea
Spain
Sri Lanka
Sweden
Switzerland
Taiwan (ROC)
Thailand
Tunisia
Turkey
UAE
USA
Wales (UK)
Zimbabwe

PRESIDENT
PROFESSOR RICHARD O'KENNEDY



July 2017

It gives me great pleasure, as President, to welcome you to the London International Youth Science Forum (LIYSF) for 2017. The LIYSF provides a major opportunity for you to meet young scientists from all over the world, to learn from their scientific and cultural perspectives, and to exchange and debate ideas, with science providing the starting point and catalyst for such interactions. Currently the world faces very many challenges at all levels and, in the future, you must take responsibility to resolve the many significant issues that will arise.

I have been involved with the Forum as a participant, staff member, host, advisor and President for forty six years. It has made me aware of the roles that we all have as citizens of this world. Science can and does make major contributions, but it is part of a much larger network of responsibilities and it must play its role effectively while recognising the dignity and integrity of all humanity. This is my final year as President - LIYSF has changed my life, enabled me to make great friends, to carry on exciting scientific research that improves the lives of others and to do so in a global context.

At the LIYSF you will be constantly challenged in terms of your knowledge of science and your opinions. This is a very exciting aspect and will ensure that you grow and develop both scientifically and personally. I am confident that coming on the Forum will be a wonderful experience and I look forward to meeting you.

Richard O'Kennedy

Richard O'Kennedy
President, London International Youth Science Forum
Professor of Biological Sciences & Scientific Director, Biomedical Diagnostics Institute
Dublin City University (DCU)

DIRECTOR
RICHARD MYHILL

July 2017

In 1959, what was then called the 'Science Fortnight', began the belief that "out of like interests, the strongest friendships grow". Today in 2017, we hold the same belief: with our focus on cultural interaction and the very best science and engineering.

LIYSF was founded in the aftermath of the Second World War - in an effort to overcome the animosity resulting from war with a coordinated programme in science. HRH The Duke of Edinburgh agreed to be Patron and spoke at the first, second and third LIYSF. Within a short period, interest in LIYSF spread across the UK and beyond Europe to the USA and Canada, and later across the five continents.

In the seventh decade of its existence, the structure of LIYSF and its participation is constantly evolving, but our core principle remains; we pride ourselves in welcoming the best science students from across the world to put science and culture into perspective and to encourage those attending to; be aware of and consider how to help address the needs of the world.

LIYSF has a full, rich and varied programme with students participating in incredible lectures from world renowned speakers, visits to leading university departments and research organisations, debates and an engaging social programme. As Director, it is my job to bring this all together. I work throughout the year, carefully managing all aspects and development of the Forum,to ensure that we fulfil and exceed the responsibility and expectations of our attending students, supporting organisations and governments.

It is with great pleasure that I welcome you to London and hope that you have a wonderful time at the Forum.

Richard Myhill
Director

CHAIRMAN
MIKE CLARK

July 2017

It is the time of year again when we look forward to welcoming some 475 students from 67 countries to London for the 59th London International Youth Science Forum (LIYSF). Anticipation is in the air for our participants and the team who have been putting the event together for the last year bringing all the planning and preparation, both internationally and here in London, together to provide the unique event that is the LIYSF.

I can add little to Professor Richard O'Kennedy's foreword in terms of the impact that the LIYSF has on so many in terms of their future career direction, the lifetime friendships which will be made and the opportunity to learn, attend science and cultural visits and, of course, enjoy the Forum and its unique culture amongst individuals from so many different parts of the world.

May I publically thank Richard for his amazing contribution over the 46 years he has been involved with the LIYSF at all levels – from participant through to President.

In my time involved with the LIYSF, it has become increasingly apparent that many of the world's issues will be resolved by multi-disciplinary and multi-national approaches - a concept that the LIYSF has championed for over 59 years. At a time when actual and perceived barriers to international collaboration appear to be on the rise, it is essential that we all understand that there is no monopoly of ideas from any discipline or nation and collaboration can be so beneficial.

For our students visiting, please make the best of your time at the LIYSF this summer, be it in the lecture theatre, on science and cultural related visits, debating amongst yourselves and even when having fun with your new found friends. Enjoy the best of what this great capital city of ours has to offer!

MClark

Mike Clark
Chairman

THE SCHEDULE

Wed 26th July	10:00 – 16:00	Arrivals
	19:30 – 21:00	Welcome. Kensington Suite, Millennium Gloucester
Thurs 27th July	11:00 – 12:30	LIYSF Opening Ceremony, Ondaatje Theatre - Royal Geographical Society
		Key Note Address - Professor Hayat Sindi, UNESCO President's Address - Professor Richard O'Kennedy
	15:15 – 15:45	Programme Introductions. Ondaatje Theatre, Royal Geographical Society
	16:00 – 17:30	Lecture/Demonstration - Dr Rolf Landua: 'CERN: The Higgs Boson - and Beyond' Ondaatje Theatre, Royal Geographical Society
	17:30 – 18:30	Sale of Optional Excursions. Royal Geographical Society
	20:30 – 23:30	Welcome Party. Orchard Suite, Millennium Gloucester
Fri 28th July	09:00 – 13:00	Visits to Research & Scientific Establishments in London
	14:30 – 16:00	Lecture/Demonstration - Professor Sir Colin Blakemore: 'Vision Impossible!' Ondaatje Theatre, Royal Geographical Society
	18:30 – 22:00	The Science Forum Bazaar - Student Project Poster Board Evening Royal Geographical Society
Sat 29th July	10:30 – 12:00	Lecture/Demonstration - Jonathan Firth: 'Virgin Galactic: Adventures in the New Space Industry'. Ondaatje Theatre, Royal Geographical Society
	14:00 – 16:00	Optional London River Sightseeing Tour and The London Eye
	19:30 – 21:30	FameLab LIYSF - Student Topics. Ondaatje Theatre, Royal Geographical Society
Sun 30th July	08:30 – 17:00	Optional Visit to Stonehenge & Salisbury
	19:30 – 21:00	Student Debate Evening. Ondaatje Theatre, Royal Geographical Society
Mon 31st July	09:45 – 12:00	Specialist Lectures. Meet at Queen's Lawn
	14:30 – 16:00	Lecture/ Demonstration - Professor Sarah Hainsworth: 'CSI Richard III: Wounds And Weapons'. Ondaatje Theatre, Royal Geographical Society
	19:30 – 22:00	Great Crossword Treasure Hunt. Queen's Lawn and South Kensington Area
Tues 1st Aug	07:30 – 18:00	National Visits to Research & Scientific Establishments
	19:00 – 22:30	Optional Theatre Shows

Wed 2nd Aug	09:15 – 17:00	Specialist Study Day - 'Science - Making Life Better'. Ondaatje Theatre, RGS
	19:30 – 21:00	Lecture/Demonstration - Dr Jason Nurse: 'Cybersecurity: It's So Much More Than Just 1's and 0's!'. Ondaatje Theatre, Royal Geographical Society
Thurs 3rd Aug	08:00 – 17:30	Visits to Oxford & Cambridge Research and Scientific Institutions
	19:00 – 21:00	Rehearsals/Auditions, Ethos Sports Hall
Fri 4th Aug	09:45 – 12:00	LIYSF Alumni Specialist Lectures. Meet at Queen's Lawn
	13:30 – 15:00	Lecture/Demonstration - Professor David Smith: 'Chemistry Fighting Disease - Medicine Beyond the Molecule'. Ondaatje Theatre, Royal Geographical Society
	15:30 – 18:00	Visits to Science & Natural History Museums
	20:30 – 22:00	International Cabaret – Cultural Showcase Performance Evening Orchard Suite, Millennium Gloucester
Sat 5th Aug	10:30 – 12:00	Lecture/Demonstration - Professor Mark McCaughrean: 'Explore the Universe with the ESA'. Ondaatje Theatre, Royal Geographical Society
	15:00 – 17:00	LIYSF Sports Day Session. Ethos Sports Hall
	19:30 – 21:00	Lecture/Demonstration – Professor Semali Perera: 'Molecules and Nanotechnology in the Modern World'. Ondaatje Theatre, RGS
Sun 6th Aug	08:30 – 17:30	Optional Visit to Oxford or Cambridge
	09:00 – 16:00	Optional visit to the Tower of London and London Sightseeing Bus
	20:30 – 22:00	Traditions of Home – Sharing World Customs and Fashion Orchard Suite, Millennium Gloucester
Mon 7th Aug	09:45 – 12:00	Specialist Lectures. Meet at Queen's Lawn
	14:00 – 16:00	Optional Visits to State Rooms at Buckingham Palace and The London Eye
	19:00 – 22:30	Optional Theatre Shows
Tues 8th Aug	09:30 – 11:30	Participant's Forum. Ondaatje Theatre, Royal Geographical Society
	13:30 – 15:00	Closing Lecture - Professor Eric Yeatman: 'The Information Age: How Far Can It Go?' Ondaatje Theatre, Royal Geographical Society
	15:30 – 16:00	Closing Ceremony. Ondaatje Theatre, Royal Geographical Society
	20:30 – 23:30	Farewell Party. Orchard Suite, Millennium Gloucester
Wed 9th Aug	08:00 – 10:00	Departures

Principal Lectures and Demonstrations	Specialist Lectures	Visits	Social Programme	Optional Visit

PLENARY LECTURES AND DEMONSTRATIONS

KEY NOTE ADDRESS

PROFESSOR HAYAT SINDI

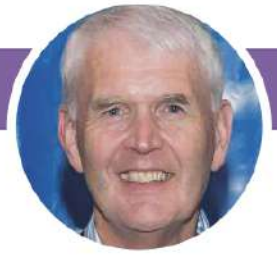
UNESCO GOODWILL AMBASSADOR, CEO I2 & DIAGNOSTICS FOR ALL

AN INSIDER VIEW ON SCIENCE AND SUSTAINABILITY

The world and all of its people are always facing new challenges and now it's up to science to solve on the most difficult challenging problem. Sustainability. We have to think differently, work differently in order to save planet earth, and future generations, in time. With the clock ticking, what exactly are countries, leaders, scientists and others doing about it? This lecture will give an insider view of the challenge and how we're working to getthe very best out of humanity's greatest tool. Science!

Hayat Sindi is a leading bio technologist and a champion of science and technology in the Middle East. At a young age, inspired by great scientists and thinkers, Hayat convinced her family to allow her to travel alone to England to pursue her higher education, a rare permission for a young Saudi woman. She went on to earn a degree in pharmacology with honors from King's College London in 1995 and five years later became the first woman from the Gulf to obtain a PhD in biotechnology from Cambridge. Driven by her desire to more closely link science and social impact, she co-founded a non-profit organization with a team at Harvard called 'Diagnostics For All', which creates innovative, inexpensive, point-of-care diagnostic devices for people in impoverished regions. These devices require no power, water or trained doctors and have the ability to provide potentially life-saving medical results in minutes. She has invented a machine combining the effects of light and ultra-sound for use in biotechnology.

In 2011, she launched i2, the Institute for imagination and Ingenuity, to encourage innovation among young people. Through fellowships, trainings and mentorships, i2 seeks to empower and inspire the next generation of innovators so that they may realize their dreams. In 2013, Sindi was one of the first 30 women to be appointed to the Saudi Arabia's highest consultative body, the Shura Council, and is one of 25 global experts selected by United Nations (UN) Secretary General Ban Ki Moon to be a member of the newly constituted UN Scientific Advisory Board. Sindi is also a Goodwill Ambassador for Sciences at UNESCO.



PRESIDENT'S WELCOME

PROFESSOR RICHARD O'KENNEDY

LIYSF PRESIDENT

DUBLIN CITY UNIVERSITY

Since 2005, Professor Richard O'Kennedy has been the academic President of LIYSF. Richard is Professor of Biological Sciences and Scientific Director of the Biomedical Diagnostics Institute at Dublin City University (DCU). He is former Vice-President for Learning Innovation in DCU, (since, Vice- President of the Institute of Biology of Ireland and represents Ireland and the Royal Irish Academy (RIA) on the Biosciences committee of the European Academies Science Advisory Council).

He directs the Applied Biochemistry Research Group, internationally recognised for its expertise in antibody generation and immuno/ biosensor assay development, has published extensively (210 peer-reviewed papers, 25 reviews, 30 book chapters, 1 book and another in preparation) and has mentored 60 PhDs to completion. He is a member of the Industrial Research and Commercialisation Committee at Enterprise Ireland, reviews for many journals/ international scientific bodies, edits three journals, has patents and licensed technologies/reagents and works closely with Irish/ international companies. He is a recipient of the Biochemistry medal of the RIA, President's awards for Teaching and for Research, the Fujitsu Innovation award and he coordinates the Masters in Biomedical Diagnostics which received the Outstanding Masters award in 2011. In 2014, he was elected to membership of the Royal Irish Academy.

THURS 27TH JULY

DR ROLF LANDUA
CERN

CERN: THE HIGGS BOSON - AND BEYOND

In 2012, the ATLAS and CMS experiments at CERN's Large Hadron Collider (LHC) announced the discovery of the Higgs boson, a crucial piece for our understanding of fundamental physics. This lecture describes how the Higgs boson was found, the amazing instruments that have allowed such an accomplishment, and the many open questions that provide opportunities for future discoveries.

Rolf Landua, Senior Research Physicist at CERN. PhD in physics from the University of Mainz, Germany (1980). Research at CERN focussed on experiments with antimatter: co-initiator of the antimatter factory (AD), and spokesperson of the ATHENA experiment that produced millions of antimatter atoms in 2002. Since 2005, leader of CERN's education and teacher programmes. Since 2009, also responsible for CERN visits and exhibitions. He is now CERN's Head of Global Engagement, still with a great passion for inspiring and motivating young people for science.

FRI 28TH JULY

PROFESSOR SIR COLIN BLAKEMORE
SCHOOL OF ADVANCED STUDY

VISION IMPOSSIBLE!

Vision is our primary sense and knowledge of how the brain works has been driven by the study of vision. We experience the world like a detailed, seamless, real-time video stream. But in reality, shifts of gaze, occurring about 3 times each second, deliver data-dumps to the brain, most of the information coming from the portion of the image falling on the tiny central fovea of the eye. During each snapshot, the brain gathers, encodes and stores only a small fraction of the information from the eye. The task of scientists is to account for the miraculous transformation of so little into so much. And if conscious awareness is largely invented, why do we need to be conscious of anything?

Sir Colin Blakemore is Professor of Neuroscience & Philosophy in the School of Advanced Study, University of London and Emeritus Professor of Neuroscience at Oxford. From 2003-7, he was Chief Executive of the Medical Research Council. His research is concerned with many aspects of vision, development and plasticity of the brain. He has been President of the British Science Association, the British Neuroscience Association, the Physiological Society and the Royal Society of Biology. He is strongly committed to engagement between science and the public. He is a frequent broadcaster and he writes for the national / international press.

SAT 29TH JULY

JONATHAN FIRTH
VIRGIN GALACTIC

ADVENTURES IN THE NEW SPACE INDUSTRY

This lecture will summarise how; Richard Branson, the Virgin Group and Jonathan himself became involved in the commercial space industry, some of the challenges faced along the way and how these were overcome. The lecture will consider Virgin's goals and progress of its various aerospace companies now established in the United States - especially Virgin Galactic's work to provide suborbital personal spaceflight and science research flights on its SpaceShipTwo spaceplane, and Virgin Orbit's efforts to deploy small satellites into various earth orbits using the Launcher One vehicle.

Jonathan Firth holds an honours degree in mechanical engineering from Imperial College, London and an MBA from Henley Business School. He has been a member of Virgin Galactic's leadership team since 2004, and is currently Executive Vice President of Spaceport & Program Development, New Mexico and California USA, where he currently lives. He began his Virgin career in the UK in 1998 as Project Director at Virgin Rail Group and was the companies professional head of engineering. After that, he spent three years as Director of Projects at Virgin Atlantic Airways.

SUN 30TH JULY

DR FRIEDERIKE OTTO
UNIVERSITY OF OXFORD

CLIMATE CHANGE DEBATE

Join us for this debate evening where will consider climate change and the relationship/responsibility science and engineering has with/for this topic.

This session will be led by Dr Friederike Otto, Deputy Director and senior researcher at the Environment Change Institute (ECI) at the University of Oxford. Friederike leads and coordinates the international project: World Weather Attribution and the distributed computing climate modelling project: climateprediction.net. Her main research interest is on extreme weather events, improving and developing methodologies to answer the question 'whether and to what extent external climate drivers alter the likelihood of extreme weather'. She furthermore investigates the policy implication of this emerging scientific field. Friederike is a physicist by training but gained a PhD in philosophy of science from the Free University Berlin.

PLENARY LECTURES AND DEMONSTRATIONS

MON 31ST JULY

PROFESSOR SARAH HAINSWORTH

UNIVERSITY OF LEICESTER

CSI RICHARD III: WOUNDS AND WEAPONS

The remains of a skeleton were discovered under a car park in Leicester in 2012. The skeleton had injuries that had been sustained in battle and a pronounced scoliosis. DNA testing and a Bayesian statistical analysis showed that the remains were those of Richard III, the last Plantagenet King. The lecture will discuss the dig, the analysis of the skeleton, the wounds and weapons and the way in which this skeleton was confirmed to be those of England's last King to die in battle on home soil.

Sarah is Head of Department of Engineering at the University of Leicester and a Professor of Materials and Forensic Engineering. Her research interests are in forensic engineering related to stabbing and dismemberment, materials characterisation, automotive tribology, and materials for future power plants. Sarah is a Fellow of the Royal Academy of Engineering, a Chartered Engineer, a Chartered Scientist and Fellow of the Institute of Materials, Minerals and Mining. In 2009, she was named as one of the Women's Engineering Society's Inspiring Technical Women and in 2015 was awarded the Andrew H Payne Jr Award of the American Academy of Forensic Sciences.

WEDS 2ND AUGUST

DR JASON NURSE

UNIVERSITY OF OXFORD

CYBER SECURITY: IT'S SO MUCH MORE THAN JUST 1'S AND 0'S!

Our world is driven by technology, and while it offers a plethora of benefits to society, it also opens us up to a significant amount of new and complex risks. These can relate to how we conduct transactions online, how we engage with our friends, and how we interact with new platforms such as social media and the internet-of-things. This lecture will explore these issues from the perspective of Cyber security.

Jason is a Research Fellow in Cyber security at the University of Oxford and a JR Fellow in Wolfson College. He graduated; with first class honours from the University of West Indies in Barbados, Masters in Internet Computing from the University of Hull and a Doctorate in ICT's & Security from the University of Warwick. These degrees were sponsored by scholarships including; UK Department for International Development, an ORS Awards Scheme, and the Warwick Chancellor. He is a visiting Fellow in Defence and Security at Cranfield University, and Professional Member of the British Computing Society. For his interdisciplinary research, he was nominated as a Rising Star within EPSRC's RISE awards campaign.

FRI 4TH AUGUST

PROFESSOR DAVID SMITH

UNIVERSITY OF YORK

CHEMISTRY FIGHTING DISEASE - MEDICINE BEYOND THE MOLECULE

In the last 100 years, the human lifespan has almost doubled. This lecture outlines the crucial role in this achievement played by chemists. Indeed, biology only functions because of fundamental chemistry - to develop drugs capable of interacting with the human body, we need a firm grasp of chemistry. This lecture will explore the history of medicinal chemistry and how both 'bad' drugs (such as crystal meth) and good drugs (such as antibiotics) work, and consider cutting-edge research from his labs in York to glimpse the future of medicine.

David is a Professor of Chemistry at University of York doing ward-winning research in the field of smart self-assembled nanomaterials/medicines. He graduated with first class honors and obtained his PhD from the University of Oxford. In 2012, David was awarded the Corday Morgan Award from The Royal Society of Chemistry and the Bob Hay Lectureship in 2011. David has more than 110 independent peer-reviewed papers, two patents and >4000 citations. He was shortlisted for Times Higher Education 'Most Innovative Teacher' Award and won; the Royal Society of Chemistry's Higher Education Award, Vice Chancellor's Teaching Prize.

SAT 5TH AUGUST

MARK MCCAUGHREAN

EUROPEAN SPACE AGENCY

EXPLORE THE UNIVERSE WITH THE EUROPEAN SPACE AGENCY

In 2016, the European Space Agency (ESA) had a huge year in science and exploration, with the first results from its Gaia Milky Way surveyor and its LISA Pathfinder gravitational wave detection technology test bed, as well as the arrival of its ExoMars Trace Gas Orbiter and Schiparelli lander at the Red Planet, and the final act in the amazing Rosetta comet-chasing mission. This lecture will give an insight into each of these missions, their challenges, and their successes (as well as the not-quite-so-successful), and tell you what's coming next, including new missions to study the Sun, Mercury, and the wider Universe.

Mark is the Senior Advisor for Science & Exploration at the European Space Agency. He is also responsible for communicating results from ESA's astronomy, heliophysics, planetary, exploration, and fundamental physics missions to the scientific community and wider general public. Following a PhD from the University of Edinburgh, he worked at the NASA Goddard Space Flight Centre, followed by astronomical institutes in Tucson, Heidelberg, Bonn, and Potsdam, and taught as a professor of astrophysics at the University of Exeter. He is also an Interdisciplinary Scientist for the NASA/ESA/CSA James Webb Space Telescope.

SAT 5TH AUGUST

PROFESSOR SEMALI PERERA
UNIVERSITY OF BATH

MOLECULES AND NANOTECHNOLOGY IN THE MODERN WORLD

In the modern world, molecular separation/purification or delivery of molecules for medical treatment using nanotechnology has become extremely important. The lecture will concentrate on the manufacturing and testing of some of these molecular separation devices and biodegradable/biocompatible sustained drug delivery vehicles for cancer treatment. The molecular separation technology such as membranes and structured adsorbents for pollution control will also be discussed along with her personal experience in establishing a spin-out company nano-porous solutions limited (n-psl).

Professor Semali Perera has a BSc (Eng) in Chemical Engineering and a PhD from Brunel University, Uxbridge. She is a Chartered Engineer and a Fellow of the IChemE. In 2002, she won the Mary Tasker Award for Excellence in Chemical Engineering Teaching. In 2007, she won the prestigious Royal Society Brian Mercer Award for Innovation in pollution control technology. In June 2007-2010, she was Research Director for the University spin-out company Nano-Porous Solutions Ltd. In 2017, she was the winner of the Academic Award in the UK's biggest programme championing women in technology, FDM Every Woman in Technology Awards. She specialises in adsorption and low-pressure drop adsorbent structures for advanced separations, nanomaterials and microencapsulation of drug molecules.

TUES 8TH AUGUST - CLOSING CEREMONY

PROFESSOR ERIC YEATMAN
IMPERIAL COLLEGE LONDON

THE INFORMATION AGE: HOW FAR CAN IT GO?

We have become used to a world where our access to all kinds of information is simple and immediate, wherever we are. We know this is driven by the rapid and relentless advances, over decades, in our ability to capture, transport, process, store and present information. But how long can these advances continue? Are there limits to the ultimate capabilities in information technology (IT)? And can we know whether what seems to be a fundamental limit will turn out to be just another hurdle which some technological breakthrough will overcome?

This lecture will consider a few basic principles underlying IT, and how far we have come in relation to the potential these principles imply. The lecture will consider what some ultimate limits might be, in computing power, wireless communication, and data storage, and how our technological world might respond when finally we reach these limits.

Professor Eric Yeatman is Professor of Micro-Engineering at Imperial College London, and has been Head of the Department of Electrical and Electronic Engineering since 2015. He was also Visiting Professor at the University of California, Berkeley from Jan-Sept 2015. He has published more than 200 papers and patents on optical devices and materials, micro-electro-mechanical systems (MEMS), and other topics, and currently works on energy sources for wireless devices, micro-engineered sensors and actuators, wireless sensor networks, and 2D materials.

Professor Yeatman was awarded the Royal Academy of Engineering Silver Medal in 2011, given "to recognise an outstanding and demonstrated personal contribution to British engineering", and was made a Fellow of the Academy in 2012. He is also co-founder and Chairman of Microsaic Systems plc, which develops and markets miniature mass spectrometers based on MEMS technology, and was the first company to introduce a miniature mass spectrometer for liquid analysis to the market.

MONDAY 31st JULY
SPECIALIST LECTURES

LECTURE 31.1

ROMA AGRAWAL
AECOM

ENGINEERING: THE MOMENTS THAT CHANGED OUR WORLD

Roma will talk about her journey into engineering and about her work on The Shard, the tallest tower in Western Europe. She will then follow up with four inspiring stories of engineers from history that - sometimes accidentally - created or discovered things that have had a revolutionary impact on our modern world.

Roma Agrawal is a structural engineer at AECOM who builds big. From skyscrapers – including The Shard – to footbridges, and train stations to sculptures, she has made a lasting contribution to London's landscape through her designs. She is a tireless promoter of engineering, scientific and technical careers to young people. She has advised policy makers and government on science education, and has spoken to thousands at universities, schools and organisations worldwide. She is a television presenter, and writes articles about engineering and education.

LECTURE 31.2

ENRIQUE AMAYA
UNIVERSITY OF MANCHESTER

UNCOVERING THE SECRETS OF EMBRYONIC DEVELOPMENT, TISSUE REPAIR AND REGENERATION

This lecture will discuss the molecular and cellular mechanisms responsible for embryonic development, scar free wound healing and tissue regeneration in frog embryos and tadpoles. We have recently found that tadpole tail regeneration requires the sustained production reactive oxygen species (ROS), which had previously been thought to be toxic to cells. Remarkably, we have also found that fertilization also induces sustained elevated production of ROS, which is also required for embryonic development.

Enrique is The Healing Foundation Professor of Tissue Regeneration at the University of Manchester. He obtained his undergraduate degree from the University of North Carolina at Chapel Hill. He obtained his PhD at the University of California at San Francisco. After spending ten years at the University of Cambridge, Enrique moved his laboratory to the University of Manchester in 2005, where his lab is investigating the cellular and molecular mechanisms responsible for tissue formation, repair and regeneration in amphibians and fish, with the hope it will lead to novel therapies for human tissue healing and regeneration.

LECTURE 31.3

PROFESSOR GRAZIELLA BRANDUARDI
UNIVERSITY COLLEGE LONDON

SPACE ASTRONOMY AND THE EXOTIC UNIVERSE

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 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 sources encompass some of the most energetic and exotic phenomena in the Universe: the densest stars; the hot debris of the explosive death of stars, giving rise to bright X-ray aurorae; they all provide us with clues about the origin, the evolution and, ultimately, the fate of our Universe.

Graziella has been fascinated by astronomy and space research since she was a teenager. After a degree in Physics at the University of Milano, Italy, and a PhD in X-ray Astronomy at University College London (UCL), she worked at the Harvard-Smithsonian Center for Astrophysics, USA and then returned to UCL Mullard Space Science Laboratory where she is based. After participating in major X-ray observatory missions over many years, Graziella is now co-leading the development of a joint ESA-Chinese Academy of Sciences mission called SMILE.

LECTURE 31.4

PROFESSOR LESLEY COHEN
IMPERIAL COLLEGE LONDON

SUPERCONDUCTIVITY AND MAGNETISM

Quantum mechanics underlies our understanding of superconductivity and magnetism. In this lecture, I will provide an introduction to the world of superconductivity, how it was first discovered and the mechanisms that were understood to be responsible for its remarkable properties as well as some of its current uses and current questions which lead the research directions in superconductivity today. I will then move onto a brief discussion of magnetism and magnetic solid state refrigeration describing the properties of the materials that underpin this technology. If time, I will discuss our latest work on frustrated magnets.

Professor Lesley Cohen is a professor of solid state physics studying the fundamental behaviour of materials and devices with unusual electronic, optical, superconducting or magnetic properties for a variety of applications including solid state efficient and environmentally friendly magnetic refrigeration. Over a number of years her group have developed a suite of characterisation tools that have enabled unique insight into the behaviour of materials at low temperatures and high magnetic fields. She has published over 350 journal publications in her areas of interest.

LECTURE 31.5

DR JAMES GRIME
THE ENIGMA PROJECT

BITS AND PIECES: SECRETS OF A DIGITAL WORLD

The world sends more messages today than ever before. Through the internet, we email, tweet and Instagram. With these messages being in code. This may not be surprising, but even those codes contain more secrets than you realise. We will reveal how film studios know if you are sharing movies illegally, how to hide a secret message on the internet in plain sight and the ingenious maths within a CD that allows it to keep playing. We will also reveal a World War II code machine even more secret and difficult than the famous Enigma, and how that code was broken. We will introduce the Golden Age Hollywood actress and secret inventor who came up with an idea still used in Wi-Fi today.

James Grime is a mathematician and public speaker. Formerly of the Millennium Mathematics Project for the University of Cambridge, James now runs The Enigma Project and travels the world giving public talks on the history and mathematics of codes and code breaking. James is also a presenter of the YouTube channel: 'numberphile'.

LECTURE 31.6

DR DARREN MONCKTON
UNIVERSITY OF GLASGOW

THE DNA SEQUENCING REVOLUTION, HUMAN GENETICS AND UNSTABLE DNA

The first copy of the human genome DNA sequence took 15 years to complete at a cost of three billion pounds. Due to recent advances, it is now possible to obtain a sequence in a week for under £1,000. The ability to generate genome sequence data of large numbers of individuals is revolutionising our ability to diagnose inherited disease, understand the genetic contribution toward complex disorders such as heart disease, and genetically acquired disorders such as cancer. In addition, these advances are providing fundamental insights into biology and the origin of our species, as well as opening new markets in direct to consumer genetics.

Darren obtained a BSc in biochemistry from the University of Bath, a PhD in human genetics from the University of Leicester and did postdoctoral research in Baylor College of Medicine and MD Anderson Cancer Center, USA. In 1996, he took up a lectureship in genetics at the University of Glasgow, where he was also the recipient of a Lister Institute Research Fellowship. He is currently Professor of Human Genetics and Head of Subject for Biomolecular Sciences. He has presented more than 200 invited seminars and lectures, including the Genetics Society Balfour Lecture and the Tenovus Medal Lecture and many to patient groups.

LECTURE 31.7

PROFESSOR DEREK MOULTON
UNIVERSITY OF OXFORD

SEASHELLS, BALLISTIC TONGUES, AND EXPLOSIVE PLANTS – MATHEMATICAL MODELLING IN BIOLOGY

Until recent decades, mathematics and biology were seen as disparate, non-overlapping fields. Yet mathematics has been pivotal in some of the great advances in our understanding of and ability to manipulate and mimic the biological world. One of the biggest challenges is finding the appropriate level at which to study a phenomenon and to devise an appropriate mathematical representation – this is the 'art' of mathematical modelling. In this talk, I will explore these themes through several examples and demonstrate how mathematics can provide the perfect language to comprehend the marvels of the biological world.

Derek Moulton is an Associate Professor of Mathematical Biology in the Mathematical Institute at the University of Oxford. He received his PhD from the University of Delaware in the United States and has lived in Oxford since 2010. As an applied mathematician, Derek has studied a wide range of scientific problems, using computational, analytical and experimental tools to answer questions in the natural sciences, especially the biological world.

LECTURE 31.8

DR LUCY THORNE
UNIVERSITY COLLEGE LONDON

THE SECRETS TO A VIRUS' SUCCESS

The main goal of a virus is to spread. Everything about the way a virus infects your body, turns it into a virus-making factory and causes disease is geared towards securing its transmission to the next person or host. Human norovirus (Winter Vomiting Bug) is very efficient at spreading and has been called the perfect human virus, yet we have no drugs or a vaccine to stop it. In the past few years, the Ebola virus has caused the largest known outbreak in West Africa. This lecture will look into and compare the reasons behind the success of these different viruses, and by how researching their molecular secrets we can discover antiviral drugs and develop vaccines to use against them.

Lucy Thorne studied biochemistry at the University of Oxford, specialising in virology and immunology. She went on to complete at PhD at Imperial College London in infectious disease and immunology. Afterher PhD, she moved to the University of Cambridge to continue this workand in 2015, she went to Sierra Leone to contribute to research on Ebolavirus. She has recently moved to University College London to take up a Wellcome Trust postdoctoral research fellowship studying how HIVinteracts with the immune system.

WEDNESDAY 2rd AUGUST
'SCIENCE – MAKING LIFE BETTER' SPECIALIST STUDY DAY

LECTURE 2.1

PROFESSOR SIR ROY ANDERSON
IMPERIAL COLLEGE LONDON

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. The lecture will discuss the factors that promote the emergence and spread of pathogens. 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 consider 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, Imperial College London. His recent appointments include Rector of Imperial College London and Chief Scientist at the Ministry of Defence, UK. He has served as Director of the Wellcome Centre for Parasite Infections and the Epidemiology of Infectious Disease. He is author of 450+ scientific articles and has sat on numerous government and international agency committees including the World Health Organisation and UNAIDS. He is a Trustee of the Natural History Museum and chairs the science advisory board of WHO's Neglected Tropical Diseases programme.

LECTURE 2.2

DR ANNA BARNARD
IMPERIAL COLLEGE LONDON

TARGETING PROTEIN-PROTEIN INTERACTIONS FOR DRUG DISCOVERY

Our ability to mimic nature has resulted in some of the most significant breakthroughs in drug discovery. Proteins are responsible for controlling the majority of processes which occur inside a cell. However, they rarely carry out their function in isolation. Their activity is critically dependent on their interactions with other proteins. Protein-protein interactions (PPIs) not only play an important role human biology but are also essential for the survival and reproduction other organisms such as bacteria, viruses and disease causing parasites. The misregulation of PPIs, often through an abnormal increase in the levels of one of the binding partners, is often a key event in causing disease, most notably in many forms of cancer.

Following an undergraduate degree at Durham University, Anna completed her PhD in Chemical Biology at the University of York in 2012. She then carried out a postdoctoral research position at the University of Leeds working on protein-protein interactions in cancer. In 2015, Anna began a Junior Research Fellowship at Imperial College London where her group focuses on developing new ways of targeting protein-protein interactions in malaria parasites and infectious bacteria.

LECTURE 2.3

PROFESSOR JONATHAN GREEN
UNIVERSITY OF MANCHESTER

IMPROVING THE OUTCOME FOR AUTISM WORLDWIDE

Autism Spectrum Disorder (ASD) has a global population prevalence of about 1%; it profoundly effects children's' social development into adulthood and is a priority condition within the WHO mental health Global Action Programme (mhGAP). This lecture will focus particularly on our early parent-mediated interventions (PACT and iBASIS) that in UK trials are the first to produce sustained improvement in autism symptoms over the medium term; how PACT has been adapted for use in global low resource settings, with evidence of effectiveness from our trials in South Asia.

Jonathan is a Professor of Child & Adolescent Psychiatry at the University of Manchester and Manchester Academic Health Sciences Centre and Honorary Consultant at the Royal Manchester Children's Hospital. He trained in Paediatrics in London and Psychiatry in Oxford and Manchester. He has also led research on social development after early neglect and maltreatment, and treatment studies for self-harm in adolescence. Clinically, he runs a regional specialist Social Development Clinic, which undertakes assessment and treatment innovation with ASD and other impairments of social development in children.

LECTURE 2.4

DR MATTHEW DUNSTAN
UNIVERSITY OF CAMBRDIGE

FROM DATA TO DEVICE: SUSTAINABLE MATERIALS DESIGN FOR THE FUTURE

Most modern technological advances that improve our quality of life, from smart phones to renewable energy to transport, rely on the development of corresponding materials with new desirable properties. In the past the discovery of these materials has relied on serendipitous breakthroughs or trial and error, and thus limited the rate at which new technologies could be implemented. Additionally, modern design has increasingly more constraints as we seek materials that are environmentally sustainable. This lecture will give an overview of a new approach, rational design, which uses computational methods to model and predict the properties of new materials without actually making them, allowing scientists to target particular applications with precision and control.

Matthew Dunstan completed his undergraduate degree in Science at the University of Sydney, before moving to the UK to complete a PhD in Materials Chemistry at the University of Cambridge. He currently is a Research Fellow at Clare College, Cambridge, and works in the Chemistry Department focussing on big data computational methods to design new materials for environmental and energy applications.

LECTURE 2.5

DR NIKOLAY KORNIENKO
UNIVERSITY OF CAMBRIDGE

RENEWABLE ENERGY TO CHEMICAL FUELS

Society's increasing use of fossil fuels has led to rising global temperatures, decreasing air and water quality, and ultimately a worse planet for future generations to live in. This lecture will consider how we can decrease our reliance on fossil fuels by developing ways to capture and utilize renewable energy sources. This lecture focuses on catalysts that can transform electricity generated from solar/wind sources into chemical fuels that function as an energy storage and transport media. The challenge is to drive fuel-forming reactions with 1) earth-abundant materials, 2) at high efficiency and 3) with selectivity for a specific product. We will consider how sunlight and electricity is to generate fuels and what remains to be done for renewable energy to take the place of fossil fuels.

Nikolay Kornienko is currently a Royal Society Newton Fellow at the University of Cambridge. He received his BS degree from the University of Pittsburgh and his PhD from the University of California, Berkeley. His over arching motivation is to discover and implement the chemistry necessary to transition to a sustainable energy-based society. Specifically, he is working to develop and understand materials that convert solar and electrical energy to chemical fuels.

LECTURE 2.6

DR KEITH MATHIESON
UNIVERSITY OF STRATHCLYDE

AN OPTOELECTRONIC RETINAL PROSTHESIS FOR RESTORING VISION TO THE BLIND

Retinal degenerative diseases lead to blindness due to loss of the 'image capturing' photoreceptors, while neurons in the 'image-processing' inner retinal layers are relatively well preserved. Electronic retinal prostheses seek to restore sight by electrically stimulating the surviving neurons. We present a photovoltaic sub-retinal prosthesis, in which silicon photodiodes in each pixel receive power and data directly through pulsed near-infrared illumination and electrically stimulate neurons. This demonstrates the possibility of a fully integrated photovoltaic retinal prosthesis with high pixel density capable of restoring detailed vision to patients with degenerative retinal diseases.

Keith is the Director of the Institute of Photonics, a research institute with over 60 staff/students that focuses on applied photonics. In 2005, he was awarded a Royal Society of Edinburgh Personal Fellowship to develop devices to interface with the retina and form part of a retinal prosthesis system. He then moved on to hold a research scientist position at the University of California Santa Cruz and won an RCUK Science Bridges Fellowship (SU2P) to Stanford University. There he helped develop an optoelectronic retinal prosthesis to repair retinal degeneration.

LECTURE 2.7

PROFESSOR MARCUS RATTRAY
UNIVERSITY OF BRADFORD

MAKING MEDICINES IN THE MODERN AGE

We are in an era of rapid scientific discoveries to understand disease and discover effective treatments. However, we are still lack medicines to treat many important conditions, one example being Alzheimer's disease. This lecture and associated student-led workshops will discuss how to develop safe and effective medicines and explore the science underlying medicines development, including the innovations that are being developed to conquer illnesses.

Marcus Rattray is Professor of Pharmacology and Head of the School of Pharmacy & Medical Sciences, University of Bradford. Prior this he was a Reader in Pharmacology at the University of Reading, a Lecturer, then Senior Lecturer in Biochemistry at King's College London, and a post doctoral fellow at the National Institutes on Drug Abuse in Baltimore. Marcus' research interests are in understanding the processes involved in neurodegenerative diseases, particularly motor neurone disease and Alzheimer's disease and working towards the discovery of more effective medicines.

LECTURE 2.8

DR SETH ZENZ
CERN / IMPERIAL COLLEGE LONDON

INDIVIDUAL IDEAS, WORKING TOGETHER: THE DISCOVERY OF THE HIGGS BOSON

The recent discovery of the Higgs boson at CERN was the culmination of many years of work by many thousands of scientists, engineers, and technicians - many of them students. In an effort that requires so much long term planning, major engineering works, and large amounts of money, how do individual scientists contribute? This lecture will trace the flow of ideas in a big particle physics experiment, starting from individual insights, through collective discussion and refinement. Strategies for communication will be discussed: between independent scientists and groups in journals, in conferences, and on the web; as well as between scientists working together in formal collaborations.

Seth Zenz is a particle physics researcher at Imperial College London, working on the Compact Muon Solenoid (CMS) detector at the Large Hadron Collider (LHC) at CERN in Geneva, Switzerland. He contributes to studies of the Higgs boson, which was recently discovered by CMS and ATLAS. By studying specific mechanisms by which this new particle is produced and decayed, he will help determine whether it is truly consistent with the predictions for the Higgs boson made by the Standard Model of particle physics.

FRIDAY 4th AUGUST
ALUMNI SPECIALIST LECTURES

LECTURE 4.1

MAURICE BROWN
UTRECHT UNIVERSITY, THE NETHERLANDS - LIYSF 1986

THE IMPACT OF HYDROGEN FUEL TECHNOLOGY

The Hydrogen fuel cell has been around since 1839. This relatively obscure, but highly valued technology, helped power the United Space programme from the 1960's and still today. The technology holds great promise, as it presents a real alternative to fossil fuel energy. However, the industry will face a tough future. Promoters of this energy source must master the learning curve of the energy industry, if it is to become a feasible alternative. How does this technology work, what are its applications and what problems does it face as an industry?

Maurice Brown is from Kingston, Jamaica, studying at Campion College and the College of Arts Science and Technology. He moved to the Netherlands in 1994 and completed his Bachelor's degree in International Business Administration and Master's Degree in Business Management. He became a consultant to the aviation industry and later, held financial positions in various international companies. Currently, he is lecturer in Finance and Business Strategy at the University of Applied Sciences, Utrecht, (Netherlands) and is owner of a small company looking into promoting and exporting to developing countries.

LECTURE 4.2

JAMEER EMAMALLY
NUVIA GROUP - LIYSF 2003

ENGINEERING OUR LIVES

How do discoveries made today become tomorrow's reality? How does science move from the classroom to something you can touch and feel, or something that can help you solve a problem, investigate an idea, meet the needs of a city, a person or a company? This interactive lecture will give you an introduction to engineering and an awareness of the design process as we go on a brief journey to take an idea from concept to reality.

Jameer Emamally attended LIYSF 2003. Jameer has a strong background in engineering and management,with a good track record of working in collaborative teams on both the national and international level. Jameer has project managed complex teams to deliver key submarine systems and has worked on a number of defence projects in various phases of the product lifecycle. During his career, he has worked in civilian and defence industries and across varying disciplines.

LECTURE 4.3

PROFESSOR CHRISTOPHER KENNARD
UNIVERSITY OF OXFORD - LIYSF 1964

FROM FROGS EYES TO MAN: A 50+ YEAR JOURNEY IN NEUROSCIENCE

Some 50+ years since attending the LIYSF, Professor Kennard will describe the ups and downs of an academic career in clinical neurology and visual neuroscience. The emphasis will be on clinical research and the different methods we can use to understand the human brain in health and disease.

Professor Christopher Kennard is Head of the Medical Sciences Division, University of Oxford since January 2017. He is a medical graduate of the University of London and obtained a PhD at the MRC's National Institute of Medical Research. After training posts in neurology, he was appointed Consultant Neurologist at the Royal London Hospital, subsequently moving to Imperial College London as Professor of Clinical Neurology in 1991, and then Deputy Principal of the Faculty of Medicine. He became Head of the Nuffield Department of Clinical Neurosciences, University of Oxford in 2008. He has chaired the UK's Medical Research Council's Neuroscience and Mental Health Board and is a Fellow of the Academy of Medical Sciences. His research has covered many aspects of vision, oculomotor control and cognition in health and disease.

LECTURE 4.4

DR ED LLEWELLIN
UNIVERSITY OF DURHAM - LIYSF 1992

BUBBLE AND BANGS! BIG EXPERIMENTS IN VOLCANO PHYSICS

Volcanic eruptions are spectacular, fascinating and diverse. Some produce explosions that blast many cubic kilometres of rock into the stratosphere and cause regional devastation. Others produce fountains and rivers of lava that create a dramatic natural tourist attraction. Many do no more than quietly release gas into the atmosphere. Despite this diversity of eruptive style, all volcanic eruptions are driven by the same fundamental mechanism - the formation and growth of bubbles of magmatic gas. So why do some volcanoes explode violently, whilst others bubble quietly? Answering this question is one of the key goals of physical volcanology.

Ed Llewellin is an Associate Professor in Volcanology at Durham University and was a participant in LIYSF 1992. After reading Natural Sciences at Cambridge University, Ed undertook his doctoral research in Physical Volcanology at Bristol University. His research combines laboratory experiments, numerical modelling and fieldwork to understand how and why volcanoes erupt.

LECTURE 4.5

OJALI NEGEDU

IMPERIAL COLLEGE NHS TRUST - LIYSF 2006

PURSUING A CURE: HIV EUREKA MOMENTS

This lecture will give an overview on the development of antiretroviral therapy (ART) in the battle against human immune deficiency virus (HIV) from the start of therapy in the 1980s to the sophisticated and highly active treatments currently available and on to curative treatment strategy options as we build the armamentarium in HIV therapy. We will be looking at how the evolution of treatment has led to the continued successful management of HIV in the 21st century as well as exploring the struggles which lie ahead in resources, limited settings and the combined global efforts in tackling this condition.

Ojali attended LIYSF in 2006. She returned as a member of staff for several years and was chief of staff for two years. She studied pharmacy at King's College London and went on to work at Chelsea and Westminister Hospital, where she developed her interest and passion in the HIV and sexual health field, becoming a specialist pharmacist there. She is currently a specialist HIV Pharmacist working at St Mary's Hospital, Imperial College London, working with both adolescent and adult patient groups. Ojali has managed and organised trips to East Africa with a charity organisation and helped to facilitate educational sessions to village healthcare workers as well as managing projects for adolescents, women in-patient hospital visitations.

LECTURE 4.6

DR BECKY PARKER

INSTITUTE FOR RESEARCH IN SCHOOLS - LIYSF 1978

HELPING YOU DO RESEARCH IN SCIENCE RIGHT NOW

The Institute for Research in Schools supports school students and teachers getting involved in authentic research through a wide range of research projects in physics, space science, biomedical science, chemistry, marine science, energy, transport, maths and engineering. IRIS finds engagement in cutting edge research inspires students and teachers alike and in the year since launch we have over 350 schools taking up these opportunities from all over the country and some across the world! This session will get you started on research. We hope that you will love the chance to develop ideas at the cutting edge of science joining in with us and also developing new projects.

After a physics degree and research at the University of Chicago, Becky taught in a variety of schools and was Senior Lecturer in physics at the University of Kent. She is now Director of the Institute for Research in Schools (IRIS) based at the Science Museum and she teaches physics. Becky was awarded an MBE in the Queen's Birthday Honours 2008 and received Honorary Fellowship of the Institute of Physics in 2014. She is Visiting Professor, School of Physics and Astronomy, Queen Mary University of London. In the summer of 2016 she was awarded the Kavli Education Medal from the Royal Society.

LECTURE 4.7

DR HANNAH PRICE

UNIVERSITY OF TRENTO, ITALY - LIYSF 2005

EXPLORING EXOTIC PHASES OF MATTER IN THE QUANTUM WORLD

At very low temperatures, exotic new phases of matter emerge that are governed by the rich physics of quantum mechanics. In this talk, I will present how quantum effects lead to remarkable collective behaviour in many-particle systems, including superfluidity, where a liquid flows without viscosity, and superconductivity, where electricity flows without resistance. I will also introduce the so-called topological phases of matter that were recognised by the 2016 Nobel Prize and which are the focus of exciting on-going research across solid-state materials, photonics and ultracold atoms. Through exploring such exotic phases, we hope to both learn more about fundamental quantum physics and also move towards future applications in quantum technologies.

Hannah Price attended LIYSF as a high-school student in 2005, before going tothe University of Cambridge, where she studied Natural Sciences, with a focus on physics. After completing her M.Sci in 2010, she stayed at Cambridge for a Ph.D. and specialised in theoretical quantum physics. In 2013, she moved to Italy as a postdoctoral researcher at the INO-CNR BEC Center and University of Trento, before winning a Marie-Curie Individual Fellowship from the European Commission to continue her research in Trento.

LECTURE 4.8

DR MATTHEW SINCLAIR

IMPERIAL COLLEGE LONDON - LIYSF 2006

MACHINE LEARNING IN MEDICAL IMAGE ANALYSIS – HOW AI IS AUGMENTING DIAGNOSIS

In just the last 5 years, we have seen an explosion in the use of advanced machine learning techniques applied to image and video data, which have led to new applications across domains such as surveillance, special effects, self-driving vehicles, data compression and medical image analysis. In this talk we will explore how AI is impacting the way in which medical images are used to aid and improve medical diagnosis. We will look at several current and future applications, and cover what makes AI so adept at these tasks in an age of high powered computing and big data.

Matthew Sinclair is currently a post-doctoral researcher at Imperial College London, where his interests lie in applying deep learning toautomate and aid clinical assessment of medical image data, including fetal ultrasound and cardiac MRI data. He graduated from the University of Auckland in 2009 with a Bachelor of Biomedical Engineering (Hons). Hereceived his PhD from King's College London in 2014, where he worked onthe analysis of blood flow distribution in the coronary circulation, and onthe analysis of cardiac motion patterns to improve patient selection criteriafor surgery.

MONDAY 7th AUGUST
SPECIALIST LECTURES

LECTURE 7.1

DR GEMMA BALE
UNIVERSITY COLLEGE LONDON

SHINING LIGHT ON THE FUNCTION OF THE BRAIN: OPTICS IN MEDICINE

Near-infrared spectroscopy is a technique to monitor changes in brain activity using infrared light. It is becoming an important tool in neuroscience and neurointensive care as it can monitor the activity and health of the brain in a safe, non-ionising, way. This lecture will cover a broad range of topics to reflect the multidisciplinary nature of medical physics. In particular: the physics of light transport through tissue, the engineering of optical medical devices, the physiology of the brain in health and disease, and how these link together.

Gemma Bale is a Research Associate in the Biomedical Optics Research Laboratory at UCL. Her work focuses developing new neuromonitoring techniques for the measurement of cerebral oxygenation and metabolism to help diagnose and treat brain injury in newborn babies. Dr Bale received the Dietrich Lubbers award from the International Society on Oxygen Transport to Tissue in 2016, and in 2015 she was awarded the UCL Provost's Engineering Engager of the Year award for her work in communicating science to the public. Recently, Gemma has launched a new public engagement platform called MetaboLight.

LECTURE 7.2

TEMITAYO OLUGBADE
UNIVERSITY COLLEGE LONDON

TECHNOLOGY NEEDS TO KNOW ABOUT EMOTIONS

Emotions, feelings, mood are an important part of our interactions with one another, our world, and even within our own selves. This means that technology that is designed to make these interactions better needs to learn about emotions and related states. I will introduce you to the world of Affective Computing, the field of computer science where technology is taught to recognise and/or express emotions and related states, and the possibilities for technologies that know about emotions.

Temitayo Olugbade is a research scientist at the end of a PhD in Affective Computing at University College London where her research has been on the development of technology that can detect pain and related emotions and thought processes so that it can support chronic pain physical rehabilitation. Before her PhD, she earned a Masters in artificial intelligence at the University of Sussex following undergraduate study in computer engineering at Obafemi Awolowo University, Nigeria.

LECTURE 7.3

IAN CHRISTIE
UNIVERSITY OF SURREY

DOUGHNUTS, BANANAS AND FOOTPRINTS: WHY 'SUSTAINABLE LIFESTYLES' ARE HARD TO ACHIEVE

There is widespread understanding that in order to prevent dangerous climate change and reconcile development with Earth's ecological limits, we need to transform consumption patterns as well as make our production systems cleaner and greener. But changing lifestyles is hard to do. This lecture discusses the ways in which we as individuals can make changes - and the obstacles that make it so difficult to succeed. It proposes ways to make progress through old and new social networks, and through changes in what we value and how we think about 'prosperity'.

Ian Christie is a teacher and researcher in the Centre for Environment and Sustainability at the University of Surrey. His interests are in sustainable development, and how our lifestyles, values, political systems and ethics can evolve to help us achieve it. In his previous career he had numerous senior roles in business, think-tanks and central and local government in the UK. Ian currently works with the major ESRC-funded research programme CUSP, led by Prof. Tim Jackson of Surrey University, which explores the nature of 'sustainable prosperity' and how we might achieve it.

LECTURE 7.4

PROFESSOR FIONN DUNNE
IMPERIAL COLLEGE LONDON

COLD DWELL FATIGUE: UNCONTAINED AERO-ENGINE FAILURE AND ITS CONTROL

Cold dwell fatigue is thought to be the biggest single cause of uncontained aero-engine failure in aviation history. This talk starts with a brief history of dwell fatigue and the empirical observations made about its origins and the driving forces. This is followed by a presentation of the mechanistic understanding gained over the last twenty years or so and includes the novel (micro) experimental methods, state of the art characterisation techniques, and multi-scale modelling capabilities brought to focus on dwell fatigue. The talk concludes by showing that careful microstructural design and control may finally eliminate the potential for dwell fatigue in aero-engine components completely, so providing the elusive solution for a technologically demanding problem.

Fionn Dunne is an academic researching in the behaviour of materials, and prior to coming to Imperial College, spent seventeen years in Engineering Science at Oxford University. He moved to Imperial College in 2012 as Chair in Micromechanics in the Department of Materials. He holds a Royal Academy of Engineering/Rolls-Royce research chair, directs the Rolls-Royce University Technology Centre at Imperial, and leads the Engineering Alloys research group.

LECTURE 7.5

DR FARHAT KHANIM
UNIVERSITY OF BIRMINGHAM

RECYCLING DRUGS; WHAT IS IT AND HOW DO WE DO IT BETTER

Drug repurposing (reprofiling, repositioning, redeployment) is a complementary approach to new drug discovery, and has been gaining ground across the world as a viable route to finding affordable new therapies for diseases. This is particularly true for rare diseases and diseases of low/middle income countries. Using some fascinating case studies, the talk will discuss some of the history, the current state of affairs and the future of drug repurposing as a pipeline. We will debate how do we, as a global community, accelerate the pipeline and deliver better, affordable drugs to clinic as quickly as possible.

Farhat Khanim obtained an honours degree in Biological Sciences and then went on to study Epstein Barr Virus in nasopharyngeal carcinoma for a her PhD at the University of Birmingham. After a fellowship at the Karolinska Institute, she returned to Birmingham to continue her research. For the last 14 years, Farhat has been using drug repurposing, the use of existing drugs for new conditions, to help to identify and develop new drug therapies for cancer. The work of the team has resulted in several clinical trials and current studies have identified several new combinations that are being developed for the clinic.

LECTURE 7.6

DR SIMON KYLE
UNIVERSITY OF OXFORD

WAKING UP TO THE IMPORTANCE OF SLEEP

This lecture will give an introduction to the fascinating world of sleep research and outline the importance of sleep for health and wellbeing. For example, this lecture will discuss the impact of artificial light on our sleep-wake patterns and present the latest science on how technology can be used to improve sleep.

Simon Kyle is Senior Research Fellow in the Sleep and Circadian Neuroscience Institute (SCNi), Nuffield Department of Clinical Neurosciences, Universityof Oxford. He is also programme director for the new Oxford OnlineProgramme in Sleep Medicine. He holds an MA (First Class Hons) inPsychology and PhD in Psychological Medicine, both from the University ofGlasgow. Dr Kyle has research expertise in the aetiology and managementof sleep disturbance and the interaction between sleep disturbance andhealth. He has published >70 articles and book chapters and serves asAssociate Editor of the journal, Behavioral Sleep Medicine.

LECTURE 7.7

ANNA CHIARA PIRONA
GERMAN CANCER RESEARCH CENTER

CRISPR: LET THE GAME BEGIN!

Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) is nowadays a very hot topic in research. But how does it really work? And why does it represent a major revolution for scientists? In order to understand the advantages of this system it is crucial to have a clear view on the DNA repair mechanisms of the cells. Latest applications and modifications of the basic CRISPR system using different versions of Cas9 endonuclease will also be covered in this lecture, with special focus on synthetic lethality screenings.

During her high school studies Anna took part to several scientific competitions, eventually winning the participation to the EUCYS 2007. She completed her Master studies in Biotechnology in Milan University and subsequently moved to Sweden where she had the chance to work in different laboratories. Anna had her first approach with CRISPR in 2014 when everything was just at the early beginning. She moved to Germany in 2015 within a Marie Curie project and she is currently pursuing a PhD at the German Cancer Research Center (DKFZ) in Heidelberg in the Functional Genomics division.

LECTURE 7.8

PROFESSOR BHAMA RAMKHELAWON
NEW YORK UNIVERSITY MEDICAL CENTER, USA

THINKING OUTSIDE THE BOX: THE KEY TO SCIENTIFIC CREATIVITY AND SUCCESS

Thinking about the box elicits creative thinking which is key for novel and innovative scientific discoveries. The aim of this lecture is to help guide towards identifying, defining and collapsing the limits of the box in order to foster creativity in science. We will explore why it is important to think outside the box and discuss about strategies to achieve this aim. With the support of scientific publications, we will illustrate examples of how thinking outside the box has enabled to uncover important mechanisms in diverse pathologies.

In 2010, Bhama obtained her PhD from the University of Paris VII, France in cardiovascular diseases. Her work was focused at understanding how different blood flow patterns regulate cardiovascular diseases. She then moved to New York University Medical Center for a postdoctoral training to gain insights in the mechanisms governing the immune response in cardiovascular pathologies. She is currently an Assistant Professor and head of a laboratory focused at understanding the immune response in aortic aneurysms at New York University Medical Center in the department of surgery and cell biology.

FRIDAY 28th JULY
LONDON SCIENTIFIC VISITS

28.A Imperial College Healthcare, Alexander Fleming Laboratory Museum
St Mary's Hospital is home to the Alexander Fleming Laboratory Museum. Fleming discovered the antibiotic penicillin at St Mary's Hospital in 1928, a breakthrough that revolutionised medicine and earned him a Nobel Prize. Visitors to the Museum can see Fleming's laboratory, restored to its 1928 condition, and explore the story of Fleming and the discovery and development of penicillin through displays and video.

28.B Imperial College London, Department of Chemical Engineering
See the laboratories, pilot plant and computing facilities of one of the UK's largest departments of its kind.

28.C Imperial College London, Department of Life Sciences
One of the largest life science groups in Europe, research of full breadth of modern life science activity including, Molecular Biosciences, Molecular Biosciences; Cell & Molecular Biology and Ecology & Evolution.

28.D Imperial College London, Department of Materials: Biomaterials in Regenerative Medicine
Research into biomaterials for tissue engineering and regenerative medicine; and bio-nanotechnology for nanostructures and create nano-biomaterials.

28.E Imperial College London, Department of Electrical Engineering/Energies Futures Lab
The Energy Futures Lab is the focal point for the dynamic and diverse multi-disciplinary energy research across Imperial College London. We enable funding, training, and global partnerships for our researchers and students.

28.F Jodrell Laboratory at the Royal Botanic Gardens, Kew
World-famous centre for botanical research and study; includes a visit to the Jodrell Laboratory.

28.G King's College London - Centre for Stem Cells & Regenerative Medicine
Led by Professor Fiona Watt, located on the Guy's Hospital campus, the Centre acts as a focus for cutting-edge stem cell research taking place across the College and its partner NHS Trusts. The centre is particularly interested in how stem cells interact with their local environment, or niche and how an understanding of these interactions is important for developing effective cell therapies.

28.H Lloyds Register Foundation
The Lloyd's Register Foundation is a UK charity which aims to protect the safety of life and property, and to advance transport and engineering education and research.

28.I Sports Science
Sports courses at London Met are led a by a team of passionate and experienced lecturers with varied experience within sports teams, private practice and research environments. Teaching and learning is built around a mix of practical and theoretical sessions in custom built facilities.

28.J 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.

28.K Natural History Museum
Visit the Natural History Museum (NHM) to learn more about the work of the Museum and its 350+ scientists. The NHM has over 80 million specimens, a fraction of which are on display. Students will have the opportunity to go behind the scenes to see some of the specimens that are not on display to the public. NHM scientists will also provide an insight into research carried out at the Museum and their own personal experiences as a Museum scientist.

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

28.M Queen Mary University of London - School of Engineering and Materials Science
The School of Engineering and Materials Science (SEMS) is ranked as one of the best in the UK, with cutting-edge research focused in: Modelling and Simulation in Engineering Systems, Bioengineering and Materials Science. SEMS provides outstanding degree programmes coupled with internationally leading research.

28.N The Royal Institution
The Royal Institution (Ri) is an independent charity dedicated to connecting people with the world of science with over 200 years of history. At the L'Oréal Young Scientist Centre students will undertake a magnets and motors workshop, seeing a demonstration of Faraday's original electric motor and then building a simple battery powered motor that uses similar principles.

28.O University of London, Royal Veterinary College
The Royal Veterinary College is the largest and longest-established vet school in the English-speaking world and is a college of the University of London.

28.P The Tate - Conservation Department
Conservation scientists investigate artists' materials and techniques and study parts of the collection that are both difficult to conserve and poorly understood in terms of construction and materials. They also develop and provide analysis of materials to support conservation and collection-related activities.

28.Q University College London - Faculty of Engineering
The Engineering Faculty is uniquely international. Our students and staff join us from over 120 nations – as do our academic and business partners. Our teaching programmes are designed to engage students and give them the skills to address the world's challenges. We have pioneered new teaching methods for undergraduates and involve our postgraduates with our cutting-edge, highly-rated academic research. The graduates we educate progress to a wide range of roles, within engineering and technology sectors and beyond.

28.R University College London – Department of Haematology and Blood Transfusion
The laboratory issues approximately 50,000 blood and plasma products per annum, supporting the large Haemato-Oncology Department, a tertiary referral centre for the North West London area and the large Sickle Cell and Thalassaemia Unit which transfuses more patients than any other Trust in the UK.

28.S University College London, Jill Dando Institute of Security and Crime Science
Visit the first Institute in the world devoted to crime science. Research is concentrated on new ways to cut crime and increase security.

28.T London Wetland Centre
Over 100 acres of wetland sites, with extensive populations of wild birds, plants and insects. Talk to the experts about biodiversity and conservation.

TUESDAY 1st AUGUST
NATIONAL SCIENTIFIC VISITS

1.A Airbus UK
Core activities at Filton include the design, engineering and support for Airbus wings, fuel systems and landing gear integration.

1.B The Animal & Plant Health Agency (APHA)
The Animal and Plant Health Agency (APHA) is the UK Government agency responsible for animal, plant and bee health. APHA are responsible for; identifying and controlling endemic and exotic diseases and pests in animals, plants and bees, and surveillance of new and emerging pests and diseases; scientific research in areas such as bacterial, viral, prion and parasitic diseases and vaccines, and food safety; and act as an international reference laboratory for many farm animal diseases. As well as; facilitating international trade in animals, products of animal origin, and plants, protecting endangered wildlife through licensing and registration, managing a programme of apiary (bee) inspections, diagnostics, research and development, and training and advice and regulating the safe disposal of animal by-products to reduce the risk of potentially dangerous substances entering the food chain.

1.C British Geological Survey
The British Geological Survey is a UK public sector research establishment with the prime function of compiling national inventories of geological resources and managing the resource environment. We provide essential research and baseline evidence to support policy on energy supply, natural resources, infrastructure planning and environmental management.

1.D Cardiff University - School of Pharmacy and Pharmaceutical Sciences & Cardiff University Brain Research Imaging Centre (CUBRIC)
University Department with a strong tradition of innovative pharmaceutical education, scientific research and service to the pharmacy profession. In the 2014 Research Excellence Framework ranked the joint top School of Pharmacy in the country. Cardiff University Brain Research Imaging Centre (CUBRIC) is set to become one of Europe's top facilities for brain imaging. The new facility brings together world-leading expertise in brain mapping with the very latest in brain imaging and brain stimulation. The centre plays a pivotal role in the global endeavour to better understand the causes of neurological and psychiatric conditions, so as to yield vital clues for the development of better treatments.

1.E Cranfield University
Cranfield University (a wholly postgraduate institution) has a global reputation for inspirational teaching and research, industrial-scale facilities and superior links with industry and commerce. From unique cabin evacuation research to finding life on Mars, from a frost blanket for racecourses to zero-emission cars, and from the next generation of anti-landmine devices to a new blood glucose monitor, Cranfield's focus is squarely on the application of its research.

1.F John Innes Centre, Norwich Research Park
An independent, international centre of excellence in plant science and microbiology working to generate knowledge of plants and microbes through innovative research to benefit agriculture, the environment, human health and well-being.

1.G University of Leicester Space Research Centre & National Space Academy
Students will learn about Earth Observation science and the latest technology being developed here at Leicester for future Mars Sample Return missions. At the National Space Centre, students will tour the exhibit and attend a Masterclass in space-related physics.

1.H National Oceanography Centre & University of Southampton's School of Ocean and Earth Science
NOCS is the national focus for oceanography in the UK with a remit to achieve scientific excellence in its own right as one of the world's top five oceanographic research institutions.

1.I Rolls Royce
Visit to see Rolls-Royce, from its beginnings to present day product range. See the largest collection of aero engines in the country, ranging from World War 1 era piston engines, the famous Merlin, right up to modern day jet engines.

1.J Rothamsted Research Centre
The longest running agricultural research station in the world, providing cutting-edge science and innovation, in areas of crop productivity and quality and sustainable solutions for food and energy production.

1.K Rutherford Appleton Laboratory
The Science and Technology Facilities Council (STFC) is trying to answer some of the biggest questions about our World today. From the infinite simally small to astronomically large, from blue skies research to improving current technologies. The Rutherford Appleton Laboratory ishome to many of the UK's most advanced research facilities and supportswork in a range of areas including space science and astronomy, particlephysics, high powered lasers, physical and life sciences and developing new materials.

1.L Syngenta's International Research Centre at Jealott's Hill
Syngenta is a leading agriculture company helping to improve global food security by enabling millions of farmers to make better use of available resources. Jealott's Hill International Research Centre is the company's largest R&D site with key activities including the discovery of new active ingredients, new formulation technologies, product safety, technical support of our product range and seeds research.

1.M 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.

1.N University of East Anglia - The Tyndall Centre and the School of Environmental Sciences
UEA is a pioneering British University, leading the way in fields as diverse as climate change, social work, creative writing, international development, food science and much more. They are part of the most cited research centre outside of Oxbridge and London, and have won two Noble prizes.

1.O University of Essex, Human Performance Unit
The Human Performance Unit based in the University of Essex's state of the art Sports Science laboratories, provides physiological testing, nutritional support and body composition assessments to athletes looking to improve their performance. Further to their work with athletes from outside of the University, the HPU Sports Scientists also work closely with Performance Sport athletes from the University's three Performance Sports of Rugby 7's, Volleyball and Basketball. Athletes in these sports from all over the world are attracted to Essex University due to the high calibre coaching and sports science services offered to the teams.

1.P University of Kent, Electronics Laboratory
Design and research in electronics and digital multimedia equipment.

1.Q University of Nottingham, The School of Chemistry - Carbon Neutral Laboratories
A £4 million HEFCE-STEM funded award is supporting new teaching laboratories at the University of Nottingham. The development within the School of Chemistry will see the creation of a new teaching laboratory that will be fully equipped with cutting-edge, facilities used for research and teaching.

THURSDAY 3rd AUGUST
OXFORD AND CAMBRIDGE SCIENTIFIC VISIT DAY

3.A British Antarctic Survey
The British Antarctic Survey (BAS) is an international leader in Antarctic science, providing world-leading research infrastructure that enables scientists to work safely and effectively. The polar environment and ecology provides a sensitive indicator of global change.

3.B University of Cambridge, Department of Chemistry
The Department includes a large number of internationally recognised research groups covering an exceptionally broad spectrum of chemical science ranging from molecular biology to geophysics. Research includes strong collaborations in new areas with other academic disciplines and institutions, while maintaining a powerful presence in the traditional core areas of chemistry.

3.C University of Cambridge, Department of Earth Sciences
From geophysics and applied mathematics, geochemistry and sedimentology, petrology and volcanism, palaeontology and evolutionary biology, to the physics and fundamental properties of materials.

3.D University of Cambridge, MRC Laboratory of Molecular Biology
The MRC Laboratory of Molecular Biology (LMB) is one of the world's leading research institutes. Discoveries and inventions developed at the LMB, eg. DNA sequencing and methods to determine the structure of proteins. Its scientists work to advance understanding of biological processes at the levels of atoms, molecules, cells and organisms.

3.E University of Cambridge. NIHR Cambridge Biomedical Research Centre and Cambridge Science Centre
A partnership between Cambridge University Hospitals Foundation Trust and the University of Cambridge, creating an environment where internationally outstanding biomedical and clinical scientists work alongside clinical practitioners to achieve translation of research for the benefit of patients.

3.F University of Cambridge, Scott Polar Research Institute
The Scott Polar Research Institute (SPRI) was founded in 1920, as a memorial to Ct. Robert Falcon Scott, RN, and his four companions, who died returning from the South Pole in 1912 and is the oldest research institute of its kind. Now part of the Geography Department at the University of Cambridge, SPRI's mission is to enhance the understanding of the polar regions.

3.G Wellcome Trust - Medical Research Council - Cambridge Stem Cell Institute (CSCI)
The Cambridge Stem Cell Institute (CSCI) is a world-leading centre for stem cell research. Its mission is to transform the prevention, diagnosis and treatment of disease through a deep understanding of the mechanisms regulating stem and progenitor cells, both normal and pathological.

FRIDAY 4th AUGUST
VISITS TO SCIENCE & NATURAL HISTORY MUSEUMS

4.A Natural History Museum
NHM's vision is to advance knowledge of the natural world, inspiring better care of our planet with the mission to maintain and develop collections, and use them to promote the discovery, understanding, responsible use and enjoyment of the natural world. The 8-storey, landmark Darwin Centre and cocoon structure is the most significant development at the Natural History Museum since it moved to South Kensington in 1881. This dramatic new public space and state-of-the-art scientific and collections facility opens its doors to reveal a whole new Museum experience for visitors.

3.H Wellcome Genome Campus
A leader in the Human Genome Project, this institute is focused on understanding the role of genetics in health and disease with research into connection between genetics and infectious disease.

3.I Culham Centre for Fusion Energy
The Culham Centre for Fusion Energy (CCFE) is the UK's national laboratory for fusion research, owned and operated by the United Kingdom Atomic Energy Authority (UKAEA). CCFE hosts the world's largest magnetic fusion experiment, JET (Joint European Torus), on behalf of its European partners along with MAST (Mega Amp Spherical Tokamak), the UK's magnetic fusion experiment.

3.J HR Wallingford
HR Wallingford has been involved in research to solve water-related challenges worldwide for 70 years. The company has impressive physical modelling facilities which include seven wave basins, used to build and test scale models of ports, harbours and beaches. It also has numerous wave flumes, the largest of which, the Fast Flow Facility, can house a tsunami simulator, or be used to test the stability of renewable energy foundations.

3.K University of Oxford, Jenner Institute & Oxford Vaccine Group
The Jenner Institute was founded in November 2005 to develop innovative vaccines against major global diseases and has grown into one of the largest non-profit sector research and development activities in vaccinology. Uniquely it focuses both on diseases of humans and livestock and tests new vaccine approaches in parallel in different species.

3.L University of Oxford - Nuffield Department of Clinical Neurosciences
The Nuffield Department of Clinical Neurosciences (NDCN) provides a focus for world-leading translational neuroscience allowing the swift transfer of basic biomedical findings to the clinical setting and the delivery of evidence-based therapies for the benefit of society and the economy.

3.M University of Oxford, Pitt Rivers Museum
The Pitt Rivers Museum displays the archaeological and anthropological collections of the University of Oxford. The museum was founded in 1884 by Lt-General Augustus Pitt Rivers, who donated his collection to the University of Oxford.

3.N University of Oxford - Department of Physics
Oxford Physics Department work on major facilities worldwide, develop the most advanced experimental techniques and the most sophisticated theoretical methods to investigate nature at every scale.

3.O Oxford Brookes University, Department of Mechanical Engineering & Mathematical Sciences
The Department of Mechanical Engineering and Mathematical Sciences provides a range of professionally accredited mechanical, automotive, motorsport, mathematical and statistical programmes of study. The focus is to provide world class, high quality teaching and applied research so as to give our students an excellent experience.

4.B 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. It has been uniquely placed to acquire objects recording the Industrial Revolution, and now holds unrivalled collections in this area. Medical artefacts from all periods and cultures also form an important part of its holdings

FRIDAY 28th JULY
SCIENCE BAZAAR - STUDENT PROJECTS EVENING

All students are invited to take part in the Science Forum Bazaar, either presenting a project or visiting the stands and asking questions. The Science Bazaar is an exciting opportunity to present an independent research project in a non-competitive environment with fellow students from all over the world and our science experts.

LIYSF is very privileged to have the support and help of a team of science experts who will be asking questions at the stands and giving feedback.

SCIENCE BAZAAR JUDGES

Professor Colin Blakemore
School of Advanced Study
Director

Gabriele Butkute
Royal Society of Biology and the Biochemical Society
Science Policy Assistant

Elizabeth Chambers
The Royal Society
Education Outreach Officer

Dr Shaun Holmes
British Council, Science Adviser
Research and Partnerships

Professor David Phillips
Imperial College London

Richard Myhill
LIYSF
Director

Annette Smith
Association for Science Education
Immediate Past-CEO

Clare Thomson
Gender and Education Consultant

FAMELAB LIYSF

10 projects will be chosen to be presented on Saturday 29th July in the FameLab LIYSF evening. This evening will provide an introduction to FameLab and how you can join in the future, with some former FameLab winners presenting. FameLab is a communications competition designed to engage and entertain by breaking down science, technology and engineering concepts into three minute presentations - www.famelab.org

International FameLab TALKINGSCIENCE

BRITISH COUNCIL

CHELTENHAMFESTIVALS

SOCIAL PROGRAMME

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

Thurs 27th July	20:30 – 23:30	Welcome Party. Orchard Suite, Millennium Gloucester
Fri 28th July	18:30 – 22:00	The Science Forum Bazaar - Student Project Poster Board Evening Royal Geographical Society
Sat 29th July	19:30 – 21:30	FameLab LIYSF - Student Topics – The Royal Geographical Society
Mon 31st July	19:30 – 22:00	Great Crossword Treasure Hunt. Queen's Lawn and surrounding South Kensington
Thurs 3rd Aug	19:00 – 21:00	Rehearsals, Ethos Sports Hall
Fri 4th Aug	20:30 – 22:00	International Cabaret – Cultural Showcase Performance Evening Orchard Suite, Millennium Gloucester
Sat 5th Aug	15:00 – 17:00	LIYSF Olympics. Ethos Sports Hall
Sun 6th Aug	20:30 – 22:00	Traditions of Home – Sharing World Customs and Fashion Orchard Suite, Millennium Gloucester
Tues 8th Aug	20:30 – 23:00	Farewell Party. Orchard Suite, Millennium Gloucester

OPTIONAL VISITS

LIYSF offers a varied programme of optional visits. On Thurs 27th July at 17.00pm tickets will be on sale from LIYSF staff after the plenary lecture demonstration. Please see website for full details.

Sat 29th July	14:00 - 18:00	Optional London Thames Sightseeing River Cruise
	14:30 - 18:00	Optional Visit to The London Eye
Sun 30th July	09:00 - 17:00	Optional Visit to Stonehenge & Salisbury
Tues 1st Aug	19:00 - 22:30	Optional Theatre Shows
Sun 6th Aug	09:00 - 17:30	Optional Visits to the Tower of London and Sightseeing Bus Tour
	08:30 - 17:30	Optional Visit to Oxford or Cambridge
Mon 7th Aug	14:00 - 17:00	Optional Visit to State Rooms at Buckingham Palace
	17:00 - 19:00	Optional Visit to The London Eye
	19:00 - 22:30	Optional Theatre Shows

PROGRAMME VENUES

HALLS OF RESIDENCE

Beistside Halls of Residence
Hall Host: Emer Hickey

Beit

Southside

Metrothorne Halls of Residence
Hall Host: Ricardo Rodrigues

Metrogate House

Copthorne Tara

MGM Halls of Residence
Hall Host: Emmanuel Shofoluwe

Millennium Gloucester

Meininger

PROGRAMME VENUES

Royal Geographical Society

Imperial College London

Millennium Gloucester

LIYSF STAFF TEAM

Executive Assistant
Nyree Wilkie
England

Chief of Staff
Simran Mohnani
Malta

BEITSIDE HALLS OF RESIDENCE

Hall Host
Emer Hickey
Ireland

Deputy Host
Sam Thomas
England

Senior Counsellor
Palmira Llorens
Catalonia, Spain

Counsellor
Daniel Davies
Wales

Counsellor
Aranza Meza Dorantes
Mexico

Counsellor
Serge Shyirambere
Rwanda

METROTHORNE HALLS OF RESIDENCE

Hall Host
Ricardo Rodrigues
Portugal

Programme Liaison
Krsna Mohnani
Malta

Deputy Host
Anin Luo
Taiwan (ROC)

Counsellor
Noga Arad
Israel

Counsellor
Daniel Calarco
Brazil

Counsellor
Hugo Madge
Spain

Counsellor
Athina Zitta
Cyprus

MGM HALLS OF RESIDENCE

Hall Host
Emmanuel Shofoluwe
England

Programme Liaison
George Kettle
Australia

Deputy Host
Ariadna Gistes
Catalonia, Spain

Counsellor
Kashif Ali
Pakistan

Counsellor
Hajar Al Kaabi
Oman

Counsellor
Enrico Caprioglio
Italy

Counsellor
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ASDAN China

National Youth Science Forum

Rede POC

Arkwright Scholarships Trust

مجلس البحث العلمي
The Research Council

Emilset

SUPPORTING ORGANISATIONS

LIYSF is very proud to have the support across the globe of; National Government Offices, British Council Offices, National and International Science Competitions, Science Organisations, Schools and Universities. We are truly grateful to all organisations for their work in nominating and supporting students to attend, a selection of them are shown here:

Akademeia	Poland
Arkwright Scholarships Trust	UK
ASDAN	China
Beijing NGO Association for International Exchanges	China
Binus International School Serpong	Indonesia
British Council	Taiwan (ROC)
British Council School Madrid	Spain
British School of Brussels	Belgium
Calouste Gulbenkian Foundation	Portugal
Cathedral and John Connon School	India
Celia and Glyn Allen	Guernsey
China Association for Science and Technology	China
Cyprus Research Promotion Foundation	Cyprus
Dublin City University	Ireland
English School	Cyprus
Fallibroome Academy	England
Federazione delle associazioni scientifiche e tecniche (FAST)	Italy
Foundation Jeunes Scientifiques Luxembourg (FJSL)	Luxembourg
University of Fraser Valley	Canada
Fundació Catalunya-La Pedrera	Catalonia, Spain
GC School of Careers	Cyprus
John Roan School	England
Korea Science Service	Korea
Light Academy Girls' Secondary Nairobi	Kenya
Louisiana State University Laboratory School	USA
Memorial University of Newfoundland	Canada
National Youth Science Forum	Australia
Pakistan Science Foundation	Pakistan
Polish Children's Fund	Poland
RED Science and Technology Youth Activities Network	Mexico
REDE POC	Brazil
Research Council of Norway	Norway
Rotary National Science & Technology Forum	New Zealand
Royal Society of New Zealand	New Zealand
Society for Science and the Public	United States
South African Agency for Science & Technology Advancement	South Africa
Swedish Federation of Young Scientists	Sweden
Swiss Youth in Science	Switzerland
The Research Council	Oman
Young Scientists for Africa	UK

ACKNOWLEDGEMENTS

LIYSF offers its thanks to all those who so generously assisted in the planning and preparation of LIYSF 2017 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 Government departments, schools, colleges, universities, educational groups, science competitions and foundations worldwide, which select and sponsor overseas participation, including: The European Commission, The British Council, Education UK and the GREAT campaign.

Various individuals who provided much appreciated support and advice including; Dr. Daniel Amund, Professor Sir Roy Anderson, Professor Clare Elwell, Mr Ray Lewis, Mr John Needle, Mr Deepesh Patel, Professor David Phillips, Dr Tim Slingsby, Ms Annette Smith and Sir Colin Terry.

Imperial College London for providing facilities, accommodation, meals and working with us across the University to integrate all aspects of the College with LIYSF. The Royal Geographical Society for hosting our plenary sessions. The Millennium Gloucester for providing facilities and hosting our social programme. Metrogate House, Copthorne Tara and Meininger for providing accommodation.

NOTES

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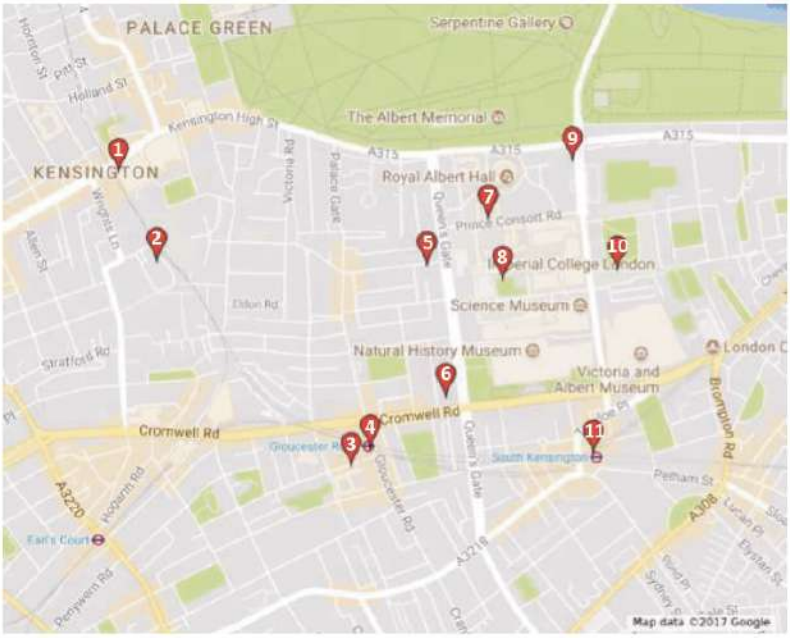
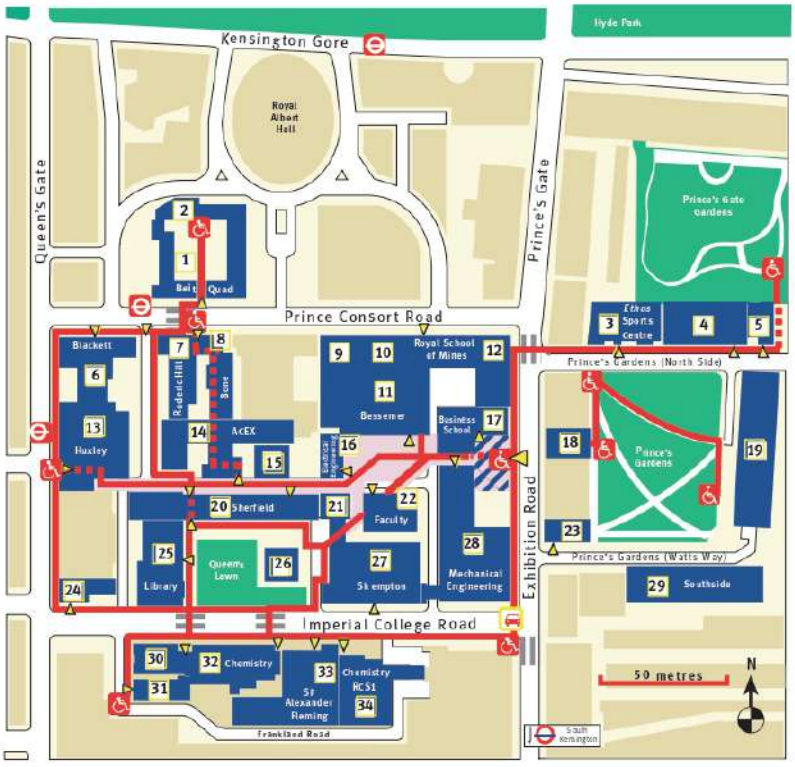
LIYSF CAMPUS

LIYSF South Kensington Locations



1 - High Street Kensington Station
2 - Copthorne Tara
3 - Millennium Gloucester
4 - Gloucester Road Station
5 - Metrogate House
6 - Meininger
7 - Beit
8 - Queen's Lawn / SCR
9 - Royal Geographical Society
10 - Southside
11 - South Kensington Station

Imperial College London, South Kensington Campus



1- Beit
3 - Ethos Sports Centre
12 - Royal School of Mines
13 - Huxley
19 - Eastside
20 - Sherfield/SCR
26 - Queen's Tower
27 - Skempton
29 - Southside
33 - Sir Alexander Fleming