PROGRAMME

2015

St Paul's Way
Trust School

ST PAUL'S WAY TRUST SCIENCE SUMMER SCHOOL 2015 WITH PROFESSOR BRIAN COX OBE

MAKING BRITAIN THE BEST PLACE TO LEARN AND EXPERIENCE SCIENCE

TUESDAY 25 – WEDNESDAY 26 AUGUST 2015

Welcome

In association with supporters and sponsors we are pleased to welcome you to our fourth St Paul's Way Trust Science Summer School, hosted by our Patron, Professor Brian Cox OBE.

St Paul's Way Trust School, now a 'National Teaching School' and a 'Through School', places science at the heart of the curriculum with its unique Faraday learning pathway. The aim is to inspire young people to become the next generation of Britain's scientists. The newly-opened sixth form research laboratories designed by Queen Mary University build on this offer by giving students access to exciting and cutting edge research such as the Authentic Biology DNA research project.

SSS 2015 offers students who are passionate about science the opportunity to interact with some of Britain's leading scientists and engineers through a programme of seminars, discussions and hands-on experiments. This year we welcome a programme that mixes the best of science, maths and engineering.

We hope that you will welcome our guest speakers with your usual enthusiasm and make a positive contribution to the various sessions. This is an exciting opportunity to expand your scientific knowledge and gain an appreciation of the importance that science plays in all aspects of our lives. With determination and an enquiring mind you can see what it is possible to achieve in the future when following a scientific career path.

TUESDAY 25TH AUGUST at St Paul's Way Trust School

13:00 Registration
13:30 Welcome and Introduction
Grahame Price, Executive Headteacher
Professor Brian Cox OBE
Lord Andrew Mawson OBE
Jo Johnson, MP – Minister for Universities and Science – to open Science Summer School 2015

Session One 13:45–15:25

13:45 **Opening Presentation** Professor Brian Cox OBE
14:03 **We Are Stardust** Professor Raman Prinja
14:21 Q&A Session and General Discussion
14:35 Student Presentation 1 - Robert Clack School
14:45 Practical Break-Out Workshop – Session A1

15:25–15.50 - Break

Session Two 15:50–17:30

15:50 **Mole-rat Mathematicians: Fractal Geometry in Biology**
Dr Steven Le Comber
16:08 **Is There Hope for Conservation?**
James Borrell
16:26 Q&A Session and General Discussion
16:40 Student Presentation 2 – Bancroft School
16:50 Practical Break-Out Workshop – Session B1

17:30 Day One Sessions end

Evening Reception 19:00–21:00

19:00 Guests arrive
19:15 Welcome and Introduction
20:00 "A Discussion with Professor Brian Cox"
21:00 Close of Evening Reception

"As we continue to build on Professor Cox's ambition that Britain is recognised as the best place to 'do science', Science Summer School 2015 offers a practical reminder of the sheer diversity across STEM subjects (Science, Technology, Engineering and Maths) and the urgent need to recruit more graduates across the UK 'to make things happen'.

Exciting STEM career opportunities are emerging here in east London at the Olympicopolis in Queen Elizabeth Olympic Park. This new science and cultural quarter will host branches of University College London, V&A, Sadlers Wells Dance Theatre, London College of Fashion and University of the Arts.

Now is the time to start 'joining the dots' and creating pathways into these opportunities for our young people in east London. We are delighted to play our part by bringing the final afternoon of this year's Science Summer School, incorporating a 'pop up' exhibition, to Here East in Queen Elizabeth Olympic Park.

We end this year's event at the top of the ArcelorMittal Orbit overlooking the Olympic Stadium with all eyes to the future. We thank Professor Cox for generously hosting another fundraising event to help sustain the work of the Science Summer School here in east London with, we hope, a national rollout to follow."

Lord Andrew Mawson OBE

WEDNESDAY 26TH AUGUST

Sessions Three and Four at St Paul's Way Trust School

10:00 Registration

Session Three 10:15–11.45

10:15 Practical Break-Out Workshop – Session A2
10:55 **Engineered in your Imagination** Professor Danielle George
11:13 **How can Maths Help Solve Big City Challenges of Congestion and Air Pollution?** James Swanston and Dr Robin North
11:31 Q&A Session and General Discussion

11:45–12:00 - Break

Session Four 12:00–12:40

12:00 Practical Break-Out Workshop – Session B2
12:40 Session Four ends

Delegates transfer to Here East by coach for lunch

Sessions Five and Six at Here East, Queen Elizabeth Olympic Park

14:00 Welcome to Here East and Opening Address
14:35 Science exhibition walkabout Exhibitors include: Cardiff University/The Royal Society; The Floating Cinema; Loughborough University; The University of Manchester; Mulberry School; Olympic Stadium Transformation Project; Robert Clack School; St Paul's Way Trust School; UCL

Session Five 15:00–15:50

15:00 **Can You Teach an Old Drug New Tricks?** Dr Sally Boss
15:18 **The Maths of Chocolate Fountains** Adam Townsend
15:36 Q&A Session and General Discussion

15:50–16:00 – Break

Session Six 16:00–18:00

16:00 Science exhibition walkabout
16:20 **Why Electrical Engineering is the Career for You** Dr Will Whittow
16:38 **The Joy of Problem Solving** Damian Phelan
16:56 Q&A Session and General Discussion
17:10 Closing talk with Professor Brian Cox OBE
17:20 Awards Presentation and Final Address
18:00 Science Summer School 2015 ends

19:00–21:00

An Evening with Professor Brian Cox OBE – The Universe from the Orbit

at ArcelorMittal Orbit, Queen Elizabeth Olympic Park

(admission to this Science Summer School fund-raising event is by ticket only)

"SOMEWHERE, SOMETHING INCREDIBLE IS WAITING TO BE KNOWN."

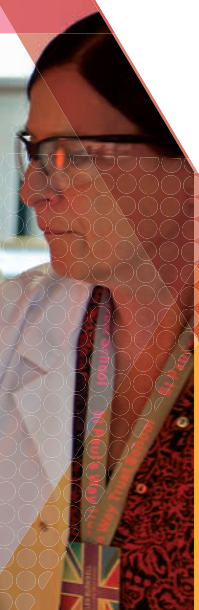
Carl Sagan
Astronomer


KEEP
CALM

"ALL OF OUR **GUEST SPEAKERS** HAVE BEEN GIVEN 18 MINUTE TIME SLOTS FOR THEIR **PRESENTATIONS**.

WHY 18 MINUTES?

IT'S LONG ENOUGH TO BE SERIOUS AND SHORT ENOUGH TO HOLD PEOPLE'S ATTENTION. IT'S A FORMAT THAT HAS BEEN ADOPTED BY THE ONLINE **TED LECTURES** AND HELPS ENSURE THAT SPEAKERS CONVEY THEIR KEY POINTS IN AN **INFORMATIVE** AND **INTERESTING** WAY."



Professor Cox gained a first class degree in physics from the University of Manchester and was awarded a PPARC Postdoctoral Fellowship. He has worked on a plethora of major projects including the H1 experiment at DESY, HERA, the Tevatron collider in Chicago, POMWIG and the ATLAS experiment at CERN. He was awarded a Chair in Particle Physics at the University of Manchester and through his Royal Society University Research Fellowship continues his work on ATLAS and the public promotion of science.

Brian has received many awards for his work in publicising science. In 2012 he received both the Michael Faraday Prize of the Royal Society for his excellent work in science communication, as well as the Institute of Physics President's medal where he made a speech about the value of education in science and the need to invest more in future generations of scientists. He was appointed Officer of the Order of the British Empire in 2010 for services to science.

BIOGRAPHIES

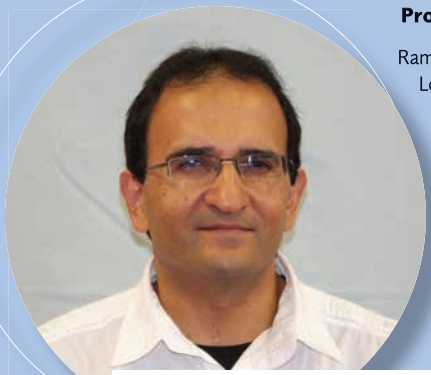
PROFESSOR BRIAN COX OBE

Professor Cox also has a distinguished career in science broadcasting on television and radio. Programmes that he has written and presented include the BBC documentaries "Wonders of the Solar System", "Wonders of the Universe", "Wonders of Life" and a major 5 part series, "Human Universe", broadcast in 2014 on BBC2. He is the co-author of "Why Does E=mc2?", the bestselling "Wonders of the Solar System", "Wonders of the Universe", "Wonders of Life" and "Human Universe". Professor Cox was an ambassador for the UK Young Scientists and Engineers Fair, fronting the campaign to promote take-up of STEM subjects in schools.

"YOU DON'T HAVE TO BE A GENIUS AND YOU DON'T HAVE TO BE A MAN — SCIENCE IS FOR EVERYONE. ALL YOU NEED TO BE IS INTERESTED, AND IF YOU'RE INTERESTED THEN YOU CAN DO IT."

Professor Brian Cox OBE

BIOGRAPHIES



PROFESSOR RAMAN PRINJA

Professor Raman Prinja

Raman Prinja is Professor of Astrophysics at University College London (UCL). His main research interests are in multi-waveband studies of the evolution and properties of the most massive stars in our Galaxy. He is also the Director of Teaching and Deputy-Head of Department at UCL. He has been awarded the PoI and Christiane Swings research prize and is a multiple winner of the UCL MAPS Faculty Teaching award. Beyond research and teaching, Raman is keen to promote astronomy to wider audiences, and has written several successful Outreach-level books, including the award winning titles "Science Crazy" and "Night Sky Watcher".

DR STEVEN LE COMBER

Dr Steven Le Comber

Steve's work covers a wide range of subjects within evolutionary biology, including mathematical and computer models of molecular evolution and studies of spatial patterns in biology, notably in epidemiology and invasive species biology. His research on molecular evolution is principally in the field of genetic code evolution and polyploidy. In a recent paper in BMC Evolutionary biology, he pointed out for the first time an apparently deleterious feature of the universal genetic code: the occurrence of multiple stop codons. The paper proposed and found evidence for a compensatory benefit for this otherwise puzzling feature of the code.

Steve's work on the mathematics of spatial patterns spans two main areas and in the first of these, has pioneered the introduction of geographic profiling – a statistical technique originally developed in criminology – to biology. He is currently using geographic profiling to study biological invasions and epidemiological data. In the second of these areas, he uses fractal dimension to quantify burrow architecture in fossorial mammals. Previously, he has studied alternative male mating tactics in the three-spined stickleback, patterns of morphological and molecular evolution in European vespertilionid bats and mate choice in the greater horseshoe bat.

"SCIENCE AND EVERYDAY LIFE CANNOT AND SHOULD NOT BE SEPARATED."

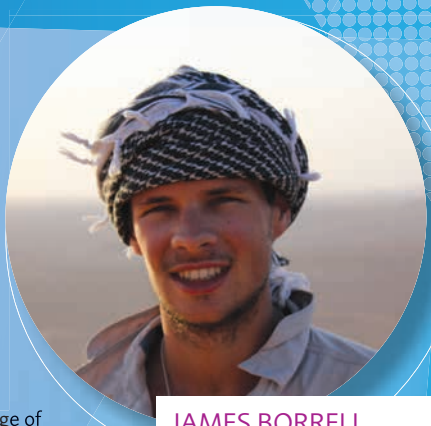
Rosalind Franklin
Chemist

James Borrell

James is a conservation biologist with a passion for challenging expeditions and field research. He has been involved with a variety of projects from critically endangered big cats in the remote Dhofar Mountains, to biodiversity surveys in the Peruvian Amazon and ecology in the high Arctic, but perhaps the wettest and coldest was the Scottish Highlands!

James' particular interest is the genetics of endangered species and exploring how we can engage young people with conservation through citizen science and fieldwork.

Despite all the bad news we are bombarded with daily about the state of our natural world, James is stubbornly optimistic and is convinced we are beginning to turn the corner. It is this message of optimism that James will aim to share in his talk.



JAMES BORRELL

Professor Danielle George

Danielle was given a telescope by her parents when she was 8 years old and would regularly get up in the middle of the night to watch lunar eclipses. She credits this experience as the moment she first realised how physics and mathematics could be applied in a practical sense outside the classroom and as the first step on her path to her current career. She is Associate Dean for Teaching and Learning in the Faculty of Engineering and Physical Sciences, and a Professor in the Microwave and Communications Systems research group at the University of Manchester. She completed her BSc in Astrophysics, MSc in Radio Astronomy at The Victoria University of Manchester based at Jodrell Bank Observatory and her PhD in Electrical and Electronic Engineering with UMIST. She worked at Jodrell Bank Observatory as a senior Radio Frequency Engineer until 2006 when she took up a lectureship post in the School of Electrical and Electronic Engineering.

PROFESSOR DANIELLE GEORGE

Danielle was awarded a Professorship earlier this year at the age of 38. She thoroughly enjoys the teaching aspects of her career and lectures to both undergraduates and postgraduate students, in particular Electronic Circuit Design to undergraduates and Microwave Systems to MSc students. She is passionate about raising public awareness of the positive impact engineering has on all aspects of our everyday lives and highlighting to young people the immense depth and breadth of opportunities a career in engineering can offer.

You can follow Danielle on Twitter at: @EngineerDG

BIOGRAPHIES

James Swanston

James is the founder of Voyage Control, a technology business focused on making logistics more efficient. He has run a number of businesses as well as serving as an officer in the Australian and British Armies with tours of duty in East Timor, Iraq and Afghanistan. He was awarded the US Bronze Star, the Defence Imagery and Geospatial Organisation's Outstanding Service Award and the Australian Joint Operations Command Commendation. He has bachelor degrees in Law, International Business and Arts, and a Masters in International Relations. He is a Fellow of the Royal Society of the Arts and holds the Freedom of the City of London and the Worshipful Company of Cordwainers. In 2014, he received the City of London's Entrepreneur of the Year Award and was named a Rockefeller Foundation's Resilience Innovator and won Canary Wharf's Cognicity Challenge in 2015.

JAMES SWANSTON

Dr Robin North

Dr Robin North spends his days working to accelerate new transport systems technologies to market at the Transport Systems Catapult. This includes investigating the potential of driverless cars and using computer games to answer real world questions such as how to predict traffic jams and air pollution. His background involves far more time than he had ever intended studying and working at Imperial College London; gaining MEng and PhD qualifications in Aeronautical and Civil Engineering and then becoming a Lecturer in Transport and the Environment. Here he led research into vehicle emissions and air quality and established the Intelligent Infrastructure and Transport Systems Laboratory with colleagues in the Department of Civil Engineering. He is a Member of both the Institution of Engineering Technology and of the Chartered Institution of Highways and Transportation and occasionally gets to travel to interesting places to discuss new research ideas and opportunities.

DR ROBIN NORTH

Dr Sally Boss

Sally studied for a degree in chemistry at the universities of Bristol and Heidelberg before moving to Cambridge in 2002 to begin a PhD. She now holds a College Lectureship in Cambridge and divides her time between teaching and research. Sally's research interests lie somewhere between biology and chemistry. She is interested in improving the profile of metals in medicine by careful design of drug molecules to exploit the rich chemistry of the transition metals. For half a century the field of metal-based anticancer drugs has been dominated by the precious metal platinum, however, there are many unpleasant side effects associated with this drug and it is not effective against all tumour types. A new element, ruthenium, is now emerging as a contender which could offer less toxic and more effective therapies and Sally's work is aimed at understanding the chemistry of ruthenium-containing molecules in biological settings.

DR SALLY BOSS

Adam Townsend

Adam is a PhD student in the mathematics department at UCL, where he works on non-Newtonian fluids (like chocolate!) and teaches a few classes. Unashamedly convinced that maths is fun, he hopes he can bribe you with chocolate to think so too.

ADAM TOWNSEND

"NO PROBLEM CAN WITHSTAND THE ASSAULT OF SUSTAINED THINKING."

Voltaire
Philosopher

BIOGRAPHIES

Dr Will Whittow

Dr Whittow is a Senior Lecturer in Electronic Materials Integration in the Centre for Wireless Communications Group (WiCR). His current research interests also include antennas; electromagnetics; artificial dielectrics; nanomaterials; wearable antennas, heterogeneous substrates, VHF antennas; specific absorption rates (SAR); FDTD; Pulsed Power and High Speed Networks. He is especially interested in cross-discipline research.

DR WILL WHITTOW

Damian Phelan

Damian's primary and secondary education was split between Ireland and Luxembourg and culminated in excellent final results leading to the study of Theoretical Physics at Imperial College London. After achieving a first class degree he went on to train as a teacher on the Inspire PGCE course, a teacher training course for PhD and Masters level scientists. He has been a science teacher, specialising in physics, for the last 5 years, teaching in Hackney and Tower Hamlets. Damian also gained a Masters degree in the Economics of Education in 2013. He is currently the Head of the Science Faculty at St. Paul's Way Trust School.

DAMIAN PHELAN

"NOW IS THE TIME TO UNDERSTAND MORE, SO THAT WE MAY FEAR LESS."

Marie Curie
Physicist and Chemist

Lord Andrew Mawson OBE

Andrew is a serial social entrepreneur. He is best known for founding the Bromley-by-Bow Centre in east London, Community Action Network (CAN) and Poplar Harca (one of the first housing companies). Andrew has now "graduated" from most of these ventures and each of them continues as a successful organisation.
He has now created Andrew Mawson Partnerships as a vehicle both to grow and replicate his approach and successes. Under the AMP banner, he launched Water City CIC to create and implement a vision for east London revitalised by the opportunities of the 21st Century and the 2012 Olympic Games.

LORD ANDREW MAWSON OBE

Andrew was made a life peer in 2007 in recognition for the social impact of his work and he now sits as an independent crossbench peer in the House of Lords. In 2012, he was made a Freeman of the City of London. He is also the bestselling author of the book, "The Social Entrepreneur: Making Communities Work."
He is a Director of the London Legacy Development Corporation. In 2006 Andrew was asked to lead the St Paul's Way Transformation Project bringing together, in a joined-up project, the physical improvements along St Paul's Way; creating new networks and relationships between the agencies and local residents, and pursuing a coordinated vision for the future of the area. St Paul's Way Trust School, home of Science Summer School, is a key element in this project. For Andrew, nothing is impossible.
His favourite saying is, "live dangerously or do not live at all."

Special Thanks

The St Paul's Way Trust School is very grateful for the support of XL Catlin, Workspace, Voyage Control, The London Legacy Development Corporation (LLDC), J.P. Morgan, Here East, ArcelorMittal Orbit and Andrew Mawson Partnerships.

We are also very grateful to the Lloyd's Register Foundation for their continued support of the Science Summer School. The Lloyd's Register Foundation helps to protect life and property by supporting engineering-related education, public engagement and the application of research.

Project Management: Richard Mallett Arts Management Ltd
Design: Trout Design Ltd
PR Consultant: Barnie Choudhury
Programme Photography: Elizabeth Norden
Interactive Science Presentation (August 25 evening reception): Guerilla Science

St Paul's Way Trust School is a Royal Society School and the first Faraday Science School in London. We lead the way in delivering an innovative and engaging science curriculum and providing access to state-of-the-art facilities for our students.

The Faraday project is named after the pioneering chemist and physicist Michael Faraday, who himself grew up in London and worked in the East End. Our Faraday status has allowed us to change how science and technology is taught. We provide practical, project-based learning opportunities and encourage our students to develop a lifelong interest in science.

In March 2013 Ofsted graded St Paul's Way Trust School as 'Outstanding' in all categories and in 2014 the school was designated a 'Teaching School' and invited to be part of the Mayor of London's 'Gold Club'. The school has undergone a £40 million rebuild as part of the St Paul's Way Transformation Project in Tower Hamlets.

In September 2014 the school became a 'Through School' offering us the exciting prospect of working with others to develop new approaches to primary science. Our annual Science Summer School is an important part of this work introducing young scientists, from our school and a range of other partner schools, to the work of leading internationally renowned scientists.

Over the past year our ambition of fostering links between science, education and the local community has taken another step forward with the opening of the St Paul's Way Trust Research Centre designed by our lead Trust Partner Queen Mary, University of London. This centre enables students from St Paul's Way Trust and other schools to engage in exciting and challenging research, including our Wellcome Trust funded 'Authentic Biology' project and our work on 'Type 2 Diabetes'.

This Science Summer School is proudly supported by

XL CATLIN

Lloyd's Register Foundation

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WORKSPACE®

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