2017 PROGRAMME

SCIENCE SUMMER SCHOOL

BRITAIN – THE BEST PLACE TO DO SCIENCE

St Paul's Way

Education · Foundation · Trust

SCIENCE SUMMER SCHOOL 2017 WITH PROFESSOR BRIAN COX OBE

MAKING BRITAIN THE BEST PLACE TO LEARN AND EXPERIENCE SCIENCE

TUESDAY 25 & WEDNESDAY 26 JULY 2017

Welcome

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

St Paul's Way Trust School, 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. Our new sixth form research laboratories designed by Queen Mary, University of London, build on this offer by giving students access to exciting and cutting edge research opportunities such as the Authentic Biology DNA research project.

SSS 2017 offers students who are passionate about science the opportunity to interact with some of Britain's leading scientists, engineers and entrepreneurs through a programme of seminars, discussions and hands-on experiments. This year we present a programme that mixes the best of science, maths and engineering. We are also delighted to welcome many students from the north and north west of England as we continue to take the project 'national'.

We hope that you will greet 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.

Grahame Price

Executive Headteacher, St Paul's Way Trust School

TUESDAY 25 JULY

at St Paul's Way Trust School

10:30 Registration and Refreshments – Main Atrium

11:00 Welcome and Introduction – Willoughby Theatre
Phil Akerman,
Associate Headteacher
Professor Brian Cox OBE
Lord Andrew Mawson OBE

Presentations
11:15-12:00 – Willoughby Theatre
11:15 **The Universe and Our Place Within It**
Professor Brian Cox OBE
11:35 **Better Lives for Women and Babies Around the World with Bioengineering**
Dr Tina Chowdhury
11:53 Q&A and General Discussion
12:00 Session ends

Practical Workshops
12:05-13:00 – see page 5 for details

Lunch
13:00-13:45 – Dining Hall

Presentations
13:45-14:30 – Willoughby Theatre
13:45 **Pressing FIRE on the Most Powerful Laser in the World**
Dr Ceri Brenner
14:05 **The Curious Incident of the Dog in the Night-Time**
Dr Steven Le Comber
14:23 Q&A and General Discussion
14:30 Session ends

Practical Workshops
14:35-15:30 – see page 5 for details

Break and Refreshments
15:30-15:45 – Main Atrium

Presentations
15:45-16:40 – Willoughby Theatre
15:45 **Marvellous Materials – The Secret Science of Superpowers**
Dr Suze Kundu
16:05 **Will Robots Rule the World?**
Professor Peter McOwan
16:25 **We Need More Women in Engineering**
Lois Medley, apprentice engineer
16:35 Q&A and General Discussion
16:40 Session ends

Practical Workshops
16:45-17:35 – see page 5 for details

Closing Address
17:40-17:55 – Willoughby Theatre
17:40 Professor Brian Cox OBE
17:55 Close

Evening Reception
19:00-21:00 – Main Atrium and Willoughby Theatre
19:00 Guests arrive
19:45 Welcome and Introduction
20:00 Discussion and 'Meet the Speakers' with Professor Brian Cox OBE
21:00 Close

WEDNESDAY 26 JULY

at St Paul's Way Trust School

09:15 Registration and Refreshments – Main Atrium

09:45 Welcome and Introduction – Willoughby Theatre
Phil Akerman,
Associate Headteacher
Lord Andrew Mawson OBE

Presentations
10:00-10:50 – Willoughby Theatre
10:00 **The Beginner's Guide to the Universe**
Dr Maggie Aderin-Pocock MBE
10:20 **Living Systems and the Science of Health**
Dr Chris Bem
10:38 Q&A and General Discussion
10:50 Session ends

Practical Workshops
11:00-11:50 – see page 5 for details

Break and Refreshments
11:50-12:10 – Main Atrium

Presentations
12:10-13:00 – Willoughby Theatre
12:10 **The Science of Flies**
Dr Erica McAlister
12:30 **The Knowledge: How to Rebuild Our World from Scratch**
Professor Lewis Dartnell
12:48 Q&A and General Discussion
13:00 Session ends

Closing Address and Awards
13:00-13:20 – Willoughby Theatre
13:00 Professor Brian Cox OBE
13:20 Close of Science Summer School 2017

A Message from Lord Mawson OBE

"While England is experiencing challenging times, we are working even harder with Professor Cox and Executive Headteacher Grahame Price, together with his excellent science team at St Paul's Way Trust School, to develop Science Summer School as part of a major local integrated regeneration initiative here in St Paul's Way. We have come a long way in the past six years as we continue to build on Professor Cox's ambition that Britain is recognised as "the best place in the world to do science" but there is much work still to do.

Current events in our country make it even more important to shine a light on the sheer diversity of STEM subjects on offer to students in our schools. We must continue to highlight the urgent need to recruit more graduates across the UK, including young women, as we seek to find the one million engineers that the country now needs to compete in the world.

Science Summer School is playing its part in 'telling the story' not only in London but nationally. Working with Well North, we are taking the project to towns and cities in the North of England including Bradford, Doncaster and Daresbury, the birthplace of Lewis Carroll, author of Alice's Adventures in Wonderland. An appropriate link as this project reflects Professor Cox's own sense of wonder at a world of science about which we have so much more to learn.

A great science adventure is starting too in West Cumbria. Inspired by coming down to Science Summer School in London last year, our Cumbrian colleagues are launching their own event on 28 September 2017 supported by local partners including The React Foundation and the nuclear industry. We will be there too to cheer them on.

Back in London, we continue to build the project profile and partnerships, linking with the Olympic Park and the London Legacy Development Corporation. Exciting STEM career opportunities are emerging with the development of the new science and cultural quarter on the Park which will host branches of University College London, V&A, Sadler's Wells Dance Theatre, London College of Fashion, the Smithsonian and University of the Arts, plans for which continue to develop at a pace.

In a post-Brexit world, being "the best place in the world to do science" is really going to matter for our young people and Science Summer School continues to play an important part in the unfolding narrative".

"Now is the time to understand more, so that we may fear less."

Marie Curie, Physicist and Chemist

PRACTICAL WORKSHOPS (Correct at time of press)

Tuesday 25 July

Alien Autopsy
Rebeka Khanom

Augmented Reality
Said Mohamed

The Bioengineering Experience
Dr Tina Chowdhury, QMUL and
Dr Rhiannon Lowe, GSK

Capital Engineers
Museum of London Docklands

Cells
Explorer Dome

Chemistry of Ion Compounds
Amirul Islam

Engineering Materials
Ronan McDonald

Homopolar Motors
Paul Cook

Ingenious Genes
Centre of the Cell

Light and the Eye
National Science and Media Museum, Bradford

Magic Tricks Created by Light and Vision
Mohsin Yemani

Mechanisms Challenge
Andrew Walmsley

Robot Racer
David Akinrinwa

Sport Science – Testing the Heart
Aaron Chapman

Wednesday 26 July

Bilateral Transfer in Sport
Aaron Chapman

Cancer Diagnostics
Amirul Islam

Crazy Circuits
Mohsin Yemani

Engineering Materials
Ronan McDonald

Hydraulics Challenge
Andrew Walmsley

Lego Mindstorms
David Akinrinwa

Mind Games
Dr Matt Pritchard

NANO: The Little Things with a Side of Technology
Susan Hyon Parker

NASA on Target
Said Mohamed

QR Code and AR Technology
Paul Cook

Rainbow Electrolysis
Syeda Hussain and Farhana Aktar

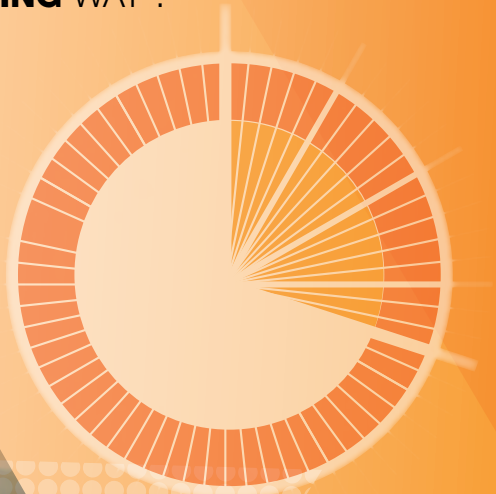
Supercool
Science Museum

Virtual Reality Explorer
Jamie Buchanan-Dunlop and XL Catlin Oceans Education

"No problem can withstand the assault of sustained thinking."

Voltaire, Philosopher

"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".



"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

Professor Brian Cox OBE

Professor Brian Cox OBE

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 an Officer of the British Empire for services to science in 2010 and is a Fellow of The Royal Society.

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", "Human Universe", and most recently "Forces of Nature" broadcast on BBC 1 in 2016. He is the co-author of "Why Does E=mc2?", the bestselling "Wonders of the Solar System", "Wonders of the Universe", "Wonders of Life" , "Human Universe", "Forces of Nature" and "Universal: A Guide to the Cosmos"

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.

Dr Ceri M Brenner

Dr Ceri M Brenner

Dr Ceri Brenner studied physics at Oxford University before completing a PhD in laser plasma physics while based at the Rutherford Appleton Laboratory in Oxfordshire. She has since become a physics-engineering-business hybrid with a passion for technology that tackles grand challenges.

Ceri specialises in using the most powerful lasers in the world to generate bright flashes of x-rays and particle beams and is interested in developing this technology so that it can be used to treat cancer, or mimic space radiation for space travel safety testing, or see through large and dense objects like jet engines and nuclear waste barrels.

She is a senior application development scientist and has just been announced as the Institute of Physics winner of the 2017 Clifford-Paterson medal for the application of physics in an industrial context.

Dr Steven Le Comber

Dr Steven Le Comber

Steven Le Comber is a senior lecturer in the School of Biological and Chemical Sciences at Queen Mary, University of London. His research covers a wide range of subjects within evolutionary biology, much of it focusing on the mathematics of spatial patterns.

He has pioneered the introduction of geographic profiling – a statistical technique originally developed in criminology to prioritise the investigation of serial murders – to epidemiology (identifying disease sources from the addresses of infected individuals).

"Your theory is crazy, but it's not crazy enough to be true"

Neils Bohr, Physicist

Dr Tina Chowdhury

Dr Tina Chowdhury

Tina is an Associate Professor in Regenerative Medicine at Queen Mary, University of London. Tina's research is trying to understand why the amniotic sac, which protects the baby as she grows inside the mother's womb, is more prone to breaking too early, which can lead to premature birth.

She works with clinicians, scientists and engineers around the world to address this weakness in the womb tissue and help women who have had previous preterm births feel more confident about their pregnancies and their ability to carry a pregnancy to full term. Tina's talk will discuss the exciting aspects of her research and explain the pathway she took to becoming a woman in bioengineering.

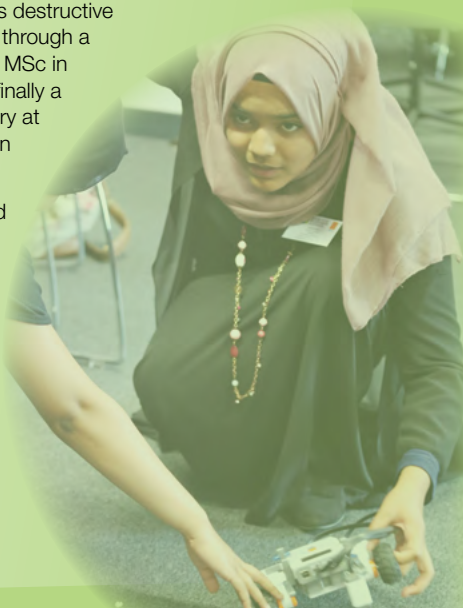
More at www.tinachowdhury.com or follow @ttchowdhury

Dr Suze Kundu

Dr Suze Kundu

The world around us is made of 'stuff.' From a very early age, Dr Suze Kundu has been fascinated by this stuff, often breaking things apart to try and figure out how everything worked. Luckily science has enabled her to turn this destructive curiosity into a career, first through a BSc in Chemistry, then an MSc in Analytical Chemistry and finally a PhD in Materials Chemistry at University College London in 2012.

Fulfilling her destiny as an eternal student, she has since studied for a teaching qualification, before lecturing for three years in the Department of Materials at Imperial College London and now at the University of Surrey's Chemical and Process Engineering Department. Although her research area is functional nanomaterials, as a science communicator she delves into the wider applications of chemistry, physics and materials science and engineering all around us, and loves sharing this through live lectures, on TV (Discovery Channel) and radio, and as a science writer at Forbes and Standard Issue magazines.



Professor Peter McOwan

Professor Peter McOwan

Peter McOwan is Vice Principal for Public Engagement and Student Enterprise and Professor of Computer Science in the School of Electronic Engineering and Computer Science at Queen Mary, University of London. His research interests are in visual perception, mathematical models for visual processing, in particular motion, cognitive science and biologically inspired hardware and software. He has authored more than 100 papers in these areas.

He co-created CS4fn, an outreach project to enthuse schools about computer science research. He was elected a National Teaching Fellow by the Higher Education Academy in 2008 and was awarded the IET Mountbatten medal in 2011 for his work in promoting computer science. He is a very amateur magician with a healthy interest in science fiction.

Lois Medley

Lois Medley

Lois is seventeen years old and attended St Catherine's Catholic School in Bexleyheath. She began her two year apprenticeship last September with WSP Parsons Brinckerhoff and is based in the rail team, which is engaged in the Crossrail project. She works four days a week with the firm acquiring engineering skills while earning a salary.

Lois also attends South Thames College one day a week, where she is studying for a level-3 BTec in building services engineering. She is also studying for EngTec (engineering technician) and IEng (incorporated engineering) qualifications. Lois enjoys college because it relates to the work she does on a day-to-day basis.

Once she has completed her apprenticeship Lois hopes to take an advanced apprenticeship and perhaps even a degree apprenticeship. In the meantime she is keen to spread the word by taking part in the Brathay Apprenticeship Challenge and by coming along to speak at Science Summer School to encourage others to follow in her footsteps. "We need more women in engineering" she says.

"Somewhere, something incredible is waiting to be known."

Carl Sagan, Astronomer

Dr Maggie Aderin-Pocock MBE

Dr Maggie Aderin-Pocock MBE

Dr Maggie Aderin-Pocock MBE is a space scientist whose passion is presenting science to a general audience and demonstrating that you 'don't need a brain the size of a small planet' to understand, participate in and enjoy science. Her BBC 2 programme, "Do We Really Need the Moon?" showed just that. The programme earned Maggie the talkback Thames new talent award at the prestigious Women in Film and TV Awards in December 2011. She went on to present "Do We Really Need Satellites?" and was one of the main scientists on Channel 4's "Brave New World". She is currently presenting "Sky at Night" on BBC 4, "Mini Stargazing" for Cbeebies and is a panellist on Sky One's successful science quiz show, "Ducks Quack Don't Echo". She also makes regular appearances on "The One Show", "Newsnight" and "Woman's Hour" and was a guest on Radio 4's "Desert Island Discs".

Maggie studied at Imperial College where she obtained her degree in Physics and her PhD in Mechanical Engineering. Since then she has spent much of her career making novel, bespoke instrumentation ranging from hand held land mine detectors to an optical subsystem for the James Webb Space Telescope.

To further share her love of science Maggie conducts "Tours of the Universe" and other public engagement activities, showing school children and adults around the world the wonders of space.

Dr Chris Bem

Dr Chris Bem

For the past fifteen years Chris has been Consultant Surgeon/Honorary Senior Lecturer at Bradford Hospitals, and visiting Lecturer/Surgeon to the Malawi School of Medicine. His current work mostly involves the care of patients with head and neck cancer, helping develop surgical services across Malawi, and most recently involvement with the Public Health programme, Well North, a programme to promote urban community and environmental health.

Previously he has worked as a Senior Lecturer/Surgeon at the University Teaching Hospital, Zambia 1988-1994 (six years), a time when HIV was beginning to decimate the local population, and where he carried out research into HIV and tuberculosis (MD, 1993).

In 1978, after qualifying as a medical doctor, he worked as an archeologist in Iran. He has also spent time in India (some three years) and Poland (two years). Chris has a degree in Public Health (Leeds, 2002). His interests include history, philosophy, living systems and the ecology of health.

Dr Erica McAlister

Dr Erica McAlister

Erica is a Senior Curator of Diptera (Flies) at the Natural History Museum, London and manages part of the fly collection (and all of the flea collection).

She has worked at the Museum for over ten years and maintains and enhances the collection for research and other applications.

She undertakes her own research on taxonomy (species descriptions), biodiversity, food security and vector incrimination, regularly travelling round the world to collect flies for these projects.

Professor Lewis Dartnell

Professor Lewis Dartnell

Lewis (www.lewisdartnell.com) is an astrobiology researcher based at the University of Westminster, studying how microbial life and signs of its existence might persist on the surface of Mars.

Alongside his research he writes regular science articles in newspapers and magazines, and has appeared in TV shows such as BBC "Horizon", "Wonders of the Universe", and documentaries on National Geographic, Discovery and History channels.

"The Knowledge: How to Rebuild our World from Scratch" (www.the-knowledge.org) is his third book, and is a Sunday Times Book of the Year.

"Science and everyday life cannot and should not be separated."

Rosalind Franklin, Chemist

Lord Andrew Mawson OBE

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. 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."

Andrew is a Director of the London Legacy Development Corporation. In 2006 Andrew was asked to lead the St Paul's Way Transformation Project. His challenge was to join-up the physical improvements along St Paul's Way by 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.

Andrew is now the Executive Chairman of Well North, a public health programme which is taking his experience in east London and using it to work with local people to develop pathfinder projects in 10 challenging communities in 10 towns and cities in the North of England. For Andrew, nothing is impossible. His favourite saying is, "live dangerously or do not live at all."

Special Thanks

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Administration, Event and Catering Team: St Paul's Way Trust School staff and students
Programme Design: Trout Design Ltd
Sponsorship Consultant: Nick Ryan, Vantage Fundraising Ltd
Programme Photography: Elizabeth Norden (elizabethnorden.com)

St Paul's Way Trust School (SPWTS) 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. In September 2016 SPWTS became the Founding School within the University Schools Trust. Our annual Science Summer School is an important part of this work introducing young scientists, from our school and partner schools in east London and now from schools in other parts of England, to the work of leading internationally renowned scientists.

Our ambition of fostering links between science, education and the local community has taken another step forward with the recent opening of the St Paul's Way Trust Research Centre. This centre, designed by our lead Trust Partner Queen Mary, University of London, 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; our research focus within the centre also includes our work on 'Type 2 Diabetes'.

Science Summer School 2017 is proudly supported by:

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Andrew Mawson Partnerships

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THE REACT FOUNDATION

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QUEEN ELIZABETH OLYMPIC PARK

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