PROGRAMME

2014

SCIENCE SUMMER SCHOOL

BRITAIN – THE BEST PLACE TO DO SCIENCE

St Paul's Way
Trust School

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

MAKING BRITAIN THE BEST PLACE TO LEARN AND EXPERIENCE SCIENCE

THURSDAY 28 AUGUST – FRIDAY 29 AUGUST 2014

Welcome

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

At St Paul's Way Trust School, we are proud of our status as London's first Faraday specialist science school. We are committed to inspiring young people to take a life-long interest in science and encouraging the next generation of Britain's scientists through innovative teaching methods and a practical and investigative approach to learning. The 2014 Science Summer School offers students who are passionate about science the chance 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 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.

PROGRAMME

THURSDAY 28TH AUGUST

13:00 Registration
13:45 Welcome and Introduction
Grahame Price Headteacher
Professor Brian Cox OBE
The Rt Hon Dr Vince Cable MP

Session One 14:00 – 15:30

14:00 **"The Universe: What We Know and What We Don't Know"** Professor Brian Cox OBE
14:18 **"Is Life Quantum Mechanical?"** Professor Jim Al-Khalili OBE
14:36 Q&A Session and General Discussion
14:50 Student presentation 1
14:55 Practical Break-out Sessions

15:30-16:00 - Break

Session Two 16:00 – 17:30

16:00 **Part 1 – "How to Discover a Planet"** Dr Chris Lintott
16:18 **Part 2 – "Human Herds"** Dr Hannah Fry
16:36 Q&A Session and General Discussion
16:50 Student presentation 2
16:55 Practical Break-out Sessions

17:30 **Day one sessions end**

Evening reception 19:00 – 21:00

19:15 Welcome and Introduction
20:00 **"A Discussion with Professor Brian Cox"**
21:00 Close of evening reception

"Building on Professor Cox's ambition that Britain is recognised as the best place to 'do science', the Science Summer School presents us with an important opportunity to address the shortage of STEM (Science, Technology, Engineering and Maths) graduates, particularly from the Lower Lea Valley in East London. We are very pleased therefore that on the evening before the Science Summer School starts, Level 39, Europe's largest technology accelerator space for finance, retail and future cities technologies is hosting a reception with Professor Brian Cox. As well as a fundraising event for the Science Summer School itself, the evening will launch a "kickstarter" campaign to raise funds for widening the scope of the Summer School to include financial support for promising local students who want to study STEM subjects at university ".

Lord Andrew Mawson, OBE

FRIDAY 29TH AUGUST

10.00 Registration

Session Three A 10:25 – 10:55

'Sonic Fire and the Science of Sound' Steve Mould - Demonstration Lecture

Session Three B 10:55 – 12:05

10:55 **'From Jack the Ripper to Malaria: Geographic Profiling in Biology'** Dr Steven Le Comber
11:13 Q&A Session and General Discussion
11:25 Student presentation 3
11:30 Practical Break-out Sessions

12:05-12:30 - Break

Session Four 12:30 – 13:20

12:30 **Part 1 – "Can Type 2 Diabetes be Prevented?"** Professor Graham A. Hitman
12:48 **Part 2 –** Student presentation 4 – Authentic Biology Research Project
12:58 Q&A Session and General Discussion
13:10 Dr Julie Maxton – The Royal Society

13:20-14:10 - Lunch

14:10 Practical Break-out Sessions

Session Five 14:55 – 15:50

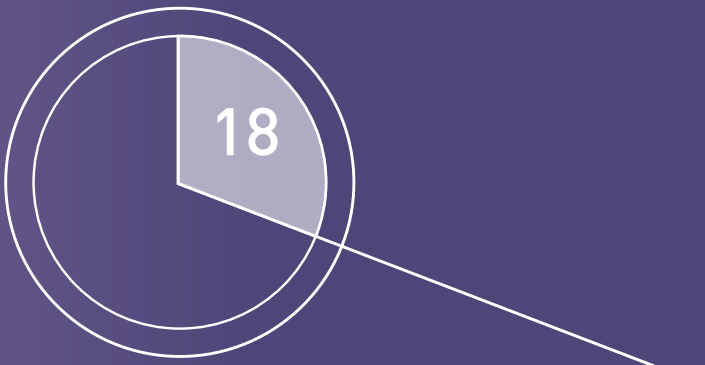
14:55 **Part 1 – "The Science of Laughter"** - Professor Sophie Scott
15:13 **Part 2 – 'All Life on Earth, Inside a Computer?'** - Dr Drew Purves
15:31 Q&A Session and General Discussion

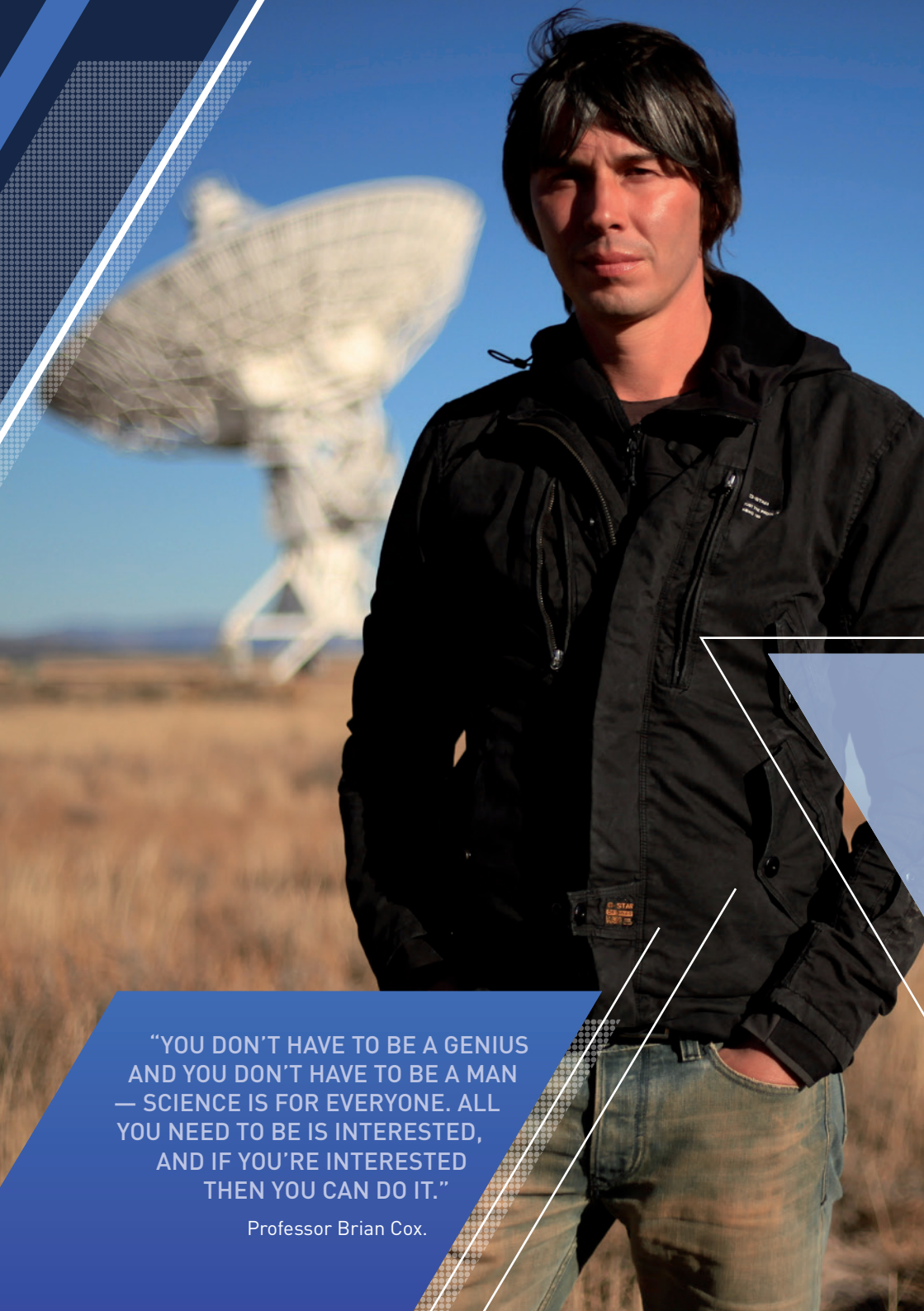
15:45 Final Address
15:50 **Official End Time**

THE WORLD OF SCIENCE AND ENGINEERING IS OPEN TO EVERYONE – AND THERE IS A GREAT VARIETY OF JOBS ALL OVER THE UK, AT ALL LEVELS AND IN LOTS OF SURPRISING ENVIRONMENTS.

Diana Garnham,
Chief Executive of the Science Council.

"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.

BIOGRAPHIES

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.

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" and "Wonders of Life". This autumn he will present a major new series on BBC2 called "Human Universe". He is the co-author of "Why Does E=mc2?" and the bestselling "Wonders of the Solar System". "Wonders of the Universe" and "Wonders of Life".

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.

BIOGRAPHIES

Professor Jim Al-Khalili OBE

Jim Al-Khalili OBE is a professor of physics, author and broadcaster based at the University of Surrey where he currently teaches and also holds a chair in the Public Engagement in Science. He received his PhD in theoretical nuclear physics in 1989 and remains active in research in quantum physics. He is also active as a science communicator and has written a number of popular science and history of science books, between them translated into over twenty languages. His most recent book is Paradox: The Nine Greatest Enigmas in Physics and his latest, Life on the Edge: the coming of age of quantum biology, is published in early 2015. He is a regular presenter of TV science documentaries, including the Bafta nominated Chemistry: A Volatile History, and Shock and Awe: the story of electricity. He also presents the weekly BBC Radio 4 programme, The Life Scientific. Jim is also active in public life and is a strong advocate for rationalism and secularism and is president of the British Humanist Association. He is a recipient of the Royal Society Michael Faraday medal and the Institute of Physics Kelvin Medal and has honorary degrees from the Universities of London and Bradford.

Dr Chris Lintott

Dr Chris Lintott is an English astrophysicist, working as a researcher in the Department of Physics in the University of Oxford. Chris is involved in a number of popular science projects aimed at bringing astronomy to a wider audience. He is the primary presenter of the BBC series The Sky at Night, having previously acted as a co-presenter alongside Patrick Moore until Moore's death in 2012. Lintott is also a co-author of the book Bang! – The Complete History of the Universe with Patrick Moore and Queen guitarist and astrophysicist Brian May.

Dr Hannah Fry

Dr Hannah Fry is a lecturer in the mathematics of cities at the Centre for Advanced Spatial Analysis (CASA). Her first degree was in mathematics and theoretical physics and this was followed by a PhD in fluid dynamics. After a brief period working in aerodynamics, she returned to UCL to take up a post-doctoral position researching a relatively new area of science - social and economic complex systems. The systems cover a broad range of real-world mechanisms, from crime and security to trade, archeology and transport. Hannah has a broad portfolio of public engagement activities including schools outreach, podcasting, academic stand-up, cafe scientifique and public lectures. Her TEDx talk at the inaugural TEDxUCL was featured on the front page of TED.com and currently has around half a million views across all TED channels.

Steve Mould

Steve Mould is a Science Presenter with a Physics MA from Oxford University. He is a former resident science expert on Blue Peter, and is currently part of the comedy trio 'Festival of the Spoken Nerd'. He also co-presents ITV1's 'I Never Knew That About Britain,' looking into surprising science stories.

SCIENTISTS AND ENGINEERS ARE VITAL TO OUR ECONOMY AND SOCIETY. THEIR KNOWLEDGE AND SKILLS ARE IN HIGH DEMAND ACROSS A RANGE OF SECTORS, FROM MANUFACTURING TO FINANCIAL SERVICES AND EVERYTHING IN BETWEEN.

Rt Hon David Willetts MP

BIOGRAPHIES

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.

Professor Graham A. Hitman

Graham A. Hitman is Professor of Molecular Medicine and Diabetes at Barts and The London School of Medicine and Dentistry, Queen Mary University of London and Consultant Diabetologist at Barts Health NHS Trust. He is Editor-in-Chief of Diabetic Medicine.

His main research interests are the genomics of type 2 diabetes and prevention strategies, especially in people from South Asia. He is also one of the principal investigators of the CARDS (Collaborative Atorvastatin Diabetes Study) trial that has influenced the development of current lipid lowering guidelines in diabetes. He has over 250 peer reviewed publications.

Professor Sophie Scott

Professor Sophie Scott received her PhD in Cognitive Science at UCL in 1994 and went on to work in Cambridge at the MRC Cognition and Brain Sciences Unit (formerly Applied Psychology Unit) in Cambridge. She returned to UCL as a Research Fellow in 1998 and was awarded a Wellcome Trust Fellowship in 2001 and has been funded by them since. Sophie is head of the Speech Communication Group at UCL's Institute of Cognitive Neuroscience. Her research investigates the neural basis of vocal communication - how our brains process the information in speech and voices, and how our brains control the production of our voice. She is also interested in the expression of emotion in the voice. In particular, research in recent years has focused on the neuroscience of laughter.

Dr Drew Purves

Drew studied ecology at Cambridge University and then completed a PhD in ecological modelling at the University of York. He spent nearly 6 years as a research scientist at Princeton University, before joining Microsoft Research Cambridge in 2007, where he is now head of the Computational Ecology and Environmental Science group, CEES. The goal of CEES is to develop simulation models of all kinds of ecological phenomena at all kinds of scales, from microscopic to global – and to invent the new software tools that are needed to do develop such models.

WE NEED ABOUT 1.25M SCIENCE, ENGINEERING AND TECHNOLOGY PROFESSIONALS AND TECHNICIANS BY 2020

Philip Greenish, Chief Executive, Royal Academy of Engineering, 2014

BIOGRAPHIES

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." He is a Director of the London Legacy Development Corporation.

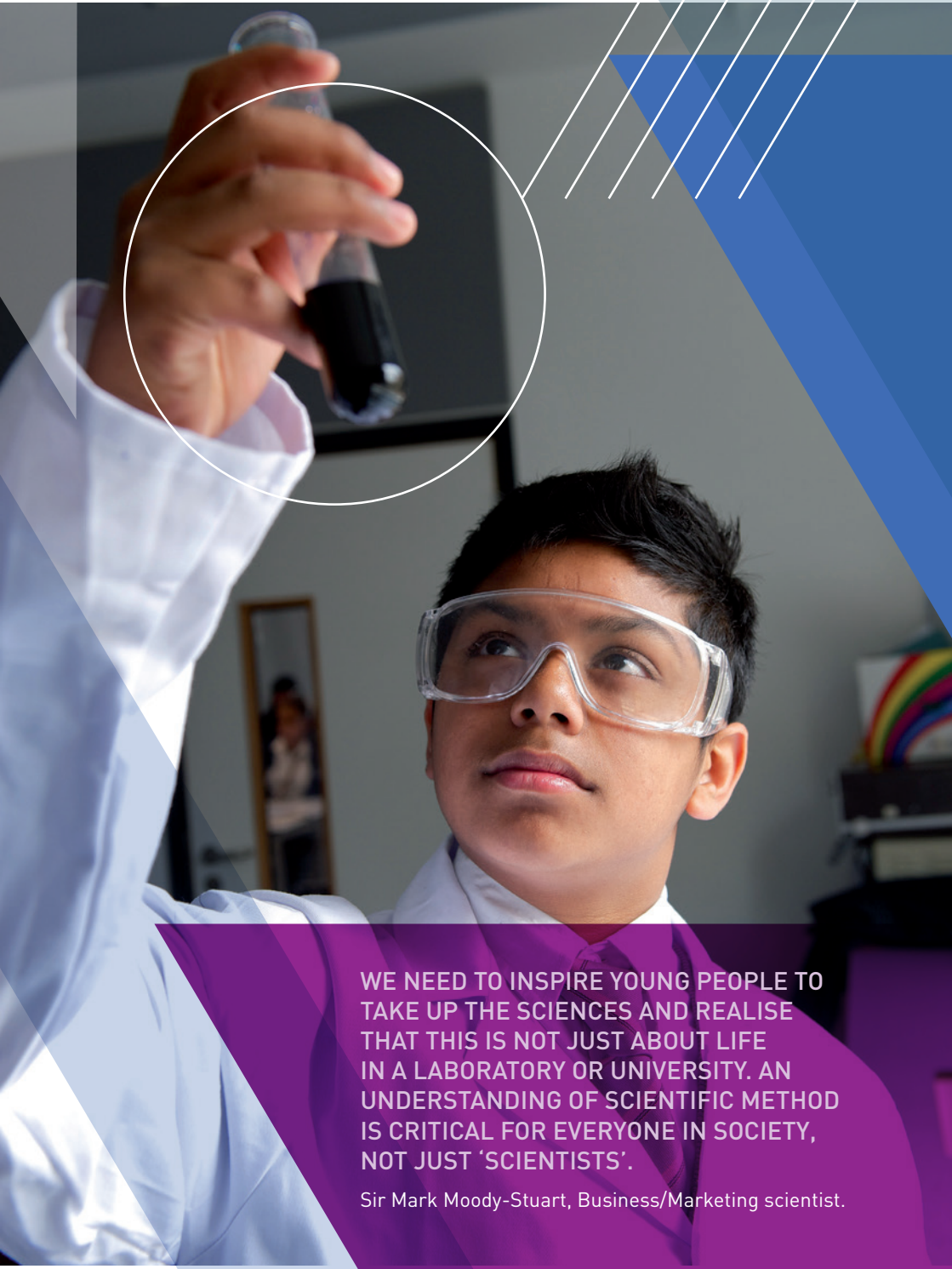
In 2006 Andrew was asked to lead the St Paul's Way Transformation Project bringing together, in a joined-up project, the physical improvements along St Paul's Way; creating new networks and relationships between the agencies and local residents, and pursuing a coordinated vision for the future of the area.

For Andrew, nothing is impossible. His favourite saying is, "live dangerously or do not live at all."

Special Thanks

The St Pauls Way Trust School is very grateful for the support of Catlin Group, Tesco, Canary Wharf Group, Level 39, Carbon Voyage, ELBA and Andrew Mawson Partnerships.

We are also very grateful to the Lloyd's Register Foundation for their 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.



WE NEED TO INSPIRE YOUNG PEOPLE TO TAKE UP THE SCIENCES AND REALISE THAT THIS IS NOT JUST ABOUT LIFE IN A LABORATORY OR UNIVERSITY. AN UNDERSTANDING OF SCIENTIFIC METHOD IS CRITICAL FOR EVERYONE IN SOCIETY, NOT JUST 'SCIENTISTS'.

Sir Mark Moody-Stuart, Business/Marketing scientist.

St Paul's Way Trust School is the **first Faraday Science School in London**.

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'. We are a Royal Society School and the first Faraday Science School in London leading 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. As part of the St Paul's Way Transformation Project in Tower Hamlets, the school has undergone a **£40 million rebuild**. 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 September 2014 the school becomes a 'Through School'. This move gives 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.

This year our ambition of fostering links between science, education and the local community will soon take another step forward with the opening of the St Paul's Way Trust Research Centre. This centre, designed by our lead Trust Partner Queen Mary, University of London, will enable 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 will include our work on 'Type 2 Diabetes'.

The Science Summer School is proudly supported by

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TESCO

Lloyd's Register Foundation

Andrew Mawson Partnerships

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