

Exploring & Understanding Science

fascination

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Early Detection

It's estimated that a third of the world's population is infected with the bacteria that causes tuberculosis (TB). Each year about 9 million people develop the disease and up to nearly 2 million people worldwide are killed by it.

Global BioDiagnostics Ltd is looking to take its research to the next level by designing and launching an affordable and portable test for TB that could have a huge humanitarian impact.

American based Global BioDiagnostics, a spin out biotechnology company of the Texas A&M Health Science Center College of Medicine, is the latest international high-tech company to locate its strategic R&D unit at the Daresbury Science and Innovation Campus.

Global BioDiagnostics, whose technology measures light produced by a chemical reaction between the company's proprietary chemical

substrate and a naturally occurring TB enzyme, is embarking on an ambitious market development strategy in Europe. The company will use the Campus as its key European base to take its basic research and develop it into a test. The test will be useful globally and will potentially offer the capability to be used in undeveloped countries by doctors with an electronic, hand-held device that could work from the back of a van with results in 30 minutes, instead of several weeks.

From Left to Right Damien Roberts NWDA, Gareth Derbyshire STFC, John Manwell Global BioDiagnostics, Colin Whitehouse STFC, Michael Norman Global BioDiagnostics, Martin Morlidge STFC, Paul Treloar Daresbury Innovation Centre.



Launch of new Research Complex

Formally launched on 9 July the Research Complex at Harwell (RCaH), is a facility that provides an environment for researchers in the life and physical sciences to work in synergy at the interface between traditional disciplines of biology, chemistry and physics.

The RCaH is located at the Rutherford Appleton Laboratory, on the Harwell Science and Innovation Campus in Oxfordshire.

The RCaH is a joint-Council initiative involving the Biotechnology and Biological Sciences Research Council, Engineering and Physical Sciences Research Council, Natural

Environment Research Council, Science and Technology Facilities Council and Medical Research Council and Diamond Light Source Ltd.

Science Minister David Willetts said: "This state-of-the-art complex has huge potential for maintaining our position at the cutting edge of world leading science. By bringing together scientists from all disciplines under one roof, on the doorstep of internationally-renowned research facilities such as Diamond and ISIS, their work will deliver far-reaching benefits for our everyday lives, and attract internationally mobile business R&D here."



*Venki Ramakrishnan,
2009 Nobel Laureate for Chemistry.*



Sir Leszek Borysiewicz CEO of MRC.



*Simon Phillips, Director of RCaH and
Ed Vaizey MP Minister for Culture.*

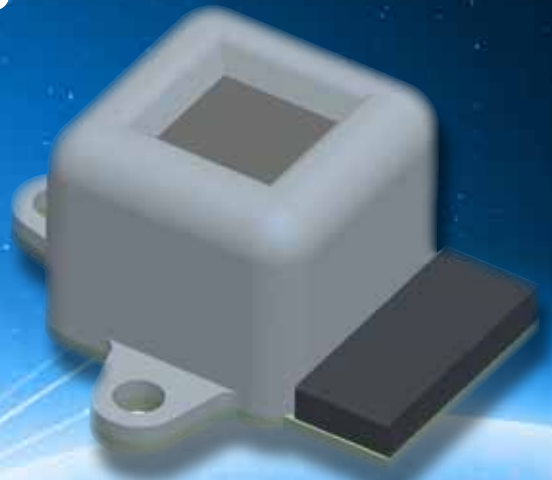


Revolutionary radiation monitors

STFC's reputation for developing world class space science instrumentation and high performance detector systems has led to the award of a contract by the European Space Agency (ESA) to STFC and Imperial College London to develop the next generation radiation monitor for ESA spacecraft.

Capitalising on STFC- funded technology development in Space Science, High Energy Physics and Detector Technology; the monitor will provide detailed information on the type and intensity of radiation which damages spacecraft. This data will enable engineers to design and operate spacecraft that is better able to withstand the rigours of the hostile space radiation environment and deliver services such as GPS, telecommunications, climate science and weather monitoring services more cheaply and reliably.

The new radiation monitor represents a breakthrough in terms of performance, weight, power and price. In the next phase of the programme, STFC plans to commercialise the monitor for European and non-European markets generating valuable, high-tech jobs and export income.



Unique Collaboration

Inward investment in UK science and technology received a boost with the signing of an agreement to extend one of the largest research collaboration projects between the UK and Japan until 2018.



The seven and a half year extension of the partnership between the Japanese research institute, RIKEN and STFC enables vital research to continue in areas such as superconducting materials for computing and medical technology and the science underpinning fusion energy.

The agreement, which was signed at a celebratory event at STFC's Rutherford Appleton Laboratory (RAL) in Oxfordshire on 2 July 2010, builds on 20 years of collaboration between scientists and engineers at the RIKEN

Nishina Centre for Accelerator-based Science in Japan and the ISIS Neutron and Muon Facility at RAL. This collaboration has resulted in tens of millions of pounds of investment into ISIS by RIKEN over the 20 year period.

The RIKEN-RAL facility produced its first muons in 1994 and generates the most powerful pulsed muon beams in the world using the intense pulsed proton beam provided by the ISIS synchrotron accelerator.

Professor Mason and Professor Noyori signing the RIKEN-RAL Agreement.



Getting back into research, with STFC's Return to Research Bursary



Scientists looking to return to active research after even a short career break face considerable challenges in getting back up to speed with their research field and achieving a successful re-entry to the scientific work place.

In the light of this, STFC has now introduced its new Return to Research Bursary scheme.

The bursary is designed to enable researchers with a PhD who have been out of active research for two years or more to develop a proposal suitable for submission to STFC's Fellowship Scheme for future funding. Researchers may be returning to research following a break for a number of reasons, for example, looking after a

family or caring responsibilities, long-term illness or a period working in a non-research role.

The bursary funds can be used to support time for literature searches, networking and other preparatory work based at a host institution that would refresh and update skills and position an applicant to write a good research proposal on an area relevant to STFC-funded research, either for a fellowship or a postdoctoral post on a grant.

This year STFC will be awarding six bursaries of up to £2500, each for a maximum term of six months.

Hydrogen Storage

Today's technology is capable of powering a car using hydrogen rather than petrol as a fuel. With water rather than carbon dioxide as the waste product, hydrogen cars have the potential to reduce harmful automotive emissions to zero. In order to achieve mass production of vehicles, however, the automotive industry must find a hydrogen store that is not only low-cost and safe but is also compact,

lightweight and easy to refuel. Many systems come close to achieving the majority of these target criteria but no system currently fulfils them all. The challenge is to develop a new generation of materials that will put hydrogen power onto our roads and into our homes.

Scientists at ISIS in collaboration with UK universities have, over the past few years, studied many hundreds

of new materials and discovered and optimised new families of compounds with improved hydrogen storage properties. The ideal material has not yet been found but the UK combination of world-leading synthesis and characterisation means that the hunt is very much on.



STFC Congratulates Joe Hoskins

STFC congratulates staff member Joe Hoskins, who has been awarded an MBE in Her Majesty the Queen's Birthday Honours List.

Joe, who has played a key part in the development of the Engineering Apprenticeship Training Scheme for many years at the STFC's Rutherford Appleton Laboratory, has been awarded an MBE for 'services to engineering'.



Stellar research keeps us **PRIVATELY SECURE**

With public protection high on the nation's agenda, it is welcome news that ThruVision Systems Limited, a spin out company of STFC, is set to launch a new generation of compact security body scanner, the TS4.

Designed for use by security personnel at international airports, public transport facilities, large sporting events and other high-security points of interest, ThruVision Systems' unique security imaging technology can detect explosives, liquids, narcotics, weapons, plastics and ceramics hidden under clothing and can image both metallic and non-metallic threat objects concealed on still or moving subjects - without revealing any body detail.

Combining all the ground breaking features of ThruVision Systems' existing scanners, the TS4 provides a much more compact and discreet, yet more effective and powerful alternative to full body scanners currently in use. Already successfully trialled in a major European airport,

the TS4 is now also generating significant interest from the corporate community and is being considered by a major Fast Moving Consumer Goods (FMCG) manufacturing organisation for loss prevention purposes.

ThruVision Systems' technology is passive. The scanner does not emit energy onto the people being screened. Some other body scanning technologies emit x-rays and other types of radiation during the screening process. It operates by receiving natural energy that emanates from all people.

ThruVision's passive imaging technology stems from a collaborative European Space Agency (ESA) project which was based on research carried out over many years by UK astronomers, including those at the STFC Rutherford Appleton Laboratory, to study dying stars.



LOFAR Installation

The first major radio telescope to be built in Britain for many decades has been installed at the Chilbolton Observatory, Hampshire. The telescope, which works on either side of FM-radio frequencies, will collect data to help astronomers with their research.

Astronomers hope to detect when the first stars in the Universe were formed and will observe some of the most distant galaxies, revealing more about how the Universe evolved.

Radio emission comes from a variety of astronomical sources. Such objects represent some of the most extreme and energetic physical processes in the Universe.

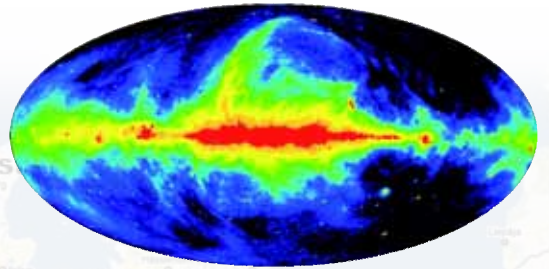
The European Low Frequency Array (LOFAR) telescope involves two sets of 96 radio antennas

erected in a field at the Chilbolton Observatory. Over 5000 further antennas are to be positioned across Europe.

The antennas will work at the lowest frequencies accessible from the Earth and will be connected using sophisticated computing and high speed Internet. A super computer based in the Netherlands, will use digital electronics to combine the signals from the antennas to make images of the entire radio sky.

LOFAR-UK is funded through a collaboration of UK universities with the SEPnet consortium and the STFC. It is the largest radio consortium in the country with astronomers representing 22 British universities.

www.lofar-uk.org



The image above shows the whole sky as seen by three radio telescopes around the world. The different colours are used to indicate the measured signal level, with red being the strongest. Image: MPIfR Bonn, Germany (C.G.T. Haslam et al.)



Ninety-six antennae have been installed at Chilbolton.

UK's International Space Innovation Centre becoming a reality with new Earth Observation Hub

The £40 million International Space Innovation Centre (ISIC) in Oxfordshire is transforming ambition into action with the first contract awarded to create a new capability in Earth Observation for the UK, paving the way for a better understanding of our planet and growth in the industrial sector underpinning this work.

STFC, which is leading ISIC, is awarding a contract to form the first key element of the ISIC, an Earth Observation (EO) Hub. The £4.9m contract has been awarded to a consortium led by top space company Astrium to develop an end to end operations centre on the Harwell campus with the ability to run cost effective satellite flight operations and payload data processing and exploitation.

This development was a recommendation of the recent 'Space Innovation Growth Strategy', a joint government, industry and academia initiative that set out a 20-year vision for the future growth of the UK space industry.

STFC Chief Executive Professor Keith Mason said "The Earth Observation Hub will enable the UK to operate advanced spacecraft and process the data from them, transforming large amounts of complex information into answers to questions on climate change and its effect on our environment, and laying the foundations for new applications of space data."



All eyes on giant telescope project

Plans for the largest optical telescope in the world, European Southern Observatory's European Extremely Large Telescope (E-ELT), were showcased at the Royal Society's Summer Science Exhibition.

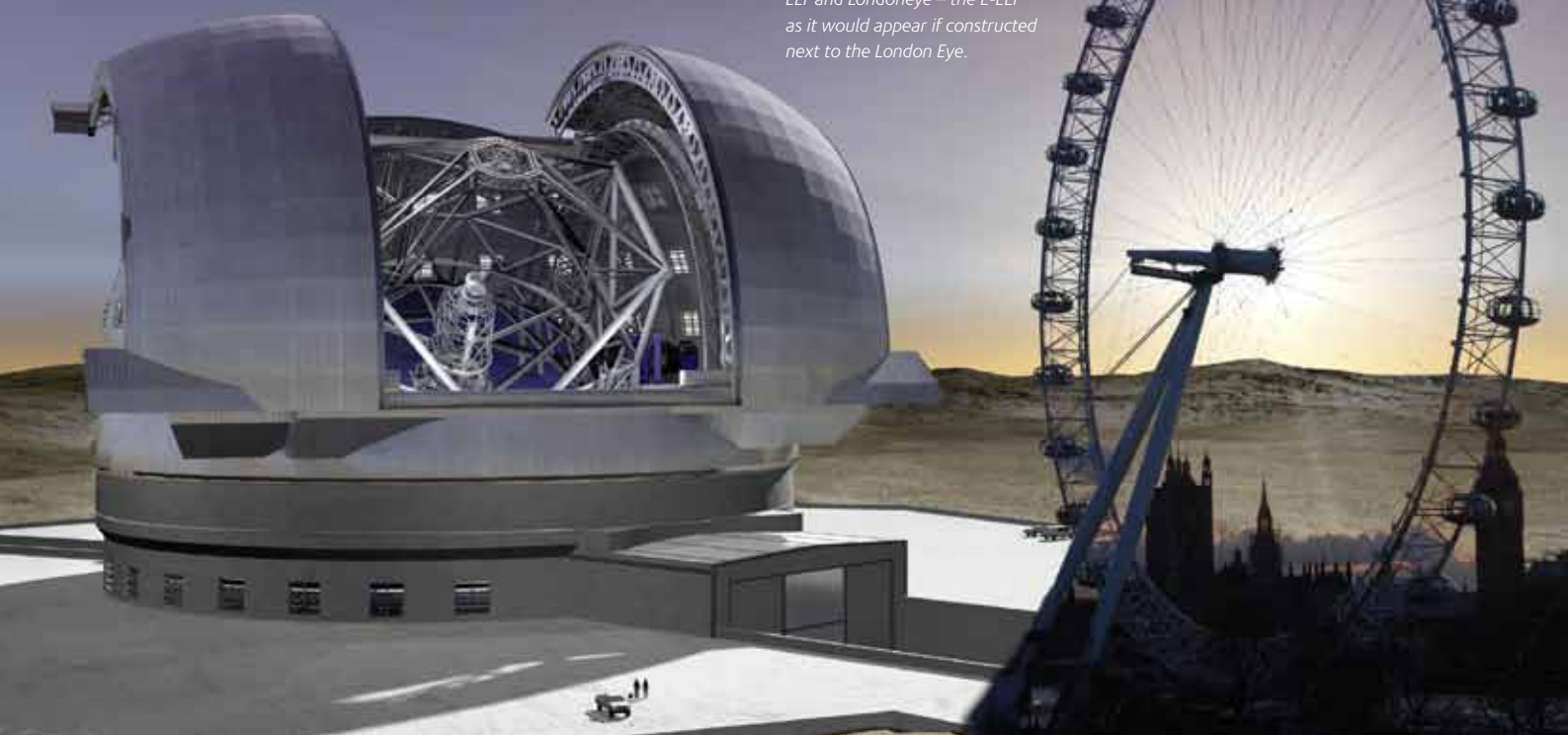
Staff and students from the UK E-ELT partners, led by STFC's UK Astronomy Technology Centre explained 'Designing a Giant Eye on the Sky'. The strikingly designed exhibit included a 3D video illustrating the giant telescope's design, alongside images showing how E-ELT will enable us to take images of Earth-like planets around nearby stars and study the earliest, most distant galaxies in the Universe.

The proposed European Extremely Large Telescope will be the largest optical and near-infrared telescope in the world, giving us a much more detailed and deeper view of the Universe from Earth than ever before. Research and Development teams from both the academic and industrial sectors have been pushing forward

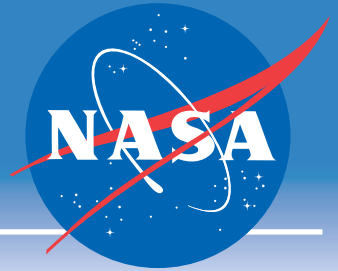
the boundaries of current optics manufacturing technology. For instance, a consortium led by OpTIC Glyndwr based in St Asaph, have been awarded a contract to develop prototype mirror segments.

Current major ground-based telescopes have mirrors ranging between 8-10 metres in diameter. The mirror for the proposed E-ELT will have a diameter of 42 metres – almost half the length of a football field. Another key feature of the design is that the 42m mirror will be comprised of 984 segments, each of which will have to be individually polished and shaped with superb accuracy, then kept in almost perfect mutual alignment as the telescope points to different galaxies and stars wherever they are in the sky.

ELT and London Eye – the E-ELT as it would appear if constructed next to the London Eye.



NASA makes award to Edinburgh scientist



The late Dr Timothy Hawarden, who was based for many years at the UK Astronomy Centre (UK ATC), has been awarded a NASA Exceptional Technology Achievement Medal for his pioneering work on innovative cooling techniques that make possible future infrared space telescopes, including the one that will follow the Hubble

Space Telescope. The awards were presented at NASA's Goddard Space Flight Center, home of the Hubble, on 16 June 2010. Nobel laureate, Dr John Mather, an American astronomer who was an early convert to Tim's concept, accepted it on Tim's behalf.

Minimalist Operating Mode for UKIRT

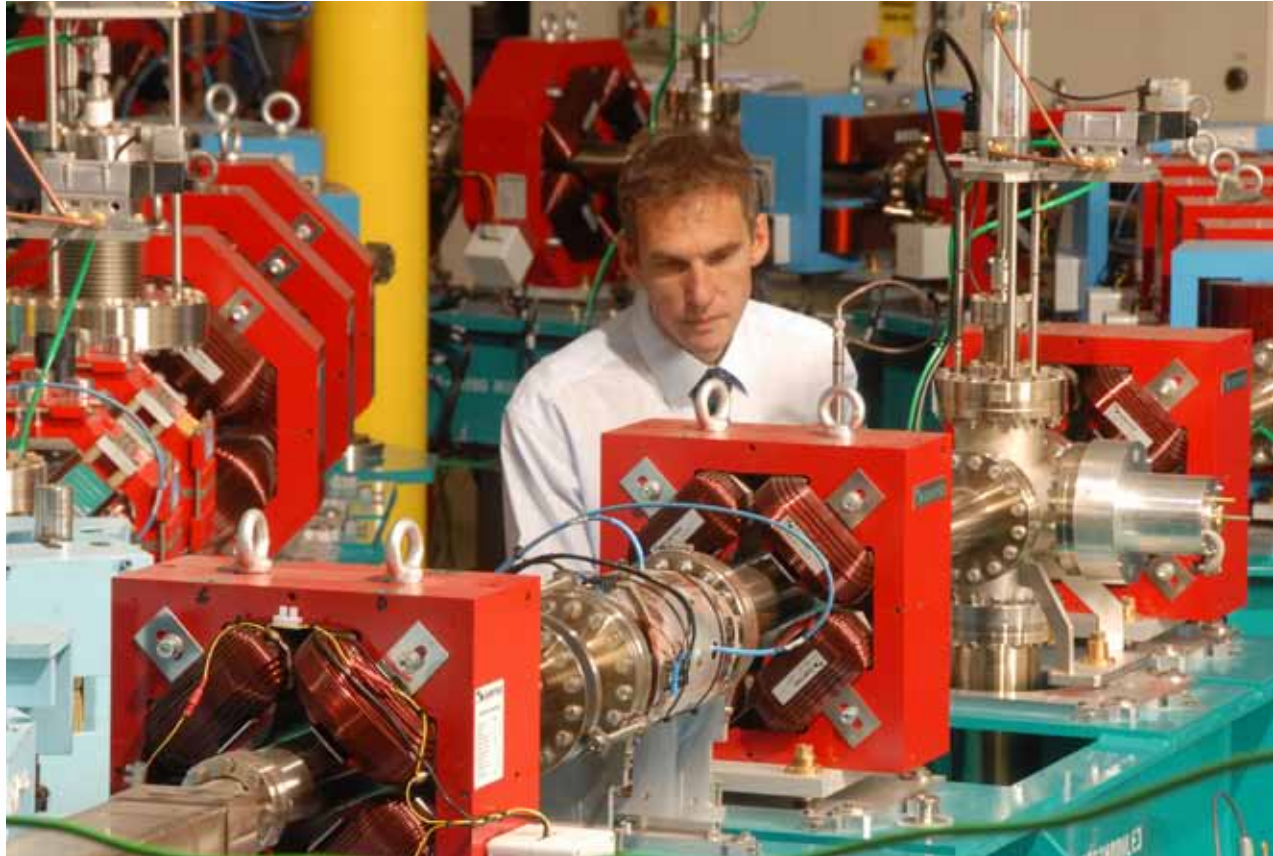
In December 2009, following a reprioritisation exercise, STFC announced their science programme for the next five years. Regrettably, UKIRT (UK Infra-Red Telescope) was ranked as a low priority in this exercise, and in addition the UKIRT Planet Finder project was not approved. STFC's announcement therefore called for a "managed withdrawal" from UKIRT.

JAC (Joint Astronomy Centre)
Director, Professor Gary Davis ,

announced a new low-cost operating mode and associated restructuring plan. "I am pleased to announce that I have developed a low-cost operating mode for UKIRT, known as 'minimalist mode'. This new operating mode was approved by the UKIRT Board and will be adopted on 1 January 2011. STFC have endorsed the change of mode and have agreed to continue supporting UKIRT until at least 31 March 2012."



The Next Milestone



Cutting edge particle accelerators are usually huge, global endeavours. However, at STFC's Daresbury Laboratory in Cheshire, a beautifully small and elegant new type of particle accelerator design is coming to fruition. Accelerator scientists at Daresbury Laboratory are constructing a demonstrator for a new technology that is the first of its kind in the world. This 20 million electron volt prototype, known as EMMA, not only uses technology that is simpler and less expensive than current accelerators, it also promises applications from treating cancer to powering safer nuclear reactors that produce less hazardous waste.

EMMA has reached a major milestone by successfully steering its first electron beams through a major fraction of the accelerator circumference. The next step in commissioning is now underway that will demonstrate the feasibility of this unique accelerator.

Further details at:

<http://www.astec.ac.uk/news/emmaCONFORM.html>



EMMA at Daresbury Laboratory.

FESTIVAL

season at Daresbury Laboratory

Secondary school teachers from across the North West flocked to STFC's Daresbury Laboratory, which hosted the North West Design Technology Festival on 25 June 2010.

The result of collaboration between the National and Regional Design and Technology Associations (D&T) with Science, Technology, Engineering, and Maths (STEM) organisations, the festival is designed to demonstrate the design and technology support available to schools in the North West and to discuss the future of STEM education.

A high-technology trade fair, which included demonstrations and

presentations from design and technology industrial companies from the North West, was held alongside an exhibition of excellence in student design and technology projects, which ended with a schools' Best in the West D&T Award presentation.

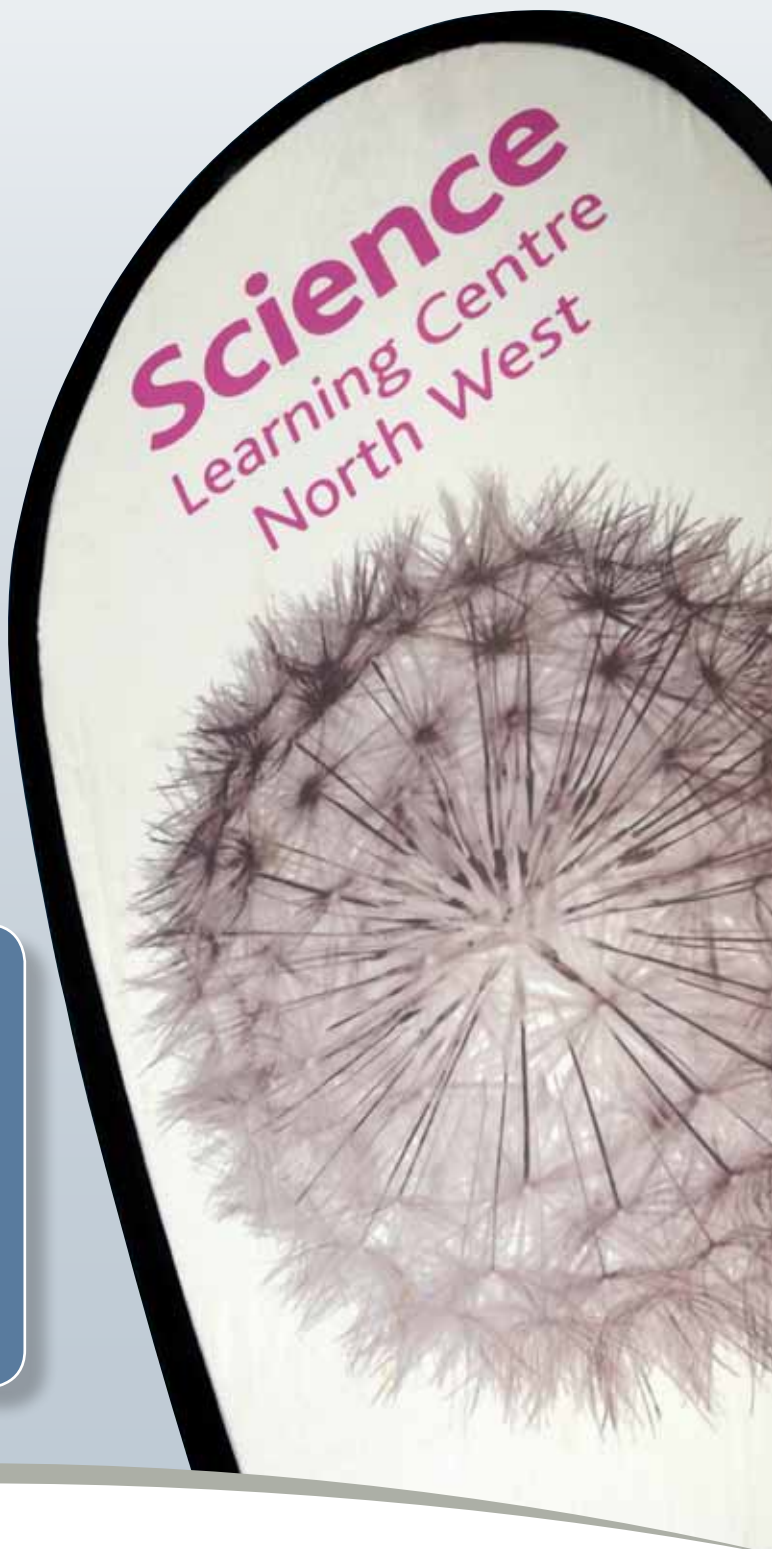
The activity packed day ended with a programme of talks on the importance of Daresbury Laboratory and the role of science and innovation. It allowed teachers to engage with researchers to learn how to convey the importance of physics to the next generation of scientists.



Attended by over 80 researchers, including students, postdoctoral researchers and facility staff a public engagement for research facility users symposium

was held on 19 May. Aimed at harnessing the enthusiasm, commitment, and talents of users to highlight the crucial role that our scientific facilities play in advancing knowledge for the benefit of society.

Delegates heard talks from inspiring speakers such as Quentin Cooper about the benefits of public engagement and how to communicate their science to a wider audience.



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