ISSUE No.3

Portal

CLRC

THE NEWSLETTER OF THE CENTRAL LABORATORY OF THE RESEARCH COUNCILS

Bright new horizons

The results of the quinquennial review of the CCLRC (The Council for the Central Laboratory of the Research Councils), recently announced by the Science and Innovation Minister Lord Sainsbury, have given us a clear statement of confidence and established a blueprint for our future.

CCLRC's new strategic role as the national focus for large-scale scientific research facilities for neutron scattering, synchrotron radiation and high power lasers is a welcome challenge. We look forward to co-ordinating the development of policies and strategies to provide access for UK scientists to such facilities, both nationally and internationally.

Staff working on the major facilities at CCLRC's laboratories are among the best in the world and, working alongside users who themselves are doing world-class research, are well placed to understand the needs and to appreciate trends and future requirements. Through the new arrangements, the UK will be able to play a full part in international initiatives in research, development and strategic planning for the next generation of large-scale facilities and associated cross-disciplinary research.

The results of this, our first, quinquennial review are particularly important as they outline ways to strengthen and promote greater value for money from investment in CCLRC, a major element of the UK's science budget. Establishing a sensible level of core funding will allow the development of the infrastructure and facilities at CCLRC's laboratories to take on a new pace, as befits the world-leading research that they support.

The importance of CCLRC's key new role in the future of UK research is manifest. On announcement of the review's results, Science and Innovation Minister Lord Sainsbury said, "a strong science base is crucial to our future economic and social well-being. Having an excellent scientific infrastructure is vitally important if we are to help UK scientists remain at the forefront of their specialist fields."

CCLRC will continue to operate where it has the expertise to do so - and this includes providing project and programme co-ordination support, exploitation of capabilities for longer-term research and development and the commercial take-up of the products of its R&D. Beyond large-scale facilities, CCLRC has strengths in advanced technologies and engineering, as well as operating a number of smaller but nonetheless vital research facilities. This tremendous breadth represents a unique national endeavour.

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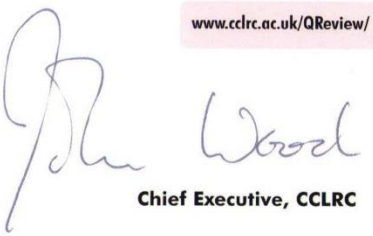
The next phase is the implementation of the changes required to bring the review's recommendations into reality. New funding arrangements are expected to be in place by April 2003. The other changes - particularly to strategic planning activities - will be introduced over the next twelve months.

We look forward to continuing and building on our role as a beacon for scientific investigation and discovery on the international stage.

www.cclrc.ac.uk/QReview/



Chief Executive, CCLRC

You can view Portal online at:

www.clrc.ac.uk

CLRC launches 'CLIK'

– CENTRAL LABORATORY INNOVATION & KNOWLEDGE TRANSFER COMPANY

The Central Laboratory Innovation & Knowledge Transfer Company ('CLIK') commenced operations on 2 April 2002, headed by Dr Keith Winters.

"CLIK will provide CLRC with a range of technology transfer services. The CLIK team has already begun working closely with CLRC technical staff to identify projects that show promise for licensing or possible spinout. These will be taken forward through Venture Capital and seed funding sources for further development and commercial exploitation. CLIK has an exciting future!" explained Keith.

CLIK initially comprises eight staff across CLRC's sites with a brief to stimulate and nurture spin-out, spin-in and licensing opportunities for CLRC. The team includes two additional business development managers, Dr Jonathan James (Rutherford Appleton Laboratory) and Paul Vernon (Daresbury Laboratory) who were recruited from industry in March 2002.

A major part of CLIK's strength is that it will have access to a newly formed £4M seed capital fund known as the Rainbow Seed Fund.

John Ellis, representing CLRC on the Rainbow Seed Fund management team explained, "Rainbow will be invaluable in bridging that all-important gap in seed funding for early stage innovation that shows commercial promise. For example Rainbow may provide fast track funding to secure IP rights, undertake market assessment and prototyping, or provide working capital for business creation."

The launch of CLIK demonstrates CLRC's commitment to technology transfer. It is supported in part by an award from a Government scheme to stimulate technology transfer from public sector research establishments.

The Rainbow Seed Fund was established by a consortium consisting of CLRC, DSTL (Defence Science & Technology Laboratory), NERC (Natural Environment Research Council), PPARC (Particle Physics Astronomy Research Council) and UKAEA (United Kingdom Atomic Energy Authority) with funding from the same scheme that supports CLIK.

Keith with John Wood, Chief Executive CCLRC, at CLIK's launch.

Contacts:
Keith Winters **k.winters@rl.ac.uk**
John Ellis **j.a.ellis@rl.ac.uk**

www.clikbiz.co.uk

www.rainbowseedfund.com

Sainsbury Re-appoints Research Council Chairmen

Science and Innovation Minister Lord Sainsbury announced the re-appointment of Dr Peter Doyle as Chairman of the Biotechnology and Biological Sciences Research Council (BBSRC) and Sir Anthony Cleaver as Chairman of the Medical Research Council (MRC) on 8 March 2002.

Lord Sainsbury was "delighted that Dr Doyle and Sir Anthony Cleaver have agreed to remain as Chairmen of BBSRC and MRC for another term of appointment. They have contributed to the good work of their respective research councils and will continue to play a key role."

Dr Peter Doyle has been re-appointed for one year starting on 1 May 2002 and Sir Anthony Cleaver has accepted a further term of 4 years commencing on 1 October 2002.

www.bbsrc.ac.uk **www.mrc.ac.uk**

Tiger with THz-ray vision

Technological advances take place all the time – driven by need. But can these advances be speeded up in quantum leaps? The European Space Agency thinks they can, and is launching a pioneering project at CLRC Rutherford Appleton Laboratory (RAL) to test this theory.

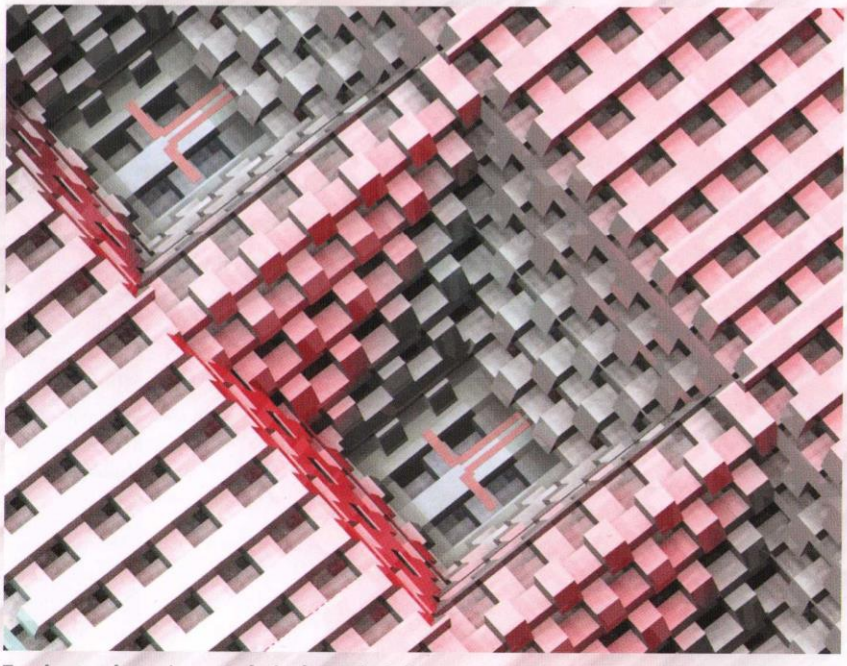
The Star Tiger (Space Technology Advancements by Resourceful Targeted and Innovative Groups of Experts and Researchers) project will gather together a team of 10 enthusiastic scientists and engineers with a range of expertise from around Europe to complete a technically challenging project.

The task will be to produce the world's first compact terahertz (THz) imager, capable of operating in two frequencies (250 and 300GHz) and of imaging a human hand in more or less real time. The use of two frequencies provides a means for contrasting between materials with different transmission and reflection properties, effectively creating two colours.

"The over-riding limiting factors for present imagers are their complexity, combined with their size, mass and cost. Star Tiger's requirement of colour imaging makes this challenge truly demanding," explains Peter de Maagt, the project manager at ESA.

In order to reach their goal, the team will have to integrate several innovative technologies, such as planar antennas, planar detectors, photonic band gap materials and miniaturised electronics.

"The key to success of this approach is ready access to state-of-the-art equipment, facilities, computing power and technical support," explains Chris Mann, project manager at RAL, "all of which are in abundant supply at CLRC."



Terahertz photonic crystal pixel – artist's impression.

A project of this ambition would normally take years but Chris and Peter are confident that it is possible to complete this task in just 4 months (commencing June 2002). The key to their plan is to remove all the distractions and administrative burdens that can take up 90% of a researcher's time, releasing both time and money which can be invested in Star Tiger.

"Forget Big Brother and Castaway, where people were thrown together with no goal other than to entertain the public through TV programmes. In this project we'll be handpicking people for their expertise and ability to work in a team – to work together to push technology to its limit," explains Chris.

The imager will provide a view port into presently hidden information embedded in the natural THz radio waves emitted by pretty much everything, including people. Space applications presently include astronomy, atmospheric physics, and Earth and environment monitoring. With the use of micro electro-mechanical systems and photonic band gap technology the Star Tiger imager will be low powered, small and compact and open up the possibility of planetary and micro satellite missions.

Non-space activities will also benefit from this technology, including industrial process control, security surveillance, and medical diagnostics – THz radio waves are able to penetrate the uppermost layers of skin making the early detection of skin cancers an exciting and real possibility.

Contact: **Chris Mann**
Email: **c.m.mann@rl.ac.uk**

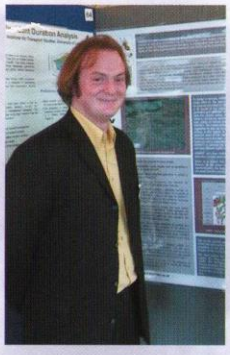
www.startiger.org

Bright Sparks

RCRU Trio Visit the House of Commons

MPs and industrialists were invited to guess the connection between weather radar, satellite links and wireless networks over nibbles and wine at the House of Commons on 18 March. These diverse topics are being investigated by three young researchers from CLRC's Radio Communications Research Unit (RCRU), who presented posters at a prestigious reception billed as the grand finale of National Science week.

Sarah Callaghan (right) presented her work using the world's largest steerable weather radar to study the effects of rain and cloud on essential communications systems. "As mobile phones and the weather are common topics of conversation in this country, there was a lot of interest in my poster," explained Sarah. "It was good to see that young women made up a sizeable proportion of the presenters."



Archie Wade (left) showcased a revolutionary software design tool called HORNET, that will optimise how radio networks deliver telephone, TV and fast internet connections to our homes.

Dr Charles Kilburn (right) assured MPs that 'Meteorology Matters' with his poster describing how intense storms and tornadoes can be tracked and analysed using radar, helping meteorologists to understand and predict extreme weather events in the UK. Charles was glad to be invited; "It was great to get a flavour of other people's research and to see such an amazing place at work."

www.rcru.rl.ac.uk

New Grants

MERLIN – A new neutron spectrometer at the ISIS Facility

Funding has been awarded by EPSRC to Professor Keith McEwen of University College London and Professor Stephen Hayden of Bristol University to construct MERLIN, a new neutron spectrometer at the ISIS Facility at RAL. A further award to Dr Martin Dove of Cambridge University is expected to be announced in May. The total EPSRC contribution to the project will be approximately £3.8M.

[MERLIN will be a high count-rate chopper spectrometer at the ISIS pulsed neutron source offering new capabilities for studies of condensed matter. When it is completed in 2005, the MERLIN scientific programme will cover a wide range of fields spanning studies of magnetism in high-temperature superconductors and giant magnteoresistance materials to investigations of the role of water in biomaterials.]

www.isis.rl.ac.uk

Papers

Harris, J. R.; Wattis, J. A. D.; and Wood, J. V. *A comparison of different models for mechanical alloying.* Acta Materiala **49**, 3991-4003 (2001)

Degnan, C. C.; Jackson, P.; Weston, D. P.; and Wood, J. V. *Reactive sintering of stainless steel.* Materials Science and Technology **17**, 1624-1634 (2001)

Living in a material world

The 2002 programme of the Associate Parliamentary Engineering Group was opened by Professor John Wood's stimulating talk *'Materials for Society: Tensions, Conflicts and Opportunities'*.

The talk focussed on the developments in materials in the last century and their effect on everything from food packaging to transport, telecommunications to health. It is no surprise that the plethora of new materials has had a profound effect on our lifestyles and industry. In parallel, however, there are tensions associated with these developments which have both employment and environmental implications, as well as affecting personal freedom. Rather than avoiding this controversial area, John tackled it head-on, highlighting the requirement for a new approach to engineering creativity for which non-traditional approaches to engineering and science education must be explored.

MINISTER'S COMMENDATION

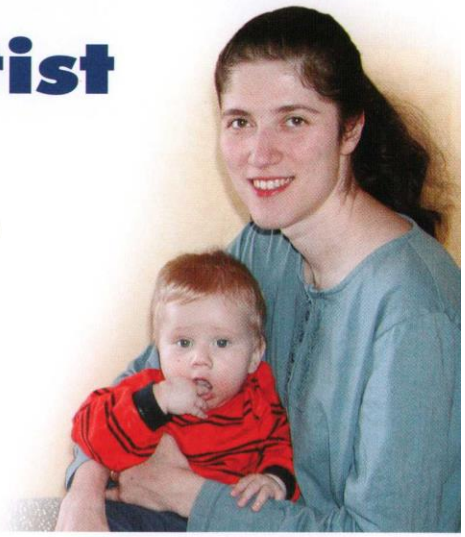
Dr Paul Randall Williams (former Chief Executive of CLRC) received an award entitled 'Minister's Commendation for Meritorious Service in the Field of International Exchange' on 5 March 2002 at the Ministry of Education, Culture, Sports, Science and Technology of Japan in Tokyo. The commendation was awarded in recognition of Paul's "outstanding contributions and achievements in promoting international exchange" by virtue of the scientific cooperation he has advanced between Japan and the United Kingdom through "long and dedicated years of research in the field of muon particles".

The recipients of the award were chosen from all the fields, scientific and non-scientific, for their significant achievements in advancement of international understanding and cooperation over a decade. This year they included one organisation and seven individuals, three of which were Japanese and four from other countries.

Dr Tomoya Ogawa, Vice President of RIKEN, and Professor K. Nagamine, visiting RIKEN researcher at ISIS, attended the award ceremony and shared the celebration.

A travelling scientist

From Bologna to California via Denmark, Stefania Xella-Hansen took the long route to CLRC Rutherford Appleton Laboratory.



If RAL were to run a competition to find the lab's most European staff member, Dr Stefania Xella-Hansen would be in with a great chance. Born in Italy and educated at the University of Bologna for her first degree, her next stop was CERN in Switzerland to work for an MSc. While she was there Stefania met her husband to be, Steen Hansen, a theoretician working in astrophysics at Oxford University.

Stefania then travelled to the Niels Bohr Institute in Denmark to do her PhD, on the Hera-B experiment at DESY in Germany. After spending some time in Palo Alto in California working at SLAC, Stefania arrived at RAL where she is currently a research associate.

Stefania had a scientific baptism of fire in her PhD project on detector triggers at the Hera electron-proton collider. Like many researchers, she spent much of her time devising new software. A problem with many high luminosity experiments is that they are so 'bright' that they produce a veritable flood of data. Stefania had to develop ways to trigger detectors so that only useful information was kept. It wasn't until the final few months of the project that Stefania could get down to some real research, collecting data and trying to understand the science. Fortunately, everything came together and she managed to perform some measurements on real data in time for her PhD.

With her PhD completed, Stefania's next plane ticket took her to the USA where she worked on the BaBar detector at SLAC. There she succeeded in getting her name among the cast of thousands that feature on many of the papers from the BaBar collaboration. She was in the team that investigated charge-parity (CP) violation, an important subject in particle physics. This experiment hit the headlines last year when the newspapers carried reports that there really are subtle differences between matter and antimatter. The collaboration, says Stefania, "has measured CP violation and, given the present statistics, it is compatible with what we expected from the standard model."

As yet there is no need to go back and rewrite the basic rules of physics but the project is due to continue for several years and will deliver a lot more data. Stefania continues to be a UK member of the BaBar collaboration.

Stefania is now using the experience she gained during her PhD and on linear colliders at SLAC in her new role at RAL, developing a new detector for the proposed next generation linear collider. To work, the instrument has to be faster than anything made so far.

Devising the new detector is a significant R&D project in itself. As well as working to produce a much faster device, Stefania and her colleagues want to create an instrument made with charge-coupled devices (CCDs) that do not require support along their length. A large part of the project involves working with the company making CCDs to perfect the design and produce them. If they succeed, with no supporting structure in the way, the resulting instrument will be able to gather very precise 3D data from collisions.

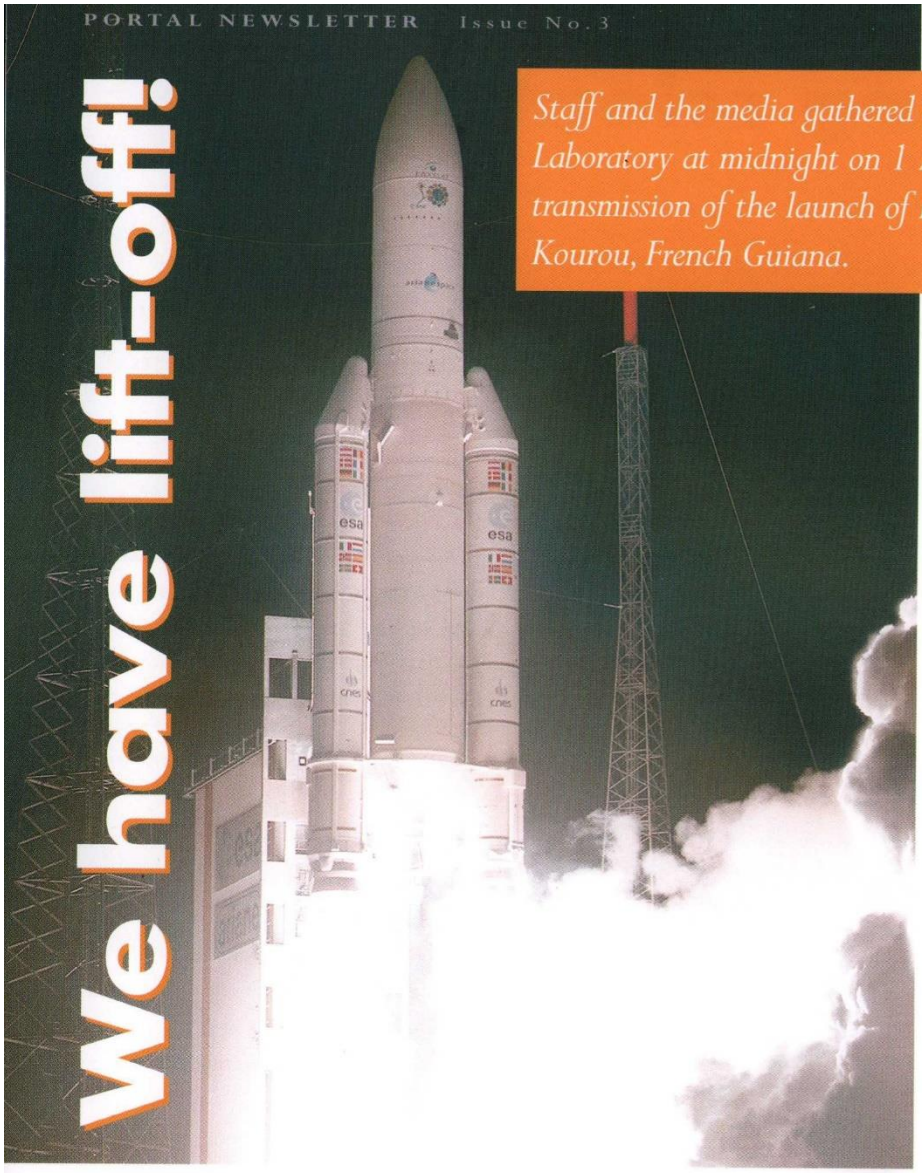
Isn't RAL a bit quiet after all that time spent on big machines? "Maybe," says Stefania, "but it has its advantages. I like to work directly on the experiment, but it is also nice to be a little bit off to the side sometimes. You get time to think."

At the moment, Stefania is also thinking a lot about another next generation 'project', her baby son Massimo. With a Danish father and an Italian mother, Massimo is indeed a true European, but it is too soon to tell if he has acquired the 'physics gene' from his parents.

Contact: **Stefania Xella-Hanson**
Email: **s.m.xella.hansen@rl.ac.uk**

hepwww.rl.ac.uk/pub/ppd.html

We have lift-off!



Staff and the media gathered at CLRC Rutherford Appleton Laboratory at midnight on 1 March to watch ESA's live transmission of the launch of Europe's Ariane 5 rocket from Kourou, French Guiana.

Scientists and engineers from around the UK and Europe watched with bated breath as, at 1.07 am (BMT) the countdown came to an end and the rocket's engines flared. Rising into a clear sky, Ariane 5 propelled the enormous European environmental satellite Envisat towards a lofty vantage point some 800 km above the Earth's surface. Lift-off was witnessed by dozens of cheering engineers, scientists and project members at the launch site and at ESA (European Space Agency) centres across Europe.

The Ariane rocket performed flawlessly, safely delivering Envisat into precisely the correct orbit. The massive solar array deployed smoothly and successfully and provided power to the satellite as planned.

"This is a very important mission for Europe – and especially the UK, who played a major role in the platform and the instruments," explained Mike Sandford, Envisat project leader at RAL. "The ten instruments on board, including two that the lab has been involved in, will monitor different aspects of the Earth's environment, giving our planet a full health check."

As soon each of the 10 instruments have been calibrated and validated, a process essential to guarantee data quality, the delivery of data to Envisat users will start. It is expected that data collection will commence in September this year.

Many of Envisat's instruments are a development of those that flew on the Agency's Earth-observing missions of the 1990s (ERS-1 and -2). Scientists will, therefore, have observations stretching back over 10 years, which will allow comparisons between conditions observed during Envisat's lifetime and those recorded during the past missions, a vital requisite for monitoring long-term trends.

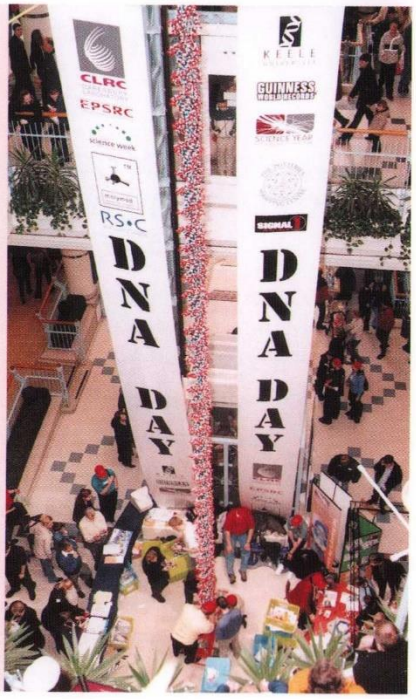
Contact: **Mike Sandford**

Email: **m.c.w.sandford@rl.ac.uk**

www.sstd.rl.ac.uk
www.esa.int/envisat/

WORLD'S LARGEST DNA MODEL

The world's largest model of DNA was built by teams from CLRC Daresbury Laboratory and Keele University at the Potteries Shopping Centre in Stoke-on-Trent on 9 March. Three thousand school children from Staffordshire and Cheshire, and celebrities from science, politics and the arts built base pairs for the model. The 10.78 metre model, containing over 1500 atoms, is now seeking a new home.



New light on our environment

NERC-supported research at the synchrotron radiation source (SRS) at the CLRC Daresbury Laboratory is revealing how rocks and minerals are formed at an atomic level, as well as opening up new windows on other environmental processes.

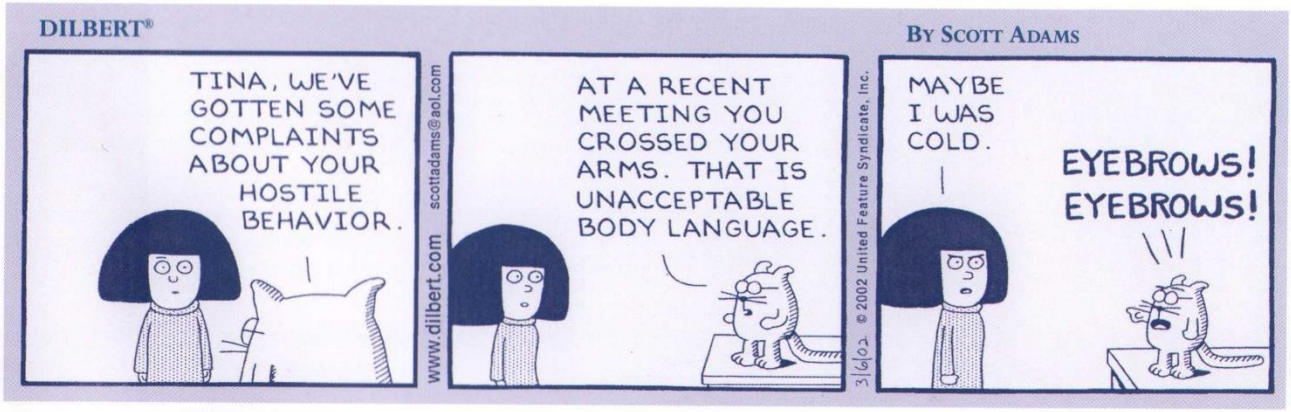
Light emitted by the acceleration of electrons to almost the speed of light in the SRS spans a range of wavelengths, from the infrared through to hard X-rays. This intense light allows experiments to be carried out more quickly, using smaller and more dilute samples. The types of research undertaken can be divided into two broad camps: molecular environmental science, where experiments seek to provide a fundamental understanding of biological, mineralogical and geochemical processes; and high pressure petrology and mineralogy, where studies of the stabilities and physical properties of high pressure minerals are helping to improve understanding of the deep Earth.

Fourier transform infrared (FTIR) spectroscopy, a key tool for molecular environmental science, has been used to examine the freshwater phytoplankton Pediastrum duplex. Studies revealed a wide variation in molecular composition suggesting that the population is very heterogeneous, with wide differences between colonies. This work will open up new studies on biodiversity and species interaction.

Synchrotron experiments have studied Earth processes from the core to the upper crust, and the atomic structure of rocks and minerals from their eruption at mid-ocean ridges to their subduction at destructive plate margins. The ability of the SRS to support high pressure X-ray powder diffraction is key to this work. Different cells can hold samples either in variable but isotropic pressure up to 150,000 atmospheres or with pressure applied along a single axis, whilst temperature is controlled up to 1,500°C. This work has highlighted the important role of water released by the dehydration of hydrous minerals in the initiation of magma generation and volcanic activity at destructive plate margins such as the 'Ring of Fire' around the Pacific Ocean.

Earth and environmental sciences have been late to discover the advantages of using synchrotron light. However, a strong programme is now developing in the UK. New facilities for this research are being developed at the Daresbury Laboratory and a new synchrotron, diamond, will soon be built at the Rutherford Appleton Laboratory. This will provide superb research facilities when it begins operation in 2007. An even brighter light is about to shine on Earth and environmental sciences.

www.srs.ac.uk/srs/



What's on

DL scientific lectures

22 May 2002 **Detective work and the Dead Sea scrolls at Qumran, a Hugh Jigsaw Puzzle**
(Dr Jan Gunneweg, Hebrew University of Jerusalem)
2 & 7pm, Merrison Lecture Theatre, Daresbury Laboratory.
Contact: Manolis Pantos Email: e.pantos@dl.ac.uk

29 May 2002 **Return to the Lions Den – The CuPd story continued**
(Professor P. Weightman, The University of Liverpool)
2pm, Merrison Lecture Theatre, Daresbury Laboratory.
Contact: Alison Mutch Email: a.mutch@dl.ac.uk

5 June 2002 **Nano Materials, Chemistry and Synthesis**
(Professor Paul O'Brien, The University of Manchester)
2pm, Merrison Lecture Theatre, Daresbury Laboratory.
Contact: Alison Mutch Email: a.mutch@dl.ac.uk

14 June 2002 **Development of High Energy X-ray fluorescence analysis its applications to archaeology, forensic science, and geochemistry**
(Professor Izumi Nakai, The University of Tokyo)
2pm, Merrison Lecture Theatre, Daresbury Laboratory.
Contact: Manolis Pantos Email: e.pantos@dl.ac.uk

DL lecture series

21 June 2002 **Sports Engineering – is it cheating?**
(Dr S Haake, Sheffield University)
7pm, Merrison Lecture Theatre, Daresbury Laboratory. Recommended age: 14+
The Lecture will use super show motion video to show some of the work that is being carried out under the name of sports engineering. Several sports will be analysed to see if sports engineering has made a difference. The audience will be able to decide if the question 'Isn't it just cheating' is answered. Booking essential (can be made after 24 May).
Contact: Marg Jacks Email: m.jacks@dl.ac.uk

North West Structural Genomics Centre Seminars

14 June 2002 **From Protein Structure to Biological Function**
(Janet Thornton, UCL)
5pm, Merrison Lecture Theatre, Daresbury Laboratory.

22 June 2002 **SSRL in the new Millennium - SPEAR3, Structural Genomics and X-ray FELs**
(Keith Hodgson, Stanford)
11.30am, Merrison Lecture Theatre, Daresbury Laboratory.

28 June 2002 **High Throughput Protein Crystallisation**
(Naomi Chayen, Imperial College)
5pm, Merrison Lecture Theatre, Daresbury Laboratory.

www.nwsgc.ac.uk

Further information

Enquiries
Email: enquiries@cclrc.ac.uk

Portal Editor
Karen Whitaker, CLRC Rutherford Appleton Laboratory, Chilton, Didcot, Oxon OX11 0QX
Email: k.l.whitaker@rl.ac.uk

For further details, contact:
CLRC Communications Group
Daresbury Laboratory 01925 603272
Rutherford Appleton Laboratory 01235 445789

Liaison Offices:
Central Laser Facility 01235 445655
clf@rl.ac.uk
www.clf.rl.ac.uk/access/index.htm

DARTS 01925 603757
Daresbury Analytical Research and Technology Services
darts@dl.ac.uk www.darts.ac.uk/

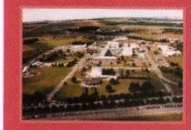
ISIS 01235 445592
isisuo@rl.ac.uk www.isis.rl.ac.uk/userOffice/

SRS 01925 603223
srs-ulo@dl.ac.uk http://www.srs.ac.uk/srs/

Sites:

Chilbolton Observatory
Chilbolton, Stockbridge, Hampshire. SO20 6BJ
Tel: 01264 860391 Fax: 01264 860142

Daresbury Laboratory
Keckwick Lane, Daresbury, Warrington, Cheshire. WA4 4AD
Tel: 01925 603000 Fax: 01925 603100



Rutherford Appleton Laboratory
Chilton, Didcot, Oxfordshire. OX11 0QX
Tel: 01235 821900 Fax: 01235 445808

Visit our website at: **www.cclrc.ac.uk**

Venturefest 2002

Oxford's International Fair for Entrepreneurs

RAL, 24 & 25 June 2002

The CLRC Rutherford Appleton Laboratory is looking forward to hosting Venturefest this June. Venturefest is a unique forum for investment organisations, including seed fund managers and business angels, to meet the innovators whose ideas could generate outstanding returns in years to come. It provides an opportunity for new entrepreneurs to get free advice, develop their business plans and discuss ideas with like-minded individuals who have already achieved their goals.

Last year's event attracted some 1,800 attendees.

In addition to seminars there will also be an exhibition of over 40 stands. Entry to all of the conference sessions and the exhibition is free of charge, but you must pre-register at:

www.venturefest.com

sci-art club

sci-art club is aimed at young people interested in science but is also suitable for those who are young at heart. Members have access to quizzes, projects, easy and fun experiments, as well as competitions and teaching resources.

To join, register on-line now at:
www.sci-art.clrc.ac.uk

Articles, ideas and comments are welcome! *Please submit articles to the Editor by Friday 31 May for inclusion in the next issue.*