

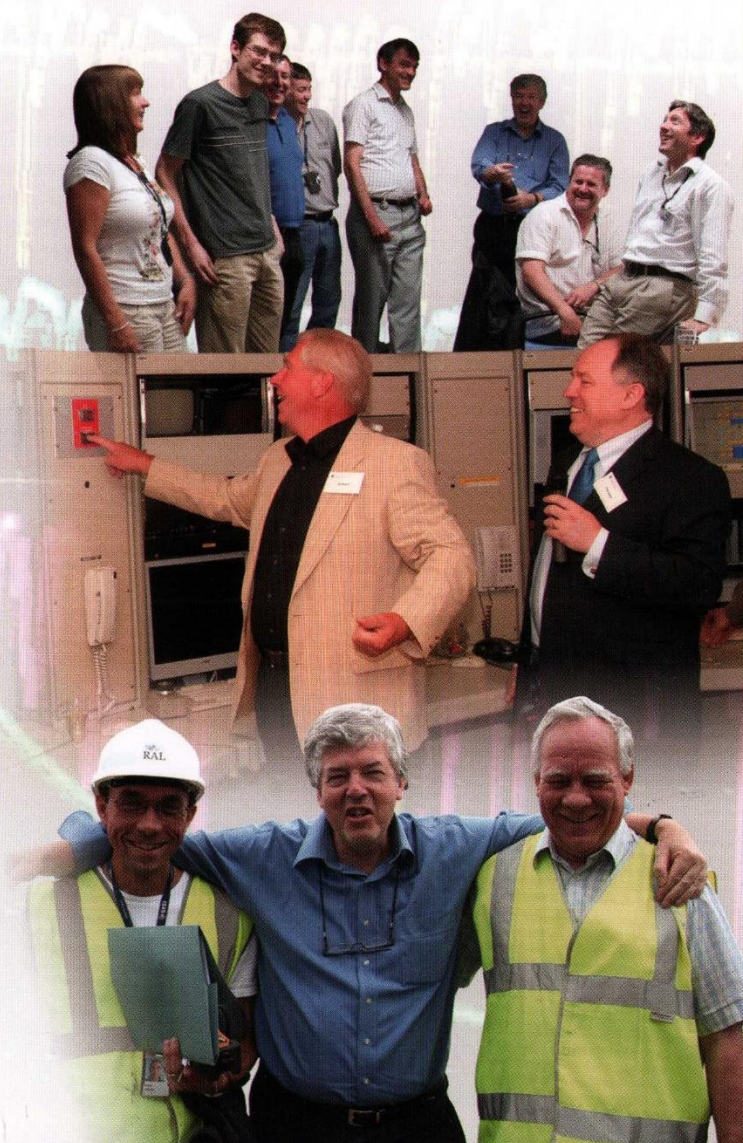


One chapter closes, another opens

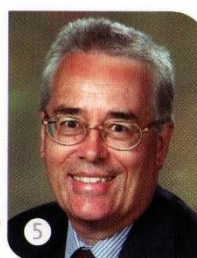
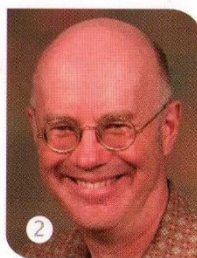
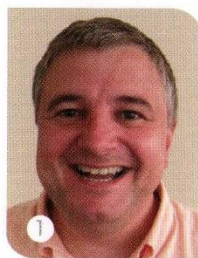
Whilst staff at Daresbury were toasting the achievements of the Synchrotron Radiation Source after 28 years of great science, staff at RAL were celebrating the first neutrons to be generated in the ISIS Second Target Station.

At DL on 4 August, many of the staff who had been instrumental in designing, building and operating the SRS gathered to celebrate the success of the SRS and its tremendous contribution to UK science. Ian Munro, the first director of the SRS, paid tribute to the machine and its people before performing the official switch off. Along with Paul Quinn, Elaine Seddon and Keith Mason, he attributed the success of the SRS to the drive, determination and enthusiasm of the DL staff.

After a week of intense activity, long hours and hard work, the first ISIS TS-2 neutrons were detected by the Inter instrument at 13:08 on 3 August. This is a huge achievement by the team, and a major step towards full operations later this year.



Movers and shakers



Congratulations to **1 John Collier** (PSD) who has been appointed Honorary Professor of Physics at Swansea University. This appointment is particularly special for John as he was both an undergraduate and postgraduate student at Swansea.

The University of Oxford has appointed **2 Nick Gould** (CSE) as a Visiting Professor in Numerical Optimisation. This is in addition to a similar position that he has held at the University of Edinburgh since 1999.

3 Alan Soper (ISIS) chaired the prestigious Gordon Research Conference on Water and Aqueous Solutions in July. The GRC series promotes discussion and the free exchange of ideas at the research frontiers of the biological, chemical and physical sciences. Attendance is by invitation only and based on research profile. The Chair is nominated at the previous conference in each series as someone who is recognised as being at the forefront of their field and who will draw together

a challenging programme for discussion.

4 Hanna Fikremariam (ISIS) has been elected as a Member of the Institution of Mechanical Engineers and is now a Chartered Engineer.

5 Mike Johnson (ISIS) has been appointed as an Honorary Fellow at the University of Edinburgh, attached to the School of Physics and the Centre for Science at Extreme Conditions.

Poo, what's that smell?

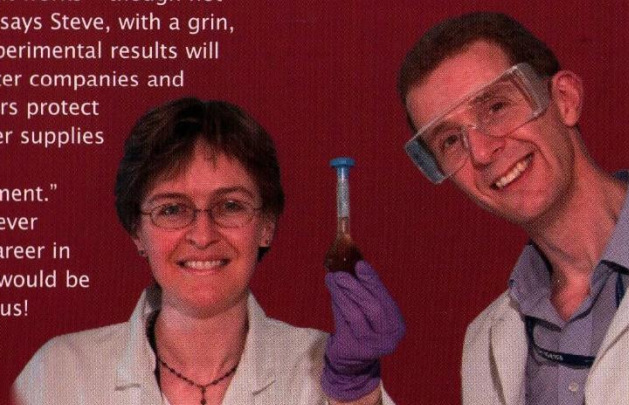
Experimental samples at ISIS come in many shapes and sizes. A recent experiment on the LOQ beam line required more risk assessments and special handling than most.

Instrument scientist, Steve King, has been working with the NERC Centre for Ecology and Hydrology and the Department of Pharmaceutical Science at King's College to investigate the transport of man-made nanoparticles in wastewater.

For the latest experiment, Steve had to put samples of fresh, raw sewage in the neutron beam. "The sewage samples were collected from a nearby

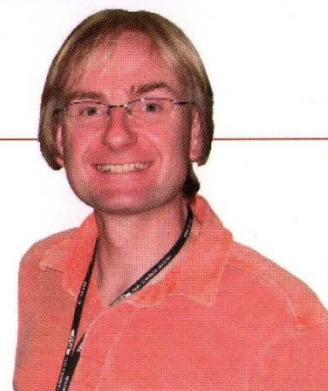
treatment works – though not by me," says Steve, with a grin, "The experimental results will help water companies and regulators protect our water supplies and the environment." No-one ever said a career in science would be glamorous!

→ *Steve King (ISIS) and Helen Jarvie (Centre for Ecology and Hydrology) during a previous experiment at ISIS. For obvious reasons their most recent experiment was not photographed!*



In a spin

Electrons have a charge. There's nothing new about that, but did you know that they also spin? Spintronics is the manipulation and measurement of electron spin. This relatively new field of research will undoubtedly be responsible for the next generation of computers and new ways of storing data. 2007 Nobel prize for physics was awarded for spintronics research.



→ Sean Langridge.

FBU has an active spintronics research programme and this is about to increase with further funding from EPSRC. Nicholas Harrison (CSE) will be working with Imperial College and the University of Warwick to develop the new field of molecular spintronics. Sean Langridge (ISIS) is working with seven UK universities to understand how to control spintronic metallic systems that operate at room temperature. By combining the unique capabilities and expertise within STFC Nicholas and Sean can obtain a very deep, atomic understanding of how these materials behave.

Typically, Sean and his team take a sample of a material of a known chemical composition and use neutrons and photons to determine its physical and electronic structure. From this information, they can predict its properties.

Nicholas and his team will start by determining the properties of the ideal material and then use powerful modeling programmes to work out the likely electronic and physical structure. They can then predict the composition. Samples of these materials can then be prepared and given to Sean for verification.

The clear advantage of combining these two approaches is the speed with which new materials can be designed, tested and made available to industry. Not only can we look forward to electronic devices with bigger memories (even more tunes on your iPod!) but even flexible solar cells sewn into your clothing!

You can find out more about Spintronics at a brand new OPB event. Log on to <http://fbu.stfc.ac.uk/opb/index.asp> for more information and to book a place.

Fungus to clean up war zones?

Depleted uranium (DU) is a devastating after-effect of war. Used in shells and armour piercing ammunition, DU contaminates the area around impact sites and can have detrimental effects on the health of those that come into contact with it.

Cleaning up DU contamination is rarely a high priority but recently published research from the SRS suggests that a humble fungus could help.

X-ray absorption spectroscopy has been used to show that *Hymenoscyphus* fungus can stabilise DU by transforming this unstable and highly toxic waste into minerals that are capable of long-term uranium retention. Converting soluble forms of uranium into stable minerals may be able to prevent uptake by plants, animals and microbes in the soil and therefore reduce the chance of it entering the food chain.

This phenomenon could lead to new techniques for cleaning up uranium-polluted soils and ultimately reduce the threat from DU to human populations.

Speeding up cancer treatment

One in nine women are likely to develop breast cancer at some point in their lifetime. More than 670,000 men are diagnosed with prostate cancer each year. While the diagnosis is obviously a cause of anxiety to the patient, it can be exacerbated by the delay before treatment starts. An innovative technology being developed by a consortium including Technology's Cryogenics and Magnetics group could lead to cancer diagnosis and treatment in a single session.

→ Left to right: Ali Akgun and Ray Hughes (Speciality Magnetics Limited) with Tom Bradshaw and yes, a pair of false breasts!



The new Intra-Operative MRI (magnetic resonance imaging) Scanner has the potential to enable image guided surgery to take place as soon as a tumour is detected and diagnosed. It will use techniques such as focused ultrasound and cryo-ablation (freezing) to tackle the cancer – treatments which cause less damage to healthy tissue, and reduce patient stress and anxiety. The new scanner would have the potential to rapidly diagnose and treat most cancers such as breast, prostate, liver and kidney.

Tom Bradshaw, Head of Technology's Cryogenics group believes that MRI is the best way to make sure that the cryogenic tools can target the tumour and destroy the cancer cells. "This is a highly exciting project and requires a variety of specialist engineering skills; we are uniquely placed with expertise in cryogenics and magnet technology to make a significant and innovative contribution. The key to this work is that we will be able to accurately position the cryo-probe, using the MRI, which will reduce damage to the surrounding tissue."

The £3.2M project started in April and is funded by the Technology Strategy Board. The other collaborators are Specialty Magnetics Limited and the Institute of Cancer Research.

For more information email tom.bradshaw@rl.ac.uk

Making space for lasers

Not only is the Central Laser Facility's Target Fabrication team celebrating moving into a superb new laboratory, they are also moving into a new era of target production. They are capitalising on the expertise of colleagues in Space Science and have jointly purchased a new ultra-precision milling machine, the first of its kind in the UK.

The CLF is moving towards using high repetition rate lasers which will use more targets over a shorter space of time. Until recently, targets were made individually, typically by hand. Complex targets could take several hours or even days to produce – impossible when bulk quantities are required. As Martin Tolley explains “Any facility that can address the issue of mass production of precision targets will remain at the cutting edge. For CLF to stay ahead of the field, we needed to find a way of mass producing targets to keep up with demand.”

So Martin and his team worked with Space Science and Technology's Precision Development Facility to find a solution. “The accuracy of most milling machines is typically several 10s of microns,” explains John Spencer (SSTD), whose team has expertise in this area. “The KERN Pyramid-Nano is accurate to an impressive 1/3 of a micron.



→ John Spencer and Martin Tolley.

It is the most accurate milling machine currently available on the market. Ours is only the 18th one commercially supplied – it's the first in the UK.”

Working in collaboration, Martin and John's teams have completely re-designed some targets so that they can be almost entirely produced by the KERN Pyramid-Nano. Developing this idea further multiple targets can now be created in a continuous machining process,

giving significant cost savings. Crucially, many more targets can now be produced in a shorter space of time to keep up with user requirements.

John and Martin will be hosting OPB events in the near future – to find out more about manufacturing instruments for space or to have a go at making a laser target, reserve your place at <http://fbu.stfc.ac.uk/opb/index.asp>

Survival skills

By day, Geoff McBride is a scientist in Technology's MNTC group but he also serves as an Officer with 600 Sqn Royal Auxiliary Air Force. In May he was offered the chance to take part in a Survival Instructors Course with the Royal Marines.

"Having been in the services (regular and reserve) for 17 years, I'd been on these things before but at 45yrs old I felt the need to be cautious. I didn't suspect a thing!

In typical Marine style, we were told very little about the course content. The first few days were classroom-based with demos on first aid, skinning animals, and search and rescue methods. We would be trained to be assistant combat survival instructors giving survival techniques demos and lectures to other military units preparing for an escape and evasion exercise. At least that's what we thought.

The brief for the first fitness session was that we'd run around the exercise area to familiarise ourselves. We were not told how far or for how long. The pace was a bit fast for me but I was determined not to show that I was struggling. One of the instructors started calling out the time to keep us in step and almost two hours later we finished. I was exhausted but elated. It was decades since I'd done anything like this but I had never considered giving up.

After more training including shelter building, fire making and unarmed combat (Commando style) there was another surprise – those of us who had done well on the run would take part in the exercise. Imagine being in a small group trapped behind enemy lines and being hunted down – no pressure!



→ Bed and ...

On the Saturday, I enjoyed running the field cooking stand. I saved snacks throughout the day and as we were politely taken out into the exercise area in a blacked-out land rover, I distributed them to the rest of my group.

Our group consisted of four Air Force and two Marines. We followed the advice of the Marines and found an area to hide for the night. Although it was dry and I was wearing a hooded jacket I was still freezing. We managed to lie low until dawn before evading capture at numerous checkpoints. But, faced with the British Transport Police and more importantly, their dogs, I surrendered at the final check point.



→ ... breakfast.

I spent eight days outdoors with no email, no coffee and only occasional calls home. I ate three cooked meals a day and still lost 2 Kg. Did I enjoy it, and would I do it again? Yes, but don't tell my Flight Commander I said so!

www.raf.mod.uk/rafreserves/

Tea at the Palace

Hundreds of Territorial Army (TA) soldiers have just celebrated 100 years of the TA at a Buckingham Palace Garden Party. Tony Kershaw (ISIS) and Mike Curtis-Rouse (Technology) were invited.



→ Tony Kershaw and Andrew Taylor outside Buckingham Palace

The garden party was a once in a lifetime opportunity for Reservists to thank their employers for their support with a very special day out, and Andrew Taylor represented STFC.

“It was a superb afternoon, in a unique location” said Mike who is a Captain in the 71 (Yeomanry) Signal Regiment. “Going to the Palace was an amazing experience”, explained Tony (a Warrant Officer Class 2 in the Specialist Team Royal Engineers), “STFC has supported me throughout the 25 years that I’ve been in the TA so it was great to be able to take Andrew along to the garden party to say ‘thank you’.”

Introducing HECToR

High performance computing offers exciting opportunities in understanding, developing and, increasingly, predicting the properties of complex materials that could effect many aspects of our lives and the world around us. A recent grant of £1.2M from EPSRC will enable a step change in these opportunities by providing access to the new HECToR facility. The five year project includes CSE and University College London.

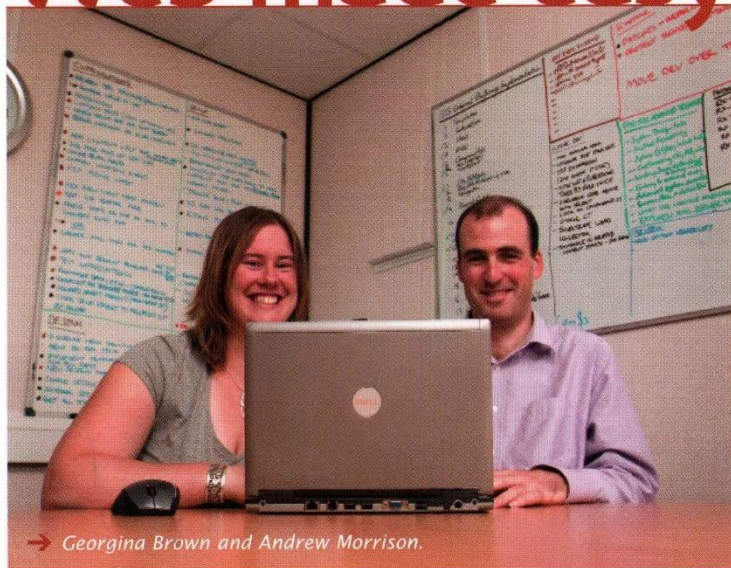
HECToR’s terabyte computing power will enable large-scale simulations to be applied to seven main thematic areas; catalysis including modeling innovative car exhaust systems; surfaces and interfaces such as coatings for self-cleaning glass; environmental materials including looking at how minerals can immobilise pollutants; nano-chemistry including the development of

new solar cells; biomaterials science where HECToR hopes to contribute to the next generation of artificial bone materials; energy where simulations will allow rapid progress in the development of fuel cells, solid state batteries and materials for nuclear reactors; and quantum devices where HECToR will model the fundamental electronic structure of materials.



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Web made easy



Take a brief look at internal and external department websites, and soon becomes apparent how many different styles are currently in use across STFC. Take a slightly closer look and you'll see that there are lots of different ways in which websites are set up, maintained and updated.

In partnership with a number of other STFC departments, the FBU and Technology Communications Team has bought a powerful piece of software which will make setting up and maintaining web sites much easier.

The new software, called Rhythmyx (don't worry, you don't have to remember how to spell it!) will enable staff to take a direct approach to the management of their departmental websites - you will no longer have to make the same change to numerous web pages; make one change and every page linked to that content will be updated automatically.

The end result? Up-to-date websites which require less maintenance with easier access for staff to change their own

content, rather than relying on someone else.

The new website templates have been designed by specialists BluHalo. The designs are dynamic and enable each department to maintain their individuality within a family look and feel.

Georgina Brown and Andrew Morrison are heading up the project but working closely with staff from each department. They are working hard to customise Rhythmyx to meet our needs and the first new style web sites will be unveiled before Christmas.

If you would like to improve your web writing skills sign up for one of our workshops at <http://fbu.stfc.ac.uk/opb/index.asp> and follow the link to 'Training'.

Other People's Business

Open to all STFC and Diamond staff.

SEPTEMBER

- 3 ALICE
- 4&5 CLF's Target Fab
- 9 Testing for Space
- 11&17 Vulcan
- 23 Diamond
- 30 Mice – the search for antimatter

OCTOBER

- 2 Millimetre Technology – precision for Space
- 7 Dimensional metrology
- 14 Managing data with robots
- 16 Satellite Ground Station
- 22 Chips with everything
- 29 A virtual tour of UKATC

NOVEMBER

- 5 Astra
- 6 Exploring the Sun
- 12 ISIS TS-2 Science
- 18 Designer Materials
- 26 CLIK and Microvisk

To book a place on any of these events, please go to <http://fbu.stfc.ac.uk/opb/index.asp>