



spectrum

staff news and events

June 2010

50th Anniversary of Lasers celebrated with Vulcan upgrade

For over 50 years since its invention, the laser has quietly pioneered some of the greatest achievements of the last half century. It has had a profound and far reaching effect on a range of sectors, from communications to entertainment from medicine to high energy physics, but despite being initially developed as a 'solution looking for a problem' the laser shows no signs of age as it continues to be developed as a possible new energy source and even personalised medical treatment.

STFC has celebrated the 50th anniversary of Theodore Maiman 'firing' the first ruby laser at the Hughes Research Laboratory in California, by

releasing a detailed brochure and leaflet looking at the laser's development since its invention and predicting its future applications. The brochure plots the history of the laser, from Einstein's theory of stimulated emission (from where the laser gets its name); through the creation of the first compact disk, (Billy Joel's 52nd Street album being the first released CD), to its pinnacle in Vulcan: one of world's most powerful lasers.

Vulcan, STFC's petawatt laser, is in the process of ensuring the most enigmatic of inventions, the laser, continues its remarkable journey.

The project to upgrade Vulcan to 10 petawatts is in its second phase with

the facility due to be operational in 2014.

The new, more powerful, Vulcan will provide focused intensities of 10^{23} Wcm⁻² to the user community, opening a wide range of novel scientific opportunities and pioneering new, advanced applications to test the very fundamentals of science.

As Dr Kate Lancaster explained "new applications are being researched and developed almost daily in medicine, communications, industry and science - undoubtedly the laser has become a key technology in driving a whole range of socio-economic applications."

For more information:
www.clf.stfc.ac.uk

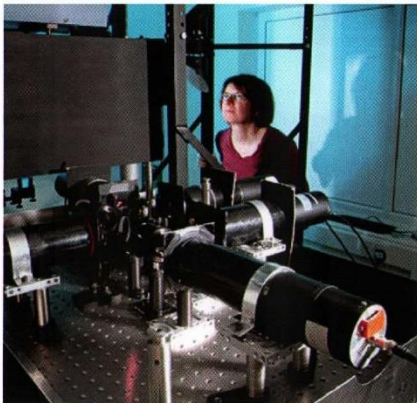


An artist's impression
of the brand new
Vulcan facility

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Chilbolton covers ash cloud



Judith Agnew with the UV Raman Lidar

On 16 April 2010 Europe watched helplessly as Iceland's presumed -dormant volcano Eyjafjallajökull erupted in a cataclysm of superheated dust and gas grounding all aircraft within UK airspace. No one could have predicted the volcano's impact and the hold it would have over the whole of Europe, each day brought delays and cancellations, with images of stranded airline passengers becoming a regular sight in the media. Since that day the Chilbolton Observatory and the Molecular

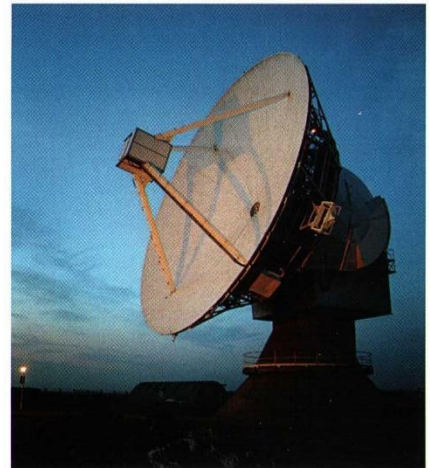
Spectroscopy Facility (MSF) at RAL, have been collecting data about the location and properties of the volcano ash cloud to determine its composition and movement through the atmosphere. At Chilbolton they have been using ground-based instruments called lidars (LIght Detection And Ranging) which transmit a pulsed laser beam 10-12 km into the atmosphere to detect the tiny ash particles.

"We normally use the lidars for weather-related research; however we are now using them daily to detect the shape, size, height and location of the ash particles and to see how they mix with the rest of the atmosphere. This data is vital to help verify the predictive models with the UK, through Chilbolton, being the best equipped to undertake this task" said Charles Wrench, Head of the Chilbolton facility.

Whilst scientists have been busy collecting data from ground-based instruments, STFC and University of Oxford researchers have been using the MSF laboratory to analyse data generated by the European Space Agency's Envisat Satellite. The data is being used to determine the amount and particle size distributions of the ash.

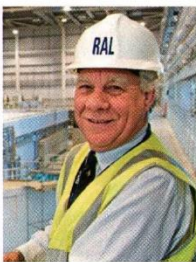
In response to the needs of the international atmospheric research community and the UK National Centre for Atmospheric Science, RAL's Centre for Environmental Data Archival has set up a dedicated database and Volcano Event Mapping Tool to share observations of the volcanic plume.

For more information: www.chilbolton.rl.ac.uk



The Chilbolton disk at dusk

Movers and shakers



We say our goodbye to **Harry Jones**, who after 43 years of service to ISIS has retired. His achievements include project managing the creation of the second Target Station and being awarded an MBE during the Queen's New Year's honour list.



Congratulations to CLF Director **Mike Dunne** who is moving onto pastures new to work on the new Laser Inertial Fusion Engine at the National Ignition Facility at the Lawrence Livermore National Laboratory in California.



The late **Dr Timothy Hawarden**, a long serving STFC staff member, has been awarded a NASA Exceptional Technology Achievement Medal for his pioneering work on passive/radiative cooling of infrared space telescopes.



Efforts to improve relationships between staff at the different STFC sites are clearly paying off! On 21 May, **Julie Bellingham** Higher Education Institute Relationship Manager based in Swindon) married **Martyn Bull** (Head of Comms for ISIS at RAL) in a beautiful ceremony attended by colleagues from both sites. We wish Julie and Martyn a long and happy life together.

Election brings change to BIS

Following the general election, the new look BIS Ministerial team has been announced by the coalition Government. As with other departments, the BIS team incorporates MPs from both the Conservative Party and the Liberal Democrats. The key ministers are listed below.



Rt Hon Dr Vince Cable – Secretary of State for Business, Innovation and Skills

Prominent Liberal Democrat MP, **Dr Vince Cable** is the coalition Government's Secretary of State for BIS (and heads up the Department). Since arriving in parliament in 1997 to represent the Richmond constituency, he has been the Liberal Democrat Shadow Chancellor since 2003 and was deputy leader from 2007-2010.

As Secretary of State, Dr Cable has overall responsibility for BIS's strategy, all department policies, and its budget. Within the department, he will have a particular focus on business and banking issues, and is also the lead Cabinet Minister for reducing regulatory burdens across Government..

David Willetts – Minister of State for Universities and Science



As the Conservative Shadow for Universities prior to the election, **David Willetts** becomes an observer in the coalition Cabinet and Minister of State for Universities and Science. He has represented Havant in Parliament since 1992, working in the last Conservative Government and has had spells in the Treasury and the Number 10 Policy Unit.

As Minister of State, Mr Willetts' portfolio is wide ranging and includes BIS's strategic priorities, higher education, science and research (including research councils), life sciences, innovation and Space.

Other appointments include **John Hayes MP** (Con) as Minister for Further Education, Skills and Lifelong Learning, **Mark Prisk MP** (Con) as Minister for Business and Enterprise, **Edward Davey MP** (Lib Dem) as Minister for Employment Relations, Consumer and Postal Affairs, and **Baroness Wilcox** as Parliamentary Secretary for BIS, Baroness Wilcox will also be BIS's spokesperson in the House of Lords.

Ed Vaizey, local Harwell MP, has been included as Minister for Culture, Communication and Creative Industries in a role shared with the Department for Culture, Media and Sport.



John Hayes MP



Mark Prisk MP



Edward Davey MP



Baroness Wilcox

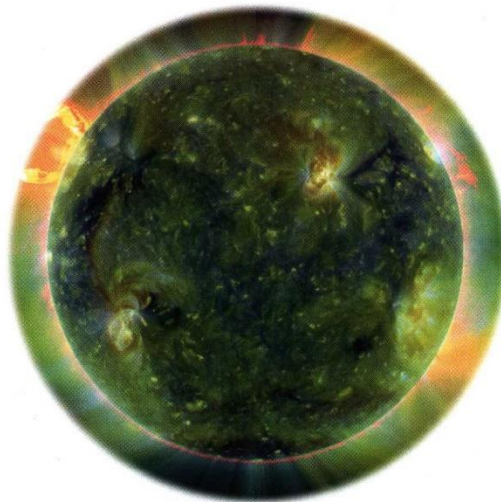


Ed Vaizey MP

SDO staring at the Sun

STFC scientists and engineers are celebrating the release of the first images from NASA's Solar Dynamics Observatory (SDO), which show, with unprecedented clarity, solar flares and their associated waves across the surface of the Sun. The images received will help scientists gain a better understanding of the Sun's disruptive influence on services such as telecommunications.

SDO was launched from Florida's Cape Canaveral on 11 February 2010. Its unique orbit allows high resolution images to be recorded every three quarters of a second, providing in-depth information about the Sun's complex magnetic fields and space weather generated by solar activity.



Images taken by SDO immediately after the Atmospheric Imaging Assembly CCD cameras cooled on 30 March, 2010

Engineers from STFC built the electronics systems for the six cameras on two of SDO's instruments. Under contract from Lockheed Martin they developed the electronics boxes which control and read out the data from SDO's cameras.

Professor Richard Harrison from the Space Science and Technology Department said; "To see five years of hard work from scientists and engineers at RAL, as well as other UK institutions, come to fruition is extremely rewarding."

Members of the public can also do their bit to help track solar storms by looking at the Solar Stormwatch website and by getting involved in an award winning project involving UK-led instruments aboard the NASA STEREO spacecraft, to spot solar storms and track their progress across space towards the Earth.

For more information: <http://sdo.gsfc.nasa.gov/>

Snippets from your site

Electron Microscope looks into the past



Daresbury's brand new Innovations Technology Access Centre (I-TAC) has taken delivery of the first new model of Hitachi's desktop scanning electron microscope (SEM), the TM3000, in Europe. Hitachi's brand new tabletop microscope has been designed to simplify and facilitate research and observation of the microstructures of material surfaces with a magnification of up to 30,000 times, and is applicable to a host of applications and industries.

Wood from the Mary Rose analysed by new scanning electron microscope

Dr Andy Smith, having recently returned from successful beamtime at Diamond Light Source, looking at novel conservation techniques for preserving historic marine timber artefacts, such as those recovered with the wreck of the Mary Rose, said "It was great to be able to use the new I-TAC SEM to visualise some of the same specimens at high resolution."

For more information:
www.itac.stfc.ac.uk

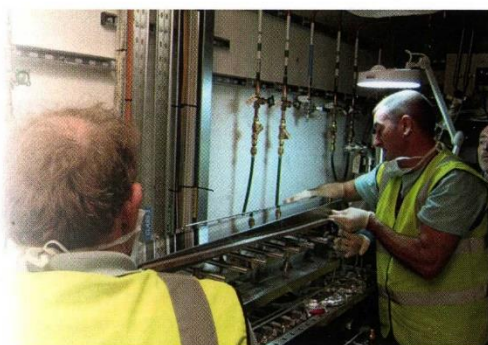
Diamond's new Beamline

Diamond Light Source has announced a major milestone in its development with the successful start of its 18th experimental station. On Wednesday 27 April, the first researchers arrived from the University of Hull to take advantage of the recently completed beamline for X-ray spectroscopy analysis of nanoparticles.

Incorporating advanced X-ray optics and detectors from the UK's former synchrotron source, the SRS at Daresbury Laboratory, a collaboration was forged between STFC and the Diamond technical team to help design and build the latest addition to Diamond's comprehensive array of instruments.

STFC's Dr Andy Smith said: "We were extremely pleased to be able to work with our Diamond colleagues and contribute our knowledge, experience and equipment to what is now a valuable addition to Diamond's world-leading capabilities."

For more information: www.diamond.ac.uk



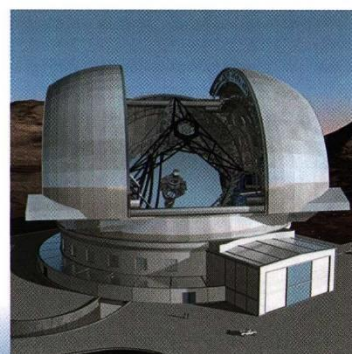
Phil Robbins (Diamond) and Paul Hindley (STFC) installing a mirror into one of the former SRS mirror mounts, now in its new home on B18, Diamond

Where do you put an Extremely Large Telescope?

The European Southern Observatory has announced the location for the European-Extremely Large Telescope (E-ELT). The site of the 42 metre optical/infrared telescope will be Cerro Armazone; a mountain 3,060 metres above sea level in the central part of Chile's Atacama Desert.

Currently in the design phase, the UK's contribution to the E-ELT is being coordinated by the UK Astronomy Technology Centre, in collaboration with industry and university partners, with particular emphasis on instruments and adaptive optic systems.

For more information: www.eso.org



Above: an artist's impression of the European Extremely Large telescope



a panoramic shot of the Cerro Armazone, the location of the E-ELT

Swindon goes LCD



STFC's Swindon Office has recently taken delivery of a brand new LCD presentation screen. Like the screens located at Daresbury and RAL, the Swindon screen will be used to advertise upcoming events, notify staff of recent scientific achievements and update regarding important corporate information. The screen sits at the entrance to the STFC section on the second floor of Polaris House.

If you would like to let staff in Swindon know about the work you are currently doing or of an event, please email: internal.communication@stfc.ac.uk

The brand new LCD screen in Swindon, being modelled by Jim Gallagher and Maureen Ayres of Internal Communications

Science with the William Herschel Telescope

On 22 March, 86 astronomers from around the world descended on Burlington House, in London, to discuss the future scientific exploitation of STFC's 4.2 metre William Herschel Telescope (WHT), on La Palma, in the Canary Islands. The workshop was organised by the Isaac Newton Group of Telescopes (ING), which operates the WHT. Since its inauguration in 1987, the WHT has been one of the most scientifically productive telescopes in the world; several important factors have contributed to its success, including the excellent site at the Roque de los Muchachos Observatory and the high quality of the telescope.

In an era of eight and ten metre telescopes, four metre telescopes need to look to their particular strengths to maintain a competitive edge. One of these strengths is the ability to offer a relatively wide field of view on the sky (about 2° diameter or four times the diameter of the full Moon) compared to that available with larger

telescopes. At the workshop, there was a strong consensus that, to be able to continue to deliver world class science in the years up to 2020, the WHT needs to be equipped with a new wide-field fibre-fed spectrograph, to allow astronomers to obtain simultaneously the spectra of many hundreds of stars or galaxies within a 2° field of view. This huge leap in observing efficiency makes the WHT ideally suited for follow-up of ESA's ambitious Gaia mission (launch 2012), which will map the positions in three dimensions of about 1000 million

stars in our Galaxy.

To establish a long-term plan for European astronomy, preparation of a detailed science case for the spectrograph kicked off with a meeting of interested parties in Leiden, Holland on 26 April.

Article contributions by: Chris Benn (crb@ing.iac.es), Don Abrams, Marc Balcells, Javier Mendez

Further information about the workshop can be found at: <http://www.ing.iac.es/conferences/wht201020/>



Astronomers discussing the future of the William Herschel Telescope. Credit: Fiona Ridick, ING

AstroDay

On 1 May, staff from the Joint Astronomy Centre in Hawaii joined approximately 30 other Hawaiian astronomy institutes and amateur astronomy societies for the traditional Astronomy Day (Astroday). Held in the Prince Kuhio Plaza Mall in Hilo, the purpose of the day is to 'bring astronomy to the people of Hawaii'. With a stand to entice shoppers, the JAC rolled out an interactive display called Celestia, which gave a controlled flythrough of the solar system visualising the objects of the solar system and their motion through it. Young and old were also given the opportunity to learn about the solar system by taking part in quizzes or to play a game called asteroid target practice; the queue for the target practise was unsurprisingly longer than that for the quiz.

With Hawaii being one of the astronomy centres of the world, Astronomy Day is there to not only inspire children of all ages, but to give something back to the community that lives in the shade of some of the world's most awe inspiring telescopes.

For more information: <http://outreach.jach.hawaii.edu/>

Shoppers in the Prince Kuhio Plaza Mall enticed by the JAC astronomers



Talking Science – a review of the year



Dr Maggie Aderin, one of the speakers during this year's Talking Science

Another successful year of RAL's 'Talking Science' lectures has drawn to a close. From October to June the Science in Society team have hosted eight talks on such wide ranging subjects as: the environment, fusion (a possible solution to the Earth's dwindling resources), antimatter and the search for the secrets of the Universe using the Large Hadron Collider. So far the lectures have pulled in 1,740 people to RAL, 400 of who have been children. With praise for the 'Talking Science' lectures coming from not only the general public, but also STFC staff: "I attended the talking science lecture

last Friday with a friend and I just wanted to say how much we both enjoyed it. Despite working at RAL, I knew absolutely nothing about this area of research, so the talk was a real eye opener"; the programme shows no signs of slowing down. The final talk of this year's programme was 'The genetics of ear diseases and Fair Trade in the NHS', by Mahmood Bhutta of the Medical Research Council.

For information about next year's talking science lectures please visit: <http://www.stfc.ac.uk/Public%20and%20Schools/4796.aspx>

STFC: what do they do?

We all know that science has an enormous impact on our everyday lives, but how much do you know about the part STFC is playing?

The External Communications team has been working with departments across STFC to produce and launch a series of informative factsheets to provide an introduction to the organisation and its science, sites and facilities.

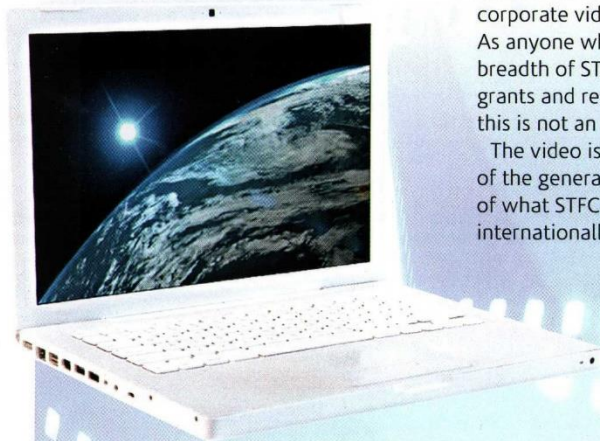
The factsheets showcase the positive impact STFC's investment in science and technology has in a wide range of areas including energy, security, healthcare and the environment. More than 30

factsheets are now available. You can find them on the STFC website or you can order them in small, cost-effective print runs for specific audiences (such as high profile or industry visitors to your site) for just 27p each through RCUK's in-house print service JRS.

For more information go to the STFC website: <http://www.stfc.ac.uk/News%20and%20Events/18693.aspx>



STFC hits the silver screen



It's said that a picture speaks a thousand words and STFC's recently-released corporate video aims to do just that. As anyone who has tried to explain the breadth of STFC's facilities, expertise, grants and research programmes will know, this is not an easy task.

The video is intended to give members of the general public a quick overview of what STFC does both in the UK and internationally, and demonstrate how we

are using our expertise to solve some of the problems that society faces such as future energy needs and climate change.

The video is available in a full length five minute version and a shorter three minute version. The shorter version is now available on STFC's YouTube channel, where it has been viewed more than 500 times.

To watch the video go to: <http://www.youtube.com/watch?v=eshwNbVatDA>



Muons find frustration in a superconductor

Using the ISIS and Diamond facilities, alongside the European Synchrotron Radiation Facility (ESRF) in Grenoble, scientists have demonstrated how a new material made from metal atoms and buckyballs (tiny carbon-60 molecules shaped like a football) becomes a high temperature superconductor when it is squashed. When pressure is applied the structure shrinks, reducing the electrical resistance of the material thereby allowing electrons to travel through the material unimpeded.

The effect of superconductivity occurs at extremely low temperature; a material, such as lead, becomes a superconductor below a given or 'critical' temperature; for lead that temperature is -266°C.

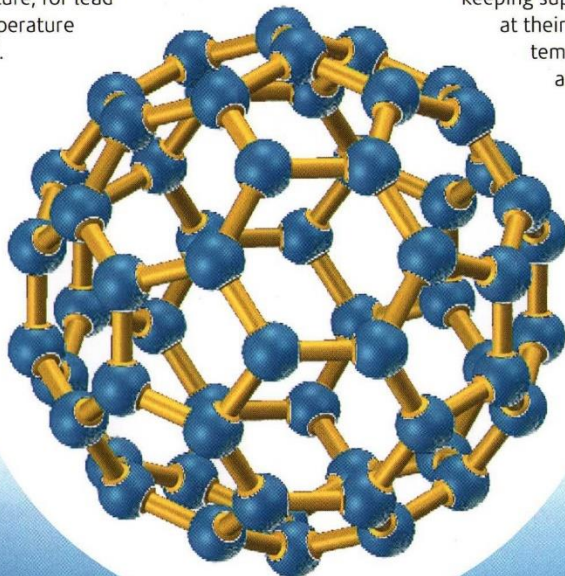
To reach such a low temperature, large and expensive cooling equipment is required; an MRI body scanner, for example, has to have its person sized superconductive magnet kept inside a bath of liquid helium in order to regulate its superconductor's temperature at -270°C.

Researchers from the universities of Durham and Liverpool made the new material supported by funding from the EPSRC; for a programme investigating ways of creating higher temperature superconductors (where the superconductive magnet can be operated at or as near to room temperature as possible); in an effort to reduce some of the costs involved with keeping superconductors at their current critical temperature as well as broadening their applications.

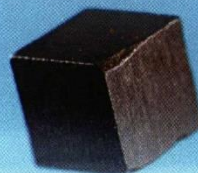
Dr Peter Baker, muon instrument scientist at ISIS said: "This research suggests that there is a universal trend in high temperature superconducting materials, which is a great step forward in understanding the fundamental nature of superconductivity. Once we know how superconductivity works it will be easier to develop high temperature superconducting materials with specific properties".

The advantage of investigating carbon-based superconducting materials is that they can be made with different structures that alter their properties; whereas the active components of other high high-temperature superconductors, such as copper oxide materials, cannot be altered. This structural flexibility offers a new way of looking at the mechanisms that drive high-temperature superconductivity, offering further insights into how to make higher temperature superconductors.

For more information: <http://www.isis.stfc.ac.uk/index.html>



A carbon 60 molecule, known colloquially as a buckyball



A magnet can be levitated through a process known as the Meissner effect: as the superconducting material is cooled to a certain temperature its magnetic field is forced around the material, rather than continuing through it

Barbados Challenge

If sun, sea, sand and drinks with tiny umbrellas are your idea of elite sporting activity, then you may wish to take part in this year's Barbados Challenge.

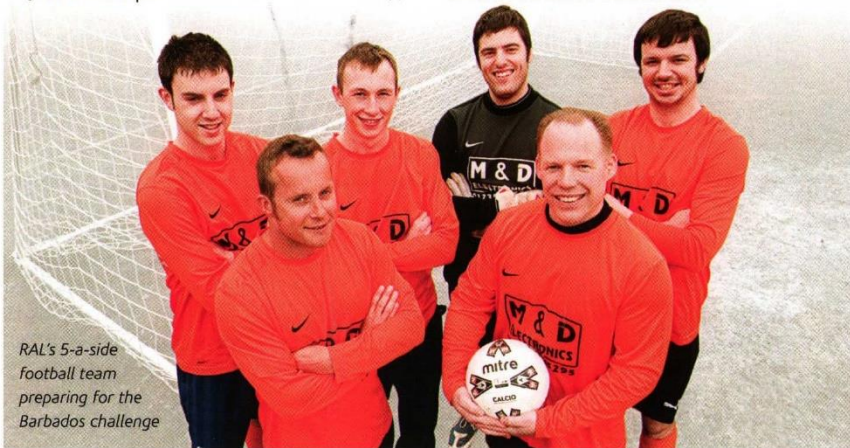
The Barbados Challenge is a collection of sporting events, such as badminton, football 5-a-side, netball, or for those less adventurous: dominoes, cribbage or a general knowledge quiz. The challenge is organised through the Civil Service Sports Council with the winner of each event invited to represent the CSSC South and South East in Barbados in 2011.

A list of the type of activities that you can enter can be found on the CSSC website: http://www.cssc.co.uk/RegionalSites/SouthernSite/S_SE_BC_Qualifiers.aspx

The CSSC will also be hosting an Indoor sports event in November, this event will take place on 13 November 2010 at the Hastings Civil Service Club and will include the Barbados Challenge Qualifiers for Cribbage Pairs, Darts Pairs (mixed), Dominos Pairs, Table Tennis (mixed pairs only unfortunately) and General Knowledge Quiz (teams of four).

If there is enough interest for this event the RAL Rec- Soc will provide a coach from the Oxford area; it will also look to provide overnight accommodation in Hastings, if accommodation can't be provided the cost of the trip will be subsidised.

If you have any questions at all please email: ralrecsoc@stfc.ac.uk



RAL's 5-a-side football team preparing for the Barbados challenge

Daresbury's golf team success

The Computational Science and Engineering Department is leading the way in this year's Daresbury Golf Society with two wins from the first three events played.

In April, Andrew Sunderland, a member of the Advanced Research Computing Group at Daresbury won the individual

stableford competition played at Alsager Golf Club. This was followed by Damian Jones capturing the Redcastle Cup individual medal played at Vicars Cross Golf Club in May. Andrew and Damian also finished second in the first event of the year at Rhuddlan Golf Club, playing as a betterball pair (where the lowest score on each hole out of the pair, is that team's score for the hole) in the Daresbury Bowl.

Damian will be looking to continue his good run of form at next month's inter-establishment competition which this year takes place in Edinburgh and involves teams from Daresbury, Rutherford, Swindon and Edinburgh, whilst also taking part in the CSSC Merseyside championships in Heswall and the CSSC North West championships in Southport over the coming months.



Andrew Sutherland receiving his trophy from Paul Hindley

DIARY DATES

Staff Fora

There will be no staff forum in August, check the Staff Forum web page on the In.Focus intranet for details of the September forum.

Events

- 14/15 July - Other People's Business @ RAL - Astra laser
- 14/15 July - PALS meeting
- 16 July - Daresbury Business Breakfast
- 19/25 July - Farnborough International Airshow
- 19/20 July - PPAN meeting
- 20/21/22 July - Other People's Business @ RAL - Neutrons
- 5 August - STFC quiz night @ Swindon Town Football Club
- 25/26 September - Royal Observatory Edinburgh Open days



Notes from the editor

Many thanks again to all who have contributed to this edition of Spectrum. The next edition will be the August edition.

The next deadline for content will be the 23 July.

Please send all content to STFC Internal Communications at internalcommunications@stfc.ac.uk or phone on 01235 445889

Design and layout by Andrew Collins, Media Services, Daresbury Laboratory.