Innovations

This issue: 1 STFC and UKTI Mechanical and Civil Engineering Meet the Buyer Event 2 SpaceTech 2012 4 STFC and CERN are pleased to announce the first call for applicants onto our new business incubation centre (BIC) programme 5 International prize for ‘no needles’ breast cancer diagnosis technique 6 CEOI Challenge Workshop – Current and Future Challenges in Calibration of EO Instrumentation 7 Underground Synergies with Astro-Particle Physics Workshop 8 ESRF researcher awarded Nobel Prize 9 Offshore Industries Could Benefit from Space Technologies and Data 11 UK contributes 24 robotic arms in giant leap forward in near-infrared astronomy 13 ESA BIC Celebrates First Alumni 14 Supplying CLIC - opportunities for UK Industry 15 Crystal Nebulae: Astronomical Art 17 Second Joint National Conference on New Science and Technologies in Earth Observation 19 STFC celebrates 50th anniversary of the European Southern Observatory 20 Innovations in Remote Sensing Event

STFC and UKTI Mechanical and Civil Engineering Meet the Buyer Event

21st November 2012, Hilton Hotel, London Heathrow

❖ Learn how to win contracts and find support through the process
❖ Substantial number and value of contracts every year in civil and mechanical engineering
❖ Wide range of contract sizes
❖ Make contacts to discover lower value contracts that are not widely advertised

❖ Featuring:
  • CERN, Switzerland
  • ESRF France
  • ILL, France
  • ISIS, UK
  • Diamond UK
  • ESO, Observatories in Chile

Register now! http://goo.gl/TiJBL by 12th November

Image copyright of CERN
UK Space Agency and Science & Technology Facilities Council invite you to The ESA Technology Transfer Network SpaceTech2012 event, the premier UK event linking the unique world of space research with successful commercial business development.

This event will be hosted at the STFC Rutherford Appleton Laboratory, Harwell Oxford.

SpaceTech 2012 Programme
Monday 5th November - UK Space Agency Technology day

A day to inform on technology programmes managed by the UK Space Agency, presenting overall shape and elements currently underway, moreover to provide a perspective on the new programmes and initiatives in space. The need to prepare for future space programmes, which are more and more demanding in terms of performance and cost is well understood. In response, UK Space Agency has embarked on new a Technology Programme (TRL2 to TRL5) which covers the five main areas involved in space systems.

Key components of the day:
• Provide a UK perspective of technology programmes - ESA and National (NSTP) and updates to IGS, with discussion opportunities
• The agency’s vision of recent developments within the space cluster at Harwell
• A high profile event with attendance from whole of the space community and broader sectors

Tuesday 6th November – convened by STFC Innovations and the ESA Technology Transfer Network

A focus on technology transfer and aimed at companies involved in medical devices, automotive, (including motorsport), electronics, sensors, robotics, energy and environmental technologies. Attending companies will become more familiar with technologies developed within the European space program and how they can be applied successfully outside the space domain and in this way contribute to innovation and new business generation.

In addition, we will be presenting some of the 65 patents available for licence from ESA in areas such as communication, electronics, materials and robotics.

Tailored networking (including one2one sessions) allowing you to develop future projects and new business will be a priority for this event.

You will be able to sign up for either or both days.

If you are interested in signing up for one2one sessions with the presenters please visit the profile pages (PDF - 344kB) and email Matthew Edwards with your requests.

Keynote talks
• European Space Agency Technology Directorate and Technology Transfer Programmes Office
• UK Space Agency
• RAL Space
• Technology Strategy Board

Other information
• Programme
• Accommodation (PDF - 392kB)
• How to get to RAL (PDF - 297kB)
STFC and CERN are pleased to announce the first call for applicants onto our new business incubation centre (BIC) programme

If you are a high-tech start-up or SME looking to take high energy physics technologies to commercial applications, then the STFC CERN BIC’s unique combination of funding, technical expertise, office space, and business support, could provide the perfect environment for your company to flourish.

This comprehensive offering includes:

• £40,000 of funding for use on intellectual property (IP) protection, design, prototyping, market studies etc.
• Access to up to 40 hours of CERN and 40 hours of STFC scientists and technical expertise
• Use of CERN IP with favourable conditions
• Opportunities for collaboration and networking on the Sci-Tech Daresbury science and innovation campus and through STFC and CERN networks
• Access to wider sources of potential through STFC’s links

STFC has a strong track record in business incubation of high-tech SMEs through our success with the ESA BIC Harwell and our Innovations Technology Access Centre (I-TAC). Being based at the thriving Sci-Tech Daresbury site, you will be well placed to achieve success, with close access to the world-class STFC Daresbury Laboratory and Cockcroft Institute facilities on a campus with over 100 similar companies.

The scheme is open to up to 5 companies per year over its two-year pilot, and the deadline for the first selection day is 9th November 2012.

If you’d like more information on the STFC CERN BIC, including how to apply, visit the website www.stfc-cern-bic.org.uk or contact Paul Vernon at Paul.vernon@stfc.ac.uk

Follow STFC_B2B on Twitter for the latest news and opportunities for industry.
International prize for ‘no needles’ breast cancer diagnosis technique

A PhD student co-funded by STFC has won a prestigious award for demonstrating that a technique developed originally at STFC’s Central Laser Facility could take away the need for a needle biopsy in breast cancer diagnosis. Marleen Kerssens, also funded by the Gloucestershire Hospitals NHS Foundation Trust has shown that SORS (spatially offset Raman spectroscopy), a method using a laser to see inside objects without making an incision, is viable for detecting if abnormalities found through mammograms are malignant or benign. Currently a needle biopsy is the only way to confirm this. Marleen received the Coblentz Society Student Award, an international prize to recognise young scientists in the area of vibrational spectroscopy, at a conference in Kansas City, USA (Sunday 30 September 2012).

The team Marleen is working in at the Gloucestershire Hospitals NHS Foundation Trust has used the SORS method to look at the molecular fingerprints of breast calcifications. The technique involves bouncing light off of the tiny grains of breast tissue and measuring the light scattered at different colours to pick up their molecular signatures which indicate if a cancer is present. This research has shown a correlation between the signature and the type of cancer present and Marleen’s work is also looking at how these calcifications form.

Currently the abnormalities are seen on mammograms in the form of dots and shadows but can only be identified as malignant or benign through a needle biopsy - the next step. This involves a cut through the skin and tissue and an anxious wait by patients for their results, and in 70-90 percent of cases the calcifications turn out to be benign.

Work by Marleen and her team at the Gloucestershire Hospitals NHS Foundation Trust could lead in the next decade, to the biopsy being replaced by a non-invasive screening with instantaneous results. The technique, however, still needs a lot of refinement.

Cancer surgeon at the Gloucestershire Hospitals NHS Foundation Trust, Professor Hugh Barr, said: “Marleen is an outstanding translational scientist who has been able to bring vibrational spectroscopy from the laboratory to a potential invaluable clinical diagnostic instrument for patients with breast disease. As a result of her work we now have the prospect of real-time non-invasive diagnosis. She is truly deserving of this great honour and will bring nothing but credit to the Coblentz Society.”

Marleen added: “I am honoured to receive this award and for the recognition given by the Coblentz Society for my work. It is a great opportunity to bring this research, with potential for future clinical impact for breast cancer diagnostics, into the spotlight.”

Pavel Matousek from STFC’s Central Laser Facility based in the Research Complex at Harwell who originally developed the SORS technique will also be given an award this week in Kansas City – he is being awarded a fellowship of the Society for Applied Spectroscopy in recognition of his outstanding service to the field of spectroscopy.

He says: “This is a well deserved international recognition for Marleen - she put great effort into her research and studies over the last three years that laid firm foundations for the development of a novel non-invasive breast cancer diagnostic tool. For myself, I am just delighted to be part of this exciting field of research that has so much potential in so many different areas of society.”

The team is currently working with real samples of excised breast tissue but it is expected to be a decade before this technique could be used routinely in hospitals.

Innovations Newsletter

Marleen Kerssens in front of the poster that she was presenting on Sunday evening in Kansas City
The Centre for Earth Observation Instrumentation (CEOI) will be holding its next Challenge Workshop – Current and Future Challenges for EO Instrumentation Calibration on Tuesday 20th November 2012 at Rutherford Appleton Laboratories, Oxfordshire.

Accurate calibration both pre- and post-launch and on board the spacecraft is fundamental to physical measurement from EO sensors. Inadequacies and variability in end-to-end calibration quality and traceability can compromise the utility of long-term measurement series for climate research. Both climate research and science missions require stable, consistent, repeatable, accurate calibration of sensors, preferably referenced to SI standards.

This CEOI Challenge Workshop will explore ways of addressing these problems by identifying calibration issues of sensors currently in development or scheduled for imminent launch, as well as issues which we anticipate will be important for future missions and instruments. Areas such as laboratory, in-orbit, and field cal/val will be covered. We expect a good mix of attendees from the science, government, industry and other stakeholder communities.

Further information on this Workshop and a draft agenda are available on the CEOI website via the following link.

To register contact Niki Legge at the Rutherford Appleton Laboratory: email niki.legge@stfc.ac.uk or telephone 01235-445621. If you require overnight accommodation please inform Niki, who should be able to arrange rooms at the nearby Cosener’s House (in Abingdon ~8 miles) on a first-come, first-served basis. Details of Cosener’s House can be found at http://www.stfc.ac.uk/About+STFC/44.aspx.
Underground Synergies with Astro-Particle Physics Workshop
Multi-Disciplinary Studies in the World’s Deep Underground Science Facilities
18-19 December 2012, University of Durham, UK

You are warmly invited to attend this ASPERA-funded 2-day workshop reviewing current and future studies and opportunities in multi-disciplinary deep underground science.

For decades astro-particle and particle physics experiments needing an ultra-low background environment have been operated deep underground where the rock overhead provides a shield against interference from cosmic rays. The growth of astroparticle physics has resulted in small but growing number of deep underground science facilities in Europe and around the world. In recent years it has become clear that the special environments provided by these facilities are of interest to other areas of science, beyond astro-particle physics, to areas such as Earth and environmental sciences, geology, geophysics, climatology, biology and astrobiology.

This ASPERA workshop will showcase the synergies between underground astroparticle physics infrastructures and the opportunities they provide to address a wide range of multi-disciplinary science challenges. The event will bring together scientists, decision makers and industry to highlight and identify underground science synergies; and address the scientific, administrative and funding challenges faced by multi-disciplinary scientists when trying to collaborate together and with industry.

The workshop is being held in the historic city of Durham in the North East of the UK. Durham University, the UK’s Boulby Deep Underground Science Facility and the UK’s Science and Technology Facilities Council are proud to be the local hosts of the workshop.

For further information and to register for the workshop please visit the workshop website: http://indico.cern.ch/conferenceDisplay.py?ovw=True&confId=199223

If you have any questions, please contact the Organising Committee: undergroundsynergies@stfc.ac.uk

Workshop Organising Committee:
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ESRF researcher awarded Nobel Prize

STFC congratulates Brian Kobilka and Robert Leftkowitz on being awarded the 2012 Nobel Prize for Chemistry.

The pair won the award for their work on characterising an important family of receptors: G Protein Coupled receptors (GPCRs.)

Brian Kobilka and colleagues used the STFC supported European Synchrotron Radiation Facility (ESRF) in 2006-2007 to solve an important GPCR structure that was mentioned in the Nobel announcement. In 2007 Kobilka solved the first structure of a GPCR that binds to hormones on neurotransmitters.

GPCRs are found on cell membranes throughout the body and can cause wide ranging, and important physiological effects. These include the retina’s response to light, the nose's sense of smell and the strength of a heartbeat. They are often commonly used as drug targets, including for betablockers – drugs that slow down heart rate and are used in cardiovascular disease.

A spin-out company from the Medical Research Council (MRC), Heptares Therapeutics Ltd, was created in 2007 and works to produce small molecule drug candidates that target GPCRs. It does this using a structure based design approach that would be impossible without the work of Kobilka, Leftkowitz and colleagues.

You can find out more about GPCR work at ESRF and Heptares in this case study.

You can read more about this story on the ESRF website.
Offshore Industries Could Benefit from Space Technologies and Data

Exciting new applications using space technologies and data are now able to be translated into end-user products for the offshore industries. As many will know, space derived technologies have a history of being spun out into numerous terrestrial applications over the years. Probably best known, is the use of global positioning and navigation technologies for transportation. Other examples include anti-corrosion coatings, scratch resistant lenses, tsunami tracking and identification of ancient sites in archaeology using radar images – to name but a few.

Satellite missions flown for science and environmental purposes are yielding valuable data on parameters ranging from wind, wave, sea surface topography and ice. Multi-purpose imagery of oceans yields yet more information including variations in water colour and temperature which affect circulation and currents, sea state and measurements of changes in ocean waves and winds. For those industries operating offshore – Oil and Gas, Renewables (wind and wave energy) and Maritime, such information is essential for the purposes of forecasting, navigation, planning, development and everyday operations. However, many end users have been unaware of the relevance and availability of Earth observation (EO) imagery and measurements. Whilst at the other end of the spectrum, suppliers of potential information solutions have themselves often been unclear of the particular needs of these industries.

The Centre for Earth Observation Instrumentation (CEOI) recently held a consultation to explore user needs. Senior industry stakeholders from the Offshore Renewables, Offshore Oil and Gas Exploration and Maritime Transport sectors, met with EO and marine science experts, geo-information solutions providers and systems integrators. The purpose of the meeting was to create a forum to discuss industry needs and how EO data and technologies could contribute towards providing solutions and services in these areas.

EO data is already playing a part in providing essential information services to the offshore oil and gas industry, but it is generally recognised that there is considerable untapped potential for its greater use. Some of the current applications of EO data in this industry include validation of hindcast wind, wave models and characterisation of historical geostrophic currents. Other physical oceanographic measurements are also possible and include water levels monitoring and provision of pollution information for modelling trace oil seepage. It is also used for security monitoring of platforms and vessels, as well as for iceberg tracking and ice mapping with increased detail.

The Offshore Renewables industry has a range of needs, covering information on forecasting for planning and energy fluctuations, to data services for collision avoidance with shipping. Numerous geophysical and ocean parameters measurements and information are required. These include wave and sea surface measurements, tidal stream and sea temperature. Wind speed, wave height and steepness were all identified in the consultation as areas needing better quality data.
Offshore Industries Could Benefit from Space Technologies and Data

In the Maritime industries, there is potential for EO data to provide solutions for shipping behaviour monitoring, such as for illegal fishing and piracy. It also holds promise for helping to optimise shipping routes, as part of vessel traffic management systems, thereby reducing fuel costs.

Industry representatives highlighted a requirement for user-friendly solutions which are timely and accurate. Continuity of data supply was also a concern as the future uptake of EO derived data services will be dependent on guaranteed long-term availability of the source data. A recent gap in provision of data on ocean surface winds (derived from scatterometer measurements) for instance, highlighted this problem. On the other hand, it is recognised that altimetry and SAR measurements, which are useful for sea-state measures (wave height, direction, wavelength and time period) and which have been continuously available since 1991, still lack a consolidated data product. The Committee on EO Satellites (CEOS) is proposing to address this by cooperating with the user community to support efforts aimed at building on the decade-long sea state records and making a more comprehensive use of the information in the future.

The Centre for EO Instrumentation needs to better understand the future technology needs of industry for monitoring the offshore environment from space. The consultation has already helped this understanding and will also assist end-users, data service providers and satellite operators to better understand how they can work together to develop innovative new products that meet evolving user needs. The outputs from the offshore industries consultation highlighted the challenges faced in reconciling the wealth of EO data into products and services which fit end user needs. These findings will be used to develop further recommendations and actions for the future. But in the meantime, work will continue to develop and build a network for the marine industries and the EO community so that better communication and understanding can be achieved.
UK contributes 24 robotic arms in giant leap forward in near-infrared astronomy

A new high-tech instrument with 24 robotic arms has crossed the Atlantic from Edinburgh to a mountain top in Chile to address in more detail than ever before, some of the key questions surrounding the beginnings of the Universe, stars and galaxies. KMOS (K-Band Multi Object Spectrometer) has been provisionally accepted by the European Southern Observatory (ESO) after it completed final assembly and testing at the UK Astronomy Technology Centre (UK ATC) in Edinburgh. It will now be fitted to one of the four telescopes which make up the European Southern Observatory's Very Large Telescope (ESO-VLT) at Paranal in Chile, providing astronomers with a far quicker solution to uncover details about galaxies and their properties.

What makes KMOS unique is its ability to image many galaxies simultaneously either in a cluster or in isolation but in both cases, still see the individual properties of each single galaxy. Until now, each galaxy has had to be identified individually to obtain that information, a process that takes years. KMOS will be able to see the same amount of detail in just two months.

Each of the 24 cryogenic robotic arms, which have gold plated mirrors on their tips, can be moved into position to pinpoint with extreme accuracy the light coming from distant galaxies. Dr Michele Cirasuolo is the lead instrument scientist for KMOS at UK ATC. He said: “KMOS represents a pivotal step in our quest to scrutinise the distant Universe. The ability to observe in the near-infrared 24 galaxies simultaneously is an enormous leap forward compared to any other current instrument. KMOS will allow a much faster survey speed … most of the observations done by similar near-infrared spectrographs over the last 10 years could be done in just two months with KMOS.”
This novel capability means astronomers will be able to make a detailed study of the mass assembly and star formation in distant, high red-shift galaxies addressing fundamental questions about when these first formed and how they evolve. This ability to observe multiple galaxies at once enables scientists to build up large statistical samples of galaxies at different cosmic epochs necessary to unveil the physical mechanisms that shape their formation and evolution.

KMOS creates this detailed picture using integral field spectroscopy and obtains spectra over a two-dimensional area, covering the entire galaxy. The light from each segment of galaxy (its core, the bulge, the spiral arms and the outer parts) is analysed simultaneously and each can be given physical and chemical properties. Not only therefore, can a complete galaxy be measured, but each individual part too, allowing a comprehensive picture to be built.

"For each of the galaxies, KMOS will give an incredible amount of information. It’s not just a picture of a galaxy, but 3D spectroscopy providing the spatially resolved physics and the chemistry and the dynamics. This is crucial to understand how galaxies assemble their mass and shape their structure as a function of cosmic time, up to the formation of the very first galaxies, more than 13 billion years ago" explains Michele Cirasuolo.

The specialised mechanisms inside KMOS have been designed to work in cryogenic conditions below minus two hundred degrees centigrade, which has been a major challenge, but which is necessary to observe distant galaxies at near-infrared wavelengths. This is because, unless cooled, the thermal emission from the instrument itself will swamp the faint signal from the astronomical sources.

Minister for Universities and Science David Willetts said: “It’s excellent to see the UK playing a leading role in the development of such a sophisticated piece of technology and overcoming some very complex engineering challenges on the way. This instrument will now take its place on a world leading telescope to help improve our knowledge and understanding of the universe around us.”

The instrument is a collaboration of six institutions in Germany and the UK, including STFC’s UK Astronomy Technology Centre (UK ATC), Durham University, Oxford University and RAL Space at STFC’s Rutherford Appleton Laboratory. The team of internationally respected scientists and engineers at UK ATC played a major role in the KMOS project, being responsible, amongst others, for the construction of the cryostat, the 24 robotic pick-off arms, the cable co-rotator and the final assembly and test of the complete instrument. RAL Space applied their cryogenic lens mounting technology in the three camera barrels they provided for spectrographs in KMOS. Durham University has the PI of the entire project and produced the complex system of more than 1000 mirrors in the integral field unit. Oxford University provided the design and assembly of the three spectrographs in KMOS.

Each incredibly powerful unit telescope on the VLT contains a mirror eight metres in diameter. It is onto the VLT Unit 1 telescope, Antu that the new KMOS equipment will be fitted.
ESA BIC Celebrates First Alumni

The ESA BIC Harwell is proud to announce that we have achieved the landmark of our first alumni in the programme, company G2way Limited.

The company joined ESA BIC Harwell in July 2011 with their LLEO (Low Level Earth Observation) project, using electrically powered micro unmanned aerial vehicles carrying cameras to evaluate farmers’ crops in the field. These are then able to advise farmers on the best use of fertilizers and pesticides to optimize yields.

Keith Geary, CEO, said: “Receiving the financial support from ESA of £41,500 was of course very helpful to the development of our Low Level Earth Observation concept, but equally important to the cash was the boost to our company’s credibility by being accepted into the ESA BIC and attending the many training workshops and information days held by ESA, STFC, RAL and the TSB.”

Paul Vernon, Head of Campus Development at STFC (who manages the ESA BIC) added: “G2Way has done a remarkable job in using the extensive support package of the ESA business incubation programme. In only twelve months, they have developed a working UAV that has the real potential to revolutionise agriculture. We’re genuinely thrilled that we’ve been able to make a real difference to the future prospects of the company and are heartened that they have graduated from the programme with a great chance of success.” Having completed 18 months in the incubation programme at the ESA BIC in Harwell, G2way Ltd has taken office space at the Nottingham CleanTech Centre and will launch its LLEO commercial services in 2013.

For more information on G2Way visit their website.
Supplying CLIC - Opportunities for UK Industry

As the LHC continues to accumulate data and the evidence builds that the long-sought Higgs particle has indeed been found, various teams around CERN are busy preparing plans for what comes next. Some are looking at a higher luminosity version of the LHC (HL-LHC), others are looking at going to higher energies. But one team is looking at a completely new accelerator altogether – a so-called Compact Linear Collider, CLIC. Apart from the HL-LHC which should be installed in 2018 (and which should also offer opportunities for UK suppliers), the decision on the longer term plans has not yet been taken but CLIC has an assigned research and development budget out to at least 2015 in order to study, design and test the components which will be needed if and when it gets the green light.

Some aspects of CLIC will require state-of-the-art equipment because of the high accelerating gradients required and the power extraction mechanism used to drive the main beam. CLIC therefore is going through a process to qualify firms which would eventually be placed on an approved supplier list. It is obvious that firms having participated in this development and prototyping phase will gain experience and expertise which will be give them a definite advantage when bidding for the series contracts.

If and when the project is approved for construction, the procedure to get qualification will be:

1. Interested firms select from a list which component they could produce for CLIC.
2. CLIC sends the technical specifications for the particular component to the firm along with any corresponding drawings.
3. The firm submits a proposal and a price.
4. If the proposal looks correct and is reasonably priced, CLIC orders one unit for testing and evaluation.
5. When the component arrives in CERN, CLIC performs very stringent tests on it to their specifications.
6. The testing period can last up to several months and if the component passes the tests, the firm is added to the list of possible suppliers for that component.
7. When a production order is required, the qualified firms for that component are asked for a quote.
8. Normal CERN bidding rules apply, the cheapest supplier gets the order.

Individual components are small and so an order for qualification is correspondingly small, but the eventual production runs will be for hundreds if not thousands of each component so the rewards for success could be considerable.

For more information please contact:
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This article originally appeared in Issue 5 of ‘UK news from CERN’. Further details, including an archive of this publication are available here: http://www.stfc.ac.uk/39789.aspx
Crystal Nebulae: Astronomical Art

Crystal Nebulae specialises in producing three-dimensional sculptures of astronomical objects. Drawing on the expertise of top professional astronomers, their sculptures bring together the latest data in order to produce scientifically accurate representations of objects including the Sun and Saturn, as well as a ‘Map of the Universe’ sculpture, which holds the Guinness World Record for the smallest scale precision map ever produced!

Michael Merrifield is a Professor of Astronomy at the University of Nottingham. In his research, he studies the structure of galaxies in order to try and understand how these collections of hundreds of billions of stars formed in the first place, and how they came to acquire the beautiful structures that we see today. In addition to making observations using telescope facilities around the world and in space, he also works on the theory of galaxy evolution, trying to understand the complex orbits that stars and gas follow within these systems.

Professor Merrifield has a longstanding interest in the representation of astronomical objects in art, and discovered that crystal glass provides an ideal medium for making attractive yet accurate representations of astronomical objects. By firing an ultra-precision, nanosecond diode pumped YAG laser into 6cm cubes of optical quality crystal glass, intricate and high resolution representations can be crafted.

Complex computer programs have been written to reconstruct the observed arrangement of magnetic fields emanating from the Sun. By following the evolution of the field as it is carried around and twisted up by the Sun’s rotation, and by modelling how different parts of the field can merge or disappear, solar ‘weather forecasts’ can be produced, looking a few days into the future.
This model, used to produce the Sun sculpture, was generated using one of the most advanced computer models of the solar corona in the world. It was produced at the Lockheed Martin Solar and Astrophysics Laboratory by solar astronomers Drs Markus Aschwanden, Marc DeRosa and Carolus Schrijver. This model reproduces the structure of the solar coronal magnetic field as it appeared on 21st October 2000. As the image shows, the Sun was in a fairly active state that day, with a number of complexes of magnetic loops, and two large ‘coronal holes’ in which open field lines leave the Sun and offer a route for charged particles to escape.

Using this computer reconstruction of the solar corona, the sun sculpture provides a faithful three-dimensional reproduction the magnetic field structure, and hence the arrangement of plasma, around the Sun at the time in question. The YAG laser focuses intense laser light at points inside the block, thereby generating minute (50 micro-metre) marks in the glass, which show up as more than tiny ‘frosted’ marks. The realisation in this sculpture illustrates the structure of the corona by tracing out 5000 of the field lines to which the coronal plasma is ‘frozen’. Each field line is mapped out with an average of 60 laser marks, so the sculpture contains some 300,000 points.

More details available from the Crystal Nebulae website, here: http://www.crystalnebulae.co.uk/

Crystal Nebulae enquiries: info@crystalnebulae.co.uk
Second Joint National Conference on New Science and Technologies in Earth Observation

The second joint science conference of the National Centre for Earth Observation (NCEO) and the Centre for Earth Observation Instrumentation (CEOI) took place at the University of Nottingham in September, bringing together scientists and technologists over 3 days to discuss recent science findings and the future technology developments for observing the Earth’s climate and environment from space.

The first day of the conference focused on NCEO science highlights and covered a wide range of interesting and challenging areas. Research was presented in a series of talks from leading scientists covering the monitoring, diagnosis and predictions of climate and environmental change. This included presentations of the science resulting from the European Space Agency’s Earth Observation (EO) programme, from the Cryosat, GOCE and SMOS missions, which have provided data on sea-ice thickness, the Earth’s gravity field, ocean salinity and soil moisture. The Conference also looked at the potential science to come from future missions such as Swarm and EarthCARE projects, which will measure the Earth’s magnetic field and the interaction between clouds, aerosols and radiation. Other talks included studies on monitoring and modelling volcanoes from space, ocean carbon cycle models and measuring photosynthesis from space using terrestrial chlorophyll fluorescence.

On the second day, the CEOI highlighted several of the EO instruments and technologies projects currently being funded, as well as the priorities for future UK-led EO missions. Daniel Gerber from STFC’s Rutherford Appleton Laboratory presented the continuing work on the passive microwave project which will make measurements of trace gases in the atmosphere important to the climate and to meteorology, involving high level system integration of UK receiver technology. There were also talks on some of the technologies nearing commercialisation – a remote sensing instrument for estimating the sea-surface wave height, a fully integrated miniaturised quantum cascade Laser heterodyne radiometer to measure trace gases at high resolution, and the University of Leicester’s CompAQS/CityScan air quality spectrometer.

The mixture of plenary and parallel sessions ensured a full and varied programme and included talks from NCEO young scientists. The final day included four EO applications sessions, highlighting the following areas:

Key components of the day:

- **Hazards and risk** – the session featured presentations from a broad range of the EO fields, including representatives from data suppliers, academia, researchers, value-adders and the insurance industry ‘downstream users’. The challenges involved in supplying timely and appropriate data was discussed, particularly in relation to rapid and major disasters (such as volcanoes), compared to the issues involved in monitoring non-catastrophic events such as compressible ground over large regions. There was also consideration of the analysis options available, from large infrastructures such as CEMS and OpenSource systems that are still the only affordable option in developing countries, which are sometimes hardest hit by hazards.
• **Climate and carbon** – the session acknowledged the huge potential that exists for development of commercial applications and services. Scientific credibility of such services is likely to become a key consideration, and the UK is well placed to differentiate itself through strengths in ensuring integrity of climate data and in quantifying underlying uncertainties. Stronger partnerships between the EO community and the end-users of climate services are required to help express the benefits of EO services in the business language of the users.

• **Maritime and marine services** – areas explored in this session included polar applications, oceanography, oil and gas and environmental protection. EO data is widely used, often fused with other data sets as part of a product. A critical issue identified, is the need to develop sustainable services with a reliable supply of robust and validated EO data from the types of sensors already flown; Thermal IR, SAR, scatterometers, radar altimeters, ocean colour sensors. It was suggested that some EO services face threats from institutional organisations offering subsidised services and that a way to work with these organisations is needed.

• **Future concepts of land resources** – focused on three areas: mapping eco systems and habitats, agriculture and forestry. Use of remote sensing in these areas is advancing rapidly and reaching a wider sphere of users than ever before. More growth in demand is expected in light of new public (GMES) and commercial systems (such as Daily Planet). It was deemed that in order to support this, there should be greater coordination at the national level in the UK and practical steps could be taken to support novel mission proposals, demonstrate the wide availability of existing products and services and coordinate data access to stimulate further multi-source, multi-scale applications.

The annual joint conference plays a crucial role in developing the next generation of EO instrumentation by bringing together NCEO’s core activity of fundamental science with the CEOIs expertise in instrumentation. Academia and industry were able to benefit from a diverse and exciting programme and overall the conference attracted nearly 200 people over three days and presented a great opportunity to continue to forge a vision for the future success of EO in the UK.
STFC celebrates 50th anniversary of the European Southern Observatory

The European Southern Observatory (ESO), the most productive ground-based observatory on the planet, is celebrating its 50th anniversary this month. (October 5 2012). ESO operates three world-class sites in Chile, enabling major contributions to answering the fundamental questions in astronomy.

Through support from the Science and Technology Facilities Council (STFC) the UK is one of the fifteen member countries of ESO. 2012 also marks ten years since the UK, through STFC, joined ESO, enabling UK astronomers, engineers and researchers to be involved in large scale projects including ALMA (Atacama Large Millimetre/Submillimetre Array) and new instruments for the Very Large Telescope and VISTA. The European Extremely Large Telescope (E-ELT), which aims to be operational early next decade is set to become ‘the World’s biggest eye on the sky’ tackling the biggest scientific challenges of our time. The Visible and Infrared Survey Telescope for Astronomy (VISTA) was project managed and built by STFC’s UK Astronomy Technology Centre (UK ATC) as part of the UK’s ‘joining fee’ for ESO. VISTA currently operates six sky surveys, five of which are led by UK scientists.

These large scale ESO projects all draw on the UK’s expertise in astronomical research, producing vast new data collections that will support research in many projects, from small bodies in our own Solar System to investigations into the nature of dark matter and dark energy. In addition ESO membership has allowed UK industry to win significant new business in this exciting area of technological excellence and offers many opportunities to train young UK scientists in a range of engineering and data analysis skills.

As part of the 50th celebrations ESO has released a one hour film ‘Europe to the Stars,’ documenting its first 50 years of exploring the Southern Sky. The movie was shown last week at STFC’s Rutherford Appleton Laboratory’s Talking Science – Life on Mars lecture, which was presented by Dr Steve Cutts.

Further details of the ESO celebration of its 50th year can be read here. Parts of the film Europe to the Stars can be viewed here.
Innovations in Remote Sensing Event
Wednesday 23rd January 2013

The Centre for Earth Observation Instrumentation (CEOI) is hosting 'Innovations in Remote Sensing' on January 23rd 2013. This event will provide a great opportunity to catch up with the latest Earth observation instrumentation technologies, as well as highlighting potential areas for licensing, collaboration or supply.

The CEOI has a vision to develop and strengthen UK expertise and capabilities in Earth observation (EO) instruments and works to position the UK to win leading roles in future international space programmes. The programme supports mainstream projects and smaller ‘seedcorn’ projects, both selected through Open Calls to the EO community. However, although the technical drive has been to produce instruments for space, in many cases the resulting technologies have non-space applications.

A number of sectors which could be potential beneficiaries of such technologies include healthcare, defence and security, analytical instrumentation, marine industries and environmental.

The event is open to all interested parties and aims to:

• Highlight collaborative opportunities emanating from remote sensing technologies in space
• Outline the particular needs in Earth Observation for spin-in technologies
• Showcase a number of CEOI projects

The format for the day will include a schedule of formal presentations – outlining technology needs and collaborative opportunities for several of the CEOI projects. Another key feature will be the exhibition element, showcasing CEOI projects, which starts at lunch time.

The event will take place at the NUT, Hamilton House, Mabledon Place, London WC1 9BD (Kings Cross or Euston tube stations). It will start at 10.00 and is scheduled to finish at 16.00, with refreshments including lunch being provided. Click here for map and directions.

Participation is free. To register and for further information, please visit the CEOI website.