Innovations

This issue: 1 Christmas message 2 The Square Kilometre Array (SKA) 3 UK companies win tenders at large facilities thanks to joint STFC-UKTI event 4 From Outer Space to Mining 5 Knowledge Transfer Partnership wins prestigious manufacturing award 6 More than £1 billion to be invested in UK science and research 8 STFC funded partnership results in UK’s first space nanosatellite and prestigious award nomination 9 Oxford spin-out promises inexpensive vaccines for cancer and viral infections 11 I-TAC is shortlisted for prestigious BioNow award in recognition of its contribution to the biomedical sector 12 STFC leads the way for sharing research data in the UK 13 Scintillating security solution 15 Grants awarded 16 Ring fencing cancer for good 17 Cheers physics – the science behind the perfect pint

Seasons Greetings from Innovations
The Square Kilometre Array (SKA) – STFC Knowledge Exchange Workshop
Jodrell Bank Observatory 20 March 2013

The STFC Innovations Club jointly with STFC’s Astronomy Programme group are hosting an event on The Square Kilometre Array to discuss current developments and future R&D needs in the key areas of SKA, the largest and most sensitive radio telescope in the world to be built in South Africa and Australia. The £1.2bn SKA’s huge fields of antennas will sweep the sky for answers to the major outstanding questions in astronomy. It is being planned and designed by a twenty-nation collaboration of engineers, astronomers, astrobiologists, physicists, industrialists and policy makers.

The SKA will be an aperture synthesis instrument. Signals from separated antennas will be combined digitally to produce a telescope with a diameter equal to the largest antenna separation - more than 3000 km. The SKA will also have a very large field-of-view (FOV) which will enable multiple users to observe different pieces of the sky simultaneously and 10,000 times faster, than any imaging radio telescope array previously built.

New technology and progress in fundamental engineering science are both required. These breakthroughs can only happen with the R&D collaboration of industrial partners offering expertise in fields such as information and communication technology, high performance computing and mass production manufacturing techniques.

Areas of particular relevance include:
- Low-cost collecting area/small to medium diameter dishes
- Low-noise, highly integrated, receivers
- Phased array antenna technology
- High-speed (terabits/s) digital fibre optic links
- Wideband optical fibre signal transport systems
- Fast, high resolution, analogue-to-digital converters
- High-speed digital signal processing engines (petabyte/s) and
- Ultrafast supercomputing (at exaflop rates).

SKA is currently in the detailed design stage (2012-2015) and R&D consortia involving industry are being formed in Australia and Canada for example. This workshop would pull together the interest from both the academia and industry and enable knowledge exchange between the STFC funded researchers (HEI’s and labs) and industry to take technologies towards commercialization and supply contracts starting in 2016.

Jodrell Bank Centre for Astrophysics comprises research activities in astronomy and astrophysics at The University of Manchester, the world leading facilities of the Jodrell Bank Observatory, the e-MERLIN/VLBI National Facility and the Project Development Office (SPDO) of the Square Kilometre Array. After the workshop there will be a tour of the observatory.

For more information contact: Dr Vlad Skarda, STFC (vlad.skarda@stfc.ac.uk) or Dr Simon Berry (simon.berry@stfc.ac.uk).

Registration: Programme and registration details will be available on the STFC website in early January.
UK companies win tenders at large facilities thanks to joint STFC-UKTI event

Almost 50 UK mechanical and civil engineering companies attended an event in London on 21st November to help them win contracts at international science facilities.

Already several of the companies are reporting positive results, receiving enquiries from the facilities as a result of the meeting and there have even been a couple of contracts placed already. AMF Precision Engineering Ltd stated: “We have been successful in winning our first order after two weeks and we are currently working on two further tender for a second facility.”

The Meet the Buyer event, organised by STFC and UKTI, introduced company representatives to specialist buyers at CERN, The European Southern Observatory (ESO), European Synchrotron Radiation Facility (ESRF), Institut Laue-Langevin (ILL) and the ISIS neutron source. After short presentations about the facilities requirements, the day was filled with 120 structured meetings between industry and buyers, allowing them to discuss real projects.

These facilities are part funded by the UK and have major tender opportunities open to UK companies. CERN is the world’s largest particle physics laboratory and has an annual procurement budget in the region of £300M every year. Winning contracts at these facilities has a financial benefit for companies, but can also increase their technological know-how and open new markets, allowing the companies to supply to other facilities with similar requirements worldwide.

UK companies interested in tendering to these facilities can register to hear about tenders at www.stfc.ac.uk/tenderopportunities or contact Julie Bellingham at tenderopportunities@stfc.ac.uk for more information.
You are warmly invited to attend a new one day workshop on the application of space technology to the mining environment, hosted by the UK Centre for Astrobiology, the Boulby Underground Science Facility and Cleveland Potash Ltd.

Time after time, technologies developed for a single purpose have found applications far beyond their original scope. Work carried out at BISAL, a new joint venture between the UK Centre for Astrobiology, the Boulby Underground Science Facility and Cleveland Potash Ltd., has indicated to us that technology originally designed for space applications could find use in mining world. Scanning technologies to detect pockets of explosive gas in the mining walls, robotic assisted exploration and improved communication equipment, are just some examples.

This workshop aims to bring leading space technology experts together with some of the world’s biggest mining companies in order to establish a discourse between the two and promote collaborations. Space technology specialists may gain the opportunity to apply their work to new areas whilst acquiring commercial support, whilst mining companies may discover new ways to resolve safety issues, increase efficiency and maintain competitiveness.

We would like to hear from any interested academics with relevant space technology expertise and/or mining technology expertise, as well as commercial/industry based professionals and enterprises. This is an excellent opportunity for both industries foster new mutually beneficial relationships.

If you have any questions, please contact S.J.Payler@sms.ed.ac.uk.

The BISAL team
Charles Cockell
Samuel Payler
Dave McLuckie
Sean Paling
Knowledge Transfer Partnership wins prestigious manufacturing award

A Staffordshire engineering firm working in a knowledge transfer partnership with Aston University has received a prestigious national award for its manufacturing excellence.

Accutronics Ltd, which develops and manufactures “smart” rechargeable batteries and chargers for medical, military and industrial sectors, has won the Institution of Mechanical Engineers Lombard Award for Innovations in Products and Processes.

The Stoke on Trent based company was described by judges as ‘an exemplar of how an agile small company can thrive against global competitors’, and deemed worthy of the Award.

Accutronics, established in September 2009, entered in a Knowledge Transfer Partnership (KTP) with Aston University, part-funded by the Technology Strategy Board and West Midlands European Regional Development Fund (ERDF), to help develop and implement an innovative continuous improvement programme. At its core are process improvements which are closely linked to customer requirements, from quality and flexibility to price control.

Working alongside Aston engineering and business experts, the 60 strong company, which employs nine engineers, has been able to embed and develop its current and long-term operation strategies and processes to help diversify into different sectors. This has included reviewing and progressing its operational strategy, responsive and reconfigurable manufacturing, enterprise simulation and logistics and supply chain management.

Find out more about Knowledge Transfer Partnerships here
More than £1 billion to be invested in UK science and research

New science investment will make sure UK competes and thrives in global race. Seven new university and business research partnerships in sectors including life sciences, energy efficiency and advanced manufacturing were announced today by David Willetts, Minister for Universities and Science.

The new projects double the number of winning bids from the UK Research Partnership Investment Fund (UK RPIF) to 14. When complete, the scheme will deliver more than £1 billion of new funding for research from Government, industry and charities.

The 14 winning bids, which cover the whole of the UK, will take up £220 million of public funding and leverage over £600 million of private support. There will shortly be a new bidding round for the remaining £80 million of public investment and both new and resubmitted bids will be eligible.

David Willetts, Minister for Universities and Science, said: “It is fantastic that our top businesses and top charities are queuing up to collaborate with our world-class universities. They want to work together to deliver innovation, commercialisation and growth, which will help make sure the UK competes and thrives in the global race. The winning projects will tackle the key issues we face – like fighting disease, ensuring energy efficiency and improving infrastructure – for the benefit of all.”

Sir Alan Langlands, Chief Executive of the Higher Education Funding Council for England (HEFCE), said: “The demand for funding from the UK Research Partnership Investment Fund demonstrates the power of universities in promoting economic growth through research and knowledge exchange.

The seven projects announced today are:

• A £38 million partnership between the University of Manchester, The Christie hospital and Cancer Research UK to develop the Manchester Cancer Research Centre. This will look at cancer treatments targeted to individuals based on the specific characteristics of their tumour biology. It will span laboratory research through to clinical trials and patient care and focus on five research areas: radiation therapy, lung cancer, women’s cancers, melanoma and haematological oncology.

• An £85 million partnership between UCL (University College London) and the Great Ormond Street Hospital. The Centre for Children’s Rare Disease Research will combine the specialist research expertise of the UCL Institute of Child Health with the unique patient cohort at Great Ormond Street to find treatments and cures for rare diseases of which over 6,000 have been identified.

• A £32 million partnership between Queen’s University Belfast, The Atlantic Philanthropies, a Wellcome-Wolfson Capital Award, The Sir Jules Thorn Charitable Trust and the Insight Trust for the Visually Impaired to deliver the next phase of the Institute of Health Sciences. The Centre for Experimental Medicine will bring researchers working on vision sciences onto the campus alongside new research programmes in diabetes and genomics.
More than £1 billion to be invested in UK science and research

- A £34 million partnership between the University of Nottingham, GlaxoSmithKline and other co-investors to support the Centre in Sustainable Chemistry. This will be housed within the iconic GlaxoSmithKline Carbon Neutral Laboratory for Sustainable Chemistry and will minimise environmental impact. It will ensure that chemistry becomes more energy and resource efficient and sustainable in meeting society’s needs for new and better medicines, safer agrochemicals and better materials.

- A £38 million partnership between Swansea University, British Petroleum (BP), and TATA Steel Europe for the development of the Energy Safety Research Institute. This will capitalise on the university’s strengths in petroleum and chemical processing and focus on the safety issues surrounding the development of existing energy processes, as well as the safe deployment and integration of new green energy technologies.

- A £60 million partnership between Brunel University, TWI and other companies to develop the National Research Centre for Structural Integrity. This will act as a dedicated national hub for interdisciplinary research into the soundness of the design and constructions of products, plant and infrastructure across the energy, transport and advanced manufacturing sectors.

- A £150 million partnership between Imperial College London and Voreda to contribute to the development of a major new campus adjacent to the White City regeneration area. The centrepiece will be the Research and Translation Hub, which will provide high specification research and incubator space for 1,000 researchers investigating next generation materials and spin-out companies.

UK RPIF was first launched with £100 million of public finance in May 2012 and, in response to the large number of high-quality bids, the Government recently tripled the public support to £300 million. All projects have to include private funding from industry or the charitable sector worth a minimum of double the public contribution – making more than £1 billion of investment in total.

The 14 projects will provide a base for developing new knowledge to support economic growth, and to help meet the health needs of the UK and the wider world. Universities are contributing over £70 million from their own resources.
STFC funded partnership results in UK’s first space nanosatellite and prestigious award nomination

A space research partnership that resulted in the production of the UK’s first space nanosatellite system, has been shortlisted as a finalist for the national Knowledge Transfer Partnership (KTP) Awards. The results of the national KTP Best Partnership Award will be announced at a ceremony in London on 22 November.

Funded by the Science and Technology Facilities Council (STFC), the partnership between Clyde Space Ltd and the University of Strathclyde has already secured the KTP Scottish Regional Best Partnership Award and a commendation in the KTP Engineering Excellence Category.

KTPs, which are led by the Technology Strategy Board, aim to stimulate business innovation by drawing on the expertise in UK universities and colleges and transferring that knowledge by placing a recently qualified individual into a company to deliver innovation and business growth. There are already some 800 KTPs across the UK, and only those who are delivering over and above the original expectations of their project can be nominated for the awards.

Clyde Space’s KTP with the University of Strathclyde developed an integrated nanosatellite for customers to buy as a kit or fully assembled spacecraft, to enable data capture for space missions and research. Nanosatellites are smaller and much cheaper to build than traditional satellites. This not only established the company at the forefront of nanosatellite design, known as CubeSat, but has also helped to position Scotland as a leader in space technology.

The partnership also formed the base platform for the UK Space Agency’s (UKSA) CubeSat competition, which was held in association with STFC and TSB, and through which Clyde Space won a contract with UKSA for testing, construction and assembly of UKube-1, the UK’s first nanosatellite system, which is due to launch in early 2013.

Through the partnership, Clyde Space is now an internationally recognised company in the market, having seen business value and R&D contracts exceed expectations, as well as attracting £1m in venture capital investment. Involvement in UKube has also sparked interest from the Ministry of Defence and the Defence Science and Technology Laboratory (DSTL) in CubeSat technology.

The University of Strathclyde benefitted from the project by overseeing 13 undergraduate group projects involving six academic departments and 34 undergraduate students. Additionally, it has built strong industry links with the space industry and was able to set up a £50,000 satellite ground station.

Professor Grahame Blair, Executive Director for STFC Programmes commented: “This is an excellent example of knowledge exchange; cementing the relationship between a small high growth company operating in a global market to a strong scientific academic group. This has clear benefits not only for the commercial partner but also provided a strong teaching and training function back into the research base.”

Iain Gray, Chief Executive of the Technology Strategy Board added: “This project clearly demonstrates that the UK has the expertise to lead space communication research. What is particularly rewarding is the end result – a product that is able for the commercial market that was hatched from collaborative research.”

Further information on the Knowledge Transfer partnerships
Oxford spin-out promises inexpensive vaccines for cancer and viral infections

A spin-out from the University of Oxford, Oxford Vacmedix, will commercialise a new technology with the potential to reduce the cost of vaccine development significantly and increase the effectiveness of vaccines in providing immunity against both infectious diseases and cancer. The technology makes use of techniques that have already produced effective vaccines under laboratory conditions.

The key to the technology lies in manufacturing new ‘overlapping peptide’ vaccines using a natural expression system. A team from the University of Oxford, Department of Oncology and the Weatherall Institute of Molecular Medicine led by Dr Shisong Jiang is responsible for the promising technology.

Describing the advantages of their work, Dr. Jiang said: “The present way of making overlapping peptides is to chemically synthesize all the peptides. The use of the peptide synthesizer, and the limited quantity of peptides produced in this way, made the overlapping peptides very expensive to produce. In contrast, our new method of making overlapping peptides in a bacterial system will allow us to obtain the recombinant protein and then the overlapping peptides endlessly. It is a great improvement compared with the previous method. There are two clear advantages to this approach to developing new vaccines. Firstly, we expect that this technique will allow us to design an effective vaccine much more quickly than using standard vaccine development methods. Secondly, these vaccines can be made using recombinant techniques, potentially a thousand times cheaper than the current solid-phase synthesis processes used to manufacture similar vaccines.”

OVM has already crossed international boundaries to access a wider range of commercialisation opportunities. As a key part of its business plan, OVM UK has formed a joint venture in Hong Kong with Chinese investors. This collaboration will enable the majority of the early stage validation of the Oxford technology to be undertaken at the newly established science and technology centre, Changzhou Bioincubation Centre, Xinbei District, Changzhou, supported by Chinese private investment and government funding. The spin-out holds the exclusive licence to the intellectual property currently owned and managed by Isis Innovation Ltd, the University of Oxford’s research commercialisation company. The support from Changzhou City government includes laboratory space in a new science business incubation centre managed by Isis and additional funding for key workers.

The joint venture, Oxford Vacmedix HK, will take an exclusive licence to four disease indications, for greater China from Oxford Vacmedix UK and the initial focus of the technology development will be on these. Oxford Vacmedix HK will be eligible to access up to 2 million RMB in funding from Changzhou Government.

Tom Hockaday, MD of Isis Innovation, said: “We saw the potential of Dr. Jiang’s work and supported it using funds managed by Isis to develop the research to the point of being industrially relevant. As the vaccine technology receives the international recognition it deserves, having an Isis base in China has been vital in facilitating the joint venture. Oxford Vacmedix is now best placed to enter markets where a cost effective solution will mean accessibility to those who are most vulnerable.”
Oxford spin-out promises inexpensive vaccines for cancer and viral infections

Oxford Vacmedix will use the investment to prepare the technology for application initially in two infectious diseases, tuberculosis and HPV, followed by other infectious diseases and as a cancer vaccine against Survivin, a protein implicated in cancer. The company will prepare a technical dossier and drug master file, aiming to establish partnerships or licenses for further development of these vaccines in China.

The CEO and investor, Dr Hong Hoi Ting, who will be leading the business and technology validation said: “We are extremely excited about the opportunity to commercially develop this Oxford technology in a region where its potential impact on healthcare is huge. This business allows us to continue building links between Oxford and China, taking advantage of the best of both and to realise the commercial potential in the technology.”

Another partner in the Oxford Vacmedix joint venture is RTC Innovation, a Birmingham based firm that commercialises early stage technology, specialising in international partnerships. Dr Jian Cao, the Director of RTC Innovation said: “From the onset we have been keen to work with Isis to promote the importance of recombinant overlapping peptide technology. Now, as the company is spun out, we are very happy to be a partner and look forward to developing this technology into vaccines.”

Further information
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I-TAC is shortlisted for prestigious BioNow award in recognition of its contribution to the biomedical sector

STFC’s Innovations Technology Access Centre (I-TAC) has been nominated for a prestigious award at the BioNow Annual Awards, which recognise the contributions of pioneering companies in the biomedical sector in the North of England. The winners will be announced at an awards dinner on 29 November.

A finalist in the ‘Service Company of the Year’ category, I-TAC provides small, high tech companies with space and access to state of the art technology that would normally only be available to big budget companies. These small companies also benefit from the additional networking and funding support opportunities available to them through being located within Sci-tech Daresbury. Since it opened just over two years ago, I-TAC tenants have secured over £270,000 in funding and investment and created 18 new jobs.

This is the third award that I-TAC has been nominated for in the last two years, each of which has represented a different sector. Last year I-TAC won Service Company of the Year at the UK Energy Innovation Awards and was also nominated at the Chemicals NorthWest awards.

Martin Morridge, I-TAC Manager at STFC, said: “I-TAC exists to support small innovative companies through a vast range of challenges and in a wide variety of areas, and our recent award nominations and successes show us how well this is working. We are all very proud that I-TAC is in the running for a BioNow Annual Award and see this nomination as real recognition of I-TAC’s achievements in the last couple of years.”

For further information on the awards see the BioNow website.
Innovations Newsletter

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STFC leads the way for sharing research data in the UK

The Science and Technology Facilities Council (STFC) have expanded their commitment to make data collected by our facilities more accessible by joining four other major research centres in the British Library’s DataCite service.

DataCite is a global initiative which addresses the problem of how to find, access and re-use the results of research. STFC, the Archaeology Data Service, the UK Data Archive, the Natural Environment Research Council and the Chinese genomics institute BGI have signed up to the service and are the first institutions to work with the British Library on this initiative.

In recent months the STFC Scientific Computing Department have been working with the British Library Datacite service to provide digital object identifiers (DOIs) for STFC collected data. In particular they have been working with the ISIS facility to add DOIs to their data sets coming from experiments undertaken by their users.

Professor Robert McGreevy, Director, ISIS Neutron and Muon Source at STFC said “Data is the core ‘product’ of STFC - all of our research results, and the resulting economic and social benefits are derived from it. We have been looking for some time at a way of making data more accessible to our research community. Signing up to DataCite and having our data sets catalogued by the British Library Datacite service offers STFC a very effective way of ensuring scientists can cite and access the data set in a standard manner. This process will allow data to be more easily found and reused, and credited in publications, thus enhancing the value of the data to STFC, giving credit to the scientists and getting better value for money for the public.”

This initiative provides a practical solution to one of the most significant challenges facing researchers today – access to data – an issue highlighted by the Royal Society in a report published in June this year, ‘Science as an open enterprise’, which recommended that scientists should communicate the data they collect in fieldwork and research more widely.

The benefits for researchers include:

• Confidence that the link to the data (or information about the data) will be persistently and uniquely identified

• Increased ease of citing data which will, in turn, increase its discovery and access, enabling others to verify the results and validate their own research

• Access to a myriad of new research opportunities which have been out-of-reach until now

• Acknowledgement and credit for sharing data and having it cited

“Enabling researchers to cite data, along with journal articles and other references, is becoming increasingly important, and DataCite has the potential to transform the way scientists communicate their research.” said Dr Lee-Ann Coleman, Head of Science, Technology and Medicine at the British Library. “As an institution dedicated to providing information, as well as practical support to researchers, we believe that the British Library DataCite service is addressing some of the barriers to data sharing.”
‘Scintillating’ security solution

Oxford researchers, in collaboration with Imperial College London, have developed an efficient way to detect neutrons. One commercial application for these detectors is within Radiation Portal Monitors to help ensure national security. Dr Jon Carr discusses this and details the latest developments from a prototype study.

Since the events of September 11th 2001, there has been an increasing focus on protecting countries from terrorist attacks. This protection is no longer limited to conventional weapons as a radiological and/or nuclear attack has also become a serious threat. Technologies that can detect radiation are at the forefront of this effort. Instruments used to detect nuclear and radioactive material are generally placed into the following categories: personal radiation detectors (PRDs), radioactive isotope identification devices (RIIDs) and radiation portal monitors (RPMs).

RPMs are portals through which vehicles can pass. The first portals designed were criticised for their inability to distinguish gamma radiation originating from benign cargo types that naturally emit radioactivity (including cat litter, porcelain and bananas) and that gamma photons could be easily suppressed by high-density shields (and therefore not detected by the monitors). This was solved by the portals also containing a specific neutron detector. However, first generation neutron detectors relied on a rare isotope of helium called helium-3, in order to function and due to increasing global demand by the security and medical sectors, supply can no longer meet demand1. This has led to increased pressure for new types of detectors to be developed.

Commercial opportunity

Over 11 million shipping containers pass through the 361 ports in the USA each year and the American government is faced with the difficult task of making sure none containing illicit radioactive or nuclear material get through. In 2009, President Obama requested a budget of $14.2 billion over five years to reduce the global nuclear threat by detecting, securing, safeguarding, disposing and controlling nuclear and radiological material. Part of this is the Second Line of Defense (SLD) programme, which will attempt to work not only in the US, but around the world to strengthen the capability of foreign governments to deter, detect, and intercept illicit trafficking in nuclear and other radioactive materials across international borders and through the global maritime shipping system.
‘Scintillating’ security solution

Oxford invention

The Oxford detector is based on a lithium-6 fluoride neutron capture design combined with an inorganic composite scintillator material. A scintillator is a material which exhibits scintillation, the process of luminescence, whereby light is emitted following the absorption of radiation. Importantly, the neutron capture releases charged particles rather than gamma rays, which are converted into light by the scintillator material, allowing the Oxford system good discrimination of gamma ray-only sources. The light produced is collected quickly and then a specific light guide efficiently transfers the light to a semi-conductor photon detector over large distances (metres).

Advantages over alternative neutron detectors:

• Lower bulk material costs
• Excellent discrimination from gamma rays
• High neutron absorption cross-sectional area
• Lower power consumption
• Lower power consumption

Readiness for market

The group were awarded a University Challenge Seed Fund to make a full size prototype neutron detector. This has been completed and testing carried out at the National Physics Laboratory with a calibrated neutron source showed good efficiency (over 2.5 neutron counts/second per 1ng Californium source at a distance of two metres) and good gamma discrimination (GARRn of 1.0). The system has relatively low bulk material costs compared to many competitor systems and the scalable design could lead to additional applications such as large neutron detector arrays for the nuclear reactor industry, detecting neutrons’ directionality, and an efficient antineutrino detector.


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Grants awarded

IPS
Professor Lucio Piccirillo
The University of Manchester
Grant Title: Industrial exploitation of a novel, miniature dilution refrigerator and associated vibrometry

Follow on Fund
Dr John Lees
University of Leicester
Grant Title: In Situ Oil Analysis in Real Time
Cancer Diagnostics & Therapies
Ring fencing cancer for good
30th January 2013

Closing light on cancer by bridging advanced detection and treatment technology with clinicians, academics and the healthcare industry.

Biophotonics is the study of interactions between light and biological material. It has applications in a number of areas including healthcare. Medical imaging techniques can be used to understand human tissue health without the need for costly and uncomfortable invasive procedures. By its very nature, biophotonics is an inter-disciplinary area, with physicists and biologists, as well as medical practitioners, working closely together on different strands of research.

There are a great number of opportunities here and many funding programmes and competitions exist to help stimulate development.

This event is designed to give an overview on those opportunities and in addition, to create mutually constructive and profitable interactions between Clinicians, Academics and Companies. This will enable the bringing together of end-users and technology providers aiming to help the translation into clinical practice of existing powerful technologies and promote new projects.

On the technology side the focus areas will be:

• Advances in radiotherapy and improvements in measurement consistency
• Advances in Biomarkers/Molecular Imaging for early detection

tinyurl.com/cd-t302013

Registration details can be found at:
https://connect.innovateuk.org/web/9986492
Cheers physics – the science behind the perfect pint

Have you ever considered just how much thought goes into making the perfect pint? As the festive season gets into full swing and people pile into pubs, a set of beer mats produced by the Institute of Physics (IOP) aims to get people thinking about the physics behind their beer.

Each beer mat features a question, such as ‘Are the bubbles in your pint of stout rising or falling?’ to engage pub-goers and generate discussion.

50,000 beer mats will be making their way to upwards of 70 pubs around the country starting today, Monday 10 December. They are being distributed by local branches of the Campaign for Real Ale, CAMRA, who are supporting the campaign.

There are three designs of beer mat that each focus on a different aspect of your pint. Scanning a QR code on the back of the mat will reveal the answer to the question, as well as an explanation of the physics that makes it that way.

The answers to the questions can be found at [www.physics.org/cheersphysics](http://www.physics.org/cheersphysics), which serves as a hub of information on the topic, providing links to further articles about beer and physics on topics such as the true colour of foam.

Alongside the campaign, the IOP is also producing five short films about the brewing process. Filmed at the Redemption Brewing Company in North London, these videos cover five different concepts that underpin the physics of beer brewing – from measuring the alcohol content using, what brewers call, ‘specific gravity’, to controlling temperature to make subtle changes in flavour. You can watch the first video in the series at: [www.youtube.com/watch?feature=player_embedded&v=ToSPPCeQjH4](https://www.youtube.com/watch?feature=player_embedded&v=ToSPPCeQjH4)

Can you flip it? Yes you can. Look out for our Cheers Physics beer mats in your local.

Rik Sargent, Outreach Officer at IOP, said: “The beermats provide a spark to get people discussing physics, to show that physics is all around us and that you don’t need to be a physicist to appreciate it.”

Tony Jerome, CAMRA’s Head of Marketing, said: “CAMRA is delighted to support the IOP’s beer mat initiative that helps consumers understand more about real ale in a fun and interesting way. We hope these beer mats will help to create discussion in pubs and encourage more people to give real ale a try.”

Andy Moffat, Director of Redemption Brewing Company Ltd., said: “Physics is important to beer brewing. There are certain rules of physics that constrain what we can do, so we try to use that knowledge to our advantage to make the brewing process as efficient as possible and brew the best beer we can.”