Editorial

An interesting and significant development in accelerator physics over the last decade is the increasing importance of lasers and laser technologies to our field. Conventional laser systems are used for tasks ranging from photocathode illumination and seeded injection systems, to advanced diagnostics like laser wire and electro-optic systems. Indeed, the distinction between lasers and accelerators becomes blurred as we construct many types of free-electron laser and laser plasma wakefield accelerators – for both electrons and hadrons. FELs, and their components like undulators and wigglers, now find myriad uses in particle physics colliders, cooling systems and storage rings, in addition to their pivotal role in 4th- and 5th-generation advanced light sources.

The conversion of the SLAC high-energy physics accelerator to LCLS over the last decade has demonstrated the enormous potential of these light sources to generate coherent X-ray beams, and the range of applications for these beams appears to expand continuously, leading to the development of sources such as the European X-FEL at DESY, SACLA at SPring8 in Japan, FERMI at Trieste and the Swiss FEL at PSI Villigen. In many of these facilities the range of laser uses and laser powers involved is quite a revelation.

This has also become an important topic within the UK, with several groups pursuing laser development and laser-based diagnostics techniques. I was involved from an early stage, with Mike Poole at Daresbury Laboratory, in encouraging the development of a critical mass of laser physicists and photonics equipment to meet what we anticipated would be a crucial requirement for accelerator physics. Daresbury, along with many other laboratories and university groups, now has specialists in this area who complement the “traditional” accelerator physics disciplines. One example of this trend is the current UK-CLIC linear collider collaboration with CERN, which includes several precision laser and photonics-based diagnostic methods, including laser-wire, diffraction and transition radiation detection, electro-optic and terahertz techniques.

Carsten Welsch’s Quasar group at Liverpool University has been successful in attracting European Union Marie Curie funding for several research training networks in the field of particle accelerators. One of these, LA3NET, is specifically aimed at laser applications in accelerators, and is training 17 early-stage researchers in this research field, making a significant contribution to the European effort. Several other accelerator schools, in the UK and elsewhere, incorporate an appreciable treatment of laser-based techniques in their schedules, and this is valuable contribution is likely to increase.

I attended IPAC 2014 in Dresden last week, and there was a clear emphasis on future accelerator technologies. Forthcoming accelerators and related devices will make increasing use of laser & photonic technologies, including nanophotonics in the case of the more exotic devices like dielectric accelerators. We can therefore expect an increased symbiosis of these fields, and a big demand for skilled practitioners. There are some really exciting possibilities on the horizon, and the UK community should be in a very strong position to capitalise on its recent activities in this area of research.

Allan Gillespie
PAB Annual Conference—Imperial College, 10 March 2014

This year’s IOP Particle Accelerators and Beams Annual Conference was held on March 10th at Imperial College, London. The day was a huge success with over 100 people attending from 18 institutes from all over the UK and abroad.

The day began with an address by Grahame Blair, who presented the STFC’s Perspective and reported on the Town Meeting that took place earlier in the week. This was followed by an exciting discussion session. Next came the presentation to Ian Gardner of the 2013 PAB group prize for outstanding professional contributions. Ian Gardner also closed the day with his prize lecture entitled “Some Proton Synchrotron Beam Profile Measurements”.

Over the course of the day there was a series of talks covering a wide range of topical UK research areas including: CLARA, The LHC, ILC, MICE, planned upgrades to Diamond, spallation sources and medical applications.

The poster session was particularly popular with over 20 posters submitted, all of which were of a very high standard. The posters were presented over lunch and three student prizes were subsequently awarded for “best poster” to X, Y and Z seen above after receiving their prize. Each prize carries a cash value of £50 and was presented by Ian Gardner. The prize winner details were:
Simon Albright, University of Huddersfield, "Variable Energy Neutron Sources".
simon.albright@hud.ac.uk

Neven Blaskovic Kraljevic, John Adams Institute, University of Oxford, "Feedback on Nanosecond Timescales"
neven.blaskovickraljevic@physics.ox.ac.uk

William Shields, Royal Holloway University of London, "Investigating the Microbunching Instability at Diamond Light Source"
william.shields.2010@live.rhul.ac.uk

The formal part of the day was followed by a drinks reception on level 8 of the physics building with great views over London. A selection of fine wines were served along with canapés and the discussions continued long into the night.

Dr Melissa Uchida

All presentations are now all available at https://eventbooking.stfc.ac.uk/news-events/annual-meeting-of-the-iop-particle-accelerators-and-beams-group-205?
agenda=1

The PAB group committee would like to thank Melissa Uchida and the team she organised at Imperial College for making the event such a success.

Peter Williams, Hon. Sec., IOP PAB Group

The IOP PAB Group is delighted to announce the award of our 2014 Prize for Outstanding Professional Contributions to:

Christopher Prior, Leader of the Intense Beams Group at ASTeC.

The citation reads:

To Christopher Prior for his seminal contributions to the mathematical modelling of intense particle beams — in particular for his development of novel simulation methods and codes; for his generation of innovative accelerator concepts; for his educational and intellectual leadership; and for his many related contributions to the success of state-of-the-art accelerator facilities in the UK and around the world.

Chris will deliver his Prize lecture at next year’s (2015) Group annual conference (date TBC).
Jim Clarke (ASTeC) and Tom Bradshaw (Technology Department) jointly chaired a workshop on 28 & 29th April 2014 at RAL on the topic of Superconducting Undulators. This is a hot topic in the light source community since the application of superconductivity to undulators promises higher magnetic fields and shorter periods which is exactly what is required to reach shorter wavelengths with lower energy electron beams. All of the international groups working on this topic were represented at the workshop and the common technical challenges faced by the groups were discussed in detail and opportunities for working more closely together were also explored. STFC staff, including Ben Shepherd from ASTeC, presented 6 talks explaining the current status of our project to develop a 2m long superconducting undulator for installation into the Diamond Light Source.

Talks from the workshop can be found at https://eventbooking.stfc.ac.uk/news-events/superconducting-undulator-workshop

**Congratulations on ALICE lasing**

Following an extended shutdown, the ALICE infrared Free Electron Laser (FEL) is operating again. Within just a few days of re-establishing energy recovery the system lased. This tunable FEL light source covers the “fingerprint” region of molecular vibrations in biomolecules and will be used in a programme of medical research funded by EPSRC. The research consortium is led by Peter Weightman from Liverpool University and includes researchers from University of Manchester, Lancaster University and University of Cardiff and clinicians from The Christie Hospital, The Royal Liverpool Hospital and Royal Lancaster Infirmary. The high repetition rate of the FEL provides a high overall intensity during 100 microsecond bursts of light but we can keep the peak power low to avoid sample damage. These light characteristics are well suited to sub-diffraction microspectroscopy of tissue and will enable a critical evaluation of various diagnostic techniques for cancers.
**RF drive system for MICE installed at the ICTF**

Ionisation cooling is required to reduce the emittance of a muon beam rapidly for application in future accelerators for neutrino factories and muon colliders. The first RF power amplifier, developed under TIARA Work Package 7 by Daresbury Laboratory working with the Rutherford Appleton Laboratory, the University of Strathclyde and Imperial College has been installed at tested at the ICTF.

The first of the four compact amplifiers for the Muon Ionisation Cooling Experiment, which recently achieved the required performance of 2MW peak power in 1ms pulses at 1Hz has now been installed in the Ionisation Cooling Test Facility at RAL. This required the establishment of all necessary services in the limited space available for the RF power stations. The amplifier has been tested to the limits of the available RF loads and exhibited the same performance characteristics as achieved in the tests previously conducted at Daresbury. This is a major step to providing the infrastructure for MICE.

Through synergy with a US NSF-MRI programme at Mississippi the components required for the distribution network developed under the TIARA project have been procured, and some parts used in the recent tests. The support of TIARA, the UK STFC, the US NSF and e2v technologies is gratefully acknowledged.

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UK wins major £4.5 million contract in construction of the world’s most powerful gamma beam facility

1st April 2014 - UK accelerator scientists have won a major contract with a European consortium tasked with delivering the most advanced and powerful gamma beam facility in the world. It will specialise in both basic and applied research, from investigating the processes that take place in the heart of stars, to industrial and medical applications.

The €5.5 million contract (approx. £4.5m) has been won by the Science and Technology Facilities Council’s (STFC) Daresbury Laboratory in Cheshire. The full €68.8 million contract was awarded to a European consortium, EuroGammaS, which is led by Italy’s Institute of Nuclear Physics (INFN). The EuroGammaS consortium has been selected to develop the accelerator based gamma source, which will form part of a major new research facility, the European Extreme Light Infrastructure for Nuclear Physics (ELI-NP) in Romania.

Professor Susan Smith, Head of STFC’s Daresbury Laboratory, said: “Winning this contract is fantastic news for STFC. It demonstrates that Daresbury Laboratory has the facilities and expertise to deliver next generation accelerator solutions anywhere in the world. As part of the EuroGammaS consortium, this contract strengthens STFC’s international reputation and collaboration with Europe’s leading institutes and commercial companies; it reinforces the UK as an international leader in this area.”

For its part of the project, STFC will supply 22 accelerator modules which steer, control and measure intense beams of electrons that are accelerated to energies of more than 7 hundred, thousand, million volts. The high energy electrons are collided with an intense pulse of light from an extremely high power laser to produce the most brilliant tuneable gamma-ray beam available in the world. This is a technically complex system delivery which involves integrating, aligning and testing the radio frequency structures, high field magnets, vacuum chambers and controls. The accelerator modules will be assembled and tested at STFC’s Daresbury Laboratory prior to delivery to the ELI-NP site in Magurele, Romania. Once operational, the facility will produce high intensity gamma beams of very precise energy that can then be used for nuclear physics experiments and other applications.

ELI-NP is one of three pillars of the Extreme Light Infrastructure (ELI) – a multi-million euro project being carried out in the Czech Republic, Hungary and Romania to create a world class laser capability. It is expected to be producing light and gamma beams by 2018. Once built, the ELI-NP will be the most advanced laser and gamma beam facility in the world. The gamma beam itself can be used to map the isotope distributions of nuclear materials or radioactive waste remotely via Nuclear Resonance Fluorescence (NRF) measurements. Medical isotopes produced by gamma induced reactions will benefit society. In addition it will produce intense neutron beams and intense positron beams, which opens new fields in material science and life sciences. The possibility to study the same target with these very different brilliant beams will be unique and enable rapid scientific advances.
President of the INFN, Fernando Ferroni, said: "It’s tremendously exciting for EuroGammaS to have won this contract and also to welcome STFC into the project. EuroGammaS is a melting pot of prestigious research institutions and companies, each with formidable experience in developing major research infrastructures, such as the ELI-NP, and INFN is proud to be leader of the Association. The work we are now doing together is tangible proof that basic research produces concrete results and impact on society."

Neil Bliss, Group Leader within STFC’s Technology Department, who has played a key role in design engineering STFC’s particle accelerators, such as the EMMA and VELA accelerators, both of which are world firsts said: “Winning this contract to work with the EuroGammaS consortium is fantastic news for STFC’s Daresbury Laboratory and true recognition of our expertise and skills in developing pioneering accelerator technology. We are constantly developing our know-how and making new and exciting breakthroughs. Major projects like this build on the UK’s expertise and experimental experience in this area, paving the way for the UK’s next state-of-the-art light source, simultaneously contributing to international R&D.”

This is the second contract that UK scientists have won for the ELI project. STFC’s Centre for Advanced Laser Technology and Applications (CALTA), recently won a major £2.2million to develop a cutting-edge laser amplifier that can supply extremely powerful bursts of laser energy.

Contact

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About EuroGammaS

EuroGammaS is a consortium of scientific institutes and industrial partners; INFN (Italy), SAPIENZA University of Rome, CNRS (France), and the following industries: ALSYOM (France), A.C.P. Systems (France), COMEB s.r.l. (Italy) and ScandiNova Systems AB (Sweden). The project is entirely funded by the EU in the amount of 66.8 million euro.

About ELI—NP

It will be called ELI-NP (Extreme Light Infrastructure - Nuclear Physics (link opens in a new window)) and will be one of the three pillars of the ELI project, along with facilities dedicated to the study of secondary sources (in Dolní Brezany, near Prague) and attosecond pulses (in Szeged, Hungary). The laboratory ELI-NP is a complex system that will be a source of gamma rays, produced by head-on collisions between high energy electrons and photons from a high power laser. The characteristics of the source will be unique and will offer new opportunities to the international scientific community in nuclear physics. It may reveal the mechanisms of nucleosynthesis in astrophysics and may contribute to the understanding of the origin of the heavy elements found in nature. In addition it will provide important applications in industrial technologies for the safe management of nuclear waste and the development of new systems of production of medical isotopes.
EU awards more than 600 k€ to support Cockcroft Research

Low energy antimatter experiments and the development of new beam diagnostics techniques for charged particle beams and are two of the main research areas in the pan-European QUASAR Group at the Cockcroft Institute. The EU has just announced that it will support the activities in these areas via two grants.

**Antimatter experiments** are at the cutting edge of science; impressively underlined through the award of ‘most important physics breakthrough’ in 2010 to the successful trapping of antihydrogen by PhysicsWorld. They are, however, very difficult to realize and presently limited by the performance of the only existing facility in the world, the Antiproton Decelerator (AD) at CERN. To enable the efficient investigation of essentially all these important questions, a new experimental facility, the Extra Low ENergy Antiproton ring (ELENA) will be built. Within the BeaPhy project a Marie Curie Intra-European Fellowship for experienced researchers will allow Dr. Javier Resta-Lopez from the University of Valencia to join the Cockcroft Institute and address some of the key challenges in the design, construction and operation of ELENA through beam dynamics studies. This work will be an important contribution to an international effort in optimizing the experimental performance for all antimatter experiments at the AD. Dr. Lopez has previously worked at CERN and the University of Oxford.

**Beam diagnostics systems** are essential constituents of any particle accelerator; they reveal the properties of a beam and how it behaves in a machine. Without an appropriate set of diagnostic elements, it would simply be impossible to operate any accelerator complex, let alone optimize its performance. Of particular importance are beam diagnostics methods based on light emitted by a beam of charged particles, such as synchrotron radiation, optical transition radiation, diffraction radiation and Smith-Purcell radiation. The goal of the DITA-IIF project is to advance the state of the art of optical beam diagnostics to meet the requirements of the present and next generation of accelerators. Dr. Ralph Fiorito of the University of Maryland at College Park is an internationally renowned expert in optical diagnostics and will join the institute via an International Incoming Fellowship to develop minimally invasive methods for low to medium power accelerators and non-invasive techniques for very intense, high power accelerators.

Professor Carsten Welsh, group leader at the University of Liverpool and PI on both grants comments: "It is absolutely fantastic news that two researchers with such impressive backgrounds will join us. They have outstanding track records and will allow us to carry out a cutting-edge research program in two truly exciting areas."
ASTeC hosts the 3rd EUCARD-2 Steering Committee Meeting

Over December 12th – 13th, ASTeC hosted the 3rd EUCARD-2 Steering Committee Meeting, bringing together each of the 12 Workpackage coordinators from across Europe. EU-CARD-2 is coordinated by Maurizio Vretenar from CERN, who reviewed activity progress in areas encompassing; Catalysing Innovation, Energy Efficiency, Accelerator Applications, Extreme Beams, Low Emittance Rings, Novel Accelerators, Ionisation Cooling Test Facility, High Radiation Materials and MagNet testing, Future Magnets, Collimator Materials, Innovative RF Technologies and Novel Concepts. The meeting also provided ASTeC with an opportunity to highlight priority research being performed at Daresbury on Test Facilities, Photocathode R&D and UK contributions towards the HL-LHC programme, whilst also providing the Steering Committee with a tour of the ALICE, EMMA and VELA accelerator facilities.

EUCARD-2 is an Integrating Activity Project for coordinated Research and Development on Particle Accelerators, co-funded by the European Commission under the FP7 Capacities Programme. This project will contribute to positioning European accelerator infrastructures at the forefront of global research.

Further information on EUCARD-2 can be found here: http://eucard2.web.cern.ch/ (link)
ISIS Linear Accelerator Tank Replacement

Work has been progressing at ISIS to manufacture a new 50-70 MeV linear accelerator tank as a replacement for the highest energy part (tank 4) of the ISIS linac. Tank 4, which is almost 40 years old, requires substantial additional vacuum pumping to compensate for small air leaks and has gradually become activated to the point where maintenance of its internal components is impossible because personnel access can no longer be permitted.

ISIS mechanical engineers have designed solutions to facilitate the manufacture, maintainability and compatible operation of a replacement tank. Extensive modelling has been carried out to ensure the correct performance is achieved with the addition of multiple access ports that enable drift tube fitting, removal and alignment. A similar port design also incorporates frequency tuning mechanisms and the single 12 inch diameter RF feed. 25 new quadrupole magnets and associated drift tube housings that allow the radio frequency field to accelerate and focus hydrogen ions will also been manufactured.

To achieve 50-70 MeV acceleration the new tank must be 12 m in length, but there is some difficulty in fitting a vessel this large into the existing space in a single section. The design has evolved such that six sub-sections will be mounted on a rail system for alignment, and can be positioned and coupled together in a more manageable fashion. A 2 m test section, manufactured from copper plated mild steel, was delivered to RAL in 2013, its primary role being to establish that materials and manufacturing processes are properly suited to producing an operationally robust end product. It will allow all of the mechanical structures, seals and fittings to be tested, assembled and disassembled several times as may be needed over the eventual lifetime and also to be driven with RF power for confirmation of thermal stability and correct and stable resonant frequency.

Alongside the design work and manufacturing of the tank section a test facility has been established and is currently being populated with the necessary RF drive amplifiers to test operation and performance.
Once the successful testing milestone of the 2 m section is achieved, a full 12 m, six section tank will be assembled. This will be operated, conditioned and then maintained at full power and duty for an extended period prior to being installed on ISIS.

2m section, with access ports, on rails.

It is anticipated that the work towards preparing the 12 m tank will allow it to be operational around 2018.

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JAI has joined JAUS

Starting this year, JAI has become a partner of the Joint Universities Accelerator School – JUAS. It is the fifteenth university partner collaborating within the framework of this international school.

JUAS was created in 1994 to meet the Europe-wide demand for a foundation course on accelerator physics and associated technologies. Starting from four universities in 1994, today JUAS includes 15 partners European Universities and offers an intensive programme for students and modular courses for professionals. The two five-week courses taught by Europe’s accelerator specialists are “Sciences & Physics of Particle Accelerators” and “Technology & Applications of Particle Accelerators”.

The operation of the school is enabled by the “Conseil Général de Haute Savoie” who provides financial support to the European Scientific Institute which organizes JUAS. Support is also provided by CERN and 14 other major European institutes and laboratories.

This year, represented officially by the University of Oxford, JAI has joined the team of JUAS partners. This connection will enhance capabilities of the partners, JAI and JUAS to develop and implement the training programs aimed at challenges of our century. Our collaboration will also facilitate exchanging of the training courses, stimulate JAI colleagues to deliver courses at JUAS, and enable JAI students to take some JUAS courses, in particular practical courses on advanced technologies.

Further information from: www.cern.ch/juas
10 years of the ISIS RFQ – a secret success!

Until April 2004 the first stage of acceleration seen by the ions in the ISIS linear accelerator was powered by an ancient and unreliable Cockcroft-Walton multiplier.

Originally part of ISIS' predecessor, Nimrod, the Cockcroft-Walton set generated a DC voltage of 665,000V and even on a good day it was a prodigious source of X-rays. The beam was transported from there to the drift tube linac by a system of nine quadrupole magnets and an RF bunching cavity, none of which were new even when ISIS was commissioned in 1984.

Between April and September 2004 the whole system was replaced by three solenoid magnets and a radio frequency quadrupole accelerator (RFQ). The aim was to decrease the downtime of the machine caused by the creaking Cockcroft-Walton and improve the stability of the beam. This was a bit of a gamble – the concept of RFQs had been around since the 1970s and while they had been deployed on high energy machines in the US and at CERN, they hadn’t been tested on machines that would run 24/7 for most of the year, like ISIS.

Alan Letchford was part of the upgrade team. He says, “There was clearly a risk to changing to the RFQ. It became my project, and I went over to Frankfurt to work with Prof Schempp, who was the world expert at the time, to really get to know them. Then I came back here to implement what I’d learnt”.

![Image of the ISIS RFQ](image.png)
The team built the entire set-up exactly as it would be installed, but in R8, where they ran it for about a year, comprehensively testing it and checking the beam parameters against the design. Alan says, “We were pleased to find that all the important parameters were as they were designed to be – this was not a given for RFQs either then or indeed now due to the highly complex nature the accelerating structure and the beam behaviour.” Then it was time for installation.

“We weren’t taking any chances,” Alan says. “Part of the design brief was that it had to be small – to fit in the gap between the Cockcroft-Walton set and the drift tubes, so that if it didn’t work we could still switch back. In hindsight that wasn’t necessary – it took us just a day to commission the beam, we switched it on, let it warm up, did a few adjustments and there it was!”

It is a testament to the quality of the work by the scientists, engineers and technicians of the upgrade team that in the 10 years since it has been an almost invisible system due to its very high levels of stability and reliability. Apart from the expected failures of parts around it, after accelerating nearly 10 billion beam pulses containing about $4 \times 10^{23}$ protons (and twice as many electrons!) and absorbing around 700 gigajoules of RF energy the reliability of the RFQ itself has been almost 100%.

The success of the upgrade re-established linear accelerator research and development activities in the UK and resulted in ISIS personnel being internationally recognised as experts in the design, construction and operation of RFQs. This success also led directly to the Front End Test Stand (FETS project) currently underway at ISIS.

Alan says, “We’d shown we could do such a good job, but we were looking for a new challenge! Part of the ISIS linac has been around since the 1950s and to run ISIS for another 20 years, we’ll need to replace it. FETS will be the starting point. But it’s also much more than that – the success of the RFQ kick started from just looking at ISIS to how we could use our expertise more broadly in high power proton accelerators and the project is really cementing the international reputation of accelerator research and development activities at ISIS. It’s fair to say all of this grew out of the RFQ upgrade project - without its success FETS would never have got going. And now it could be the first part of a new system to keep ISIS at the forefront of research for the next 20 years.”
Sara Fletcher and Alan Letchford, ISIS
On 17th -21st March, Peter Williams, senior physicist in ASTeC’s accelerator physics group attended EIC14, an international workshop on accelerator science and technology for electron-ion colliders, at Jefferson Lab, Virginia, USA.

http://www.jlab.org/conferences/eic2014/index.html

An electron-ion collider is likely to be one of the future large accelerator facilities for high energy and nuclear physics. Presently, there are five proposals under active development worldwide. They are LHeC at CERN and ENC at GSI in Europe; eRHIC at BNL and MEIC at JLab in the USA; and HIAF at IMP in China. Each of these proposed facilities covers a distinct energy range and adopts either ring-ring or energy-recovery linac (ERL) - ring collider scenarios. In order to deliver high machine performance to satisfy the science needs, an array of advanced accelerator concepts and technologies has been integrated into each of the accelerator designs. However, these facility proposals share many common accelerator R&D elements, such as ERLs, beam cooling, polarized sources and polarized beams. Collaborations among the researchers working on these facility proposals are emerging and growing.

Peter co-convened the working group on superconducting RF and energy-recovery linacs, together with Ilan Ben-Zvi of Brookhaven Lab and Bob Rimmer of Jefferson Lab. With the successful operation of ALICE at Daresbury and the Jefferson Lab FEL, the international community
now considers this technology ready to apply to a high-energy machine such as an electron-ion collider.

Former ASTeC intense beams group physicist, Stephen Brooks (now at Brookhaven), presented the current baseline design for eRHIC as a 20 GeV, 16 pass ERL, utilizing ns-FFAG arcs, following the successful demonstration of the ns-FFAG principle in EMMA at Daresbury.

Cockcroft / University of Liverpool PhD student Emilia Cruz Alaniz presented candidate designs for the interaction region of the LHeC. This presents unique challenges as one of the LHCs two counter-rotating proton beams must pass the e-p interaction point and not participate in collisions.

This successful workshop provided an unique opportunity to exchange information on one of the most active areas in accelerator development worldwide.
Fusion Collaboration for MaRS

The Culham Centre for Fusion Energy (CCFE) has enlisted the help of Ben Shepherd from ASTeC’s MaRS group to perform some magnetic material tests. CCFE brought some samples of steel to be tested by Ben in the MaRS group’s magnet laboratory at Daresbury. These samples were of a grade of steel that is proposed to be used in the new MAST Upgrade tokamak under construction at Culham, and CCFE were concerned that the magnetic permeability would be too high for the materials to be used near the plasma in the tokamak. However, it was demonstrated using a high-field dipole and accurate magnetic field measurements that the samples being tested were actually much less permeable than expected. This is an important and very positive result for CCFE. Construction of the £30m upgrade to MAST continues.

ASTeC Hosts Final Annual TIARA Preparation Phase Review

From November 25th -28th, ASTeC was host to the final annual review meeting of the EC-funded TIARA Preparation Phase, whose remit has been to substantiate integration of national and international accelerator R&D infrastructures into a single distributed European accelerator R&D facility with the goal of developing and strengthening state-of-the-art research, competitiveness and innovation in a sustainable way in the field of accelerator Science and Technologies across Europe. With 52 attendees from across Europe’s leading laboratories, the main purpose of this concluding meeting was to review the progress within the various TIARA Work Packages and finalise the results of the TIARA Preparatory Phase. For the past 3 years, ASTeC has played coordinating roles as part of collaborative workpackage teams; with Peter McIntosh representing ASTeC in WP3 to develop Accelerator R&D Infrastructures and Susan Smith in WP4 to assess Joint R&D Programming.
The Institute of Physics Particle Accelerator and Beams Group sponsored a meeting of UK accelerator professionals on 13th January 2014 at the Cockcroft Institute to discuss the accelerator science and technology opportunities that would be afforded by the proposed CLARA Test Facility. Over sixty people attended the event, chaired by Jim Clarke (ASTeC), to hear presentations about the status of the project, the accelerator design, and the ideas that different groups have for making use of the high quality electron beam that would be available.

Two of the talks reflected the fact that CLARA is primarily an FEL test facility, particularly focussed on ultra short pulse generation, but the others covered a wide variety of other applications from plasma acceleration, to dielectric accelerators, to advanced beam dynamics benchmarking, to a technology test bed for advanced diagnostics and high repetition rate photoinjectors, and even as an injector into novel circular accelerators. The breadth of the potential applications was truly impressive, and clearly demonstrated the enthusiasm and strength of the accelerator community. Several speakers identified that the science can start as soon as the front end is installed, which is currently scheduled for early 2015, and some experiments will even be starting in 2014 utilising VELA.

The presentations from the meeting can be found at: https://eventbooking.stfc.ac.uk/news-events/iop-clara-community-meeting-194?agenda=1
The 3rd Annual Meeting of the HiLumi LHC-LARP Collaboration

The joint HiLumi LHC-LARP collaboration held its 3rd annual meeting between 11-15 November 2013, hosted by the Cockcroft Institute and Daresbury Laboratory. The international meeting brought together 180 physicists and engineers from as far as Japan and America to address the luminosity upgrade of the Large Hadron Collider at CERN, which will provide an unprecedented rate of proton-proton collisions to the four LHC experiments in the 2020s. The meeting addressed key issues of accelerator design, scheduling and the exploitation of novel technologies to deliver the challenging project goals.

The week began with the kick-off meeting of the LHC upgrade project, which was attended by the CERN directorate, the senior management of STFC and senior management of US DoE (Dr Bruce Strauss). After the welcome from the Cockcroft Institute Director Prof Swapan Chattopadhyay, the STFC executive-director for Programmes Prof Grahame Blair presented the UK accelerator landscape. This was followed by a talk on the vision of CERN for the field by Prof Sergio Bertolucci, an overview of the LHC luminosity upgrade by its leader, Prof Lucio Rossi, and the status of the associated detector upgrades, again by Prof Sergio Bertolucci. Talks were then given on the Japanese and US effort for the LHC upgrades by the KEK laboratory director Prof Atsuto Suzuki and Prof Stuart Henderson of Fermilab respectively. Finally there was a closing talk on the CERN injector complex and machine upgrades by the incoming CERN director of accelerators Prof Frederick Bordry. The LHC upgrade kick-off meeting ended with a celebratory cocktail in the Daresbury atrium and an evening dinner hosted by Prof Rossi on behalf of CERN and Hi-Lumi collaboration and Prof Chattopadhyay on behalf of the Cockcroft Institute.

http://hilumilhc.web.cern.ch/HiLumiLHC/index.html
http://www.uslarp.org/

For further details please contact Dr Rob Appleby (robert.appleby@cockcroft.ac.uk)
The main workshop started on the Tuesday morning with a day of plenary talks addressing various aspects of the LHC machine upgrade. The workshop photograph was taken at morning coffee in the Cockcroft Institute atrium, while the international delegates chatted over coffee and biscuits, and the Daresbury boardroom hosted the collaboration board in the late afternoon. This was followed by the collaboration board dinner at the famous Old Trafford football stadium. The Wednesday was filled with parallel sessions, up to five at one time scattered over the site, as the various work packages focused on a day of intense scientific talks and discussion. After this strenuous day the delegates enjoyed the workshop dinner at Ruthin Castle in Wales, with a medieval banquet and entertainment providing the backdrop for further discussion and relaxation. The final day of the main workshop started with parallel sessions till morning coffee and then proceeded into summary and overview plenary talks. The workshop was brought to a close with a discussion of novel ‘crab kissing’ schemes, reminding all the delegates of the need to work closely with the experiments of the upgraded LHC machine. Friday was spent on more focused discussion in smaller satellite meetings, including a mini-workshop devoted to the special simulation challenges of high-energy proton beam collimation.

Prof Lucio presenting the plans for the high luminosity era of the LHC in the Tuesday morning plenary session.
calling all engineers

Do you want to…
- learn more about particle accelerator engineering in the UK?
- know which companies, institutions and universities employ accelerator engineers?
- network with other accelerator engineers?
- discover cutting edge technology?
- find out who uses which specialist manufacturers and services?
- influence the development of a professional network of accelerator engineers?

…then come to the first Accelerator Engineering Network meeting.

Friday 10th October 2014 10:00-16:30

1 Birdcage Walk, London, the joint IMechE and IET headquarters.

Keynote speaker: Frederick Bordry, CERN's Director for Accelerators and Technology.

Speakers from Industry, National Labs and Universities.
Networking lunch.
Free to attend.

Register at: https://eventbooking.stfc.ac.uk/news-events/particle-accelerator-engineering-network-219

This meeting is open to all engineers, technicians and physicists working in the engineering of particle accelerators: Civil, Computing, Control, Design, Education, Electrical, Electronic, High Voltage, Laser, Manufacturing, Mechanical, Modelling, Operation, Plant, Plasma, Power, Procurement, Project Management, Protection, Radiation, Research, RF, Safety, Sales, Software, Support, Thermal, Vacuum.

For more information contact: dan.faircloth@stfc.ac.uk
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Supported by:
PAB GROUP & UK EVENTS

Accelerator Engineering Network Meeting

https://eventbooking.stfc.ac.uk/news-events/particle-accelerator-engineering-network-219

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graeme.burt@cockcroft.ac.uk

National Postgraduate Open Day

RAL, 4 December 2014
Details from Dr John Thomason at RAL

Accelerators for Future Spallation Sources

University of Huddersfield, 12 December 2014
Details from Adina Toader

Useful Links

http://www.scitech.ac.uk/
http://www.cockcroft.ac.uk/
http://www.adams-institute.ac.uk/
www.diamond.ac.uk
http://www.desy.de/index_eng.html
http://www.linearcollider.org/newsline/
INTERNATIONAL CALENDAR

37th International Conference on High Energy Physics (ICHEP2014)
Valencia, Spain, 2-9 July 2014
http://ichep2014.es/

Free-Electron Lasers, FEL’14
Basel, Switzerland, 25-29 Aug. 2014
http://www.fel2014.ch/

27th Linear Accelerator Conference, LINAC’14
ICC, Geneva, Switzerland, 1-5 Sep. 2104
http://linac14.org/

3rd International Beam Instrumentation Conference (BIC14)
Monterey, California, 15-19 Sep. 2014
(hosted by SLAC)
https://conf-slac.stanford.edu/ibic-2014/

International Workshop on Future Linear Colliders (LCWS14)
Vinca Institute of Nuclear Sciences, Belgrade, Serbia
6-10 October 2014
http://lcws14.vinca.rs/

Upcoming schools

The 2014 European School of High-Energy Physics
Garderen, the Netherlands
18 June- 01 July 2014
http://physicschool.web.cern.ch/PhysicSchool/ESHEP/ESHEP2014/default.html

The Second Asia-Europe-Pacific School of High-Energy Physics
Puri, India
4-17 November 2014
http://2014.aepshep.org/

Joint International Accelerator School: Beam Loss and Accelerator Protection
Newport Beach, CA, USA
5-14 November 2014
IoP Particle Accelerators and Beams Group

IoP PAB Committee

Chair: Prof. Phil Burrows (Oxford)
Secretary: Dr. Peter Williams (Daresbury)
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Dr. Riccardo Bartolini (Diamond Light Source & JAI)
Dr. Adina Toader (Manchester)
Dr. Jonathan Smith (Tech-X UK): Industrial representative
James Henderson (Strathclyde); co-opted student

Deadline for submissions to the next newsletter is 31 October 2014

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