

# IOP PAB GROUP NEWSLETTER

Issue 12

December 2015

## Editorial

2016 is set to be a key year of change for the Committee of the Particle Accelerators and Beams Group. Coming to the end of their four year terms are our Chair, Philip Burrows, and Honorary Treasurer, Brian McNeil, together with four of our ordinary members. The committee continues to seek volunteer nominations from IOP members across the Accelerator and Beams communities of the UK and Ireland. Keen, enthusiastic members with ideas on shaping future IOP activities in the field will be most welcome. The committee is keen to ensure representation from the range of Accelerator and Beams activities, so if you feel we've not served your branch of the field please consider volunteering, or at least let us know where we can help. Elections take place at the Group's Annual General Meeting (which will be held on 8 April at the University of Huddersfield), for four year terms commencing in September. For more information, or to request a nomination form, please contact the Honorary Secretary, Aled Jones at [aled.jones@physics.org](mailto:aled.jones@physics.org).

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## News from the Laboratories — Daresbury

### First UK In-kind Contribution to ESS Successfully Installed and Commissioned

The European Spallation Source (ESS) will be the brightest neutron source in the world and is under construction in Lund, Sweden. The project will be funded by Sweden and multiple other European nations. The UK, as part of its commitment to ESS, is providing £165 million and STFC is responsible for the management of that budget.



Vacuum test facility  
(Credit: STFC)



The commissioning team  
(Credit: STFC)

STFC and ESS formally agreed the first UK work package at the end of 2014 for a cost of £1.02 million. Daresbury Laboratory (ASTeC and Technology Department) staff have worked to stringent deadlines and budget, delivering four state-of-the-art laboratory facilities within seven months from procurement to delivery at the temporary ESS premises in Sweden.

The systems include:

- Outgassing facility – to provide in-vacuum material characterisation
- Calibration facility – formal calibration of vacuum diagnostics
- Integration facility – in-house controls/vacuum testing prior to installation on ESS
- Particle test facility – ESS will be a ‘particle free’ accelerator and this facility will allow ESS to determine their procedures and make key design choices.

After ESS staff formally accepted all systems at Daresbury in early July the equipment was then shipped and a small team of ASTeC and Technology Department staff - Keith Middleman, Mark Pendleton, John Stowell, Paul Aden and James Wilson - spent a week installing and commissioning the systems.

At the end of a busy week, the ESS team formally accepted all four systems in the presence of numerous senior staff and ESS local press. Peter Ladd (head of the ESS vacuum group) and Marcelo Juni Ferreira (currently deputy) expressed how thrilled and privileged they were, and couldn't thank the Daresbury team and STFC enough for their contribution. They also highlighted the advanced position of the group, which would now be able to utilise the facilities for making key decisions towards the ESS accelerator design.

## Cavity Beam Position Monitor at VELA

A team of researchers and engineers from the John Adams Institute at Royal Holloway, University of London, FMB-Oxford and Daresbury Laboratory have commissioned the first prototype of a cavity beam position monitor (CBPM) system at VELA. Supported by STFC's [Innovations Partnership Scheme](#), the development is aimed at providing future Free Electron Lasers (FEL) and similar linac-based facilities with a reliable, high-resolution position diagnostic. This industrialisation project will allow accelerator and FEL laboratories to purchase and install CBPMs without the requirement for in-house design and tuning expertise.

An important feature of CBPMs is their extremely high sensitivity which allows them to operate at very low beam charges and still provide micrometer-level position resolution, where standard electrostatic pick-ups usually cease to operate. So far, the measurements at VELA have confirmed that the test system can operate below 10 pC bunch charge, and further work is underway to increase the system gain and provide position measurements at pC-level.

A new reference cavity will be added to the system to provide the charge normalisation and phase (which indicates positive or negative sign of the offset) information. Once these changes are implemented and commissioned, the CBPM system will become a useful diagnostic for VELA users interested in measurements at low bunch charge, including extremely short bunch operation, and help to deliver the beam to their experiments.



(Credit: STFC)

## News from the Laboratories — RAL

### ISIS Linear Accelerator Tank Replacement – First RF Tests

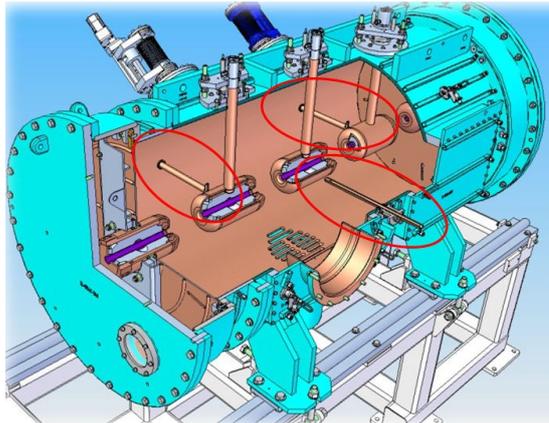


Resonance at 202.5 MHz  
(Credit: STFC)

We have previously reported (in Newsletter Issue 9) on manufacture of a 50-70 MeV linear accelerator tank required as a replacement for the highest energy stage (tank 4) of the ISIS 70 MeV linac at Rutherford Appleton Laboratory.

A one sixth section of tank has now been assembled, vacuum ready, fitted with drift tubes and has successfully undergone accurate alignment of all components in readiness for low power testing and initial setup. In order for the tank to function as an accelerator for ISIS it must be resonant at 202.5MHz. The first low power network analyser test successfully confirmed on-frequency resonance during November 2015.

Tuning mechanisms attached to the resonant vessel allow a frequency bandwidth of  $\pm 0.1\text{MHz}$ . Sufficient range is provided enabling  $202.5\text{MHz}$  to be maintained in a closed control loop, compensating for variations in temperature created by RF losses at full power. Both course and fine adjustments remained near their midpoints in achieving this frequency.

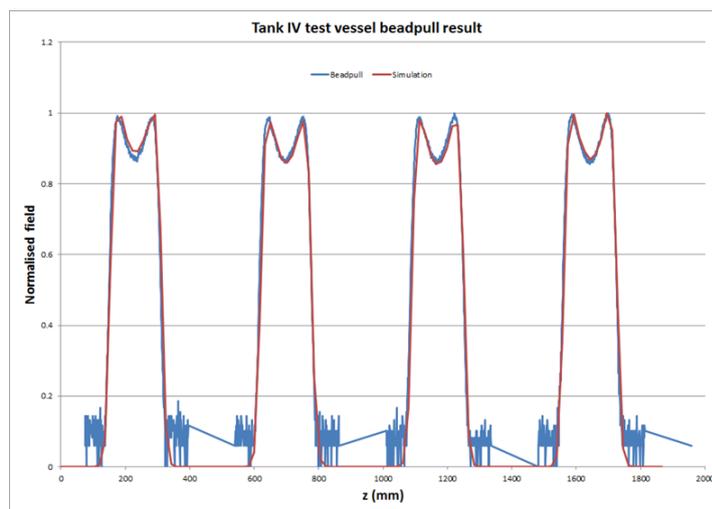


3D model showing post couplers  
(Credit: STFC)



Bead pull jig attached to tank  
(Credit: STFC)

Post couplers (indicated in the 3d CAD model above) are fitted at the midpoint of a drift tube. These are important in stabilising the on-axis electric fields against tilts produced by minor mechanical variations. Field flatness is achieved along the length of a tank once their position is correctly set. The measurement technique employed to investigate the field profile and then determine the necessary setup adjustments uses a small dielectric material bead mounted to a non-metallic wire fed axially through the vessel. The bead perturbs the electric field and allows a frequency or phase shift to be measured. National Instruments hardware is employed to control a stepper motor drive and position indicators while automating data capture and plotting from a network analyser. Good comparison of simulated and measured normalised electric field is achieved.



Normalised plot of electric field within acceleration gaps  
(Credit: STFC)

Work will continue toward high power testing on completion of this setup step.

[Mark Keelan](#)

## Cockcroft Institute Particle Accelerator School

The Cockcroft Institute recently held its second particle accelerator school at the start of November. The school was attended by 23 students from five different Universities and ASTeC. The two week school was split into two parts with the mornings dedicated to lectures, including a talk on the new proton therapy centres from Ranald MacKay from Christie Hospital, and the afternoons dedicated to a design exercise. For the design exercise the students had to do a complete design of a 3<sup>rd</sup> generation light source. The school was closed with a talk from Ian Martin on the commissioning of Diamond Light Source.

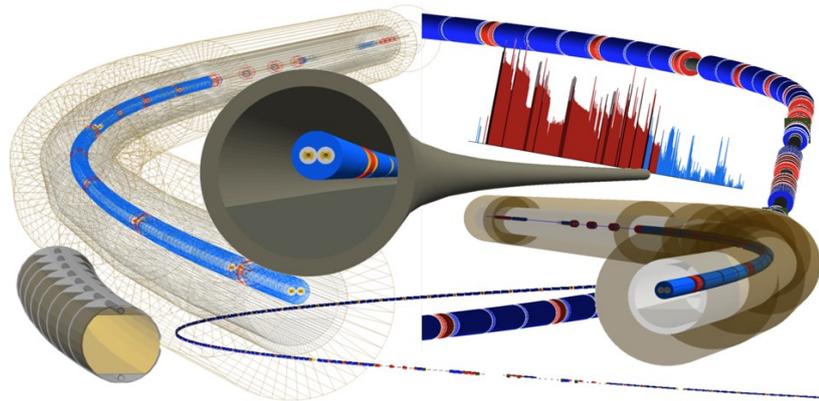


Students at ClueHQ  
(Credit: Cockcroft Institute)

The school also had a social programme, including a meal, a team building exercise at an indoor climbing centre and a trip to ClueHQ where each of the four groups had to escape from a room by solving puzzles. Unfortunately none of the students was able to escape and they had to be let out! The students and lecturers all found the school very educational. [Dr. Graeme Burt](#), head of education and training at the Cockcroft institute, remarked "I was amazed at how well the students did in the design exercise, the students all seemed to learn a lot and I was very impressed by the well informed questions they asked at the end of Ian Martin's talk".

## JAI Involved in Forefront European Projects

Continuing its development of international collaborations with world leading centres, the John Adams Institute has recently engaged in a number of front line EU projects. Here we will tell you briefly about our plans for HL-LHC, FCC, and EuPRAXIA projects.



Capability of the GEANT-based code BDSIM, developed in JAI/RHUL, for modelling of beam loss, beam collimation and background generation and handling in colliders. This code will be used for detailed technical design of HL-LHC as well as for FCC design studies  
(Credit: John Adams Institute)

First of all, the High-Luminosity LHC project, which after several years of design study has moved into the next phase: development of the prototypes for various parts of the accelerator. The JAI, and in particular the JAI/RHUL team will be engaged in HL-LHC the work package devoted to detailed design of the upgraded LHC insertions for a low-beta optics, where careful calculations of the beam losses will be done using all realistic imperfections. The studies will be performed by a set of codes including the JAI/RHUL developed GEANT-based code BDSIM.

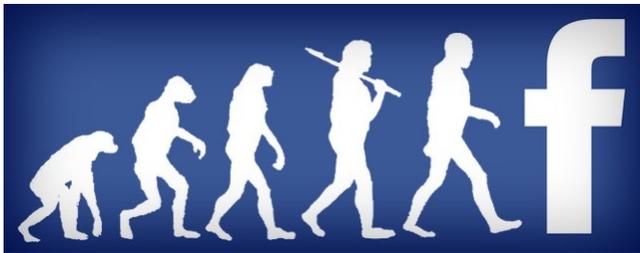
The Future Circular Collider (FCC) is a conceptual design study for post-LHC particle accelerator options in a global context. The JAI contribution to FCC is supported by the EU funded project EuroCirCol and is focused on the design of the experimental interaction region (EIR) for the FCC-hh option. The JAI/Oxford team is responsible for overall coordination of the EIR work package and for design of the EIR optics. The FCC project is an international collaboration of many tens of institutions worldwide. We will work with many partners in Europe and worldwide. Work on FCC will be undertaken in close collaboration with the entire JAI team, where in particular, the JAI/RHUL team will contribute the experience of use of the BDSIM code for energy deposition studies in hadron colliders.

The EuPRAXIA project (European Plasma Research Accelerator with eXcellence in Applications) was launched in November 2015, aimed at producing a conceptual design report for the world's first 5 GeV plasma-based electron accelerator with industrial beam quality and dedicated user areas suitable for a novel free-electron laser, high-energy physics and other applications. The JAI/Oxford team will be responsible for designing a beam line and its user area for high energy physics and other applications while the JAI/Imperial team will be engaged in design and development of the high-gradient plasma acceleration structure. As for all other projects mentioned above, the JAI engagement in EuPRAXIA is benefiting from strong synergic connections between the JAI teams in the three universities.

[Andrei Seryi](#)

## Social Media

A [Daily Mail article in 2014](#) predicted that in just a few years half of all couples in the UK will get together using online dating. One may question the Daily Mail's assertion and indeed how it might be relevant to a physicist, but it is certainly an example of how the internet has wrought fundamental changes to our society. Significant fractions of things like banking and shopping are now done online, and 'TV' is rapidly transitioning from a scheduled broadcast into an online, on-demand activity. Most young people now obtain their news from digital rather than print sources, with printed [newspaper sales dropping](#) sharply year on year. Where people once carried newspapers and magazines, they now carry smartphones.



As well as the traditional websites that dominated the '1<sup>st</sup> wave' of internet adoption, hand-in-hand with the adoption of mobile smartphones has been the rise of social media as more than just a tool for private communication. Facebook now has around 1.5 billion active users, about half of the 3 billion people on Earth

that have access to the internet. The phenomenal rise of smartphone use in the last 10 years has led a shift to mobile internet access; mobile internet usage accounts for more than half of all internet use, not only in the developing countries that lack fixed-line infrastructure but now also in developed countries like the UK.

Services such as Facebook, Twitter and YouTube are seen as much more than websites, and are now regarded as 'channels' through which content can be made available, most prominently for advertising (which of course funds these services for the most part), but also for distributing music, programmes, shopping and other services. Social media services are becoming 'just another channel', but each service differs in the way it is typically employed by users. Facebook's curated experience is used greatly for things like retail marketing, smaller-scale services and group messaging, Twitter is used more for 'real-time' services and news, and in particular for publicizing information available in other services and sites. Blogs – containing longer posts that allow individuals the same freedom to publish as organisations – now more and more act as an adjunct to the shorter messages sent through Twitter. Blog posts can provide the longer articles while Twitter points to them.

The needs of physicists and other researchers are not really different from those of the general public with regards to how information can be shared. As everyone knows, it was a physicist that invented the World Wide Web in the first place as a way to help share physics information, so we should all really be using it for that purpose! A good example of the internet transition has been the effective abandonment of print journals for online services; the latter offers near-instantaneous and hassle-free dissemination, cross-referencing and searching.

Hand on heart, most researchers will confess to 'Googling it' first to find out about a topic, rather than reaching onto a shelf for the relevant, heavy printed tome. And finding out new information – so important for the research of today – has more-or-less shifted entirely online. The advantages are obvious: magazines such as Physics World have the advantage online of allowing 'click-through' from the publicity articles to the original research papers, and the demand for this source material also from members of the general public – particularly with regard to medical articles – has led mainstream news services like the BBC and the Guardian to follow suit. One click and you can read the original research to make up your own mind about the topic.

So what has social media got to do with the typical accelerator scientist? After all, they already have access to things like PRSTAB, JaCoW, the ubiquitous arXiv, and magazines like CERN Courier and Physics World. But not everything of interest to a researcher ‘pops up’ in these services; not everything is an article, and hearing about ‘what’s going on’ can be useful as well. This is where Twitter in particular is very useful. There are a number of Twitter accounts operated by laboratories, research departments and even groups that spread news, and individuals also operate their own accounts to spread information on research topics that they think are relevant. Each of these accounts is then a sort of news channel dedicated to that one narrow topic, each operator doing the job of curating (choosing and sorting) what information they post. By following each of these accounts so their combined posts appear on your own account timeline, Twitter can be used as a personal scientific news service. Not everything appearing on your Twitter timeline will be useful, but by choosing to follow the right accounts most of it should be. In the other direction, Twitter accounts can now influence both popular and scientific opinion (for which read: ‘funding’). For right and wrong reasons, popular issues can become ‘viral’ on services like Twitter, prompting action by organisations and authorities with an immediacy that few would have expected possible even several years ago. For example, complaining [about customer service](#) is now done mainly on Twitter.



The IOP Particle Accelerators and Beams Group runs a Twitter account: @PartAccelBeams. We use it mainly to post links to relevant conferences and workshops, and occasionally news articles of general interest. There are many other useful accounts, and we’ve listed just a few of them here to give you an idea what is on offer: @johnadams\_rhul, @cockcroft\_news, @arxivblog, @symmetrymag, @CMSexperiment, @LosAlamosNatLab, @uslhic, @gridpp, @STFC\_Matters, @newscientist. And of course we shouldn’t forget IOP’s own @PhysicsNews, and @ProfBrianCox. Each account has its own particular take on a topic, from the serious to the eclectic.

One advantage of services like Twitter over traditional digital media is that they are just as easy to access on mobile devices as they are on a laptop. The busy researcher can now check their personalized newsfeed while brushing their teeth or while commuting on the train. The same is true of Facebook and YouTube. Facebook isn’t used all that much by researchers – it tends to be used by individual research groups to post seminar and social gathering bookings – but YouTube is used a lot. One space YouTube is occupying more and more is to disseminate educational videos. The PAB group has supported the creation of a [UK Accelerator Science](#) channel on YouTube, on which are postgraduate course lectures on various aspects of physics and technology for accelerators. This is a pilot scheme to gauge interest in this sort of thing (let us know your thoughts) inspired by the now widespread use of online materials by various universities; most notable are [Stanford Online](#) and [edX](#).

In summary: social media has arrived, it’s everywhere, and researchers should engage with it. We’ll leave you with a [Tweet](#) from @AcademicsSay, one of the more eclectic yet interesting accounts on Twitter:

“Perhaps the most interesting thing about academics and social media is that the most traditionally influential feel above it, leaving almost completely unattended a massive lane of influence for those not asleep at the wheel.”

By the way, you can get this article also as a Blog Post by looking at our Twitter feed...

[Hywel Owen](#)

## The NGACDT Visit to CERN



The 2015 NGACDT conference group photo. Back row from left to right: Adam Noble (staff), Nick Henthorn, David King, Nuala Hanley, Natalie Mayhead, Jordan Taylor, Seyed Mirfayzi, Karolina Kokurewicz and Cezarina Chirvase. Middle Row from left to right: Mohamed Ismail, David Bruton, John Warmenhoven, Panos Lepipas, Alexis Dimitriadis, Rory Garland and Phil Tooley. Front row left to right: Tanjilul Amin, Kamran Fathi, Martin Mitchell and Clare Scullion  
(Credit: NGACDT)

The centre for doctoral training in next generation Accelerators (NGACDT) is a collaboration of several UK universities (University of Huddersfield, Manchester University, University of Surrey, Queens University of Belfast, and Strathclyde University) dedicated to the development of accelerator technology. Having strong collaborations with OPENMED, AWAKE, the LHC, and its high luminosity upgrade, the student organised annual conference was held at CERN this year; 16-18 November.

There were a number of invited speakers who gave talks at the conference. Dr. Steve Myers, the then head of medical applications at CERN gave an overview of the accelerators at CERN. We also had more specific talks about projects at CERN, where Dr. Janet Schmidt gave an overview of the AWAKE collaboration. Dr. John Jowett, Dr. Manjt Dosanjh, and Arnaud Marsollier also gave talks.

The annual conference allows NGACDT students to present their work to the group and build collaborations. The students gave talks on their research which ranged from HL-LHC Collimation through to Stereotactic Radiosurgery and Laser-plasma Wakefield acceleration.

Complementing the talks, tours of several CERN facilities were arranged to give the students an insight into CERN activities. Highlights from these included the synchrocyclotron, the first accelerator to be built at CERN, and the CERN Control Centre where students were able to witness the operation of Pb-Pb collisions and one student was allowed to dump the Pb beam.

[Jordan Taylor](#)

## Delivering the Impact of Particle Accelerators

“The Applications of Particle Accelerators in Europe (APAE)” project, which is being run by the FP7 EuCARD-2 Integrating Activity, held a kick-off meeting in London in mid-June, supported by the IoP Particle and Beams Group.

The goal of the project is to document the applications of particle accelerators outside of the research area and present these to policy makers in Europe. It will produce 2-4 page summary documents tailored to particular European countries (including translation) and a back-up document of around 80 pages giving much more detail. The aim is to demonstrate the potential of particle accelerators and the importance of continuing their development.



Delegates to the Applications of Particle Accelerators in Europe  
kick-off meeting  
(Credit: APAE)

More than 90 researchers from various scientific fields attended the meeting at the Royal Academy of Engineering in London to determine what should be included. The event featured talks from academia, industry and medical representatives on the main application areas of accelerators including industry and environment (ion and electron beams), security, health, photonics, neutron scattering and energy.

The next steps are now in the hands of the session conveners, who will organize a structured input from their communities demonstrating the impact and challenges of accelerator research and applications. The target publication date is the end of 2016.

If you could not attend the meeting but would be interested in contributing to the document, please get in touch with the organizers or the session conveners. More information can be found on the [kick-off meeting](#) and [APAE](#) websites.

[Rob Edgecock](#)



## POSIPOL 2015 Conference

From 2-4 September 2015 the 10th annual international positron source workshop took place at the Cockcroft Institute of Accelerator Science and Technology thanks in part to sponsorship from the Institute of Physics Particle Accelerators and Beams Group. The workshop covers all aspects of producing intense positron beams with a particular focus on future linear collider projects where the positron requirements are especially demanding.



Delegates to the POSIPOL 2015 Conference  
(Credit: Cockcroft Institute)

The latest developments in conventional, electron-beam based, positron sources as well as novel sources using gamma-ray beams produced by undulator insertion devices or Compton backscattering designs were presented. The survivability of targets was a common theme across all designs, where strategies to mitigate the hostile target operating conditions range from the use of a 'hybrid' target system with a crystalline target, contact cooling methods for thin targets and changes to the timing structure of the electron drive beam to reduce the peak heat load.

Several major subsystems for the baseline positron source for the International Linear Collider were designed and prototyped in the UK some years ago. So it was fitting that in preparation for the upcoming LCWS15 linear collider workshop in Whistler Canada, there was much discussion of the detailed layout of the ILC source.

The organisers gratefully acknowledge the contributions of all attendees and the help and support of the staff of the Cockcroft Institute and Daresbury Laboratory in making the workshop a success. The organisers are also grateful to the Cockcroft Institute and the Institute of Physics for their financial support.

Slides of the presentations made during the workshop are available from the workshop [website](#).

[Ian Bailey](#)



## Accelerator Engineering Network



Members of the accelerator engineering network  
(Credit: STFC)

Daresbury Laboratory played host to the 2<sup>nd</sup> annual accelerator engineering network on 9 October. 127 engineers, technicians and scientists came to network and hear about the latest news from the community. The keynote speaker was Professor John Womersley who set out the bright future for accelerator engineering in the UK. Barry Fell gave an update on the CLARA project. Dave Willford (PPM Power) gave a historical tour of some of the characters in the industry. Ben Leigh outlined Tesla Engineering's impressive magnet manufacturing capabilities. Phil Wise (STFC) described the project to replace tank 4 on the ISIS linac.



Haroon Rafique receiving the The IET student poster prize from Peter McIntosh, ASTeC Deputy Director  
(Credit: STFC)

After a networking lunch kindly sponsored by STFC, Robert White from Elekta detailed a control system developed for training oncologists to use their accelerators. Then Paul Aden (STFC) gave an overview of the ESS work done at Daresbury. A very interesting talk about contamination control, full of useful information about clean rooms was given by Thomas Weston (STFC). The final talk of the day was given by Rosa Letizia from Lancaster University about novel materials for accelerators of the future. The IET student poster prize was won by Haroon Rafique from the University of Huddersfield. ([Slides](#), video: [morning](#), [afternoon](#))

The accelerator engineering network aims to be inclusive of all people working on accelerators, including technicians, so a technician training day organised by Graeme Burt from Lancaster University was run the day before the main networking event. Almost 50 people attended introductory lectures on electrical and mechanical engineering and accelerator physics. Lloyd Collier from RegTec was also on hand for both days promoting the benefits of professional registration for technicians. ([Slides](#), video: [first two lectures](#), [second two lectures](#))

[Dan Faircloth](#), the Engineering Network chairman said, "This year's meeting builds on the success of last year's event in London: thank you to everyone involved in making it a success. We look forward to welcoming everyone to the next network meeting at the Rutherford Appleton Laboratory next Autumn".

The organisers would like to thank the IoP, IET, IMechE and STFC for their kind sponsorship and support of the Accelerator Engineering Network.

## National Vacuum Electronics Conference 2015

The National Vacuum Electronics Conference (NVEC) 2015 was held on 18 November 2015 in the Technology and Innovation Centre, Glasgow, UK. It was hosted by the Atoms, Beams and Plasmas (ABP) research group, Department of Physics, SUPA, University of Strathclyde.

NVEC is principally a UK-based international forum in science and technology of RF, microwave and millimetre wave sources and application of RF in accelerators. NVEC 2015 aims to foster academic-industry collaboration and to engage young scientists researching electron beam driven RF and microwave systems. A unique opportunity was seized by the scientific committee with the invitation of Institute of Physics Fellow Ian Bott, who gave the plenary talk on the generation of coherent millimetre electromagnetic radiation via the electron cyclotron maser instability. Ian gave an overview of the world's first electron cyclotron maser experiment that he carried out at the Royal Radar Establishment (RRE), Malvern, in 1961-63, which pioneered the development of the gyrotron.

In addition to Ian Bott's invited talk there were 17 high-quality contributed presentations and a poster session with 12 posters. Modern computational modelling techniques of the gyrotron using CST Particle Studio, followed by an overview of gyrotron simulations using the Tech-X Ltd code VSim were presented. An update on current state-of-the-art gyrotron amplifier performance was followed by a talk on the application of high power, wideband millimetre wave vacuum tube amplifiers. Other radiation source talks included: novel split ring resonator loaded waveguides for electron beam Cherenkov masers and the use of artificial materials for high power microwave applications, Smith Purcell coherent THz radiation sources, pseudospark electron beam driven millimetre wave sources; terahertz travelling wave tube amplifiers, millimetre wave spatial harmonic magnetrons and high-efficiency klystrons. Diverse accelerator topics covered included progress towards muon ionisation cooling, thin film metal photocathodes for RF guns, the use of Smith Purcell radiation as a longitudinal beam profile monitor and proton boosting extension for imaging and therapy.



Professor Alan Phelps (on the left) of the ABP group, Department of Physics, SUPA, University of Strathclyde introducing Ian Bott (on the right, wearing the red lanyard badge) presenting on the table the world's first electron cyclotron maser experiment  
(Credit: Adrian Cross)

There were 60 participants at NVEC 2015 including 15 students and 15 industrial delegates. Significant sponsorship from Anritsu, CST Ltd, Tech-X UK Ltd, rf.com Ltd and the IoP, through the Particle Accelerators and Beams Group was gratefully received.

## National Particle Accelerator Open Day

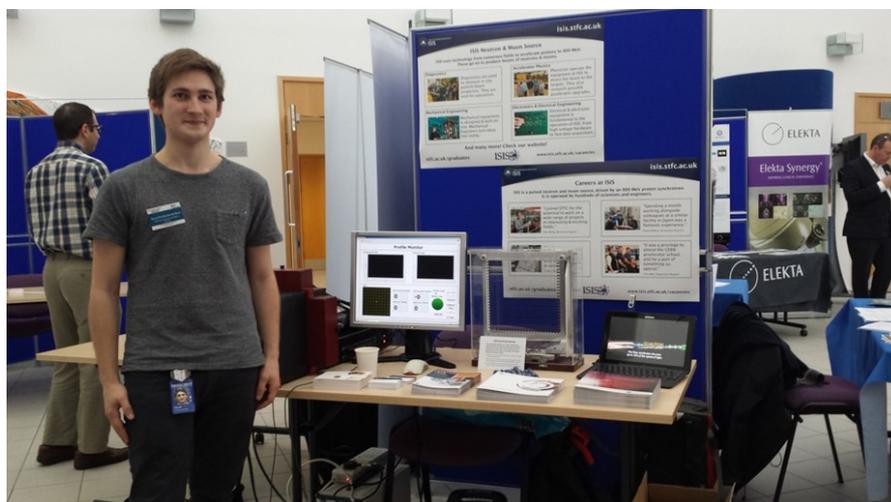
On 25 November Daresbury Laboratory played host to the 3<sup>rd</sup> Annual National Particle Accelerator Open Day. The national event, sponsored by the Institute of Physics Particle Accelerators and Beams group, opens up the doors of one particle accelerator each year to undergraduate engineering and physics students in the UK, and this year had over 70 attendees from several UK universities.

This year the ALICE and EMMA accelerators were open to the students. The day started with a series of talks from staff working at universities, national laboratories and in industry, including talks from PhD student Robert Shalloo from Oxford University and Janusz Harasimowicz from Elekta. After the talks the students went on a tour of the site including the ALICE & EMMA accelerators, the engineering technology centre to see the ELI-NP module assembly, the diagnostics lab and the vacuum lab. The event also included a recruitment event with opportunities for postgraduate research, and for employment in labs and industry.



Graeme Burt (far right) welcomes students to Daresbury Laboratory  
(Credit: Cockcroft Institute)

The organiser, Dr. Graeme Burt, said of the event “It is absolutely brilliant to see so many students showing an interest in particle accelerators, and the opportunity to visit a working facility will really turn these students on to this important field of research”.



David Posthuma de Boer manning the ISIS stand  
(Credit: STFC)



Tours around Daresbury  
(Credit: Cockcroft Institute)

[Graeme Burt](#)

## PAB Group & UK Events

### Second Topical Workshop on Instabilities, Impedance and Collective Effects (TWIICE 2)

The Cosener's House, Abingdon, Oxfordshire

8th - 10th February 2016

<http://www.diamond.ac.uk/Home/Events/2016/TWIICE-2.html>

### PAB Group / STFC Community Open Meeting on a UK National FEL Facility

Franklin Theatre, Institute of Physics, London

16th February 2016

### Annual General Meeting of the PAB Group

University of Huddersfield

8th April 2016

### XXVII International Conference on Neutrino Physics and Astrophysics

Royal Geographical Society, London

3rd - 9th July 2016

### Joint meetings with the IoP High Energy Particle Physics Group:

#### Exploring Exotic Physics with Current Neutrino Detectors

Lancaster University

Jan/Feb 2016 (postponed from 14th December 2015 due to flooding)

#### Muon Beams In The Near Future

Feb 2016

## International Calendar

### Proton Driver Efficiency Worksop

PSI, Switzerland, 29th February - 2nd March 2016

<http://indico.psi.ch/conferenceDisplay.py?ovw=True&confId=3848>

### 7th International Particle Accelerator Conference (IPAC'16)

Busan, Korea, 8th - 13th May 2016

<http://www.ipac16.org/>

### 57th ICFA Advanced Beam Dynamics Workshop on High-Intensity and High-Brightness Hadron Beams (HB 2016)

Malmö, Sweden, 3rd - 8th July 2016

<https://hb2016.esss.se/>

### 5th International Beam Instrumentation Conference (IBIC 2016)

Barcelona, Spain 11th - 15th September 2016

<http://www.ibic2016.org/welcome.html>

### 21st International Conference on Cyclotrons and their Applications (CYC2016)

PSI, Switzerland, 11th - 16th September 2016

<https://indico.psi.ch/conferenceDisplay.py?confId=3238>

### Workshop on Accelerator Operations 2016

Shanghai, China, 18th - 23rd September 2016

<http://wao2016.csp.escience.cn>

### 28th Linear Accelerator Conference (LINAC2016)

East Lansing, MI, USA, 25th - 30th September 2016

<https://indico.fnal.gov/conferenceDisplay.py?confId=10522>

### North American Particle Accelerator Conference (NA-PAC16)

Chicago, IL, USA, 9th - 14th October 2016

<http://napac2016.aps.anl.gov/ComingSoon.html>

### The 11th International Workshop Personal Computers and Particle Accelerator Controls 2016 (PCaPAC)

Campinas, Brazil, 26th - 28th October 2016

<http://pages.cnpem.br/pcapac2016/>

## Upcoming schools

### Joint Universities Accelerator School — Sciences and Physics

Archamps, Switzerland, 11th January - 12th February 2016

<http://www.esi-archamps.eu/Thematic-Schools/JUAS>

### Joint Universities Accelerator School — Technologies and Applications of Particle Accelerators

Archamps, Switzerland, 15th February - 18th March 2016

<http://www.esi-archamps.eu/Thematic-Schools/JUAS>

US Particle Accelerator School — Summer 2016 USPAS Session

Fort Collins, Colorado, June 13th - 24th 2016

<http://uspas.fnal.gov/programs/2016/colorado/index.shtml>

CERN Accelerator School — Free Electron Lasers and Energy Recovery Linacs

Hamburg, Germany, 31st May - 10th June 2016

<http://cas.web.cern.ch/cas/Hamburg2016/Hamburg-Advert.html>

CERN Accelerator School — Introduction to Accelerator Physics

Istanbul, Turkey, 18th - 30th September 2016

## Useful Links

<http://www.scitech.ac.uk/>

<http://www.cockcroft.ac.uk/>

<http://www.adams-institute.ac.uk/>

[www.diamond.ac.uk](http://www.diamond.ac.uk)

[http://www.desy.de/index\\_eng.html](http://www.desy.de/index_eng.html)

<http://www.linearcollider.org/newsline/>

<http://home.web.cern.ch/>

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**Particle Accelerators  
and Beams Group**

## IoP Particle Accelerators and Beams Group

### IoP PAB Committee

**Chair: Prof. Phil Burrows (Oxford)**

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**Prof. Mike Poole (Daresbury)**

**Dr. Jonathan Smith (Tech-X UK); Industrial representative**

**Prof. Susan Smith (Daresbury)**

**Dr. John Thomason (RAL); Newsletter**

**Dr. Melissa Uchida (Imperial)**

**Dr. Peter Williams (Daresbury)**

**Deadline for submissions to the  
next newsletter is  
24 June 2016**

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