

# **IOP** | Institute of Physics **Plasma Physics Group**

## **UK Plasma Physics News - Autumn 2014**

*Welcome to the 2nd UK IOP Plasma Physics Group (PPG) e-newsletter. If you have items for inclusion in future newsletters, please send these [p.browning@manchester.ac.uk](mailto:p.browning@manchester.ac.uk) – meeting announcements, new appointments, news of facilities/projects, etc.*

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### **RECENT MEETINGS**

#### **12<sup>th</sup> Technological Plasma Workshop**

The Technological Plasma Workshop was held in Coventry alongside the Vacuum Symposium at the Vacuum Expo at the Ricoh Arena, on the 15<sup>th</sup> and 16<sup>th</sup> of October 2014. The Technological Plasma Workshop (TPW) is principally a UK-based international forum in science and technology of plasmas and gas discharges. A diverse series of presentations were given in fields ranging from impedance matching for capacitive and inductively coupled plasmas for materials processing, through the use of cold plasmas for biomedical sterilization and food treatment and environmental applications such as the use of plasmas in catalytic conversion of carbon dioxide and the removal of formaldehyde. Space applications were covered with a presentation on scaled experiments and simulations of the magnetosphere. An oral presentation was given on the use of chemical vapor deposition of diamond on a molybdenum–tungsten layer for the coating of steel. The conference programme consisted of 10 oral presentations and 30 poster presentations with forty five people from a mixture of UK institutes attending. The support of IoP Plasma Physics Group and Vacuum Expo enabled a registration fee of £60 per delegate and £30 per PhD student to be set for this two day conference. The workshop based within the wider Vacuum Symposium was used as a form for exploring collaborative opportunities between the academic and industrial communities. The Ricoh Arena is an excellent venue with high quality attendees and provided the ideal meeting place for the next generation of researchers in this field to engage with leading researchers in both academia and in the wider plasma and vacuum based industries. We look forward to seeing you at TPW 2015 at this excellent venue in October 2015.

#### **QuAMP Summer School Durham/Newcastle**

The IOP Quantum, Atomic and Molecular and Plasma Physics Summer School was held in Durham/Newcastle September 15<sup>th</sup> - 18<sup>th</sup> 2014. PPG were represented through the participation of Alex Robinson (CLF) on the Organising Committee, also through invited speakers including Stuart Mangles (Imperial) , Kieran Gibson York and Howard Wilson (York).

### **13th International Fast Ignition Workshop**

The 13th International Fast Ignition Workshop was hosted by the UK this time round, with Prof. Peter Norreys as the principal organizer. Local organizers were drawn from STFC and AWE, and Alex Robinson (CLF) headed the local programme committee. The workshop was held from the 15th September to the 18th September 2014 in the Queen's College in Oxford, and apart from the presentation it included tours of the CLF (STFC) and Orion (AWE). There were 49 oral presentations in total, and 82 registered participants. Participants came from China, Japan, USA, and France as well as the UK. One of the highlights of the conference was a special talk given by Max Tabak, regarded as one of the great pioneers of Fast Ignition, on the history and prospects of Fast Ignition.

### **FORTHCOMING MEETINGS**

**43<sup>rd</sup> IOP Plasma Physics Conference:** Hosted by Open University at Kents Hill Conference Centre, Milton Keynes **30th March – 2nd April 2015.**

Abstract submission deadline: 12<sup>th</sup> January 2015

Chair of organising committee: Nick Braithwaite n.s.braithwaite@open.ac.uk]

An excellent set of invited talks are already lined up for this conference (details to be announced soon.) The annual IOP PPG meeting programme will include an outreach event on plasmas and light in recognition of the International Year of Light, and a visit to the National Museum of Computing at Bletchley Park.

<http://plasma15.iopconfs.org/>

**13<sup>th</sup> Technological Plasma Workshop:** Rioch Arena, October 2015

*The PPG Committee is always keen to offers from members to organise one day meetings, especially on topics which bring together different areas of research. We have a small amount of funding available to support such meetings, and can assist with publicity, finding speakers etc.*

### **CULHAM THESIS PRIZE**

This prize is awarded annually to the candidate who has displayed the highest degree of excellence in the execution of the scientific method as witnessed by the award of Doctor of Philosophy in plasma science from a UK or Ireland University in the last two calendar years. The prize of £500 is supplemented by an expenses paid trip to the IOP Spring Plasma Physics meeting, with an invited talk slot reserved for the winning entry. Nominations should be sent (in triplicate) to Christopher Ham (Secretary of the IOP Plasma Physics Group Committee at the Culham Centre for Fusion Energy, Culham Science Centre, Abingdon OX14 3DB, no later than **Friday 5th December 2014.**

For further details please see:

[http://www.iop.org/activity/groups/subject/pla/prize/culham/page\\_40815.html](http://www.iop.org/activity/groups/subject/pla/prize/culham/page_40815.html)

### **RUTHERFORD PLASMA PHYSICS COMMUNICATION PRIZE**

This prize is open to all plasma physics PhD students. The prize is awarded for an excellent achievement in outreach – this could be a podcast, video, lecture, public talk, website, essay, blog, article, ... whatever communicates our science! The winner will be announced during IOP Plasma Physics Conference 2015, and the winner will receive £500.

Please contact [ceri.brenner@stfc.ac.uk](mailto:ceri.brenner@stfc.ac.uk) for an application form. **Deadline December 18<sup>th</sup> 2014.**

### **NEWS FROM CULHAM CENTRE FOR FUSION ENERGY**

#### **MAST-Upgrade takes shape at Culham**

The project to rebuild the MAST tokamak at Culham Centre for Fusion Energy is continuing, with first plasma expected in late 2015. The various components of the MAST-Upgrade machine are now being assembled, with part of the new divertor coil assembly pictured. When complete, the device will offer many interesting research possibilities – utilising the new Super-X divertor, enhanced

diagnostics, and increased pulse lengths, heating power, magnetic field and plasma current. CCFE are planning the initial experimental campaigns and would be keen to hear from potential collaborators. Contact: [martin.cox@ccfe.ac.uk](mailto:martin.cox@ccfe.ac.uk)



#### **NEWS FROM RUTHERFORD APPLETON LABORATORY**

An article featuring work carried out by a team led by Imperial College on the CLF's Astra laser - precursor to the current Gemini facility - on 'Monoenergetic beams of relativistic electrons from intense laser-plasma interactions' and published in the journal, has reached the coveted academic milestone with over 1000 citations. These first experimental observations were a pivotal milestone in plasma-based particle acceleration and were published in Nature alongside two other groups that also reported on mono-energetic electron beams driven by laser plasma acceleration within a gas jet.

[www.stfc.ac.uk/CLF/News+and+Events/44709.aspx](http://www.stfc.ac.uk/CLF/News+and+Events/44709.aspx)

The CLF's Centre for Advanced Laser Technology and Applications this year successfully delivered the DiPOLE 10 laser amplifier head (10 J in each pulse at 10 Hz) to the Extreme Light Infrastructure (ELI) facility in Czech Republic. They are now working on DiPOLE 100 (100 J in each pulse at 10Hz) which is on track for delivery to the HiLASE facility in mid-2015, as well as recently winning a contract to supply a DiPOLE 100 laser to one of the end stations at XFEL for generating high energy density plasmas.

[www.stfc.ac.uk/CLF/News+and+Events/44684.aspx](http://www.stfc.ac.uk/CLF/News+and+Events/44684.aspx)

## COMMUNITY NEWS

### Plasma code collaboration funded by EPSRC

A recent multi-institution collaboration (between the Universities of Warwick and York, Imperial College London, the AWE and the STFC) has successfully been awarded £1M by EPSRC for the development of a 3D radiation-magnetohydrodynamics simulation code called "Odin". The new simulation code Odin will provide a unique tool for the UK laser fusion, high energy density physics and laboratory astrophysics communities. It will also have important applications in other higher-intensity branches of laser-plasma physics such as ion and electron acceleration, x-ray sources, and fundamental research.

[www.stfc.ac.uk/clf/44782.aspx](http://www.stfc.ac.uk/clf/44782.aspx)

### Scottish Centre for the Application of Plasma-based Accelerators

The construction of a state-of-the-art suite of laboratories at the University of Strathclyde has recently been completed. The Scottish Centre for the Application of Plasma-based Accelerators (SCAPA) is dedicated to using very high power, short pulse lasers as drivers for ultra-compact particle accelerators, coherent and incoherent radiation sources and their applications. A pair of Ti:sapphire femtosecond laser systems (300 TW peak power at 5 Hz pulse repetition rate & 40 TW at 10 Hz) will serve 3 radiation shielded areas housing 7 beam lines in a flexible environment for the Scottish Universities Physics Alliance (SUPA), UK and wider user communities. At the heart of SCAPA is the development of medical, industrial and scientific applications of laser- and plasma-accelerator technology that generates high energy bunches of electrons, protons and light ions and high brilliance pulses of electromagnetic radiation from the far-infra red to gamma rays. First beams on the relocated ALPHA-X laser-plasma wakefield accelerator beam line will be delivered in mid-2015.



### AND FINALLY....

You can listen on podcast to 3 members of the UK plasma community discussing nuclear fusion with Melvyn Bragg on the Radio 4 "In our time" programme (October 28<sup>th</sup> 2014).

[www.bbc.co.uk/programmes/b04mgtdq](http://www.bbc.co.uk/programmes/b04mgtdq)