

# Plasma News

Issue 2

Oct 2011

## Special points of interest:

- Quantifying the impact of plasma science: funding and journal impacts
- Call for outreach co-ordination and development

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## QUANTIFYING THE IMPACT OF PLASMA SCIENCE

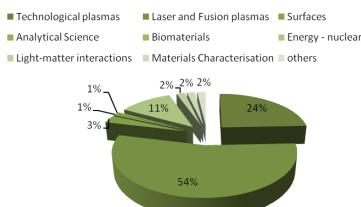
### Plasma science is extraordinarily diverse.

From fusion to astrophysics; laser-plasma interactions to semiconductor etching; surface functionalisation to efficient lighting; atmospheric pressure discharges for medicine to particle acceleration in thunder clouds. Yet this research multiplicity can lead to a dilution of the significance of plasma science itself if the impact of the research it enables is not immediately apparent as plasma derived. In order to address this, the Plasma Visions exercise was initiated by the IOP Plasma Physics Group in conjunction with the IOP Council. The full report is in preparation; on this page and the next are extracts from the draft report that show how plasma science is influencing the research frontiers.

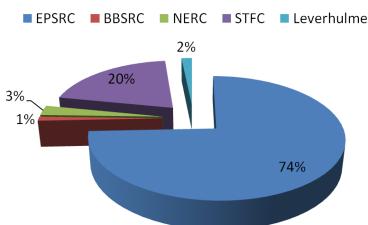
### Research Council Funding Profile

Grant awards in plasma science areas since 2006 (last 5 years) reflect the diversity of impact

EPSRC total grants awarded to plasma science by category



Grants awarded in Plasma Science since 2006



of plasma science. In the recent EPSRC Landscapes document Plasmas, Lasers and Optics as a

single entity within the Physical Sciences Programme was identified as accounting for 10% of the total programme spend, amounting in value to £30.7M. However, there is considerable plasma science content that is funded across programmes and themes, a fact recognised in the Landscapes documents but not quantified.

In order to expose the interdisciplinary nature of Plasma Science, the following data have been compiled from the Grants on the Web databases across all the research councils, and show the cumulative value of the grants awarded in the last 5 years (since 2006) in areas linked to Plasma Science.

EPSRC Landscapes 2009 can be found at <http://www.epsrc.ac.uk/research/landscapes/>

*CONTINUED OVERLEAF....*

## Plasma Physics and Outreach

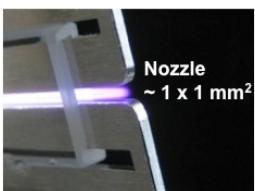
The IOP Plasma Physics Group Committee are keen to help raise the profile of plasma physics in outreach events throughout the country. We have begun by incorporating an outreach event into our main conference programme. Ideally, we would like to help create a set of presentation tools or exhibition components that could be used by prospective outreach speakers. If you have great ideas for demonstration apparatus, please contact us—we might be able to help you raise the funds to

build the equipment, or put you in touch with people who can assist.

If you are engaged in public talks about plasmas, perhaps there is something we can do for you? Our first task is to build a picture of suitable resources that are currently available, and to gauge the interest in developing additional tools. If you have anything to contribute, please get in touch: our contact details are on the back page.

## Research Student Conference Fund

**Research students:** don't forget that you can apply for financial support to attend international conferences and major national meetings. The PPGC administers grants of up to £250 per student for such events. We had more than 12 applications this year, and were able to make a contribution to the majority. Our allocation will reflect demand, so please keep applying!. Thanks to everyone who has taken the time to apply this year.



**"Plasma science is a multi-disciplinary research area with an extraordinarily broad impact"**



**"...plasma science is often a key component of other disciplines..."**

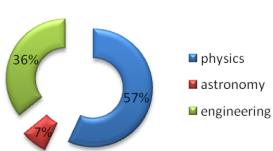


**"...UK Plasma Science is significantly influential in global terms..."**

## IMPACT OF PLASMA SCIENCE

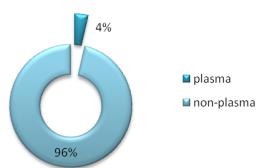
Plasma science is a multi-disciplinary research area with an extraordinarily broad impact. Though the mainstream plasma areas are readily iden-

Fig 1: 2009 Total Publications in plasma-relevant areas

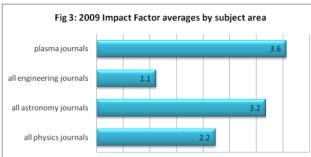


tified as fusion (both magnetic and inertial confinement strands), laser-plasma interactions, and low-temperature (or technological) plasmas, plasma science is often a key component of many other disciplines, including surface physics, spectroscopy, astrophysics, biophysics and space science. In order to bring out the influence of plasma science in these many contexts, the following sub-sections provide details of how plasma science impacts on scientific publications and research funding

Fig 2: 2009 Plasma science articles in context of all publishing



The impact of plasma science in the general scientific literature is substantial. Whilst there are clearly identified specialist journals that are either wholly dedicated to plasma science or which have plasma science as a major sub-theme, there is also a host of less obvious serials in which plasma science articles form a significant proportion of the



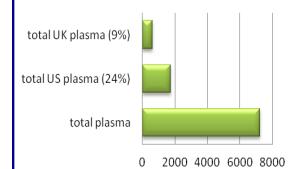
total published output. The aim of this section is to quantify that diverse impact by highlighting the range and frequency of relevant publications based on plasma science. For consistency, all figures are taken from the ISI database for the year 2009, in order that published article figures are relevant for the same year as the latest cita-

Fig 4: Plasma science articles as proportion of all published output in relevant journals



tion index data are published. The Thomson-Reuters ISI database of published articles (known also as Web of Knowledge) can be interrogated in terms of subject area, geographical location of the authors, and citation statistics (amongst other criteria). Table I shows information on the number of plasma science based articles published in the context of the entire published output across all physics, all astronomy/

Fig 5: 2009 published output comparisons



astrophysics and all relevant sectors of engineering. The data show that the number of published articles with plasma science content is 7,239: 4% of the

total novel published content across Physics, Astronomy and Engineering for 2009.

The quality of the journals publishing plasma articles is also high: the average impact factor (IF) data in Fig 3 show that journals carrying plasma articles have a significantly higher IF than those that don't (note that average here means the average over all 2009 IF).

For journals with an identified plasma sub-theme, plasma articles account for 11% of all articles published in such journals (Fig 4). Moreover, the US and UK together account for 1/3 of all published plasma articles, with the UK alone accounting for 9% of the total global output (Fig 5).

In summary, it is evident that

- peer-reviewed research on plasma science contributes significantly to the total scholarly world output in science and engineering;
- journals which carry such articles have uniformly better Impact Factors than the subject-area averages;
- the UK contribution to plasma science publications is more than 1/3<sup>rd</sup> of the total US output.

These three key conclusions demonstrate that UK Plasma Science is significantly influential in global terms.

**THE PLASMA PHYSICS GROUP COMMITTEE**

# IOP Plasma Physics Group

**Stefan Kneip** (below, right) is the winner of the 2011 Culham Thesis Prize., presented by Simon Pinches (CCFE, left) and Declan Diver (PPG Chair).



**Sharmin Sultana** (not pictured) and **Oliver Tressa** (below, left) won the Plasma Physics Group Poster prizes at this years' IOP Plasma conference.



**Yvonne Sutton** is this year's winner of the Rutherford Prize for the Public Understanding of Plasma Physics. Prof N Stj Braithwaite (below, left) received the prize on her behalf from Alex Robinson (right), RAL.



## Plasma News Oct 2011

## EVENTS

The following plasma-related events are coming up. If you are organising an event and would like it to appear here, please contact the committee.

### Nov

- Joint ITER-IAEA-ICTP Advanced Workshop on Fusion and Plasma Physics Nov 3-14, Abdus Salam International Centre for Theoretical Physics, Trieste
- 13th International Workshop on H-mode Physics and Transport Barriers Nov 10-12, Oxford <http://www.jet.efda.org/13th-h-mode-workshop/conference/>
- 53rd Annual Meeting of the Division of Plasma Physics & Gaseous Electronics Conf (GEC) Nov 14-18, Salt Lake City, Utah.<http://www.aps.org/meetings/meeting.cfm?name=53rd>
- Annual Meeting of the Division of Plasma Physics

### Jan

- TPW UK Technological Plasma Workshop Jan 5-6 Manchester. <http://www.tpw-uk.org/>

### Apr

- IOP Annual Plasma Physics Conference April 2-5, St Hugh's College, Oxford <http://plasma12.iop.org/>
- Workshop on Laser-Plasma Interaction at Ultra-High Intensity Apr 16-20, Dresden <http://www.mpiplks-dresden.mpg.de/>

### May

- 17th Joint Workshop on Electron Cyclotron Emission and Electron Cyclotron Resonance Heating May 7-10, Deurne, Netherlands <http://ewh.ieee.org/soc/nps/PlasConf/mtg12.html>
- 20th International Conference on Plasma Surface Interactions May 21-25, Aachen <http://ewh.ieee.org/soc/nps/PlasConf/mtg12.html>

### Jun

- 25th SPPT — 25th Symposium on Plasma Physics and Technology Jun 18-21, Prague, <http://sppt.aldebaran.cz/general.php>
- HTTP-12 (High-Tech Plasma Processes Conference), June 24-29, Bologna <http://www.hhttp12.com/>

### Jul

- IICOPS2012 39th IEEE Int Conf on Plasma Science July 8-12 Edinburgh <http://icops2012.lboro.ac.uk/>
- ESCAMPIG 2012 — XXI Europhysics Conference on Atomic and Molecular Physics of Ionised Gases (ESCAMPIG) July 10-14 <http://escampig2012.ist.utl.pt/>
- Culham Summer School July 16-27, CCFE, Oxford. Contact Roy McAdams ([Roy.McAdams@ccfe.ac.uk](mailto:Roy.McAdams@ccfe.ac.uk)) for details.

### Sep

- 27th SOFT (Symposium on Fusion Technology) Sept 24-28, Liège, <http://www.soft2012.eu/>

### Oct

- GEC 65th Gaseous Electronics Conference, Oct 22-26, Austin Texas

## Student Prizes

The IOP PPG administers two prizes on behalf of sponsors:

### Culham Thesis Prize

is awarded annually to the candidate who has displayed the highest degree of excellence in a PhD in plasma science.

*Watch for the call for submissions.*

### Rutherford Prize for the Public Understanding of Plasma Physics

is a PhD student prize awarded to the student who is judged to be responsible for the best example of communicating Plasma Physics to the wider community. Contact [alex.robinson@stfc.ac.uk](mailto:alex.robinson@stfc.ac.uk)

## EPSRC Funding Rates

Research proposal funding rates 2010-2011 show funding rate of 36% overall by number and value.

For **Physical Sciences**: funding rate by value is 34% responsive mode, 25% targeted (31% and 24% respectively by number of proposals); **Energy programme**: 100% (all 5 responsive mode applications funded) and 49% by value (47% by number) for targeted.

**Cross disciplinary**: 50% responsive, 22% targeted (61% and 29% by number). <http://www.epsrc.ac.uk/funding/apprev/ssrates/>



## AWE ORION

Orion is the latest high power laser facility to be hosted at AWE. Orion will have 10 long-pulse(ns) beam-

lines, each producing 500J at 351nm (3w) and two powerful chirped-pulse amplification (CPA) arms, producing ~500J in ~0.5ps (1w). It will be maintained under 'operating theatre' conditions, housed in a huge clean-room within a specially designed building which will isolate it from the effects of vibration and contamination.

Orion will be approximately 100 metres long, 60 metres wide, and 25 metres high. High-tech laser components and systems at the very edge of current technological limits, including CPA, adaptive optics (AO) and metre-diameter gold-coated diffraction gratings, will be incorporated in the laser

**ORION Academic Access** AWE's replacement high-power laser facility ORION is now nearing completion and up to 15% of "beam-time" will be available for academic use from summer 2013. AWE looks forward to working with academic partners with an interest in high energy density physics and will be seeking proposals for experiments. The deadline for proposals will be spring 2012 and we would like to encourage potential partners to contact us to develop suitable and exciting experiments. Proposals will be reviewed with the assistance of the Central Laser Laboratory at RAL. For more information, please contact Dr Tim Goldsack:

[Tim.Goldsack@awe.co.uk](mailto:Tim.Goldsack@awe.co.uk), or 01235 466582.

## IOP Plasma Physics Group Committee Members

### Chair:

Declan Diver  
([declan.diver@glasgow.ac.uk](mailto:declan.diver@glasgow.ac.uk))

### Secretary:

Lee Upcraft  
([Lee.Upcraft@awe.co.uk](mailto:Lee.Upcraft@awe.co.uk))

### Treasurer:

Alexander Robinson  
([alex.robinson@stfc.ac.uk](mailto:alex.robinson@stfc.ac.uk))

### Ordinary Members:

Ruth Bamford  
James Bradley  
Peter Johnson  
Robert Kingham  
Deborah O'Connell  
Simon Pinches  
Erwin Verwichte  
Roddy Vann

### Feedback...

We welcome feedback on any aspect of this group newsletter. If you would like to see material included, or changes made to the existing material, please contact any of the committee. In future issues we would like to feature news items from groups across the country, including staffing news, scholarships, fellowships, prizes, sponsors, industrial developments, astrophysics input, short research articles, financial updates—



Ariel view of ITER site viewed from North on Sept 2011

## York Plasma Institute

The University of York and the Engineering and Physical Sciences Research Council (EPSRC) have established a partnership to create a leading, interdisciplinary plasma research centre. This investment, including three new academic appointments, create the York Plasma Institute, consisting of new office and teaching space, video-conference meeting rooms



and remote tokamak control room, as well as a purpose-built plasma laboratory. The new appointments – Timo Gans, Deborah O'Connell and Erik Wagenaars – in the field of low temperature plasmas for technological and biomedical applications complement the existing plasma expertise in magnetic confinement fusion and laser-plasma interactions. The team of 10 academics will work closely with industry, Culham Centre for Fusion Energy (CCFE) and partners from other universities. With support from CCFE an industrial officer will be recruited to identify and drive industrial collaborations.

## News Update ...

**BVS Prizes** British Vacuum Council has two prizes which it awards annually: the Senior Prize (John Yarwood Memorial Medal) for distinguished contributions to British scientific research in the fields of vacuum science, surface science, thin films or any related topic; and the Junior Prize (C R Burch Prize and BVC Medal) for early-stage researchers working in the same area.

**COST** A new European COST Action on "Biomedical Applications of Atmospheric pressure plasma technology" has been awarded funding and was launched on October 11<sup>th</sup> in Brussels. This Action is a multi-disciplinary research initiative bringing together physicists, clinicians, biologists, chemists and industrialists across 18 countries to work on the exploitation of plasmas for new healthcare technologies. Potential applications include, for example, cancer therapeutics, wound treatment, new pharmaceuticals, and treatment of infectious and non-infectious diseases. Activities will include focused workshops and short-term scientific missions (STSM). Further details will be available soon at [www.ncpst.ie/bioplasma](http://www.ncpst.ie/bioplasma). Michael Kong from Loughborough University and Deborah O'Connell from University of York represent the UK on the management committee.

### Training Opportunities

**York Plasma Institute**, University of York runs two postgraduate training programmes: an [MSc in Fusion Energy](#) and the EPSRC-funded [Fusion Doctoral Training Network](#). The MSc in Fusion Energy is a one-year taught Masters programme that provides training across fusion energy science and technology, and related plasma science. The Fusion Doctoral Training Network is a 3-year PhD programme that is led by York in collaboration with the Universities of Durham, Liverpool, Manchester and Oxford.

**Culham Summer School** is changing in order to broaden its appeal to the UK plasma community. Parallel sessions and new topics are being introduced; Roy McAdams ([Roy.McAdams@ccfe.ac.uk](mailto:Roy.McAdams@ccfe.ac.uk)) would welcome any comments on how the school should evolve.

**Strathclyde University** offers a Post Graduate MSc in High Power RF Science and Engineering: Kevin Ronald ([K.Ronald@strath.ac.uk](mailto:K.Ronald@strath.ac.uk)) has the details

**QUB** has a web-based MSc in Plasma Physics with projects and face-to-face tuition. Contact [physics@qub.ac.uk](mailto:physics@qub.ac.uk) for more details.