

Issue no 1

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Welcome to our electronic supplement to the December printed newsletter. The December newsletter was the last to be sent out with Physics World.

In future news may be added to our branch page on the IOP site at <http://london.iop.org/> Please continue to send your news items to [rh.boutland@physics.org](mailto:rh.boutland@physics.org) so your news can be added.

E-newsletters will also be placed on the branch page of *MyIOP*. The newsletter archive is there as are various branch documents and reports.

Our centres continue to attract large audiences, often to the capacity of the venue so please book with our centre representatives via email. The relevant addresses are in the list in column one.

Michelle Supper, our media representative, will be producing a printed events list which will be available at lectures. Members wishing a printed copy should contact the branch secretary Len Lewell at: - [londonsoutheast@physics.org](mailto:londonsoutheast@physics.org)

### World Space Week



**Above:** Victoria Hodges & Prof Colin Pillinger at a Space Week event in Stevenage last October. Victoria Hodges is speaking about 'The GAIA Mission' at our London Centre on 11 May 2011.

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**Berkshire Centre** : Inaugural Lecture, Prof Sir Peter Knight at the William Penny Theatre AWE Aldermarston on 17 January 2011 at 7.30pm  
The theatre entrance can be found on the A340 Basingstoke to Newbury road, just before the Heath End Roundabout at Tadley. There is free car parking next to the theatre.

## Get hands-on for GCSE physics

Over the last few months, hundreds of 14-15 year old students have been visiting their local universities to be inspired by physics as part of the SEPnet GCSE Programme.

The programme is designed to raise aspiration by showing some of the more exciting elements of physics that are not possible in the classroom and by providing university students who can act as role models. The first part is a free half day event where pupils try some large hands-on activities and see a university style lecture. One teacher at a recent session commented 'My pupils who had been told at 11 years old that they had failed, suddenly realised as they walked around that this could be them in a few years.'

These on campus taster events are exciting and inspirational but the content is there too, being brought home by energetic demonstrators and the practical nature of the interactions. Pupils are coming away from the sessions feeling that physics is something they can do and that has relevance to them. Schools are then visited in class twice a year by someone from the university to participate practical workshops to enhance their curriculum.



This programme is organised by SEPnet (the South East Physics Network). SEPnet is a partnership of university physics departments working together to advance and sustain physics in the London and South East region. This partnership allows us to roll out an outreach programme to pupils all over the South East through our various partner institutions.

In addition to the GCSE programme, each of our partner universities has a departmental programme supporting the delivery of physics enhancement and enrichment activities. Some are on site, making the most of campus resources, and others are taken into school. All of them make best use of what our departments have to offer – predominantly a bank of physics specialists who are excited and knowledgeable about their subjects.

For more information about SEPnet and our outreach activities, contact [gcse@sepnet.ac.uk](mailto:gcse@sepnet.ac.uk) or see our website [www.sepnet.ac.uk](http://www.sepnet.ac.uk)

Clare Harvey

## Capital Ring Walk

REMS walkers on their way from Wimbledon Park Station to Richmond Saturday, 23 October 2010.



Margaret Stedman, shown on the right of the group in the woods in Richmond Park, organised this section of the walk and as you can see is issuing further instructions. (Photo from [Mike Quinton](#))

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## IOP REMS visit LGC and Strawberry Hill House

On 21 October 2010 George Freeman took 20 members to LGC in the morning and 30 to Strawberry Hill House after a pub lunch. Both visits were excellent but as usual there was not enough time for the laboratory visits.

LGC is privately owned but does work for the Government via the National Measurement Office in the field of chemistry and bio-analysis. It also hosts the office of the Government Chemist, a statutory office that the Government can call on for advice, etc. After a general introduction, we were shown two laboratories dealing with NMO's work.

Neil Harris showed how DNA fragments were magnified so that the sample was big enough to measure and identified.



**Above:** DNA Analysis Neil Harris. We did not go into the reaction laboratories but still had to wash thoroughly when leaving

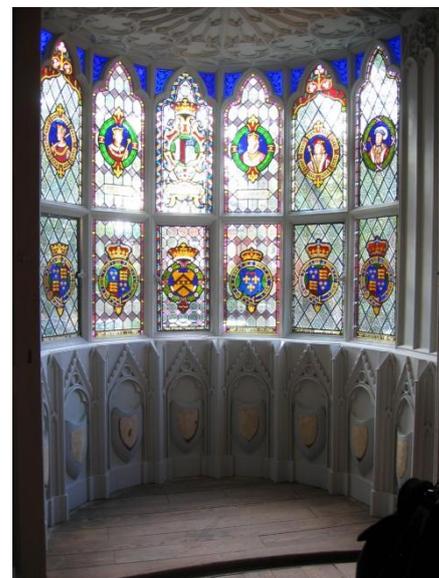
Dr K Gray told us of trace material analysis for impurities in food, drugs and allergens and discussed several examples some of which ended in prosecutions.

[www.lgc.co.uk](http://www.lgc.co.uk)



Strawberry Hill House was extended and decorated by Horace Walpole as his "little Gothic Castle" with the internal architectural features in Papier-mâché. He did not expect these to last more than 30 years. It is undergoing a £3M extensive rebuilding and restoration and we were shown the progress. Most of the work is finished with the papier-mâché

decorations and stained glass completed and they hope the builders will be out by next year's opening in March.



**Above:** Stained glass in alcove. 16th century armorial plaques, mostly English.

We were in two groups and my party had Michael Peover as the guide.



**Above:** An Original Gothic fireplace.

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**Above:** The Long gallery which shows the spectacular Gothic paper decorations.

Michael Peckover took us over the house describing what has been done and what they are planning.

All the paintings were sold last century but Strawberry Hill House is getting laser photocopies as replacements. It is not possible to get the furniture back.



**Above:** One of the two groups.

Parts of the exterior have had to be rebuilt and English Heritage insisted it was as originally built with oak framing and plaster-on-lathes with a lime-wash coating. Inside, the paint has to be lead-based. Walpole bought over 450 pieces of stained glass, mostly medieval Flemish, and half still exists. There is also some English armorial glass.

See Strawberry Hill  
Renaissance Glass, Michael Peover, 2010.

[www.strawberryhillhouse.org.uk](http://www.strawberryhillhouse.org.uk)

Article & pictures from George Freeman.



**Above:** The Gothic shelf doors still work. A library will be installed when the house is finished.

### Editor's Note

I am still getting to grips with Word 2010 and apologise for any slips made in the supplement. Please note that to keep document size down I have used photographs at 72 dots per inch (dpi) rather than the 300 dpi I used to send for the printed newsletter

### Marvin and Milo

All of the Marvin and Milo cartoons are online at [www.physics.org/marvinandmilo.asp](http://www.physics.org/marvinandmilo.asp). These were previously published in Interactions. 45 of these cartoons should be published in book form in 2012

(Posted on MyIOP by Caitlin Watson 7 Dec 2010)

### Next Committee Meeting

The Meeting will be at the IOP on 30 March 2011. If you have any items you wish to raise please e-mail the branch secretary at [londonsoutheast@physics.org](mailto:londonsoutheast@physics.org)

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## Bridging the Gap

As a member of the Institute of Physics, you may be familiar with the Ivory Tower. You might even have a key. For generations, academics have huddled within its soaring, glittering walls. Cloistered inside, they have long pursued their esoteric research in splendid isolation from the real world.

Basking in glow of the information age, wider society continues to live in the shadow of the Tower, surrounded by the high-tech gadgets they use and take for granted but barely understand. The gap between the public understanding of science and pure academic research has never been greater, and this is a matter which should concern us greatly.

Lives depend, and elections are decided, on issues such as MMR vaccination, stem cell research, GM crops and power generation: all areas in which people remain largely fearful and scientifically unaware. For both ministers and the general public to make informed choices, and for society to progress, the level of scientific literacy must rise. However, while both teachers and pupils do their level best, they are fighting a losing battle against

increasing politicisation, huge class sizes, and funding shortfalls. Fundamentally, and most tellingly, the current curriculum favours blind recollection of facts over deep scientific understanding. To shore up the education system, we must bridge the gap between the Ivory Tower and the people.

Sadly, our long seclusion has affected public perception. Too often, we are dismissed as 'boffins' by those who readily buy into the stereotype of the 'mad' scientist; invariably male, this character comes complete with lab coat, frizzy white hair and bubbling test tubes.

Clearly, it is time to leave the Tower. Or at least open a window. Some of us have to reconnect with the general public.

I've been involved in science outreach and education for the last decade. Formally, I have tutored maths and physics to students at every stage from primary to undergraduate. By teaching beyond the syllabus, I help my students to understand and love the subjects, and enable them to achieve higher grades than their teachers ever thought possible. 'Informal' outreach (outside a classroom) is equally rewarding, but presents a much greater challenge. Initiative and project management skills are required, altruism is expected, and since outreach jobs are rare, you may have to create a role for yourself. Funding is also scarce, but may be obtained from organisations such as the IOP, the IET, the Royal Society, Nesta and interested charitable trusts.

If you would like to get involved in public engagement, I recommend that you first become a STEMNET Science and Engineering Ambassador, and volunteer for a couple of their activities. If you're more ambitious, and want to put on your own major event, you will need persistence, vision, a good team and a source of funding. You should also attend the excellent (and free) IOP Outreach Workshops.

Whichever path you take, the secrets to successful outreach are to have fun, to share your passion, and to inspire your audience. Society needs you. Good luck!

**Michelle Supper**

For STEM Ambassadors see:

<http://www.stemnet.org.uk/content/ambassadors>

IOP Outreach Workshops:

[www.iop.org/outreachworkshops](http://www.iop.org/outreachworkshops)

See Also: - Physics Communicators Group October 2010 Newsletter.

[http://www.iop.org/activity/groups/subject/physcom/news/file\\_40623.pdf](http://www.iop.org/activity/groups/subject/physcom/news/file_40623.pdf)

Nesta:

<http://www.nesta.org.uk/>

IET:

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

Royal Society:

<http://royalsociety.org/>

## **When Belgium sneezes, the world catches a cold.**

As the Eurozone continues to wobble, new analysis of countries' economic interconnectedness finds that some of the countries with the greatest potential to cause a global crash have surprisingly small gross domestic production.

Using data from Bureau Van Dijk - the company information and business intelligence provider - to assess the reach and size of different countries' economies, and applying the Susceptible-Infected-Recovered (SIR) model, physicists from universities in Greece, Switzerland and Israel have identified the twelve countries with greatest power to spread a crisis globally.

The research was published on Thursday 25 November 2010, in *New Journal of Physics* (co-owned by the Institute of Physics and German Physical Society), groups Belgium and Luxembourg alongside more obviously impactful economies such as the USA in the top twelve.

Using a statistical physics approach, the researchers from the Universities of Thessaloniki, Lausanne and Bar-Ilan used two different databases to model the effect of hypothetical economic crashes in different countries. The use of two different databases aided the avoidance of bias

but threw up very similar results.

The data used allowed the physicists to identify links between the different countries, by mapping the global economy to a complex network, and gauge the likelihood of one failed economy having an effect on another.

One network was created using data on the 4000 world corporations with highest turnover and a second using data on import and export relations between 82 countries.

The SIR model, successfully used previously to model the spreading of disease epidemics, is applied to these two networks taking into consideration the strength of links between countries, the size of the crash, and the economic strength of the country in potential danger.

When put to the test with the corporate data, the USA, the UK, France, Germany, Netherlands, Japan, Sweden, Italy, Switzerland, Spain, Belgium and Luxembourg were part of an inner core of countries that would individually cause the most economic damage globally if their economies were to fail.

Using the import/export data, China, Russia, Japan, Spain, UK, Netherlands, Italy, Germany, Belgium, Luxembourg, USA, and

France formed the inner core, with the researchers explaining that the difference – particularly the addition of China to this second list – is due to a large fraction of Chinese trade volume coming from subsidiaries of western corporations based in China.

The researchers write, "Surprisingly, not all 12 countries have the largest total weights or the largest GDP. Nevertheless, our results suggest that they do play an important role in the global economic network. This is explained by the fact that these smaller countries do not support only their local economy, but they are a haven for foreign investments."

Joseph Winter  
IOP Press Officer

The researchers' paper can be downloaded for free here:

<http://iopscience.iop.org/13672630/12/11/113043/fulltext>

Garas et al  
*New J. Phys.* 12 113043

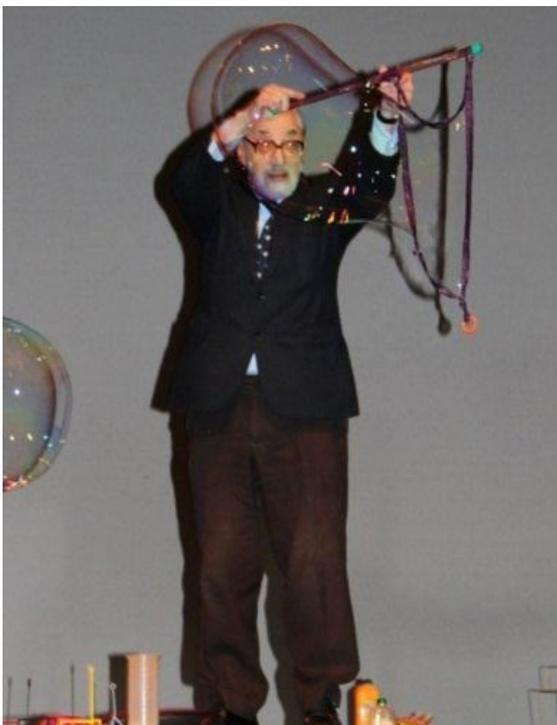
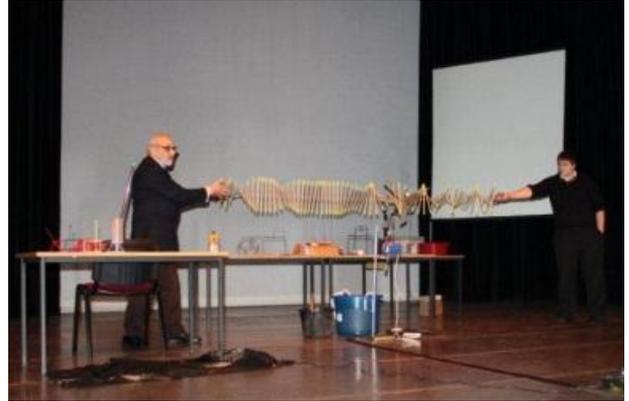
### **CORRECTION:**

The editor would like to apologise for any embarrassment caused to Miss Victoria Hodges for the error in the December 2010 printed newsletter where she was referred to as Dr Hodges.

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## The Magic of Bubbles

### Dr Cyril Isenberg - Christmas Lectures 2010 - University of Kent



The Magic of Bubbles was at the Gulbenkian Theatre University of Kent

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**Electricity and X-rays**  
**Dr Stuart Field- Christmas Lectures 2010 - University of Kent**



Above: Introduction by Dr Isenberg



Electricity and X-rays was at the  
Gulbenkian Theatre University of Kent

## "Information - Safe?" –

**EEESTA's twelfth annual prestige seminar** - took place on the evening of Wednesday 10th November 2010 at the University of Hertfordshire. This seminar was supported by Institute of Physics London & South East Branch, together with several professional science and engineering institutions.

After an informal networking buffet, the seminar was opened by the Chairman - deputy commissioner for Data Protection David Smith. The welcome address was then given by our host for the evening, Prof Reza Sotudeh, Head of School of Engineering, University of Hertfordshire, after which the Chairman presented the EEESTA Innovation Award. This annual award to an outstanding Arkwright Scholar was inaugurated in 2008 to celebrate the 10th annual Prestige Seminar at the University of Hertfordshire. This year it went to James Crossley of St Albans School - a young man of many talents. He is a key member of the award winning school Engineering and Technology Society; is actively involved with Brambleton Model Railway Club and is a theatre tech at the Alban Arena. But James is primarily a young entrepreneur. He already has three profitable businesses which will he intends to develop to full maturity.

The Chairman then set the scene for the evening and introduced the first speaker, Professor Ross Anderson FRS FEng, Professor of Security Engineering, University of Cambridge. Professor Anderson is one of the founders of a new academic discipline - the economics of information security. He is the author of the standard textbook "Security Engineering - a Guide to Building Dependable Distributed Systems" and is widely published on technical security.



*Prof. Ross Anderson talking about Personal Privacy*

Anderson spoke first about personal privacy in social networking. He pointed out that engineering for privacy, as for security or dependability, involves computer science, economics and psychology. Privacy is particularly hard to achieve because these three factors often pull in different directions. Social networking sites fund themselves by sales of user data, but users seek a

feeling of intimacy so they are liable to include private information in their profiles. Privacy controls provided by sites are often complex to configure and the default settings are usually wide open. But over ninety per cent of users never change the defaults, so exposure is the norm.

He then discussed the findings of a 2009 research programme he participated in on the security and extent of UK government databases. Of 46 databases, only six got a green light for fulfilling the spirit of privacy law and eleven were considered to be potentially in breach of the Human Rights Act. Examining the current position, he pointed out that a substantial number of the offending databases had merely been revamped or renamed, so despite public promises to the contrary, it's really business as usual.

Anderson summed up by repeating that online privacy is hard, as economics, psychology and technology are often in conflict. However European law may ultimately set the boundaries, as in the case of "I v Finland", where a nurse who was HIV+ was hounded out of work by colleagues after they gained access to her personal medical records. The European Court of Human Rights ruled that she had a right to restrict access to her health records to

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clinicians involved directly in her care.

The second speaker, Lars Davies, is CEO of Kalypton Limited.



*Lars Davies talking about Corporate privacy.*

He was a Senior Visiting Fellow to the Institute for Computer and Communications Law, Centre for Commercial Law Studies at Queen Mary, University of London where he specialised in Information Technology Law, Internet Law and Telecommunications Law. Lars currently concentrates on information management, compliance and policy for commerce and government.

Speaking on corporate privacy, he pointed out that commercial organisations have a legitimate need to make use of personal data, without which many of the services that we take for granted would be impossible to perform. This point is often lost in the hysteria surrounding data breaches, and there is often a lack of understanding of the true nature of data protection and what it

should achieve. Organisations need to understand their obligations and the benefits that they will gain from meeting those obligations. Individuals must understand why organisations need to access that data. Most importantly, both organisations and individuals need to understand what privacy really is, and what is required to maintain it. Lars pointed out that personal data is only a subset of the data corporates need to protect. Breaches can seriously damage the public image of a corporation, but proper data management can significantly enhance it.

The third speaker, Angela Sasse, is Professor of Human-Centred Technology and Head of Information Security Research in the Department of Computer Science at University College London. A usability researcher by training, her research over the past 15 years has focused on developing a human-centred approaches to security, privacy, identity and trust. Professor Sasse spoke about managing the human element in information security. She pointed out that keeping corporate data secure is a hard task, and managing human behaviour is a key challenge. Referring to a study on the escalating cost of password resets at a large corporation, she pointed out that users

faced with an excess workload tend to shortcut security mechanisms. They don't understand threats and risks. In consequence there is conflict between users and those tasked with maintaining security. Without understanding the implications, users feel overloaded with rules and are penalised for mistakes. So under pressure, they will find ways to circumvent controls. For example, an unintended consequence of chip and PIN is that some parents have sent their children shopping with their credit card and PIN, which breaches card issuers' terms and conditions, but would not have been possible when a signature was required.



*Prof. Angela Sasse illustrating the pressures on the user.*

The seminar ended with a chaired question and answer session which provided further interesting insights from all the speakers. The Chairman then summed up, mentioning the topic for

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the 2011 Seminar,  
"Engineering the Olympics".

The vote of thanks was given by Teresa Schofield, Chair Women In Engineering, IEEE (UKRI), She kindly stood in at short notice for Sir William Francis, who was unable to attend owing to illness. Reviewing the presentations, she offered some personal insights that confirmed the validity of many points made by the speakers, particularly with reference to the everyday habits of ordinary people and their potential impact on personal privacy".

Audio (MP3) and PowerPoint presentations can be found at: -

[http://www.eeesta.org.uk/seminar\\_archive/sem2010.php](http://www.eeesta.org.uk/seminar_archive/sem2010.php)

Ian Williamson

**This e-newsletter has been produced by The London & South East Branch IOP & contains articles & pictures that we were unable to provide in the December Newsletter.**

**The contents of this newsletter do not necessarily represent the views or policies of the Institute of Physics, except where explicitly stated.**

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## All Things Bright and Beautiful: the Physics of Colour Manipulation in Biology



Above: Prof Peter Vukusic & Dr Barbara Gabrys at the IOP on 8 Dec 2010

Prof Vukusic presented a variety of butterflies and beetles during the course of his interesting lecture.

He explained that there are three ways in which colour can be produced: -  
absorption due to pigmentation, fluorescence and interference which gives the ultra-high intensity blue of the Morpho butterfly.

2D & 3D photonic structures were considered as well as nanostructure in Morpho & how interference happens. L'Oreal Photonic Cosmetics in which Prof Vukusic had some input was also illustrated. An interesting lecture by an enthusiastic speaker. You can read more about photonics at: -

[http://newton.ex.ac.uk/research/emag/pubs/pdf/Vukusic\\_PW\\_2004.pdf](http://newton.ex.ac.uk/research/emag/pubs/pdf/Vukusic_PW_2004.pdf)

[http://www.iitk.ac.in/reach/2008/Biomimetics/India\\_16-03-08\\_pdf.pdf](http://www.iitk.ac.in/reach/2008/Biomimetics/India_16-03-08_pdf.pdf)

<http://newton.ex.ac.uk/research/emag/butterflies/dissertation/>

**Oxford University Press,  
Sundials & Green Men of  
Oxford 8 September 2010**



REMS have enjoyed some excellent visits recently, including a trip to Oxford on 8 September to visit the Oxford University Press, where we were shown some early printing presses used on site, and to walk the Oxford "sundial trail", and example of which is pictured above.