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The Turin Shroud - a physicist's view



Above: Dr Barbara Gabrys and Dr Wojciech Zajac

Dr Zajac, a research scientist at the Institute of Nuclear Physics of the Polish Academy of Sciences, gave an interesting and informative lecture regarding scientific tests performed on a small part of the Turin shroud.

The Linen cloth had been kept in Turin Cathedral since 1578 (except: 1939-1946 when it was at Montevergine Monastery, and 1997-1998, place undisclosed, after 1997 Cathedral blaze) but documented history begins in 1349 in France. The famous photograph taken by Secando Pia was displayed; this shows a straw coloured image of a naked man consistent with the biblical description of the death of Jesus. The image can only be seen in a recognisable form from a distance. Recent findings indicate that the image was formed in a layer made of starch fractions and various saccharides, coating the outermost fibrils of the fabric threads (up to ca. 55 μm in depth). The underlying cellulose appears not to be modified in any sense, contrary to what had been maintained over years. The image on the linen is not a photograph as colouring intensity changes with object distance. An UP image analyser gives a 3D relief. Radio Carbon dating suggests that the linen sample tested was formed between 1260 and 1350. This fascinating talk explained that while no definitive answers are known, sensible hypotheses have been formulated. This is what the scientific method, applied in a methodologically rigorous way, can offer. The so called "authenticity issue" were not addressed nor even a position in the dispute, as it exceeds the scope of physics, chemistry or even forensic sciences.

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MEDICAL HYBRID IMAGING: KENT CENTRE University of Canterbury 11 October 2011



Dr Gordon Ellul (above), from the Kent and Canterbury Hospital, explained the advances in a number of medical imaging techniques commonly available in hospitals. Among the commonest methods are the positron emission tomography (PET) and computerised tomography (CT). These build up a 3-D picture of the internal structure of the body from 2-D sections. Thus producing pictures of the internal organs and identifying disease.

The PET scan requires the injection of a radioactive positron emitter into the patient's blood. This emits positrons which interact with body cells to produce pairs of Y-rays. The Y-rays are detected and an image of the organs/disease computationally constructed.

CT uses X-rays to provide the images of the internal organs. Current machines take PET and CT scans simultaneously. The two pictures, with resolutions of about 1 mm, enable most abnormalities to be identified.

In addition MRI machines, using magnetic resonance imaging based on proton resonance, provide a further 3-D images of internal organs. Many examples of diseased patients were discussed and their treatments explained.

Dr Cyril Isenberg



**REMS
Members
celebrate at
the end of
the London
Loop Walk.**

**Pictures from
George Freeman**

REMS Last LOOP Walk



David and Gill Pick took us on the last London Loop Walk on 8 October. This was a relatively short walk from Rainham to Purfleet. Part of the walk was closed but an alternative route along a board walk over the local marsh was good. We joined the walk on the sea wall overlooking the Thames Estuary at the point where the concrete barges that were used in the invasion in WWII are dumped.



The rest of the walk was along the sea wall, past an enormous land-fill site (now grassed over) and the RSPB reserve (where the tea and bread pudding are good). In Purfleet only one of the five ancient explosive stores remains. These stored and tested gunpowder in the time of the Napoleonic wars etc. The end of the walk was at the Royal Hotel where we had a celebratory lunch with champagne that David bought us. Hats off to David and Gill as they have done the whole of the 150 mile loop twice. Some of them are worth repeating especially the high open areas on the North Downs and Chilterns owned by the Corporation of London. Thank you very much Gill and David for taking us to some very interesting places which we would not normally have visited.

George Freeman

Regional heats of FameLab UK

The search is on for the new voices of science communication. The regional heats of FameLab UK, the UK's biggest competition for new talent to engage the public in science, will start in October 2011. We'd love it if you could help spread the word to drive entries. We've created some materials to help you do just that, including copy for your website and a Q&A for those who want to find out more. Please see: - <http://famelab.org/uk/famelab-uk-2011/shout-out>

FameLab was set up in 2004 by Cheltenham Science Festival in partnership with NESTA. In 2007 the competition was adopted by the British Council as one of its flagship science engagement projects first in a South East Europe pilot and then expanding this in 2010 to include 16 across Europe, Asia and Africa. In 2012, 20 countries will be taking part in the competition.

We're looking to attract enthusiastic early career scientists to take part in order to identify a new generation of individuals who can engage the public. FameLab not only inspires the next generation of science communicators but excels at building the skills that will enable scientists and engineers to explain, debate, discuss and be challenged.

The competition is open to contestants over 21 years old and working in or studying science, technology, engineering, medicine or maths in the UK. Contestants have just 3 minutes to prove themselves to a panel of expert judges, with only the best going forward to the next round.

Heats are taking place in:-

Oxford, Science Oxford

20 and 25 October 2011 (final on 17 November)

London, Kings College

23 and 30 November 2011 (final on 30 November)

As well as: -

Newcastle, Cardiff, Glasgow & Manchester.

The UK National Final will take place on 21 March 2012 at the Royal Institution of Great Britain. Contestants taking part in the final will get the chance to take part in a weekend FameLab Master Class with Professor of Sciences and Society at Bristol University, Kathy Sykes, and experienced trainer, specialising in media & communication skills, Malcolm Love. The UK winner, chosen at the final, will win a place in the International Final and take home £1000 for themselves and up to £750 to spend on a science communication activity, whether it's attending a conference, further training or developing a new event or activity. If you want to find out more please visit

www.famelab.org/uk

Olympic Physics Competition

Schools are invited to bring a team to six students from year 12 to a SEPnet partner campus to participate in a full day challenge activity exploring the hidden physics in sport. Each heat will be based around a different Olympic sport.

Heat dates and venues:

16th November 2011 - Royal Holloway, University of London

17th November 2011 - Queen Mary, University of London

January 2012 - University of Oxford

21st or 28th February 2012 - University of Kent

All winning teams will be invited to a regional final.

Date: Thursday 15th March 2012

Venue: Lee Valley Park, London

This competition has been approved by the London 2012 Education team and given their Inspire Mark.

For further information or booking, please contact me:

Clare Harvey
GCSE Project Coordinator and Outreach Officer

clare.harvey@sepnet.ac.uk

+44 (0)7702 363731 www.sepnet.ac.uk

Events at Queen Mary University of London

2 November 2011

Physics Practical School, 2.15 pm - 4.15 pm

Suitable for A-level students. The first group slots for this are available from 2nd November. A-level students can come and spend time working in our undergraduate laboratories. Full dates and booking form available here:

<http://ph.qmul.ac.uk/schools/physics-practical-school>

March 2012 (exact date TBC), 9.30 am—5.00 pm

Particle Physics Masterclass Suitable for A-level students

The Particle Physics masterclass gives students the chance to hear world class researchers talk about their work, as well live video conference with CERN in Geneva.

<http://ph.qmul.ac.uk/schools/outreach-activities>

To book places for the above events contact the Outreach Team **E-mail:** ph-outreach@qmul.ac.uk
Telephone: 0207 882 3289

York Science

Support materials for science teachers at Key Stage 3

The University of York Science Education Group (UYSEG) has received funding from the Salters' Institute for the first phase of a new school science curriculum development project - York Science.

The project aims to develop a complete package of support materials for science teachers at Key Stage 3.

The new and distinctive features of the teaching materials we aim to develop are:

- an emphasis on science as the search for explanations of the behaviour of the material world that are based on evidence and careful reasoning.
- a central role for the 'big ideas' of science - which shape the way we look at and think about the material world.

These are of intrinsic interest and cultural significance, and provide a basis for further learning.

- a focus on learning outcomes - the things we want students to be able to do as a result of their science learning. Learning outcomes include knowledge and understanding, the ability to apply and use ideas, to analyse and evaluate information, to present and evaluate arguments and knowledge claims, and to plan and carry out investigations to answer questions or solve problems.

Want to know more? Visit the website

<http://www.york.ac.uk/education/projects/yorkscience/>

We look forward to hearing from you,

Robin Millar and Mary Whitehouse
Project Directors York Science
University of York Science Education Group

INVITE to the Physics Communicators Group Prize award ceremony and meeting on: 'The Art of Communicating Physics'.

Four shortlisted candidates will be giving their final presentations on 8 November 2.00pm at 76 Portland Place so that the judges can make the final selection for the Communicators Group Prize. The keynote speaker is Alok Jha from 'The Guardian'. London & SE Branch members are invited to the above event; there is no need to register and attendance is free, although if you are planning to attend please email david.smith@brunel.ac.uk with names and numbers for catering purposes.

Upcoming Events

31 Oct 2011 19:30 at the William Penney Theatre, AWE, Aldermaston, Reading, RG7 4PR:
The Physics of Superheroes.

1 Nov 2011 19:30 at Rutherford Lecture Theatre1, University of Kent, Canterbury, CT2 7NZ
How round is the electron and why does it matter?

2 Nov 2011 18:30 at The Institute of Physics, 76 Portland Place, London, W1B 1NT
The Square Kilometre Array: a tool for astronomy and fundamental physics.

2 Nov 2011 18:30 at Lindop Building College Lane Campus, Hatfield, AL10 9AB.
Apollo in perspective – how we went to the moon.

3 Nov 2011 11:00 REMS visit to the Mini Plant in Oxford. (This visit is full, Overflow visit 17 Nov.
E-mail john.a.belling.secrems@gmail.com)

8 Nov 2011 19:30 Berrill Lecture Theatre, Open University, Milton Keynes, MK7 6AA
The working brain: what physics can tell us about autism, shopping and learning algebra.

9 Nov 2011 17:00 The Weston Auditorium, De Havilland Campus, University of Hertfordshire, Hatfield, Herts, AL10 9AB
Engineering the Olympics

Book at: 0845 474 3341 or
<http://www.eeesta.org.uk/seminars.php>

More Events See: -

http://www.iop.org/activity/branches/south_east/se/calendar/index.html

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

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REMS Visit to the Royal Institution on the 20th October



The RI, founded in 1799, is the oldest independent research body in the world. The building includes a research laboratory with resident scientists, a museum with historical scientific collections and facilities which support the RI's extensive public outreach programme.

Our party was split into two groups for a guided tour of the building, including the museum and research laboratory. The building itself was re-opened after a controversial refurbishment was completed in September 2009.



REMS visit Steinway

The top left picture shows Faraday's coils.

After lunch the Steinway Piano Showroom and Workshop was the next port of call.

Steinway & Sons was founded in 1853 by German immigrant Henry Engelhard Steinway in a Manhattan loft. The Company is dedicated to making the finest pianos in the world.



The instruments are renowned for their quality and are extensively used on concert platforms by the world's leading pianists. During our visit we learnt something about the history of the Company and visited the Restoration Centre and Showrooms. Steinway & Sons are kindly made no charge for this visit.

The visit organiser was John Lunn and the photographs are from Mike Quinton.

From the Branch Secretary: -

Many of you have been in contact regarding next month's annual dinner. Just to clarify, the dinner will start at 2000 after Sir Peter Knight's lecture 'From Bits to Qubits' on Wednesday 16th November. Sir Peter recently became President of the IOP so we are fortunate to have him as a speaker and our guest of honour for the annual dinner. Diners will go upstairs to the Herschel Room while delegates can take tea and coffee in the Rutherford catering suite. To register for the lecture please send me an email at londonsoutheast@physics.org. To register for the dinner please use the form on the next page.

Our next lecture at the London Centre is on Wednesday 2nd November. Professor Steve Rawlings from the University of Oxford will talk about probably the most exciting project in radio astronomy: The Square Kilometre Array. This telescope will explore the origin of the universe, cosmic magnetism, dark energy, planet formation and (it is claimed) possibly detect alien transmissions! Details of this and other lectures can be found in the branch flyer or at http://www.iop.org/activity/branches/south_east/lse/calendar/index.html

Branch members are invited to the Physics Communicators Group prize award ceremony and meeting on 'The Art of Communicating Physics'. Four short listed candidates will be giving their final presentations at 1400 on Tuesday 8th November at 76 Portland Place so that the judges can make the final selection for the Communicators Group Prize. The keynote speaker is Alok Jha from 'The Guardian'. London & SE Branch members are invited to the above event; there is no need to register and attendance is free, although if you are planning to attend please email david.smith@brunel.ac.uk with names and numbers for catering purposes.

As before if I can be of assistance please do not hesitate to get in contact.

Len Lewell
Branch Secretary
londonsoutheast@physics.org

I wish to attend the Branch dinner on Wednesday 16th November 2011.

I will be accompanied by ____ guests.

Please state each diner's requirements:

Full Name	Starter: Salmon	Starter: Risotto	Main: Chicken	Main: Fish	Main: Savoy

Special dietary requirements:

If possible, I/we would like to sit near: _____ or

I enclose my cheque, made payable to "The Institute of Physics", for ____ persons @ £34.00 per head. Total = £ _____

I enclose a self-addressed, prepaid envelope for acknowledgement of this booking (please tick)

Name:

Contact telephone no. (in case of queries) _____

E-mail address: _____

Please send the completed form to: -

Dr Mark Telling (Treasurer, L&SE Branch),
Rm 1-49, R3,
ISIS Facility,
OXON, OX11 0QX

E-mail: mark.telling@stfc.ac.uk

We look forward to seeing you.