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**Hawks, Daleks and the IOP:
 Big Bang Fairs covering Our Region.**



Eastern Region 4 July

SE Region 5 July

London Region 11 July

All UK 11-18 year olds in full time education are eligible to enter the National Science + Engineering Competition via the Big Bang Regional Fairs. Nominated projects from the regional fairs go forward to the National Big Bang Fair which is next in London, 14-16 March 2013. Many students display their CREST projects; others enter the Science showcase section which is not part of the main competition.

At many of the regional fairs there are activities for the students and visitors, for example at The Eastern Region Big Bang, held at Duxford on 4th July, there was the choice of: - The Naked Scientists present: "Open Your Mind: A Spine-tingling Tour of the Brain", Matt Pritchard presents: "Could it be Magic?", Show Me Learning presents: "The Materials Show", the "You're Banned!" Acoustics Activity and The Bionic Ear Show.

Exhibitors included: BBSRC, Classroom Medics, Deafness Research UK, Ear to the Sky, Gravity Racing, Imperial Bird of Prey Academy, Institution of Chemical Engineers, MBDA, The Open University, Queen Mary University of London, Renewable Energy Systems, Shepreth Wildlife Park, Space Flight UK, The Genome Analysis Centre, University of Hertfordshire, Wonder of Engineering and also Lee Crouch with the IOP stand.

At the East of England event over 64 judges took part working in teams of two to cover the 81 projects. Each project is judged twice using laid down criteria and moderators were available in case of conflict.

As well as the CREST prizes, in the bronze, silver and gold categories, there was the Young Engineer for Britain Engineering excellence award and the nominations for the National Big Bang there were Special Prizes

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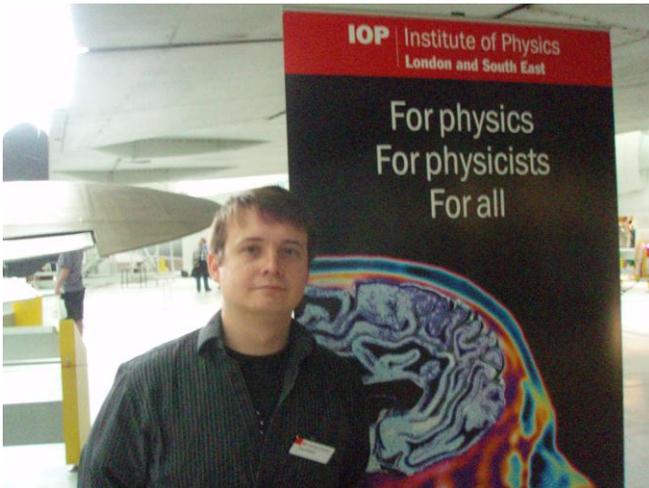
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provided by Institutes or Companies, these were: -

Institute of Physics - Physics Prize (winner, runner-up).
MBDA - Engineering Prize (winner, runner-up).
RES - Sustainability Prize (winner, runner-up).
MSD - Biology Prize (winner, runner-up).
RSC - Chemistry Prize (winner, runner-up).
TTP - Most Creative/Innovative Project (winner, runner-up).
EEESTA Club Showcase Prize, (Judged on best overall Club Showcase stand, enthusiasm & teamwork).
DynaKar Best Overall Display Stand.



Above: Lee Crouch ran the Physics Stand at Duxford.

Our branch committee provided two judges, Prof Peter Kalmus and Bob Boutland, both of whom had an interesting morning and a difficult decision regarding the Physics Prizes. IOP certificates had been prepared prior to the competition and these were available to any good physics as our committee members felt appropriate.



Left:

Mathematical modelling of the electron wave function with the Shrodinger equation to calculate the probability of success with quantum tunnelling in cancer therapy.

This project was selected to go forward to the National Finals in London March 2013



Above: -
IOP Certificate holders from Felsted Preparatory School



Above: -
IOP Certificate holders from Aylesbury Grammar School

The Branch Physics Prizes were presented to: -

Felsted Prep School –

What is the best paper aeroplane?

Aylesbury Grammar School – Hover Bover

A full list of Winners in all categories can be found at: -

<http://www.setpointherts.org.uk/#/big-bang-eastern-2012/4561095097>

Photo below courtesy of Herts. Setpoint.



The branch newsfeed and calendar are at <http://london.iop.org>

The SE Region Big Bang was held in the Hawth Theatre, Crawley on 5 July. And was organised by the University of Brighton



The Physics Stand manned by: - Sarah Allen, Lee Crouch and Paul Burton.

Once again there were interactive stands from organisations as well as those manned by the competition entrants.



The event was also popular with visiting school groups. The project displays were in the foyer and on the theatre balcony with some displays and activities in marquees surrounding the theatre. Judges and moderators made use of the backstage changing rooms.

Science shows: - Amoeba to Zebra, The Bigger Bang!, May the Force be with you, Science Magic ... Magic Science and Engineering from cradle to grave provided competitors and visitors with some interesting experiences as did the interactive stands.



Some IOP certificates were presented to pupils from The Forest School for their project 'Living on Mars' which won the Nestle Academy Striving for Success in Science Award.



Some students from Hazelwick School and their 'Fun Bin' project.

IOP certificates were also presented to students from Oaklands Catholic School, Waterlooville who won the Doosan Award for Project Engineering.

Additional to the main CREST, Young Engineers, the National Science and Engineering Competition, Young Engineer for Britain, Tomorrows Engineers and Stem Club awards there were special prizes prizes: - Doosan Award for Project Engineering, Eleactra Award for Science, Amey Award for Innovation, Invenseys Eurotherm Award for Commercial Potential, Nestle Academy Striving for Success in Science Award, Institute of Physics Award for Physics and Rolls-Royce Motor Cars Prize for Excellence in Engineering.

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The London Region Big Bang was held in Westminster Kingsway College off Grays Inn Road on 11 July with projects and exhibitors through the foyer, library and on many floors. Again this was a popular venue for school groups interested in the displays and activities. Unfortunately some school groups pulled out at the last minute so there were fewer projects here than at the other two fairs covering our region. Prof Kalmus and Bob Boutland had been elevated to be moderators rather than judges at this event; we had plenty to look at.



Some home educated children were displaying their work as a 'Science Showcase'

Amongst the choice of activities for students were the Bionic Man and his medical implants, Crime Scene Investigators, Classroom Medics warming up for the Olympics, Zebrafish from the Royal Veterinary College, Space Science by SEPnet, the Robogals Robot. IOP had its stand in the foyer and were busily launching paper rockets.



Once again in addition to the main prizes, CREST & Engineering and the places in the National final the branch had two prizes available.



Two students from La Sainte Union School presented their results concerning the strength of Velcro. They investigated the relationship between the area of Velcro and the force need to pull it apart.

The Ursuline Academy, Ilford, had a team looking at 'Understanding the insulating properties of mud as a building material'. Mini houses had been constructed and investigated with different insulators.



The 'Sustainables' from The Ursuline Academy, Ilford, and their insulation project.

Also present at the fair was Ortis Deley, who was compare for the prize ceremony. Professor John Perkins CBE FEng, Chief Scientific Adviser, Department for Business Innovation and Skills, Nick Baveystock, Director General, Institution of Civil Engineers and our former chief executive Dr Robert Kirby-Harris presented various prizes.



Left:

Testing Velcro.

Photograph courtesy of Westminster Kingsway College.

IOP Physics Prize Winners.



Our Winners at Duxford

Left: Felsted Preparatory school for their project 'What is the best paper aeroplane'.

Right: Aylesbury Grammar school for their project 'Hover Bother'

Bob Boutland helped present the IOP physics prizes.

Photographs and event organisation courtesy of Setpoint Hertfordshire.



Our Winner at Crawley

Left: Hazelwick School, Three Bridges, for their 'Fun Bin' project.

A full list of Winners can be found at: -

<http://www.crawleystemfest.co.uk/latest-news/congratulations>

Photograph courtesy of
Crawleystemfest.
SE Big Bang Fair organisation
University of Brighton

Winners at Westminster Kingsway College

Dr Robert Kirby Harris, recently retired as Secretary General at the International Union of Pure and Applied Physics and was a founder of the Big Bang Fair and currently one of the directors of the Big Bang Education CIC, presented a Physics Prize to students from La Sainte Union School. Our other prize winner, students from Ellen Wilkinson School with their showcase display, had to leave before the ceremony. A full list of winners is at : <http://www.westking.ac.uk/news/?ID=217>
Photo Courtesy of Westminster Kingsway College, who organised the London Big Bang Fair.



Left to Right: - Ortis Deley, Students from La Sainte Union School and Dr Robert Kirby-Harris.

For CREST Award details see: - <http://www.britishecienceassociation.org/> for The National Science and Engineering Competition see: - <http://www.britishecienceassociation.org/web/NSEC/NSEC.htm>

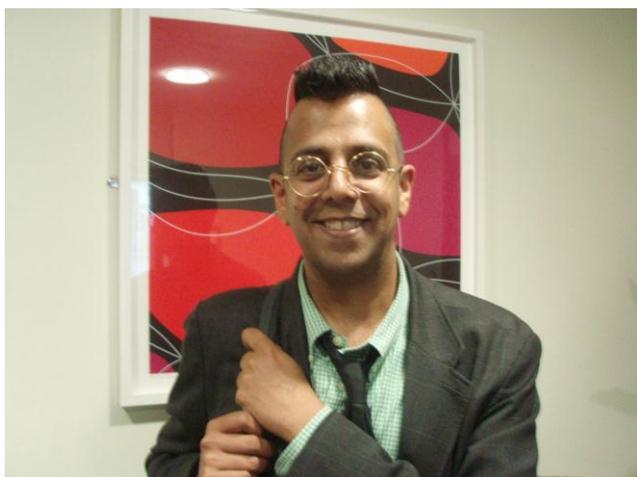
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Communicators Group Summer Meeting 29 June 2012

The Medium is the Message: Broadcasting, podcasting, YouTube and other ways of communicating physics.

The meeting began at 1pm following registration and refreshments. Martyn Bull, chair of the group, gave the meeting introduction with a reference to Marshal McLuhan's phrase 'the medium and the message' however an accident of typesetting had the book title as 'The medium and the massage' which the author left in place. The assertion was that the 'medium shapes and controls the scale and form of human association and action'. (Understanding Media, NY, 1964, P9).



Above: Simon Singh

The meeting went on to consider this with the first speaker, the writer and broadcaster, Simon Singh giving 'Random thoughts about stuff'. The power of YouTube to propagate material and websites such as the Kahn Academy, <http://www.khanacademy.org/>, and the experiments of Prof. Richard Wiseman, (<http://richardwiseman.wordpress.com/>) (<http://news.bbc.co.uk/1/hi/uk/3271309.stm>) to influence teaching and learning were some of those highlighted. Also; was putting physics with ballet, both hated by many people, a good idea? Similarly the expense of keeping a lorry on the road? An interesting talk with a thought provoking message regarding the use of resources.

Deborah Cohen, the award winning editor of the BBC Radio Science Unit, considered 'Another voice in the room: engaging listeners with physics on the radio'. Several shows were mentioned, Frontiers - science documentary, Materiel World - Science news, All in the mind –psychological research, as well as the



Above: Deborah Cohen

award winning show The Infinite Monkey cage, (<http://www.bbc.co.uk/podcasts/series/timc>), with presenters Brian Cox and Robin Ince. The point was made that "we are in the entertainment business and are trying to inspire people rather than educate people".



Above: Prof John Dore, Communicators Group Newsletter Editor, and Melissa Akdogan.

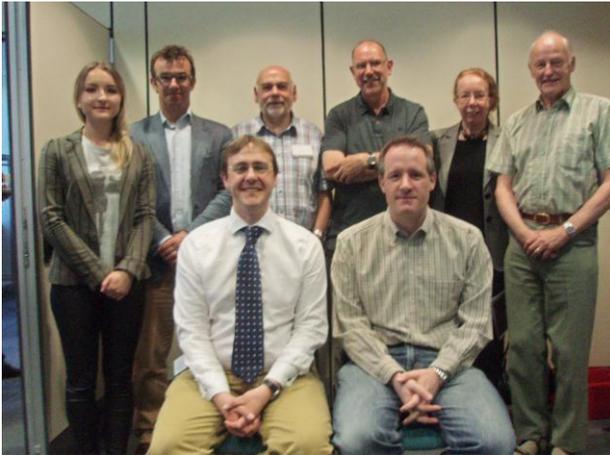
The final speaker was Melissa Akogen, a director and producer whose shows have been on various TV channels including National Geographic, Discovery and the BBC. Action works, will the show make money? The big idea is needed in a clear simple way. Ratings are important as is a mass audience. Is the program accessible to someone with a GCSE science? **Continued page 4**

The branch newsfeed and calendar are at <http://london.iop.org>

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Program commissioners don't want chemical equations or the standard model. James May's programs 'Man Lab' and 'Toy Story' were also highlighted. A person with a passion is important.

A networking session was organised so that the delegates could have an opportunity to meet each other in a random way. One person did find themselves with the Chair, secretary and treasurer of the group at one point. Refreshments followed this session and provided an opportunity for a Group Committee photograph.



Above: The Communicators Group Committee photo.

The 2012 Very Early Career Physics Communicators Award was presented, closing date 15 September with the award ceremony 20 November; see http://www.iop.org/activity/groups/subject/physcom/prize/page_50554.html for further details.



Above Rhys Phillips and Dr Suzie Sheehy.

Rhys Phillips, a winner from last year, and Dr Suzie Sheehy one of last year's runners up spoke about their experience of the competition. Both encouraged the audience to nominate someone for the 2012 award.



Above: Lena Weber and Alessio Bernardelli

The final part of the day was 'Investigating the interaction between the audience and the media' This discussion session was introduced by Alessio Bernardelli, a former teacher and IOP teacher co-ordinator now working for the TES, <http://www.tes.co.uk/article.aspx?storyCode=6168575> and Lena Weber, who works for the IOP and manages the IOP Blog, <http://www.iopblog.org/>. Ann Marks managed the discussion session following the introduction.

Details of the Physics Communicators Group are at: <http://www.iop.org/activity/groups/subject/physcom/index.html>

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REMS at HOME: - A Miscellany.

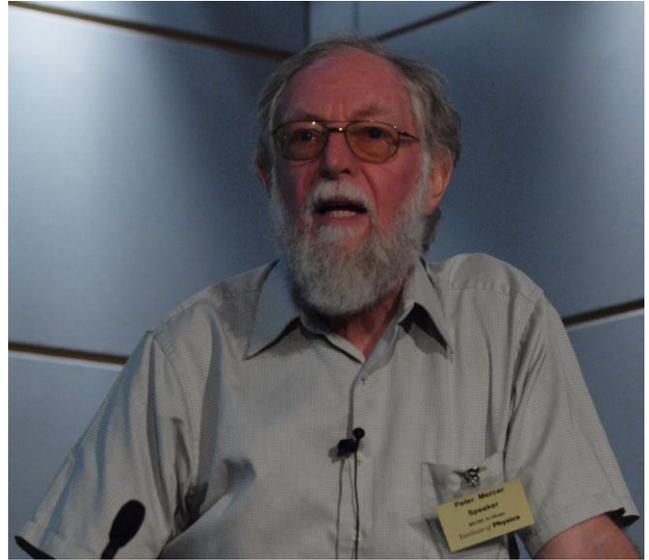
74 retired members and friends gathered on 5 July 2012 at 76 Portland Place to listen and learn from 5 speakers, a harpsichordist and a harpsichord constructor on a variety of subjects. Once again George Freeman organised the meeting and persuaded the speakers to perform. Not that they needed persuading, judging by their enthusiasm, and one of them, John Belling, our hard working Secretary, really did perform or rather demonstrated a point on the harpsichord. The meeting was chaired by Mike Quinton, who kept the timing well enough to ensure that there was time for questions.



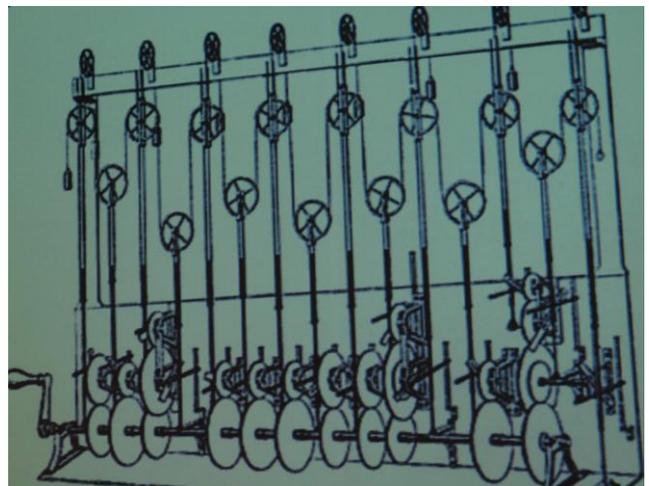
Michael Callaghan (above) gave us “**More Tales from the Cockpit**”, his third such talk. He calmly told us of some hair-raising flights in his Mark 4 Meteor jet. Lag in the gyroscope and the artificial horizon didn't help matters in conditions of low visibility. At least he could see his flight plan. Flying at night was made more difficult on one occasion, when an airfield he was due to turn at had no lights. Short of fuel he attempted to land at the next airfield into the rising sun but was ordered to go round again.

Peter Mercer (picture top right) related “**A personal History of Computing**”. He started with examples of analogue calendars: Stonehenge, a suitable range of hills to mark sunrise and sunset at each month of the year and he told us about the priests in Egyptian temples predicting the flow of the Nile.

Then there was the ingenious Antikethera from 90 BC Rhodes used to predict the movements, eclipses and phases of heavenly bodies and when the next Olympic Games should be.



The question of computer security arose during the war; the Dam Busters' plans to use the device to line up the dams' towers to get the correct distance fell into German hands. From 1948 to the early 1960s the Doodson – Légé tide predicting machine (below) allowed for the influence of the moon, the sun and Jupiter.



Peter's personal experience began with projects concerned with differential equations of flight of the TSR2 and P1, the prototype of Lightning, which was initially on analogue computers, but later on digital.

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Rems at Home:

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Much earlier there was rivalry between the two forms of computation, illustrated in “The Calculating Table” in Margarita Philosophica in a 1508 book by Gregor Reisch, in which an algorist and an abacist are being instructed by Arithmetica, algebra slowly becoming more dominant between the 12th and 16th centuries. We saw slides of a Chinese abacus and even a Roman one – very confusing!

We were brought nearly up to date through Enigma and the Bombe and Lorentz and Colossus at Bletchley Park and Dollis Hill. Then there was Turing at Manchester and Joe Lyons and the EDSAC at Cambridge, Sirius Autocode and The Elliot 803 with its magnetic core memory.



Ian Shaw (below left) demonstrated several points as well as playing several pieces of music during the lecture, while we filed out for lunch and then gave a wonderful recital after lunch.



John Belling (above) started his talk on “**Temperamental Music**” and I am sure that we shall hear more another time. Attempting to cover the history, the mathematics, and the practice in one lecture was ambitious. However, we were introduced to the need to temper the scale for fixed pitch instruments, like the harpsichord and organ, so that chords can be played in different keys.

We moved rapidly from Pythagoras being inspired by workers hammering on an anvil to the possibility of doubling the number of black notes on a keyboard by splitting them (picture above right).



William Mitchell (above right) built the harpsichord and he was there with us in the audience.

After lunch **Tony Watts** (below), Professor of Marine Geology and Geophysics in the Department of Earth Sciences at the University of Oxford,



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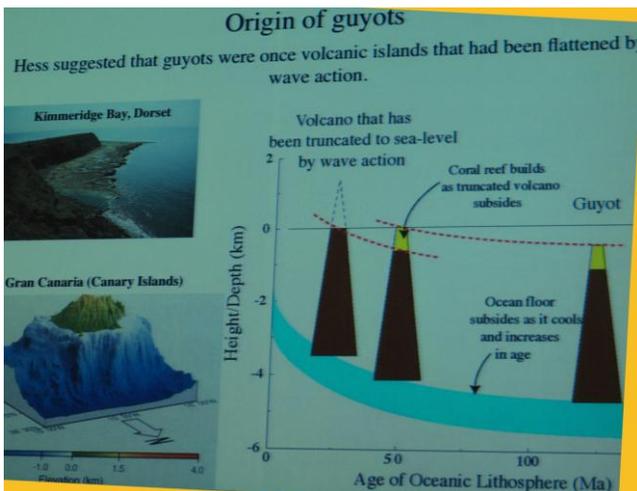
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EMS at Home:

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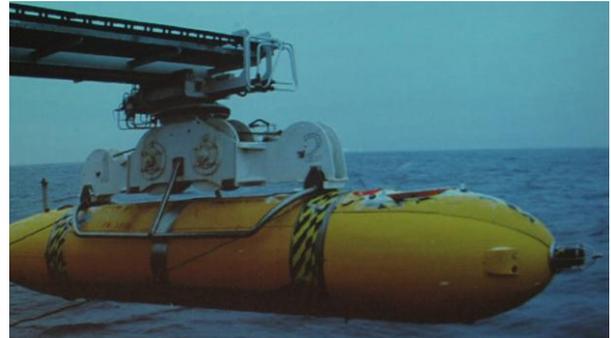
revealed the “**Mountains in the Sea**” that were first hinted at by the voyage of HMS Challenger (1872-76), when her captain took many more soundings of the seabed than was usual, using only a hemp wire and weights. Echo sounding made the job much easier and by 1911 the Mid Atlantic Ridge was mapped. During World War 2 in the Pacific, Admiral Henry Hess of the US Navy discovered the first mountain of the sea. It was flat topped and he called it a “guyot”. It turns out that guyots were once volcanoes whose tops sticking out of the sea were flattened by wave action and they were then submerged as their continental plates moved



Stephen Hall (below), of the National Oceanography Centre at Southampton and Chairman of the Society for Underwater Technology, showed how the depths



of sea are being explored by “**Autonomous underwater vehicles**”. One of these is Autosub 2 (pictured below), which operates normally at a depth of 2000m on torch batteries.



It floods freely, using seawater to lubricate the moving parts and moves very slowly driven by a one bladed propeller to reduce drag. It is launched from RRS (Royal Research Ship) Discovery to measure depth, salinity, fish levels, manganese content, oxygen etc. It can go under ice, although that is more difficult. Communication is by text message via satellites. In fact it uses mobile phone technology.

He talked about other underwater vehicles, such as the glider, which follows thermals within the sea, and Alvin the manned submersible used for recovering torpedoes, and sunken ships and aeroplanes.

Stephen mentioned the possibility of a separate talk about Alvin and his exploits. Meanwhile, we already look forward to another full programme for the At Home on 10 January 2013 with an environmental miscellany.

Mike and Kate Quinton

Institute of Physics announces 2012 award winners.

The Isaac Newton Medal, IOP's International Medal, goes to Professor Martin Rees, Lord Rees of Ludlow, for his outstanding contributions to relativistic astrophysics and cosmology.

In the Gold category, Professor Graham Garland Ross from the University of Oxford receives the Dirac Medal for his research undertaken towards a 'theory of everything'.

The full list of winners is at: -

http://www.iop.org/about/awards/page_56435.html