IOP | Institute of Physics
Education *Supporting Teachers*

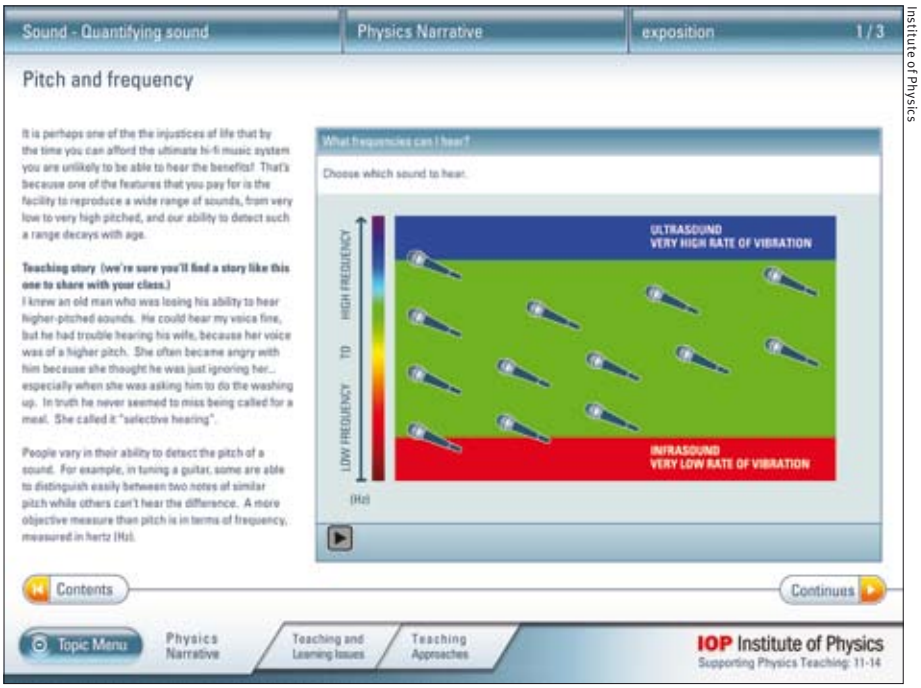
Classroomphysics

The newsletter for affiliated schools

June 2009 Issue 9

SPT initiative gets interactive

The Supporting Physics Teaching materials (SPT11–14 set of CD-ROMS) have been widely used since their launch. The current initiative builds on this practice with new materials and a new distribution mechanism, and it seeks to support further effective use of the materials over the next three years.



Institute of Physics

A sample page from the new online version of the Institute's Supporting Physics Teaching materials.

Where SPT has been

All student teachers working on PGCE courses in the sciences leave with their own set of materials in the form of the five CD-ROMS and we hope that they will have made significant use of them during their course. An increasing number of SCITTs and some GTP trainees are also using the materials. However, improving one's own pedagogic subject knowledge is a long-term process – a part of what makes teaching physics both challenging and stimulating. The materials are therefore being used in CPD as well; whether facilitated by the Institute's own Teacher Network coordinators, the Stimulating Physics project or the Science Learning Centres. The resource is designed to support teachers' learning and it is not directed at pupils. The aims of workshops, drawing on these materials, are to increase confidence and competence in the teaching of physics. The focus on non-specialists means that the resources use approaches that may also work well in the classroom, but leave lesson planning to individual teachers.

Where SPT is going

SPT is moving to the web and it is changing format. At the moment there is simply a news page at http://www.iop.org/activity/education/ (click on "projects" or google "SPT IOP") but the entire 11–14 resource will be republished on the web in July, with the address available from the news page. These reformed materials will be in Adobe PDF format, so you will only need Acrobat Reader to use them. They will still be "your" materials because they will be delivered via the web, rather than having to be accessed on a website each time.

Naturally the interactive elements and support sheets will still be available separately for use in workshops or prep rooms to support colleagues or to engage students in lessons.

In addition, three new topics are in preparation to support core physics subject-knowledge development for the 14–16 age range. These will be in the new format, using the same underlying structure of physics narrative, teaching and learning issues, and teaching approaches. The same care and thought is going into identifying the challenges, developing a coherent account of the physics and selecting teaching approaches. There will be one published a year over the next three academic years.

Since SPT is on the web, we thought that it would be useful to encourage online interactivity to find out how others are using the materials and to obtain additional support from fellow teachers and others. This will probably be useful, but only if lots of people use it. So, as with all new opportunities, we'll approach it cautiously and we'll see if there is enough added value in having focused discussions about particular aspects and new published perspectives on the materials.

A chance to say something

Teaching a lesson gives instantaneous feedback – sometimes more than you want. As a resource provider, however, it is often difficult to get a clear picture of how materials are being used. We have a fixed e-mail address (SPT@iop.org) that was set up for teachers to provide feedback. Now might be a good time to put this facility to use, with one of two subject lines in the e-mail: "stories of use" or "feedback". The former might tell how you use the resource, which is very likely to be useful for other teachers. The latter is more for constructive critiques. If you would like something a bit more structured, there is also an online multiple-choice survey at http://www.surveymonkey.com/s.aspx?sm=_2bXrh_2b4NoQrfY_2fo3BJGgeXQ_3d_3d. It will only take about 10 minutes to complete.

We look forward to receiving those stories and any feedback that we can act on.

Ian Lawrence, SPT national coordinator

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Editorial

This is the last issue for this academic year and I hope that the end of the year is nearly in sight for all of you. The start of the exam season can provide a welcome breathing space and the chance to reflect on the past year and to look at plans for the future. There are plenty of courses across the UK in June and July (p6), which might give you the chance to feel re-energised and inspired. Much of this issue is focused on resources to help you to enrich the learning experience in your classroom.

Our front-page story explains how we are moving forward with our Supporting Physics Teaching resources to support novice and non-specialist teachers.

Science clubs are a way of engaging with gifted and enthusiastic students. There is news of resources from both the Institute and the Science Museum to help you to run your club (p4).

Affiliated schools will find a Physics Activity pack included in this mailing. Bloodhound SSC (supersonic car) might be another project that will be a hit with your students over an extended period of time, providing an opportunity for some cross-curricula work (p3).

Alom Shaha is a London teacher who has done something to try to answer the question, "Why is science important?" Read about the video clips he has produced and try sharing them with your students or add your own contributions via his blog (p3).

The Royal Institution has finished its renovations and its expanded exhibition focuses on the scientists that have worked there over the last 200 years. You might want to think about combining a visit with a lecture (p5).

Affiliated schools will find a copy of the "Explore" postcard in this mailing. This is the second publication in our new suite of careers materials and it is aimed at the 11–14 age group. E-mail education@iop.org to order further copies. There are suggestions on how to use the postcard as a stimulus in your teaching (p7).

The Science Enhancement Programme has a new publication in its Innovations in Practical Work series, *Light and Matter*. You can find out about using their diffraction grids to model X-ray diffraction (p8).

Clare Thomson, editor (tel 020 7470 4981, e-mail clare.thomson@iop.org).

TDA launches national CPD initiative for physics teachers

From summer 2009 the Training and Development Agency for Schools (TDA) is launching a national CPD programme to support government targets to increase the number of specialist teachers of physics.

The Science Additional Specialism Programme (SASP) in physics enables teachers without a first degree or secondary initial teacher-training specialism in physics to teach the subject more effectively.

SASP is designed to develop participants' subject and pedagogical knowledge and to support them in teaching physics to learners aged 11–19 with more confidence, expertise and enthusiasm.

SASP was developed by the TDA in close consultation with the science communities. It has been piloted successfully in three regions since summer 2007 and it has made a big difference to the professional development of the teachers involved:

- "I used to stick to the textbook. Now, thanks to the pilot, I am knowledgeable and confident enough to be far more creative in my teaching."
- "I am much more inspired and I am able to inspire my pupils more as a result. For example, in a recent lesson my pupils made crash-test dummies with a raw egg inside them. The students had a great time testing them out – there was egg all over the place. Among all of the mess they learned a heck of a lot about physics."

The course structure and length is flexible to reflect the needs of individual participants. It comprises a mix of tuition and in-school development and it runs for up to 40 days, spread over an intensive summer start and the following academic year. Courses offer academic accreditation at H-level, with the option of taking some M-level credits.

Institute of Physics

Physics teachers have a hair-raising experience.

The course is free for participants and the TDA will fund supply cover for participating schools. Teachers meeting eligibility criteria (including the achievement of 40 credits at H-level) will receive a £5000 incentive on completion of the course. Now even more science teachers have the opportunity to take SASP courses.

For more information: visit the TDA site at http://www.tda.gov.uk/teachers/continuingprofessionaldevelopment/science_cpd.aspx.

Institute of Physics welcomes youth members

When the new academic year starts in September, the Institute will be delighted to welcome young people into a specific category of membership for the first time.

The new membership grade will be called electronic affiliate grade. This means that young people aged 16–19 who are studying for a nationally recognised qualification in physics (e.g. A-level, Higher, Leaving Certificate) will be able to join the Institute free of charge and access all of the services that the Institute of Physics provides electronically and online.

As well as having access to the digital versions of the members' newspaper and magazine, a special digital newsletter for youth members will be created. This newsletter will aim to keep young members up to date with helpful resources available from the Institute, and, as well as being interesting, the newsletter will aim to provide entertaining and understandable articles about the many ways in which physics influences our everyday world.

For those young people who are later in their study choice, the newsletter will also act as a stepping stone of understanding to the more complex articles that appear in the highly acclaimed members' magazine *Physics World*. We will also carry features about the exciting variety of careers choices that studying physics could prepare young people for in the longer term.

As well as the newsletter, there will be a special, monitored group within the members' community network, *MyIOP*. This will allow students to get in touch with their peers around the country to debate and to discuss any areas of interest. As the new youth member electronic affiliate grade gains recognition, we will continue to add physics resources that are designed specifically to help and to support our younger members.

Teacher's film backs science

Alom Shaha explains why his film could help to promote science as an important subject in schools.

The seeds of my Why is Science Important? project were sown in January 2008 when I returned to the classroom after seven years working in TV. I found myself questioning whether our approach to teaching conveys the fundamental importance of science to schoolchildren.

As well as trying to get my students to understand electrical circuits or Newton's laws, I make an effort to convey to them that science is important, that it's something worth doing for reasons beyond the need to pass exams. I wear my passion for science on my sleeve, but I don't think that's enough to convince all of my students that science is important. Nor do I think that the importance of science is implicit in the courses that we teach; that it will somehow seep into my students' consciousness through the sheer number of hours that they spend doing "science" at school.

So, as a science TV producer, I decided to make a film about it. I secured funding from the Wellcome Trust and a little extra money from Teachers TV. As part of my research and development for the film, I decided to set up a "collaborative blog" in which I would ask the great and the good of the science world, working scientists, science teachers and anyone else who had an opinion on why science is important. My plan was that extracts from the blog would appear in the film and sections from the film would appear on the blog, and that the two would inform and enrich each other. Fortunately this is exactly what has happened.

I'm hoping that the project will reach people, including some of my students, who don't think that science is important and to convince them otherwise. I want it to demonstrate that science is absolutely crucial to the future wellbeing of our world and that its contribution to culture is as significant as that of music, art or literature and, most important of all, that a sound appreciation of science is vital to realising your potential as a human being. I want this project to make it far easier for any science teacher to be able to answer that inevitable question: "What's the point of all this?"

Try the resource with your students. The film can be downloaded in high quality from the Vimeo website. If you've got something to add, do get in touch.

Alom Shaha, science teacher and producer

For more information: visit http://whyscience.co.uk/.

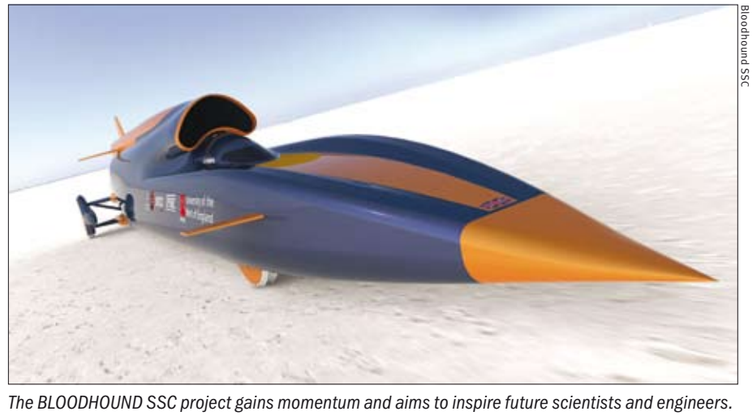
Supersonic car is a powerful vehicle for STEM

BLOODHOUND SSC (supersonic car) provides us with a once-in-a-lifetime opportunity to inspire the next generation of scientists and engineers. Launched by Lord Drayson at the Science Museum last October, this engineering-education adventure is being managed by Richard Noble who has been involved with British world land speed racing for more than 25 years. The car will be driven by Andy Green, the world's fastest mathematician, who aims to reach 1050 mph in 2011.

BLOODHOUND SSC is being designed and built by two teams of engineers at the universities of Swansea and the West of England. Visit the website for the latest pictures and all of the design information.

A classroom will be constructed alongside the build area so that students can visit and engage with curriculum materials linked to BLOODHOUND SSC. The Bloodhound Education Programme (http://www.bloodhoundssc.com/education.cfm) will be available to all pupils from primary and secondary schools, and to students in further and higher education.

More than a thousand schools have already registered interest in the programme. There are links to Primary Engineer and the Young Engineers K'Nex Challenge. In addition, the Formula One Technology Challenge, F1 in Schools (http://www.f1inschools.com) now has a BLOODHOUND SSC class.



Bloodhound SSC

The BLOODHOUND SSC project gains momentum and aims to inspire future scientists and engineers.

To join the Bloodhound Education Programme, you first need to register your organisation. This will then enable you to download our education ideas and get you started. We will send you two free posters and a flyer, and we'll be in touch with you as soon as we can to help you to get the best experience out of BLOODHOUND SSC and the curriculum materials.

For more information: visit http://www.bloodhoundssc.com/ or contact the education director, Ian Galloway, (e-mail ian.galloway@bloodhoundssc.com).

Science Museum supports KS3 science clubs

Our ambition at the Science Museum is to be the best place in the world to enjoy science, whether that is in the museum or through experiencing our expertise and resources. Our approach to learning focuses on enhancing and enriching science learning through hands-on experiences and allowing people room to develop their own thoughts and ideas – an ethos that also informs school science clubs.

The Science Museum sees science and engineering clubs as a fantastic way to engage students with science and to extend their classroom experience. Time outside structured lessons gives teachers a chance to introduce longer-term projects, to follow up particular areas of interest from the curriculum and to try less conventional techniques and ideas to enrich pupils' experience and understanding. This space to explore promotes engagement with science for students of all abilities, allowing for reflection on and further pursuit of ideas in a less-pressured environment than the formal classroom setting.

In addition to our provision of support planning visits to the museum, national outreach and the free classroom resources available from our website, we have developed two new schemes specifically designed to support KS3 science clubs.

Like all of our resources, our science and engineering club boxes have been developed in consultation with teachers and students. Each box ("Mars Mission" and "Crime Lab") provides all of the materials required to run a series of activities in your club. Extensive research and development ensures that they meet you and your club's needs and that the activities are original, fun, safe and also quick and easy to set up.

Science Museum

KS3 science students enjoy the engaging learning environment that a school science club can offer.

The new national Science Museum Clubs scheme will provide teachers with support in setting up and running their club. Schools that join the initiative will receive training, the club boxes and an exclusive activity day at the Science Museum for their club.

Nicola Upton-Swift, manager of teachers' resources, courses and visits

For more information: about the boxes, the Science Museum Clubs scheme or how to get involved with our research and development, e-mail edbookings@sciencemuseum.org.uk or visit www.sciencemuseum.org.uk/educators.

The Science Museum's science and engineering club boxes are developed with support from BP.

Supported by bp

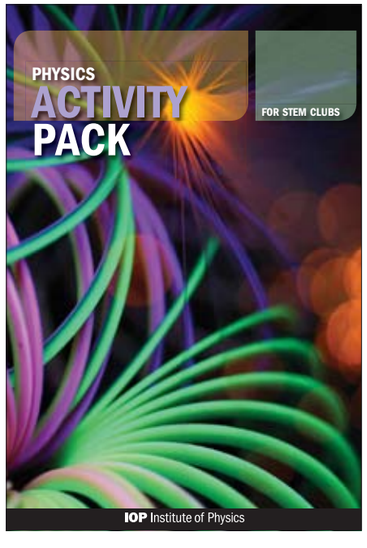
sciencemuseumlearning

Physics activity pack for STEM clubs will enhance extra-curricular learning

The Institute has produced a physics activity pack to be used by STEM clubs, also known as after-school science and engineering clubs. Affiliated schools will receive the pack with this issue of *Classroom Physics*.

The resource, which has been put together with help from club leaders, contains nine separate activities, all of which use basic equipment and can be run over three or four sessions to help to encourage students to return week after week. The activities include challenges, such as a tallest-jelly competition or building your own "eggpod" to protect a falling "egg-stronaut", and games, such as "Phoney physics" that uses the same format as *Call My Bluff* but uses true and false physics explanations instead of dictionary definitions.

Each activity has a set of teacher and student notes to help to explain the physics involved, and although the activities are designed to run over a number of sessions, club leaders can select a small section of the activity if they only have one session to fill. The activities are aimed primarily at Key Stage 3 students, but younger and older students can get involved in many of them.



The pack also includes links to the British Science Association for advice on how to run a club and it offers some more general ideas, such as finding a speaker to visit your club or how to set up a physics book group. The final section of the pack contains all of our Physics to Go experiments and Marvin and Milo cartoons. The pack comes in an A4 ring binder with pages that can be easily photocopied and it includes an electronic version on CD-ROM.

It was the valuable input of club leaders that has enabled us to develop this pack and we hope that it will be widely used to increase the number of physics activities in STEM clubs across UK. We will also be making it available to groups, such as the Guides and the Scout Association, who would like to do physics outside school.

Elizabeth Jeavons, outreach officer

For more information: If you are a club leader who is not part of an affiliated school, e-mail education@iop.org with your name and address, and we will post a copy to you.

Faraday exhibition gives a fun insight into the working lives of UK scientists

The Royal Institution (RI) Faraday exhibition has been expanded and relaunched. It showcases the history of the RI and some of the important discoveries and inventions that were made there. The displays look at the men and women of science that have worked in our laboratories, their successes and frustrations. By using the real-life examples of people that have worked here, we cover such hard-to-teach curriculum themes as life as a scientist and the realities, excitement and frustrations of working as a scientist. As our building has hosted science research laboratories for more than 200 years, we can also help to show how ideas about science have changed in the last 200 years, and reinforce concepts in history and citizenship.

Royal Institution

A budding scientist has fun learning about the elements that were discovered at the Royal Institution.

The majority of the exhibition is located on the lower-ground floor. From the odds and ends that became the first electrical transformer to the tube that told us why the sky is blue, you can see the actual objects that RI scientists built and used in some of the world's most famous experiments. From the development of the thermos flask, to the device that saved the lives of countless miners; we have the original scientific equipment used by RI scientists.

The highlight of the exhibition is Faraday's magnetic laboratory, as it was in the 1850s. Opposite this laboratory will be the current state-of-the-art nanotechnology laboratory (coming soon). Adding an exciting dimension to the museum displays, we also have an eGuide to give you a glimpse into more of the stories of the collection, like John Tyndall's obsession with glaciers, and the chance to smash glass, to electrocute frogs and to hear hidden conversations. The eGuide is available free of charge to school groups, and themed tours are available that help to tailor RI exhibition content to topics that you are covering in school at the time of your visit.

The RI Young People's Programme has a range of activities, including our famous demonstration lectures in the Faraday theatre, free for schools to attend, as well as a network of mathematics masterclasses across the UK. The Young Scientists Centre, opening next academic year, will offer whole-day workshops across a range of scientific themes where students will have the chance to be researchers for the day.

For more information: e-mail schools@ri.ac.uk or visit www.rigb.org.

Female physics students win prestigious film prize for their radioactive rap

A rap about nuclear physics has won this year's coveted SciCast Physics Best Physics Film award. *The Geiger Muller Groove*, made by a group of year-12 girls from Sydenham High School, had the audience singing along to its infectious tune at the glittering awards ceremony hosted by TV presenter Kate Humble at the Royal Institution on 30 March.

The film also triumphed in two of the other categories, winning both the Most Entertaining Film and Best Original Score awards. Natania Dunher, who wrote the words and music for the film about alpha, beta and gamma particles, said: "We really enjoyed learning about it and it's an easy topic to write about."

But it wasn't a clean sweep for the girls from south London. *The God Particle* – a technically superb animation about the Large Hadron Collider made by two students from Hampton School – won the awards for Best Technical and Artistic Achievement, and Best Film from a Secondary School.

Oli Garfkin, Futurecast.tv

It's a wrap: the year-12 team from Sydenham High School celebrates its SciCast Physics win in style.

Not to be outdone by the students, Andrew Hanson of the National Physical Laboratory took home the award for Best Film by an Adult for *It's About Time (You Switched off your Television Set and Did Physics Instead)*.

If you're interested in submitting your own science short film for the 2010 SciCast Physics competition, you can send your entries in any time before 8 January 2010. Remember to make your film entertaining, less than 2.5 minutes long and include an explanation of the physics.

You can see all of the films entered into the competition so far, including this year's winners, at www.planet-scicast.com. The website also has hints and tips on how to make a good film and deal with copyright issues, as well as a blog to keep you up to date with what's going on behind the scenes.

Events

EVENTS FOR TEACHERS

Oxford Physics Meeting
Denys Wilkinson Physics Building, Keeble Road, University of Oxford
23 June
This programme of lectures will include a talk given by Jocelyn Bell Burnell about where matter comes from and an update on fusion research. Workshops will include making a rocket launcher, data logging and teaching active physics.
Details and booking: contact Robert Strawson (e-mail robert@strawson.net).

Manchester Science Teachers Conference
Manchester Metropolitan University (MMU)
24 June
This free one-day conference organised by the local Institute branch and the MMU will focus on KS4. There will be updates on current developments in the sciences, as well as ideas and strategies to aid classroom teachers and the establishment of an area support network.
Details and registration: visit www.mmu.ac.uk/physics2009.

North East Physics Teachers Conference
Ogden Centre for Fundamental Physics, Durham University
24 June
This one-day event of talks, workshops and displays will be organised by teachers for teachers, in conjunction with Durham University and the Science Learning Centre (SLC) NE. The delegate fee will be £5.
Details and booking: visit the SLC NE site at www.slcne.org.uk/course/physicsday or call 0191 370 6200).

Liverpool Physics Meeting – Physics Can Be Easy!
Chadwick laboratory, University of Liverpool
25 June, 9.30 a.m. – 3.30 p.m.
This free day for science teachers will focus on physics at KS3 and KS4.
Details and registration: contact James Camp (e-mail: james.camp@iop.org) and visit http://www.liv.ac.uk/~iop/PTC/index.html for the full programme and abstracts.

Advancing Physics Teachers and Technicians Courses
Department of Physics and Astronomy, University of Birmingham
30 June: AS preparation (teachers)
1 July: A2 preparation (teachers)
2 July: AS and A2 preparation (technicians)
These courses will cover all aspects of teaching and learning and are for those new to Advancing Physics, as well as those who feel the need to do a bit of catching up.
Details and booking: www.advancingphysics.iop.org.

Annual Liverpool Physics Teachers Conference
Chadwick Laboratory, University of Liverpool
2 July
This conference will be for specialist teachers of physics and it will be aimed at GCSE and A-level. There will be new ideas and activities to try.
Details: contact Steve Barrett (e-mail s.d.barrett@liv.ac.uk).

Residential Courses at Charterhouse
Charterhouse, Godalming, Surrey
2–3 July
This course will feature A-level investigations, practicals and new techniques including video and data logging.
6–10 July and 13–17 July
Physics Subject Knowledge Booster courses.
Details: contact Steve Hearn (e-mail sth@charterhouse.org.uk). The courses will include free accommodation, materials and food.

IOP Yorkshire Branch Teachers Day
Department of Physics, University of York
4 July
Join us for a varied day of workshops and lectures with something for all.
Details and registration: contact Alex Brabbs, IOP regional officer, Yorkshire and North East (e-mail alex.brabbs@iop.org).

Hull Teacher Network Day
Hessle High School
6 July
This event will include a mixture of talks and workshops.
Details: contact Stephen McIntosh (e-mail physics.mcintosh@googlemail.com).

Wiimotes and Wrockets
Erwood, Powys
6 July, 4.00–6.00 p.m.
Alessio Bernadelli will be running a workshop on the Wiimote, which will involve turning a Wii into a low-cost interactive whiteboard. Running alongside that will be a workshop making compressed air-rocket launchers.
Details: contact Gary Williams (e-mail gary.williams@iop.org).

Physics Update
School of Physics and Astronomy, University of Birmingham
10–12 July
This will be an inspirational weekend for science teachers. En suite accommodation in Lucas House will be provided.
Details: contact Leila Solomon (e-mail leila.solomon@iop.org).

Salters Horners Advanced Physics Residential Courses
University of York
15–17 July: AS preparation (teachers)
Details and booking: visit www.york.ac.uk/org/seg.salters/physics or contact Sandra Wilmott (e-mail slw5@york.ac.uk).

East Midlands Network Day
Oakham School, Rutland
19 September
This will be a great opportunity for anyone teaching or supporting physics classes to share ideas, to get up-to-date information and to collect some free resources.
Details: contact Neal Gupta (e-mail ngupta@ockbrook.derby.sch.uk) or Helen Pollard (e-mail hjp@oakham.rutland.sch.uk).

EVENTS FOR STUDENTS

Institute of Physics 2009 Schools and Colleges Lecture – Exploring the Universe: a Tale of Telescopes, Time Travel and Extraterrestrials
This free lecture for 14–16-year-olds, given by Dr Andy Newsam, will continue its UK tour. It is in London and the South East in July and it goes to Scotland in September.
Details and booking: visit www.iop.org and click on "Events" under "Schools and Colleges" or contact Clare Mills (e-mail clare.mills@iop.org).

Space Academy Year-10 Careers Event
National Space Centre, Leicester
29 June, 9.30 a.m. – 2.45 p.m.
This event will be aimed at high-ability year-10 students in the East Midlands and it will consist of a collection of talks given by space-related industry on the benefit of studying science and the exciting careers that it can lead to. The keynote talk entitled "Mars and Antarctica" will be given by Anu Ojha and Dr Amy Rogers.
Details: contact Sarah Hill (e-mail sarahh@spacecentre.co.uk).

IOP East Anglia Year-9 Gifted and Talented Inter-School Physics Competition
Bury St Edmunds County Upper School
6 July
Details: contact Gerry Blake (g.blake@sep.org.uk) or read the East Anglia Newsletter Summer 2009 at www.iop.org.

Residential Summer School for AS Students Studying Physics and Mathematics (University of Birmingham)
15–16 July
Details: visit www.ph.bham.ac.uk/schools/ and click on "Forthcoming Events".

EXPLORE 11–14 postcard will bring science careers alive in the classroom

This postcard is designed to alert students to the career possibilities open to those who study physics at post-16 level. It is suggested that they can be used as a teaching resource rather than just being handed out at a careers event.

Here are some ideas about how you might use the postcard:

1. Use the images on the front to start a discussion:
- What is the connection between the various images and physics?
- Why do you think someone has chosen these images?
- Which are the areas that interest you most?

2. Ask your pupils to find out more about some of the things featured on the reverse of the postcard. Here are some helpful links:

Why toast lands butter-side down
- For a short video clip and an outline of an investigation, visit the Planet SciCast website at http://www.planet-scicast.com/experiment.cfm?cit_id=2688.
- For a little more advanced physics, to explain what is going on, visit http://www.geocities.com/Omegaman_UK/bread.html.

iPod and laptop technology (2007 Nobel Prize in Physics)
- http://www.guardian.co.uk/science/2007/oct/09/sciencenews.news

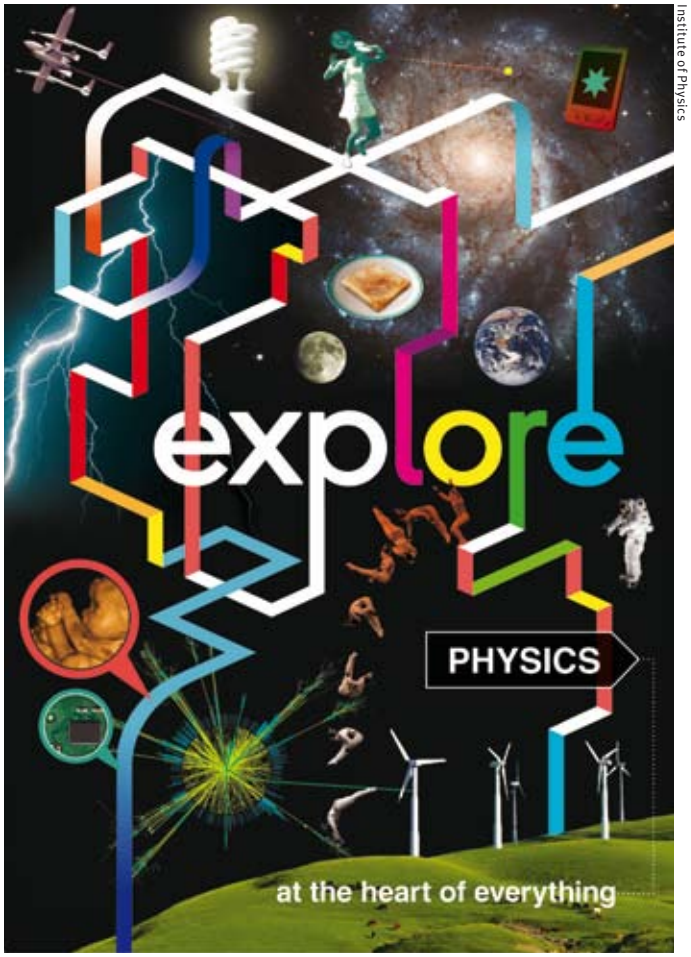
Flying car
- http://www.guardian.co.uk/science/2009/jan/14/skycar-parajet-timbuktu

Why is the sky blue?
- http://www.sciencemadesimple.com/sky_blue.html

Are raindrops round?
- http://ga.water.usgs.gov/edu/raindropshape.html

The search for aliens
- http://setiathome.ssl.berkeley.edu/

The internet
- http://en.wikipedia.org/wiki/Internet



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History of the world wide web
- Visit http://en.wikipedia.org/ and search for "world wide web".

3. Ask students to research the careers mentioned at the bottom of the second side of the post card (e.g. architect, lawyer, doctor) and to find out whether doing physics beyond GCSE/Standard grade might help them to pursue one of the featured careers.

Careers resource pack is an 'engenious' idea

The Engineering and Technology Board (ETB) Enginuity careers pack and website provides case studies and accessible information about engineering for schools and careers advisers around the country. The resource has now been updated to include more information about the diploma, apprenticeships and qualification routes for young people pursuing a career in engineering. It has more resources for teachers, including lesson plans linked to the design, technology and science national curriculum at KS3.

The pack was sent out to all UK secondary schools in January 2009. The careers materials are also available for downloaded at www.enginuity.org.uk.

To request a copy of the pack, e-mail your name and address to careers@etechb.co.uk or use the contact form available on the enginuity website at www.enginuity.org.uk/contact_us.cfm.

www.earthlearningidea.com
Earth Learning Idea
Innovative, Earth-related teaching ideas

If you are looking for some Earth-related teaching tips then why not head for Earthlearningidea at www.earthlearningidea.com?

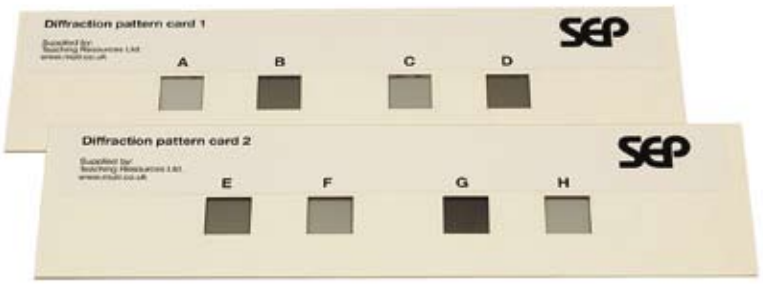
The Earthlearningidea team is publishing one new Earth-science activity every month throughout 2009. Last year it published one new activity every week, so there are lots of innovative Earth-related teaching activities, which are all free to download and use to encourage a dynamic teaching and learning environment in class.

The team is calling for any ideas, comments and suggestions relating to the popular Earth science resource via its blog at http://earthlearningidea.blogspot.com or via e-mail (info@earthlearningidea.com), so show your support and get in touch.

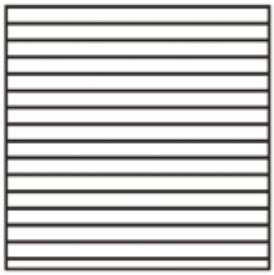
Modelling X-ray diffraction

"The instant I saw the picture my mouth fell open and my pulse began to race ... the black cross of reflections that dominated the picture could arise only from a helical structure." This is how James Watson, in his book *The Double Helix*, described the moment when he first saw the renowned "Photo 51", showing an X-ray diffraction pattern for DNA. It was a controversial episode in the history of science. The research had been undertaken by Rosalind Franklin, and the photograph was shown to Watson by her colleague, Maurice Wilkins, without asking her permission.

What Watson saw was an X-shaped series of markings. The way in which a helix can give rise to such a diffraction pattern is not difficult to understand, and it is straightforward to model the phenomenon optically. The Gatsby Science Enhancement Programme has produced a set of diffraction grids that can be used to illustrate some of the principles of diffraction. The diffraction patterns can be easily observed by viewing a point source of light (e.g. a desk lamp behind a piece of cardboard with a pinhole in it) through each grid.



A horizontal set of lines will produce a diffraction pattern consisting of a vertical series of dots. The closer the spacing of the lines, the wider separation of the dots. A helix, when viewed from the side, appears as a set of zigzag lines, that is, two sets of parallel lines at different orientations. The "zigs" produce a set of dots in one orientation, and the "zags" produce a set in another orientation, hence the X-shape of the pattern. The spacing of the lines on these diffraction grids is around 0.1 mm and they diffract light in the visible region. To obtain diffraction patterns of the much smaller dimensions in DNA, radiation of a shorter wavelength is needed; the use of X-rays with DNA produced diffraction patterns from which it was possible to calculate the critical dimensions needed to elucidate its structure.



Grid A

Pattern A

Grid B

Pattern B

More information about the diffraction pattern grids, and about other experiments showing the many uses of electromagnetic radiation for making measurements, can be found in the latest SEP publication *Light and matter: models and applications* (visit www.sep.org.uk).