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Champagne flows at Reims event

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returns to school Music: ATLAS scientists record physics music Conference: Champagne

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YOUR NEWS WANTED

The news section gives updates on what has been happening in physics education worldwide. Items included show how events in one country could be relevant to good practice elsewhere in the world. Contributions are welcome from all of our readers. They should be about 200–300 words long and can include pictures. Please e-mail your news items for the March issue of Physics Education to ped@iop.org before 17 January 2011.

PARTICLE PHYSICS

ATLAS unveils mural at CERN

The ATLAS collaboration at CERN officially unveiled a giant mural depicting the ATLAS particle detector in Geneva on 6 October 2010. ATLAS is currently collecting data at the world's most powerful particle accelerator, the Large Hadron Collider. Installed in a cavern 100 m underground, the ATLAS detector is no longer open for visits. The mural, painted on the wall of an ATLAS surface building by American artist Josef Kristofoletti, is three storeys tall yet still one-third of the size of the actual detector. The mural is designed to be the next best thing to seeing the detector itself.

This is not the first depiction that Kristofoletti has made of the ATLAS detector: it has a smaller relative that he painted for the Redux Contemporary Art Festival in South Carolina. That was spotted by members of the collaboration and resulted in the artist being invited to visit CERN.

'We were thrilled to learn that ATLAS and particle physics had found their way into popular art,' said ATLAS physicist and outreach co-ordinator Michael Barnett of the Lawrence Berkeley National Laboratory. 'And it was a natural next step to bring that art to CERN.'

Inspired by the human creativity that goes into research at the frontier of knowledge, Kristo-



Mural of the ATLAS detector at CERN Point 1 painted by Josef Kristofoletti. The mural is located at the ATLAS experiment site and shows on two walls the detector with a collision event superimposed. On the larger wall is a depiction of a Higgs boson. Photo credit: Claudia Marcelloni © CERN.

foletti was happy to accept the commission. 'You just look at certain things and think, "wow, how are human beings able to do something so huge?"' he explained. 'And that's certainly the feeling I got from ATLAS. How is it really possible? It's like a miracle that people are able to assemble something so complex.'

Kristofoletti explained what it is about the project that attracted him to particle physics: 'What got me painting murals was working in Italy for a couple of years and seeing the frescos of the Renaissance,' he explained. 'The subject of most of those works is religious mythology.

When I think about the LHC, it always seems like an unprecedented cathedral of science. I think this will be a modern-day version of a Renaissance fresco. People enjoy having something that touches on both art and science. Humans have always tried to find out where we came from and where things originate, and I think that's why this captures people's imagination.'

CERN and the LHC have attracted considerable interest from the artistic community over recent years, and the laboratory has responded by starting to develop an artist-in-residence programme.

PRIZE

Corti Trust invites essay entries

The Corti Family Trust is a small charity dedicated to promoting science education for young people. As part of this, it runs an annual science essay competition, with a £2000 cash prize, for A-level students planning on studying a science subject at university. This year's competition opens on 1 November 2010 and closes on 31 March 2011. The title of this year's essay is 'Pick an experiment or theory from the history of your subject, explain it and discuss its effect on society since then.'

The competition is open to any UK resident aged 21 or under who is starting a BSc, MSc or equivalent in a 'traditional' science or engineering subject at a British university in 2011. Eligible subjects include, for example, biology, chemistry, physics, maths, chemical engineering, electrical engineering, mechani-



cal engineering and biomedical sciences. Combined honours including these will also be eligible, e.g. chemistry with French. Social sciences are not eligible. Because there are many other bursaries available for medical students, straight medicine is

also not eligible.

Information, tips and entry forms, examples of previous winners' work and teacher packs can all be downloaded from www.cortiscienceprize.org/.

Mark Corti

ASTROPHYSICS

CERN holds cosmic-ray conference

A high-energy proton slams into our atmosphere, ultimately creating a shower of muons that rain down to the Earth's surface at speeds approaching the speed of light in a cone, eventually covering an area up to many square kilometres in size. On average one muon passes through one of your thumbnails every minute. Spotting such 'air showers' thus means having detectors spread over a wide area, and that is where schools come into the equation.

A workshop on cosmic-ray detectors in education, organized by Arnaud Marsollier (head of communications for the European Astroparticle Physics Network) was held at CERN in October 2010 to reactivate previous ideas about linking educational activities with cosmic rays throughout Europe. Almost 85 participants made the trip to Geneva, including a few from the USA—more than had originally been expected, meaning that a larger lecture theatre had to be

located at the last minute.

Following a welcome from Michel Spiro, president of the CERN Council, we spent the morning listening to several presentations about different national projects. Jan Willem van Holten spoke about High School Project on Astroparticle Cosmic Rays (HiSPARC), a network of some 80 detectors (groups of large scintillation plates) in the Netherlands, built and maintained by a collaboration of high schools and research institutes.

Becky Parker reported on a very different approach using much smaller Timepix chips from the Medipix collaboration at CERN, now involving seven schools across Kent in the south-east of the UK. A group of her pupils confirmed the levels of excitement that had been generated by the CERN@School initiative, and made interesting comments about the importance of continuity and keeping the cosmic baton off the ground as they move on to university and others take their place.

Solène Chevalier-Thery described *Cosmos à l'Ecole*—a French project that has placed several 'cosmodetectors' consisting of three small slabs of scintillator secured in a nicely designed rotatable stack in schools around the country. Despina Hatzifotiadou explained that in Italy pupils had been involved from the outset in the construction of 'muon telescopes' consisting of three large-area multigap resistive plate chambers (based on a system employed in the ALICE experiment at the LHC). These enable the hit position to be determined on each detector, allowing the muon direction to be reconstructed with considerable precision.

The QuarkNet project, based at Fermilab near Chicago in the US, has overseen the development of several generations of scintillation-based detectors since 2001. Tom Jordan passed round a sample of the specially designed electronics board and commented that about 550 of the detectors were currently being employed in 18 countries around the world. Pupils and teachers are taught to assemble the hardware



David Barney shows the students and Becky Parker a detector.

for themselves at workshops and can then use a web-based electronic laboratory (e-Lab) to upload, inspect and analyse data.

We also heard about a German detector that has been installed on a research vessel, taking data continuously as it sailed from Europe to Antarctica and back. There were also posters highlighting work in Greece (HELLICYON—the Hellenic Lyceum Cosmic Observatories Network) and the Czech Republic (CZELTA—the Czech Large-area Coincidence Array). The latter is parallel to the ALTA programme that has been running successfully for more than a decade in Alberta, Canada, which is based on a widely distributed network of trios of metre square scintillator slabs. There are similar initiatives in Slovakia, Romania and the UK (coordinated at King's College, London). The universities of Sheffield (CREATE—Cosmic Ray Experimental Apparatus for Teaching) and Birmingham in the UK are also engaged in

using cosmic rays to interest pupils in physics.

After lunch there were roundtable discussions on the need for a common data format, on the organization of a network and its relationship with educational institutions, and on a possible proposal for funding to the EC. At the concluding session, it became clear that there was a strong wish from the community to share material, data and educational activities, and Michel Spiro invited people to set up a working group that would make recommendations on outreach to the next update of the European strategy of particle physics. The idea of producing a cheap 'starter kit' was also proposed. As far as the UK is concerned, it became clear that its approach is currently not as coordinated as that in other countries—an issue that will have to be addressed if the ears of the Science and Technology Funding Council are going to be bent.

David Smith

RESEARCHERS IN RESIDENCE

Lord Winston returns to school

As part of the Research Councils UK (RCUK) school placement scheme, Researchers in Residence (RinR), Professor Lord Robert Winston visited St Bonaventures Catholic Comprehensive School in Newham, East London, on 5 November 2010.

Researchers in Residence is a free UK-wide school placement scheme funded by RCUK with support from the Wellcome Trust and is open to all secondary schools and further-education colleges. The scheme places early-career PhD and postdoctoral researchers in schools for placements of up to 24 hours contact time. Researchers come from all subject disciplines and aim to engage young people with contemporary research to stimulate their interest and motivation in learning.

New research from the National Audit Office (NAO) released on 12 November 2010 (www.nao.org.uk/publications/1011/young_scientists.aspx) shows that schools participating in programmes such as Researchers in Residence see a greater increase in the number of students taking sciences at GCSE. The NAO report also shows that schools participating in the RCUK Researchers in Residence scheme see more of the year group achieving A to C grades in A-level maths than those schools not participating in a scheme.

Professor Lord Robert Winston commented: 'We as researchers have a duty to act as positive role models for young people to help inspire them as they consider



Lord Robert Winston at St Bonaventures School in November.

their future career options. In this respect it is vitally important to engage with them while they are at school and share experiences.

I am pleased to be taking part in the Researchers in Residence scheme, which is a wonderful opportunity for researchers like me to involve the younger generation with scientific research.'

The Researchers in Residence scheme has placed more than 3000 researchers into schools over the last 15 years and Lord Winston's visit will hopefully encourage more researchers to join the scheme, which aims to inspire the next generation of bright minds.

Students from three other local schools joined those at St Bonaventures for the day and had the opportunity to hear Lord Winston talk about his inspirational life and career as a research scientist. The day was also filmed

by Newton TV as part of a documentary that will be shown on Newton and Teachers TV in January 2011.

St Bonaventures School is an all-boys' school situated in East London, an area with high levels of social and economic challenge and an ethnically diverse community. The school has consistently exceeded all national averages and has results that place it well within the top 20% for achievement. One of the reasons for this is the school's commitment to ensuring that the students receive a varied and interesting curriculum, applying their learning to the 'real world' and giving the boys access to as wide a range of facilities and facilitators as possible.

Paul Halliwell, headteacher, commented: 'St Bonaventures fully supports Researchers in Residence and is excited at the

prospect of long-term development of the programme, as we firmly believe that there are huge benefits for our students, for their current study and their future careers. Engaging with this programme will give the students a greater understanding of the role of research in society and in the world of work. This is all further amplified due to the involvement of Professor Lord Robert Winston. We are extremely fortunate to be able to welcome the world-renowned scientist to our

school, his presence and influence will leave a lasting legacy. This project will greatly impact on the future life opportunities of our students.'

Professor Alan Thorpe, chair of RCUK, said: 'The RCUK Researchers in Residence scheme is an exciting way for researchers to work with schools. RinR enriches the classroom experience and engages young people with real-life research, to raise aspirations and inspire the next generation of research-

ers. The researchers who take part say that they find working with schools a stimulating and rewarding experience, which in turn can benefit their own skills development. Schemes such as this are essential if we are to inspire the next generation of artists, biologists, chemists, scientists, engineers, economists, physicists and more.'

Teachers and researchers interested in getting involved can register at www.researchersin-residence.ac.uk.

Music

ATLAS scientists record physics music

'If I were not a physicist, I would probably be a musician. I often think in music. I live my day-dreams in music. I see my life in terms of music...I get most joy in life out of music.' Albert Einstein

The astonishing ATLAS experiment at CERN in Geneva has already made headlines around the world for its pioneering research into the origins of the universe. But incredibly, after discovering that a large number of people involved in CERN projects are accomplished musicians, ATLAS has taken the amazing step of recording and releasing an album. This goes to prove that there is far more to ATLAS than investigating the origins of matter and the fundamental forces of nature.

The result is a double album of original material and covers, crossing all styles of music from rock to classical, that looks set to prove a big hit with the scientific community and the wider public.

Released on the ATLAS sci-



The Resonance CD showcases music recorded by scientists.

entists' own label, Neutralino Records, which is named after a hypothetical particle predicted by a theory called supersymmetry in particle physics, *Resonance* features 19 artists over two CDs and a DVD.

The album features a wealth of new songs: the highlights include an original blues song about ATLAS from physicist Steven Goldfarb's Canettes Blues Band; an ode to CERN from the remarkable singer-songwriter-scientist

Cat Demetriades; classical piano pieces by head of ATLAS, Italian scientist Fabiola Gianotti; and the wry musings of guitar band TLAs and their song about their perennial bugbear—long meetings. The artists who appear on the album hope that their music will attract a new audience to physics and encourage young people to study a subject that is often wrongly perceived as lacking in fun.

Proceeds from the sales of *Res-*

onance will go to the Happy Children's Home in Pokhara, Nepal, to help them build an orphanage.

The album also features Genevieve Steele playing a beautiful traditional piece on a harp constructed by her physicist father, psych-rock from The Fullerenes, old time Appalachian from the Squirrelheads in Gravy

and music from a host of other acts, all of which include staff who work at the Large Hadron Collider in Geneva.

Released on 6 December 2010, 13.7 billion years to the day since the big bang, *Resonance* is set to prove that although physics and music may seem like very different fields they both require

abstract thought, imagination and a sense of fun.

You can expect sparks to fly when the scientists at the forefront of researching the big bang go pop.

Visit <http://atlas-music-resonance.web.cern.ch/atlas-music-resonance/ATLAS-cd1.htm> for more information.

CONFERENCE

Champagne flows at Reims event

In August, several hundred physicists and physics educators from all over the world gathered for an international conference in Reims, France. GIREP-ICPE-MPLT 2010 was a joint event of three different organizations, the Groupe International de Recherche sur l'Enseignement de la Physique (GIREP), the International Commission on Physics Education (ICPE) and the group on Multimedia in Physics Teaching and Learning (MPTL). The conference centre in Reims provided a comfortable setting for nine plenary talks, three (small) symposia, nine workshops and about 230 contributed papers presented in parallel oral sessions and a poster session.

Celebration of bubbles

The city of Reims is the centre of Champagne. This importance is visible nearly anywhere in and around the city. Roundabout flower beds at the city entrance are interspersed with vines. One of the large windows of the 12th-century Reims cathedral shows the different stages of champagne production. In Reims you can find the only full professorship devoted to the scientific

study of champagne. Even the podium lights in the main lecture hall in the conference centre were throwing champagne-flute-shaped projections on the wall.

Two of the conference excursions were related to champagne. One took participants to a winery in the neighbourhood, another one led to the champagne-making wine cellars of a famous champagne producer within the city. Both excursions had a champagne tasting and some physicists, of course, were unable to refrain from investigating the behaviour of bubbles or estimating the thickness of the bottles. These studies already anticipated one of the following day's lectures. Philippe Jeandet talked about the physics behind the bubbling properties of champagne, from the birth and ascent in the glass (did you know that the volume of a bubble can increase by a million during the ascent?) until they finally burst on reaching the surface. Physical measurement methods and modelling are used to study many different aspects of champagne bubbles: what differences can be observed between the ascent of beer and champagne bubbles? Mass spec-

trometry is used to study the molecules inside and outside the bubbles, and lasers are used to identify the molecules in the aerosol formed when bubbles burst. The chemistry of the bubbles is found to be affected by differences in flow, in turn caused by the shape of the glass.

Plenary talks

Raimund Girwidz from the MPTL group presented the annual review of multimedia resources for physics teaching and also reminded us about the wealth of resources available through compadre.org.

Laurence Viennot talked about the importance of creating conceptual links to children's observations in inquiry-based science education (IBSE) and showed results where 10 year olds were found to have a decreased interest in science after an IBSE project, in spite of the intentions of the project. She interpreted this as a failure to create these conceptual links. 'The devil is in the details—but not only the devil.'

Gorazd Planinsic demonstrated challenging optical behaviours of a prismatic foil

from an LCD computer screen and showed how it can be used to probe student reasoning as well as that of the audience.

Eugenia Etkina challenged us to use the physics concepts as a context for learning to think like a scientist and showed that engaging students in experimental design helps them learn physics. Later on she also gave a short demonstration of how roller skaters may be used in introductory physics courses.

Ruth Chabay showed how computational modelling by VPython could be connected to introductory physics instruction, giving a natural interpretation of vectors and visualization in three dimensions.

Manfred Euler's presentation included a challenge to our views of the images of physics, reproducing the 'iconic images of nanoscience' with similar images produced by acoustic wave scattering of little plastic yoghurt containers.

Sebastian Dormido Bencomo talked about virtual and remote labs, their characteristics and directions of development. He also described an inter-university project known as AutomatLabs.

Albert Fert, who was awarded the 2007 Nobel Prize in Physics together with Peter Grünberg, took us into the exciting world of spintronics, a new type of electronics that exploits not only the charge but also the spin of the electrons.

Parallel sessions, workshops and posters

Large conferences always force participants to choose between parallel sessions, workshops and symposia. Here we present just a



Pratibha Jolly among the champagne flutes of light.

few examples that we enjoyed—well aware that we missed many others that we would have enjoyed.

Can a change of currency turn into a physics-related project? (This is not a project for the UK or Sweden.) The project Euro-diffusion makes use of the different symbols found on the coins representing the nation of origin. How fast do coins migrate in Europe? Mojca Čepič from Slovenia described how the study of the distribution of coins with different origins in wallets of Europeans can turn into a collaborative project, showing for example when new coins are released in a particular country, the extent of international exchange and the relation between the sizes of different economies. Teachers in different countries working in this type of project view it as a way to show that the models of physics also have applications in society: diffusion is physics.

How does weightlessness feel? What is it like to experience

artificial gravity in a rotating space station? Igal Galili from Israel told of experiments with Israeli pupils in grades 7 and 9, who had experienced 'thinking journeys' to unusual situations, and how this could be a way to avoid having everyday conceptions getting in the way of physics understanding.

Peter Hubber from Australia spoke about professional development of biology teachers to prepare them for physics teaching. He described how one of the teachers had used plasticine in a class to introduce the concept of force, asking the class to write down different ways to change the shape of the plasticine. After writing down the words on the blackboard, the pupils started to classify them into 'push' or 'pull'.

Jochen Kuhn from Germany discussed authentic assignments, connected to newspaper articles. They had found that the students were able to read more complicated text when the tasks were authentic and engaging—and then learned the physics better.

A series of several talks was devoted to the new field of high-speed imaging. Michael Vollmer gave an introduction to the technology of modern high-speed cameras and also compared results of a number of simple hands-on experiments recorded with both a scientific-quality camera and a Casio Exilim camera. The latter camera is rather inexpensive and is expected to become quite a valuable tool for physics teaching in schools. More examples recorded with Casio cameras were discussed by other researchers from Japan and Taiwan.

Irena and Leoš Dvorak from the Czech Republic kept participants active at their Heureka workshop, entitled ‘What is the wick in the candle for?’ In the workshop by Lady Cats, female physics teachers from Japan (the ‘sisters’ of well known ‘brothers’, Stray Cats) demonstrated simple and beautiful experiments, some of which were given to participants to take home.

Poster sessions can be extremely useful, especially when there is a time and place to discuss the posters that researchers have given their effort and thoughts to produce. During this conference, the poster time was restricted to



The celebration cake for the 50th anniversary of ICPE.

informal discussions during coffee breaks—making you appreciate even more the authors who included a photo on their poster.

Birthday celebration before departure

The end of the conference marked a birthday celebration: the 50th anniversary of the International Commission for Physics Education (ICPE, <http://web.phys.ksu.edu/icpe/>), which is one of the commissions of the International Union of Pure and Applied Physics (www.iupap.org).

This event was celebrated with the launch of the printed version of the ICPE book *Connecting Research in Physics Education with Teacher Education Volume 2*, edited by Matilde Vincentini and Elena Sassi, past and present commission members. (In fact, they represent a quar-

ter of the total number of female commission members during ICPE’s history.)

During the final plenary session of the Reims conference, the 2006–2011 chair, Pratibha Jolly, gave an overview of the history of the commission and also talked about the future outreach activities, in particular the hands-on workshop PHYSWARE, which is to be organized in 2012 and 2014 at ICTP in Trieste, following a 2009 pilot workshop. The closing talk was followed by a huge ICPE birthday cake, before we all had to leave Reims.

Next year GIREP, MPTL and ICPE will have separate meetings: the next GIREP-EPEC conference will take place in Jyväskylä, Finland, in August 2011 (www.girep.org/), MPTL will meet in September 2011 in Ljubljana, Slovenia (www.mptl.eu/workshops.htm) and the next ICPE conference will be held in Mexico City in August 2011 (www.icpe2011.net/).

Due to the success of this year’s conference, however, the main question for the future will obviously be: when shall these three meet again?

Ann-Marie Pendrill, Gorazd Planinsic and Michael Vollmer

COMPETITION

Students triumph at physics olympiad

In the 2010 International Physics Olympiad (IPhO) in Zagreb, Croatia, there were five finalists representing the UK and each one of the students returned home with a medal. There were more than 90 countries participating and our finalists achieved

one gold medal, one silver medal and three bronze medals. The UK team was Gareth Wilkes, Sergei Patiakin, Matthew Donora, David Kell and Andrew Hyer. Congratulations go to them and their teachers. The next international compe-

tion will be held in Bangkok, Thailand, in July 2011.

More than 80 countries are represented at the IPhO, established in 1967. Each country is invited to send a team of up to five school students and two teachers. As in the sporting

Olympics, the International Physics Olympiad offers students the opportunity to test themselves at the highest level as well as experience a unique cultural and social opportunity. Despite the two challenging five-hour exams (one theoretical, one experimental) a festival atmosphere persists and the programme of excursions and social activities gives students the chance to learn about the host culture and make friends from across the globe.

The 2011 British Physics Olympiad

The competition details can be found at www.bpho.org.uk.

Any school that has not participated before, or has not entered students for the British Physics Olympiad in the last two years, may enter up to two candidates for Paper 2 free of charge, with entry fees kindly sponsored by The Ogden Trust.

If you want to take up this offer please e-mail Lena Hagan (l.hagan1@physics.ox.ac.uk) with your request before ordering online.

The British Physics Olympiad (BPhO) attracts entries from more than 1000 talented young physicists every year. The competition has a dual purpose: to challenge and reward the best physicists in British schools, and to select the UK team for the International Physics Olympiad. Most entrants are in year 13 (A2, Advanced Highers or equivalent level), but younger students are welcome to participate.

Physics challenge

This challenge takes place on 11 March 2011 and you must



The UK olympiad team with their Croatian guide, taken in the Central Square, Zagreb. The students are (left to right, standing): Gareth Wilkes, Sergei Patiakin and Matthew Donora, and (left to right, sitting) David Kell and Andrew Hyer.

enter by 4 March 2011. It is a fun challenge for GCSE, Standard Grade or equivalent-level students. The paper has a refreshing mathematical style and includes multiple-choice and short-answer sections. It is marked in school, with the mark scheme being provided and is suitable for candidates predicted to achieve an A or A* grade.

AS competition

The AS competition is held on 18 March 2011 with an entry deadline of 11 March 2011. The competition is designed to stretch lateral thinking skills and encourage students to apply fundamental principles to novel situations. It is a single one-hour paper marked in school and designed to favour all exam boards equally. The AS competition provides an excellent tool to assess and challenge students' ability to work at Key Stage 5 and beyond.

BPhO experimental project

An experimental project is also available. It was introduced in 2007 to provide young physicists with more hands-on experience. A project brief is provided detailing an experiment that is suitable for GCSE or sixth-form students. Teachers set the task to their students, choose the best in their school for each age group and then send it for national judging.

How to enter

There is an online entry system, using the University of Oxford's well-tested online shop at www.bpho.org.uk.

Past papers and more information regarding all of the competitions can be found at the same web address. All of the exam papers can be requested in electronic form.

Francisca Wheeler

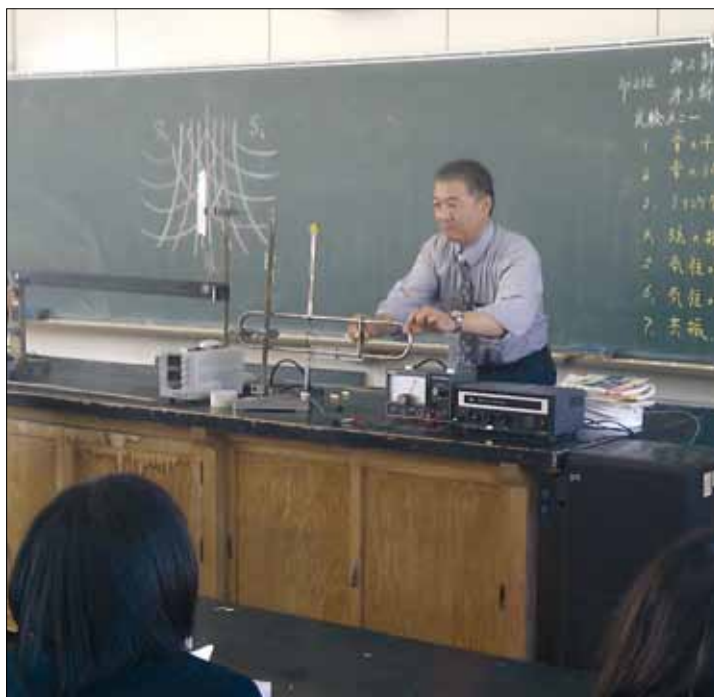
TEACHING

Physics proves popular in Japanese schools

I was fortunate to be invited, along with three students, to visit Jishukan High School in Aichi Province, Japan, over the October 2010 half-term holiday. Japan is a long way both physically and culturally from the UK but a physics lesson is still a physics lesson the world over it seems.

We were able to spend two days in the school, observing and taking part in their lessons. For me the most fascinating time was watching a lesson about sound interference. Apart from the fact that there were 38 sixth-formers in the laboratory, this could have been the same as a lesson back in the UK—an active and animated teacher, a series of demonstrations and calculations, emphasis on repeatability of measurement... it was all there. The experiments were whistled through quickly—the school has only one laboratory and most lessons take place in classrooms, so lab time is precious. Also, with no technical support staff, it is up to the teachers to prepare practical work, which ends up mainly being demonstrations.

Melde's experiment was quickly followed by the range of human hearing, the interference from two loudspeakers, the classic speed of sound with a tuning fork and a cylinder of variable length. Then there was a new one on me. The teacher demonstrated a sound version of



Nakayama-sensei shows sound interference by amplitude division.



Nakayama-sensei measures the speed of sound.

interference by showing division of amplitude (like a Michelson interferometer). Sound is generated at the top of a tube, passes down into a T-piece and then down two arms that bend back and recombine the sound at a second T and a microphone. One of the arms is a trombone slide and as its length varies the signal at the microphone varies in its intensity. The students helped to

take the measurements during the experiment and calculated the results on the spot, making the lesson a fairly full 50 minutes in length.

Science is clearly very important in Japanese high schools and is also popular. However, all of these students would also have been studying maths, English and Japanese, as well as two sciences. Students that

are taking a humanities stream would swap the sciences for other subjects. The practical application of science is evident in the high-technology society in Japan, from large flat-screen TVs to bullet trains. They also have highly robot-powered car plants, including Toyota, on their doorstep.

Ken Zetie

Forthcoming Events

If you have an upcoming event that you would like to publicize, e-mail clare.thomson@iop.org.

January

5–8 Association for Science Education Annual Conference, University of Reading, UK
www.ase.org.uk

8–12 American Association of Physics Teachers (AAPT) Winter Meeting, Jacksonville, FL
www.aapt.org

February

20–22 Physics in Perspective, University College London and the Royal Institution, London, UK. A three-day enrichment course organized by the IOP for sixth formers and college students. For details and booking visit www.iop.org/pip or contact Manchi Chung (e-mail manchi.chung@iop.org).

March

10–13 National Science Teachers Association National Conference, San Francisco, CA

www.nsta.org/conferences

10–12 The Big Bang, ICC London ExCeL, UK. The free science and engineering fair for all school and college students
www.thebigbangfair.co.uk

11–20 UK National Science and Engineering Week. The programme is aimed at people of all ages. For more information on how to get involved go to www.britishscienceassociation.org

10–13 National Science Teachers Association (USA), National Conference 2011, San Francisco, CA
www.nsta.org

April

9–22 Edinburgh International Science Festival
www.sciencefestival.co.uk

15–17 Spring Physics Update, University of York, UK. A three-day residential course for practising physics teachers. For information and booking contact Manchi Chung (e-mail

manchi.chung@iop.org) or go to www.iop.org/update

July

8–10 Summer Physics Update, University of Bristol, UK. A three-day residential course for practising physics teachers. For information and booking contact Manchi Chung (e-mail manchi.chung@iop.org) or go to www.iop.org/update

17–22 The Goldsmiths' Company free residential courses for teachers (including particle physics, astrophysics and materials science), Cambridge, Brunel and Queen Mary, London Universities.
www.thegoldsmiths.co.uk/education/sciencesociety.php

30 July–3 August AAPT Summer Meeting, Omaha, NE, USA
www.aapt.org

August

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