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Students compete in European Union Science Olympiad 2010

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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 September issue of Physics Education to ped@iop.org before 19 July 2010.

Music

Here comes science that rocks

The American alternative rock band They Might Be Giants branched out into children's music several years ago, winning a Grammy for their 2008 album *Here Comes The 123s*. Now the band has adapted its unconventional musical style and quirky lyrics to produce a CD of science-themed songs, and scientists, teachers and lots of kids are taking notice. The *Here Comes Science* album features 19 songs and a DVD with animated versions of each tune is also available (most can also be seen on YouTube). More than half of the songs have a physics, astronomy or general science theme.

They Might Be Giants was formed in 1982 by Brooklyn, NY, musicians, John Flansburgh and John Linnell. 'We've been performing science and history songs for a long time and were intrigued by popular scientific ideas,' said Flansburgh. 'After the success of our earlier kids' CDs, we wanted to do an album that covered some basic science concepts.'

While some songs are simply repetitious and reinforce a basic scientific principle, such as the difference between speed and velocity, others are more demanding of young listeners. 'Meet the elements' is a quick tour of the periodic table, which cranks out properties for more than a dozen common elements. Likewise,



They Might Be Giants have produced a science-themed album.

'Why does the Sun shine?' is bursting with solar facts. 'Science is real' and 'Put it to the test' outline what science is and how it is done, and animations on the DVD touch on the scientific method, the big bang theory, magnetism, inclined planes and the speed of falling bodies.

Other tracks include 'Roy G Biv', which sets the well known mnemonic for the visible spectrum to a snappy melody; 'Solid liquid gas', which explains the states of matter; and 'What is a shooting star?', which drums home the difference between a

meteor and a meteorite.

Some songs also cleverly sneak in a few cultural references via the music. In 'How many planets?' the lyrics are merely a list of the planets, but the pronunciation of each one changes. Venus, for example, is sung in a woman's voice, Mars has a distinct alien or 'Martian' sound, while Jupiter is spoken with a deep, slow voice conveying its massive size. Then there's the gurgling pronunciation of Neptune, which sounds distinctly subaquatic, a quaint reference to the Roman god of the sea. Flansburgh doesn't believe

that these cultural references, or the science, are beyond the targeted audience. 'Kids today are smart. They're going to get it.'

Walter Smith, a physics professor at Haverford College in Pennsylvania, feels that 'a few of the physics-related songs are brilliant. *Here Comes Science* is aimed at children up to about age 10, although older kids will enjoy some of the songs as well.' He adds that some of the songs 'would even be appropriate for high-school or college students'.

Having no scientific background, Flansburgh says that

he and Linnell sought scientific advice when composing the lyrics to get the facts correct, but acknowledges that a few bloopers slipped through. These are mostly evident in the animations where, for example, the scale of the planets or subatomic particles are not accurate, although such discrepancies are not uncommon even in textbooks. They did, however, correct the lyrics of 'Why does the Sun shine?', which calls the Sun a mass of incandescent gas. They wrote a sequel, 'Why does the Sun really shine?', which begins: 'The Sun is a miasma of

incandescent plasma'.

Flansburgh is clearly pleased with the largely positive reception of *Here Comes Science* especially when teachers adapt the songs to engage students in the classroom. 'Because we've had so much success with our music for kids, we've been able to reach a larger audience than we ever could have imagined.'

Nick Thomas professor,
Department of Chemistry,
Auburn University at
Montgomery, Montgomery,
Alabama, US

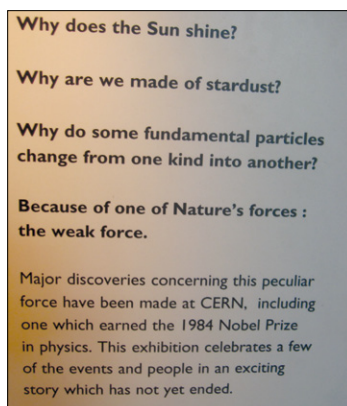
STUDENT TRIP

Two views of the future of CERN

A 17-strong group of A-level students from Withington Girls' School in Manchester, UK, spent a weekend in Geneva, taking in the sights and finding out what CERN is all about. Here are accounts from two of them.

Suzanne Hall

Nowadays, after watching the fictional scientific feats of Iron Man and *Star Trek*, it's hard to get teenagers impressed or motivated by real physics. But I can safely say that after our recent trip to the LHC, every single member of our group was left inspired by the science that it put before us. We were lucky enough to have a few scheduled tours around the site. They took us into a large warehouse where our guide explained exactly how the collider works—it really is mind-blowing physics. We were shown around the station for the LHCb detector, and it was only here that I realized the scale and phenomenal amount of



A poster at Microcosm.

work put into each of the experiments. It's difficult to comprehend exactly how detailed everything is unless you see all of the intricacies for yourself; something that I feel enormously privileged to have experienced.

I find physics truly fascinating, and I'm hoping to study it at university. For me, visiting a place like this really has put things in perspective. I knew before the trip that particle physics was the



Big European Bubble Chamber.

area in which I was most interested, but after seeing for myself how the scientists go about their research, it has greatly encouraged me to work hard and delve even further into physics, because there is so much yet to be discovered. With any luck, I might even be able to work somewhere like CERN one day.

Although visiting the LHC was definitely the highlight of our trip, I also have to mention

the time that we spent in Geneva. Our hotel was a mere minute's walk from the beautiful Lake Geneva, where we spent a good hour sitting on the rocks and admiring the view, just as the Sun was beginning to set over the city. At night the streets were buzzing with excitement and each road that we wandered down was teaming with cafés and restaurants. The next morning, surrounded by glorious blue skies and sunshine, we took a short boat trip across the lake and ate some delicious ice cream at a small parlour, right next to the incredible 140 m high fountain. It was, without a doubt, one of the most beautiful cities I have ever been to, and I would most definitely go there again.

Overall I feel as though I have benefited hugely from this trip and I know that the rest of my troupe would agree. We are on the brink of exceptional scientific discovery, due to the dedicated research carried out by places like CERN. Even if you feel completely out of your depth with particle physics, I would encourage every young person with an interest in science to take a trip to the LHC because it really was an unforgettable weekend.

Fei Lin

This was undoubtedly one of the best school trips that I have ever been on. We were all so excited at the prospect of visiting CERN, the highly publicized and world-renowned centre of new answers, discoveries and physics. Our guided tour did not disappoint.

The guides had all worked on different projects at CERN, and their passion and enthusiasm for their work was contagious. We



The group enjoy the sunshine outside at CERN.



The morning by Lake Geneva.



A close-up of a segment.

were shown the manufacture of the superconducting magnets and saw real components and mechanisms involved in making the LHC. We visited the Computer Centre (a personal highlight) and the LHCb.

The LHCb is an experiment set up to explore what happened after the big bang, which allowed matter to survive and build the universe that we inhabit today. The 'b' in LHCb stands for 'beauty'. Although absent from the universe today, particles known as beauty quarks were common in the aftermath of the big bang and will be generated in their billions by the LHC, along with their antimatter counterparts, anti-beauty quarks. b and 'anti-b' quarks are unstable and short-lived, decaying rapidly into a range of other particles. At CERN physicists believe that by comparing these decays, they might be able to gain useful clues as to why nature prefers matter

over antimatter. Fourteen billion years ago, the universe began with a bang. The energy went on to form equal quantities of matter and antimatter, but as the universe cooled and expanded its composition changed. Just one second after the big bang, antimatter had all but disappeared, leaving matter to form everything around us.

They explained theories and principles to us clearly and for the first time I understood the physics behind CERN. They actively encouraged us to participate in discussions and to ask questions, allowing us to really benefit from the experience. To be able to see the physics that we learned from textbooks put into context was a true privilege.

Visiting CERN was an incredible opportunity. I have taken so much from this trip and learned more than I could expect in one day. I have been inspired and for this I am very thankful.

CLASSROOM

Researchers can motivate pupils

Researchers in Residence is a £1.2m scheme that matches up schools and graduate researchers. Funded by RCUK and supported by the Wellcome Trust, the scheme is free and open to all UK schools. The ASE is one of a team of organizations that are currently delivering the scheme.

Teachers use the Researchers in Residence scheme to engage and motivate their students, to get them thinking seriously about physics-related careers and to make links with their local university. The amount of time that teachers have to put in is minimal. Perhaps the biggest benefit of inviting a researcher into your school is that they provide a young and energetic role model for your students. Not just any role model; someone who is actively and enthusiastically learning about physics. The scheme offers 24 hours of teacher and student classroom support from some of the country's leading researchers who can enrich curriculum delivery and bring subjects to life with imaginative projects and interactive exercises. Hosting a researcher can boost student motivation, enhance curriculum delivery, improve grades



Researchers can enrich curriculum delivery and boost student motivation.

and develop teacher CPD.

Projects can be tailored to suit your needs; for example, targeting gifted and talented students, students doing coursework or National Science and Engineering Week (which is next March). Placements can be flexible, including practical classroom activities, after-school club projects, lunchtime talks, careers advice or support for small groups. The researchers are CRB checked and are given a one-day training course on science communication and basic classroom skills. More than 300 placements were organized in schools across the country in 2008/09. The

feedback from teachers and their pupils was overwhelmingly positive: 'The programme has had the whole school talking and now teachers from other departments are keen to have a placement,' said Dr Margaret Ritchie, head of science at Arbroath High School.

If you've never tried Researchers in Residence and want to find out more, or if you've done it before and want to try it again, register online at www.researchersinresidence.ac.uk or call 0845 365 7470. The website contains case studies, teacher profiles and podcasts to give you a flavour of the sorts of placements that have taken place in the past.

APPOINTMENT

AstraZeneca trust appoints new director

The AstraZeneca Science Teaching Trust (AZSTT) is pleased to announce the appointment of Dudley Shallcross, science educator and atmospheric chemist, as its new director following the

retirement of Hugh Lawlor who had held the post since the establishment of the trust in 1998.

Professor Shallcross came to the School of Chemistry at the University of Bristol, UK, in 1999 as a lecturer, and combined running a successful research group in atmospheric science with

establishing a strong regional chemistry school teacher network, CHeMneT. By 2004 this network was 200 strong and with the establishment of Bristol ChemLabS, a HEFCE Centre for Excellence in Teaching and Learning, in 2005, the range and impact of the activities increased.

Dudley became the Outreach director for ChemLabS, a post that he held until becoming director of the AZSTT.

Two of the main reasons for the success of Bristol ChemLabS Outreach were the establishment of a full-time school teacher fellow position and the provision of high-quality training in science communication for postgraduate students, who then took on the roles of science ambassadors. In this time Dudley has won nine national awards and one international award for science education and science communication. He is a great advocate of hands-on science and wants students

and the public to experience real science for themselves.

Under Hugh Lawlor's guidance the trust has established a reputation within the science-education community for providing pedagogic support and continuing professional development for science teachers in the UK. Its work was initially targeted at teachers of science at primary level but it has recently become more engaged with the transition to secondary education.

'The AstraZeneca Science Teaching Trust prospered under Hugh Lawlor's leadership over more than a decade,' said chair of trustees Mike Rance. 'The trust-

tees are excited by the prospect of working with Dudley to build on the foundations created by Hugh.'

'I have seen first-hand the difference that good science teaching can make to school students. The AstraZeneca Science Teaching Trust has played a pivotal role in supporting science teachers at primary and transition level in the UK over the last 12 years. I am delighted to have the opportunity to continue and extend this work,' said the new director, Dudley Shallcross.

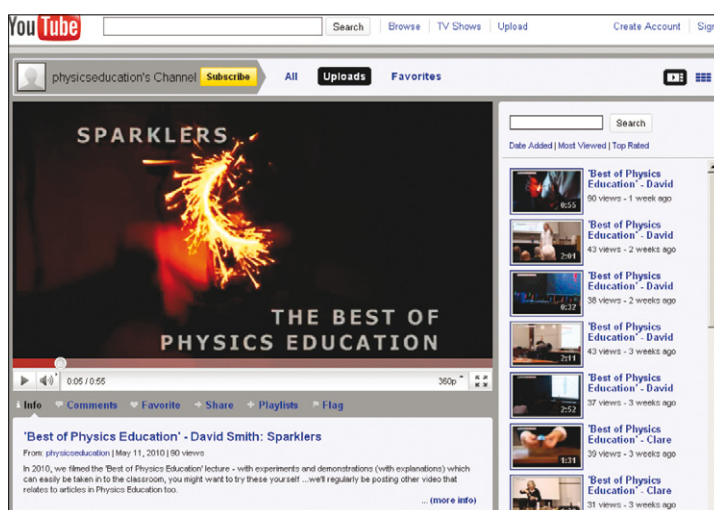
More information about the trust and its activities can be found on its website at www.azteachscience.co.uk.

MULTIMEDIA

Physics Education comes to YouTube

If you've been studiously reading the news section of *Physics Education* over the past years you'll know that at the Association for Science Education annual meeting we have a 'Best of *Physics Education*' demonstration lecture. The editorial board and a few friends get together and present some of the ideas that have graced the pages of *Physics Education* or that they hope to write up for the following year. At the 2010 meeting in Nottingham, UK, we were fortunate enough to have a film crew to record the event. Now clips of some of the demonstrations are available on a *Physics Education* YouTube channel, so if you couldn't make it you can still enjoy the benefits.

Visit www.youtube.com/user/physicseducation#p/u and you can see the presenters showing off just some of the demonstrations that were done in front of



Our YouTube channel features the best of Physics Education.

a live audience. You can leave comments, subscribe to the channel and add clips to your favourites, joining the hundreds, maybe even thousands, of people who have already viewed the demonstrations. If you have a question about a clip, post it as a comment

and we'll try to answer it.

If you are writing an article where a video clip would be useful, send it in with the submitted paper and we'll add it to the channel once the paper is accepted.

Gary Williams

COMPETITION

Students compete in European Union Science Olympiad 2010

In April, 126 young European students from 21 countries arrived in Gothenburg to take part in EUSO—the European Union Science Olympiad. Together with more than 80 teachers and leaders, they filled the Lisebergbyn camping village to the last cottage, hotel bed and youth-hostel room.

The EUSO was founded by Michael Cotter from Ireland. It was set up as a complement to existing science olympiads that take place for older students. The EUSO is a team competition, where teams of three students (two teams per country), up to 17 years old, perform two four-hour experimental tests including physics, chemistry and biology, on two separate days.

The tasks were prepared by researchers in the science faculty at the University of Gothenburg. These tasks were then discussed, modified, translated and printed during intense evening and night sessions.

The chemistry department opened its labs for 21 teams in the morning and 21 teams in the afternoon of each day.

Some time before leaving for Gothenburg, the country co-ordinators were told about the themes for the tests. On the first competition day, the students took on a role to help an extraterrestrial, Hon Sala, who was searching for precious water. Microscale equipment was used for the titrations. The experimen-



Left to right: Curt Nyberg (University of Gothenburg), Stefan Petersen from Germany and Lars Gislen (University of Lund) discuss physics aspects of the first task during a short break.



The first day: helping aliens to search for water on a visit to Earth.

tal tasks in this test—revealed to the mentors the day before the competition—included different ways to determine various properties of water, including surface tension, viscosity and hardness,

as well as humidity in the air. The second task, on Thursday, involved a CSI (criminal scene investigation) where the students were asked to solve a murder case. They had to analyse the amount of poison in the ‘blood’, identify pollen found in a letter sent to the victim and compare lists of plants to those found close to the suspects’ houses. Finally they had to estimate the time of death by modelling the cooling of a Swede, by the cooling of a swede. (We couldn’t resist that pun.) Encouraged by the EUSO president, Michael Cotter, the sciences were integrated as far as possible. For example, the measurement of surface tension involved a balance scale and was coupled to levers in the human body. The cooling of the swede was accompanied by questions

of cooling of different types of animals, including hibernating bears and hedgehogs.

Of course, the practical preparations for the event started long before the arrival of guests, with Anne-Sofie Mårtensson and Margareta Johansson (and a lot of friends and colleagues) ensuring the logistics of feeding, housing and transporting all of the guests. This task included finding ways to keep leaders separate from students on the nights before the competitions, when the leaders knew the task for the next day, but also to offer entertainment after the competitions. On Tuesday everyone got to try Swedish folk dances. On Wednesday all of the competitors visited Varberg to get an idea of what some parts of the west coast were like. On Thursday, after the final test, everyone went on a boat trip—except for some of the locals who stayed behind to mark the competition papers.

An event like this offers many opportunities to become aware of differences in curricular content and emphases, not least during the discussions, e.g. of openness and wording in task formulations, as well as of principles for grading. As always, grading student tasks highlights many different types of solutions, from quick and dirty to careful measurements, from unreflected straight-line fits to careful and accurate reflections on deviations from expected behaviour. In addition to the competition, we invited Swedish teachers and teacher educators who were not otherwise involved with the competition to discuss and compare curricula.

Preparations for the EUSO vary widely between countries.



The opening of the award ceremony: vice-dean Marie Rådbo and dean David Turner from the science faculty of the university.



Co-ordinator Anne-Sofie Mårtensson together with EUSO president Michael Cotter.

For some countries EUSO is an important part of the preparation of 16 year olds for later participation in the international olympiads in physics, chemistry and biology. In other countries, the opportunity to stimulate general interest in science is given a higher priority. During the opening ceremony in the Aula (great hall) of the University of Gothenburg, Michael Cot-

ter asked the participants: ‘Will you do your best? Will you make new friends? Will you influence my future?’

Many friendship bonds formed during the week. Maintaining contacts is made much easier with social networking making it possible to share photos and videos. Not surprisingly, a larger fraction of the young participants than of the leaders made use of

this possibility.

During the closing ceremony, the vice-dean of the university, Marie Rådbo, reminded the participants that they are always welcome to make contact should they come back to Gothenburg. All of the teams received medals—bronze, silver or gold. Czech Republic team B was the winner, and the remaining gold medals were awarded to both of the Ger-

man and Hungarian teams, as well as to the teams Romania A and Estonia B.

For many teams, the journey home turned out to be more adventurous than planned. Being stopped by the ash from Eyjafjallajökull they were offered an extra night or two in their cottages. If the competition week didn't offer much free time, this gave them some to explore their

surroundings, in the late Scandinavian spring.

EUSO is a significant event for these young gifted students. Four of the Swedish participants from the competition in Potsdam 2007 volunteered to take a week off from their last semester of school to contribute to the positive experience of this years' participants.

Ann-Marie Pendrill

PHYSICS ROADSHOW

Pupils see wonders of physics

A band of physicists toured the regions of central Finland and southern Savonia in mid-March to bring a show of physics to small elementary schools. The physics students, studying to become teachers, found themselves on a crash course in theatre studies as they planned and practiced their performance with actor and director Jussi Myllymäki. After honing their acting skills, they put the show together from the coolest bits of physics—ranging from magnetic fluids and balloons in vacuum, to lasers and fog machines—all understandable at elementary-school level.

For the student teachers, the roadshow was part of their teacher-education programme. The production of the show was supervised by Anssi Lindell, lecturer of physics education at the University of Jyväskylä. He said: 'The Seven Wonders of Physics roadshow combines teacher training, teacher professional development and inspiration to study nature. Everybody, the teachers, the teacher students and the children, learn in a natural interaction with each other.'



Rainbows are reflected from the prism when illuminated by a projector. Image courtesy Pyry Antola/Laukaa-Konnevesi.

The student teachers found the project to be a lot of work at first, but rewarding in the end. 'Taking the responsibility for this tour really motivated us to put in more

effort,' noted Joonas Soininen, Timo Aho and Esko Allinen.

The children sat nailed to their seats during the show and were visibly fascinated with the hap-

penings on stage. While the older children laughed, the younger ones were moved by the fate of Marvin the Marshmallow Man, who swelled to twice his size inside the vacuum chamber, but became slightly less impressive when the air was let back in. The physics students had to assure them that Marv was all right despite his slim appearance. The demonstration of sound waves by means of a ‘gas grill’ with a loudspeaker at one end suffered slightly from heavy air conditioning at some schools, but was popular at the others. ‘I have never seen such physics in my life!’ read a comment on the feedback form.

After the stage show the children were invited to get a closer look at some of the phenomena. They were excited to poke a magnet hovering over bars of cooled superconductor and demanded to know why it was okay for them to eat marshmallows out of liquid nitrogen, but not frankfurters (which were, of course, dipped in to demonstrate what happens to nimble little fingers if they get too curious about liquid nitrogen).

The teachers and headmasters were quick to book the show for their schools as soon as word was sent out. While the sciences are considered important in classrooms, extra motivation was warmly welcomed. ‘We try our best, but have a limited budget for science equipment,’ commented headmaster Jouni Lahti of Kurkikura School in Joutsa. ‘Will you be back in a few years?’

The ‘Seven Wonders of Physics’ roadshow was invited this year to four elementary schools (ages 7–12). The size of schools ranged from 24 pupils at Savio, Laukaa, to 137 at Haukivuori,



A sine wave of sound modulates pressure in a Rubens' tube.



One laser beam turns into many. Image courtesy of Pyry Antola/Laukaa-Konnevesi.



The magnet hovers over a cooled superconductor and won't budge.

Mikkeli. The show is free of charge to the schools and has received funding from the Finnish Physical Society. The roadshow has been organized

annually since 2007.

Anna-Leena Latvala and Anssi Lindell (anssi.lindell@jyu.fi), University of Jyväskylä, Finland