

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 send your news items for the January issue of *Physics Education* to ped@iop.org before 18 November 2005.

SPAIN

ESERA conference debates the teacher–researcher relationship

The European Science Education Research Association (ESERA) is a relatively young research organization. Following its inaugural meeting in Leeds, UK, in 1995, the fifth biennial ESERA conference was held in Barcelona, Spain, from 28 August to 1 September.

The conference was attended largely by educational researchers, giving them the chance to present their findings to fellow researchers.

More than 500 people attended the conference. Most came from Europe, but they also travelled from countries such as Brazil, Mexico, the US, Canada, Taiwan and Australia.

One of the interesting, and challenging, features of the conference was the range of cultural backgrounds. These cultural differences are apparent in the school systems of the countries represented, and also in the approaches used in educational research.



More than 500 people attended the conference in Barcelona.

A key topic of discussion at the conference was how researchers should engage with teachers. The notion that researchers should inform teachers of their research, and that teachers should simply implement these findings in the classroom, was recognized by many as being too simplistic.

Many of the presentations in Barcelona recognized the complexities of working in the classroom and aimed to identify what it is that good science teachers do

well (for example, by examining the way in which experienced science teachers talk to their pupils).

In addition there was a useful plenary session that focused on the need for researchers to involve teachers and policy makers in their work if they are to have any impact on them – and hence on student learning.

The next conference, in 2007, will be held in Malmö, Sweden.

Jim Ryder

MEDIA

Teachers' TV Associates now launched

Anyone working in a school in England can now register online to become a Teachers' TV Associate.

Associates can access sneak previews of programmes shown on Teachers' TV, join interactive

discussion forums, get involved with the programmes, and receive invitations to various events.

In return, associates are expected to spread the word to their colleagues about the range of pro-

grammes offered on Teachers' TV, and to share ideas about how to make the best use of the channel.

Register now at www.teachers.tv/associates to receive a Teachers' TV welcome pack.

SLOVENIA

GIREP seminar: 'formal' and 'informal' educators work together in Ljubljana

GIREP, the International Research Group on Physics Teaching, held its third seminar in Ljubljana, Slovenia, from 5 to 9 September. The title of the seminar, Informal Learning and Public Understanding of Physics, which was proposed two years ago at the second GIREP seminar in Udine, Italy, was a perfect choice. The number of attendees rose to more than 120, from 30 different countries.

The status of attendees ranged from university lecturers focused on physics education to educators from science centres, and many teachers from primary and secondary schools attended too.

The five-day event was organized and hosted by the University of Ljubljana's Faculty of Mathematics and Physics and Faculty of Education, and by the House of Experiments (a Slovenian hands-on science centre), GIREP and the European Physical Society.

The seminar brought together 'formal' educators from universities, institutes and schools, and 'informal' educators from science centres and museums to work on common goals. Those goals were:

- to improve physics teaching by implementing strategies that proved to be successful in informal settings;
- to address how assessing the knowledge gained in science centres can be carried out;
- to increase the public's understanding and appreciation of physics and science in general.

The mornings were reserved for the plenary lectures, which were



The House of Experiments held a make-and-take workshop.



Paul Doherty with a giant whirlly during his show at Bistra Castle.



Participants demonstrate a longitudinal wave with a human chain during a science show.

given by Urbaan Titulaer of Austria; Leos Dvorak of the Czech Republic; Manfred Euler, Joachim Schlichting and Christian Ucke of Germany; Moshe Rishpon of Israel; Marisa Michellini of Italy; Janez Strnad of Slovenia; Robert Lam-bourne and Richard Walton of the UK; and Paul Doherty of the US.

Schlichting took us through the magic world of light reflection and refraction. Dvorak showed some original, simple experiments, several of them developed by Czech teachers and students at science camps that he has organized for many years. Ucke explained the physics behind the suspension bridge by using paperclip models in combination with 3D computer-simulation freeware.

During the first two days 60 presentations were given in two parallel panel sessions and one poster session. They were grouped into four topic areas:

- science centres, schools and universities;
- learning physics from experiments;
- gaps and bridges in communicating physics to the public;
- new teaching strategies and learning methods.

The third and fourth days were devoted to discussion workshops on the same four topics. On the concluding day, reports on the workshops were presented: see www.girep2005.fmf.uni-lj.si.

Several other workshops and science shows were also on offer in Ljubljana. Preceding the meeting, the House of Experiments

hosted public demonstrations and also a hands-on make-and-take workshop for the meeting participants. During the week David Sokoloff of the US gave an evening science show on light and optics; and stimulating science shows celebrating the World Year of Physics 2005 were performed

by Brian Jones, Chris Chiaverina and Stanley Micklavzina from the US, and Miha Kos and Luka Vidic from the House of Experiments.

On Thursday afternoon participants visited the Caves of Kocjan, a UNESCO world heritage site that comprises a huge system of caves in Karst region. The trip

concluded with a visit to the Technical Museum at Bistra Castle, the conference dinner, and a short, spectacular science show by Paul Doherty from the Exploratorium in San Francisco.

**Mojca Čepič and
Stan Micklavzina**

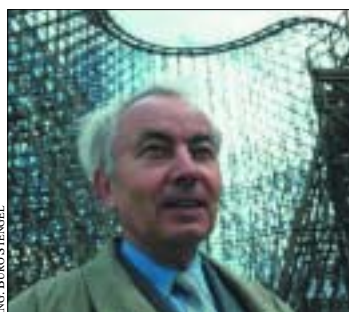
AWARD

Faculty honours rollercoaster designer

The Faculty of Science at Göteborg University has awarded Werner Stengel an honorary doctorate in recognition of his inexhaustible creativity, which connects physics and design with the experience of the body on rollercoasters and other rides.

Stengel's career in the amusement industry started in 1963 when he joined Anton Schwarzkopf [1]. One of their early joint projects was the first German rollercoaster, the Super Acht, which had its premier at the Oktoberfest in Munich in 1964. Since then, Stengel and his team have been involved in nearly 500 rollercoasters around the world, as well as many other types of rides, such as ferris wheels, bumper cars, water rides and 92 types of carousel.

The Roller Coaster DataBase website [2] says about him: "Simply put, Werner Stengel has been involved with more rollercoasters than anyone. Stengel is involved with so many rollercoasters because he does not build or sell them, but works with most of the manufacturers that do. The type of work provided by Stengel varies from client to client and project to project. His services include



Werner Stengel designed the Colossos, which opened in 2001 at the Heide-Park in Germany.

design, layout and calculations for every aspect of rollercoasters, as well as other amusement rides."

Stengel's work has brought many innovative ideas to the field, and some of them appear elsewhere in this issue [3, 4]. Since 1988 Stengel has been part of a research group that is investigating the strains placed on the human body by rollercoasters, especially during inversions.

Innovations in education

Stengel's rollercoaster innovations provide wonderful examples for physics and maths education. Sections of extended airtime are useful to help straighten out common misconceptions among students about weightlessness [3].

Determining the track shape for a clothoid loop can be an interesting programming exercise, and the appearance of Fresnel integrals and Cornu spirals in a context other than diffraction demonstrates the ubiquitous presence of mathematics [4].

The mathematical concept of a space curve may seem abstract – but not to the rider in another of Stengel's rollercoaster innovations. The usefulness of the 'g-force' concept is closely linked to the equivalence between inertial and gravitational mass. Rollercoasters provide inspiring examples of mathematics, physics and technology in positive settings, and the enjoyment of rollercoasters is essentially gender neutral. In rollercoasters, a lot of the fun is physics.

References

- [1] Ing. Büro Stengel: www.rcstengel.com
- [2] The Roller Coaster DataBase: www.rcdb.com
- [3] Pendrill A-M, Rödjegård H 2005 *Phys. Educ.* **40** 522
- [4] Pendrill A-M 2005 *Phys. Educ.* **40** 517

Ann-Marie Pendrill

OECD

Global survey to assess school leavers' abilities

In 2006 around 58 countries will take part in a survey that will focus on science. The OECD Programme for International Student Assessment (PISA) will study 15-year-olds who are reaching the end of compulsory education. The survey will compare their abilities in reading, maths and science with those of their peers in other countries.

The study will assess students' attitudes to science and test their understanding of fundamental scientific concepts and theories with regard to physical, living, Earth and space systems. It will also test their understanding of the nature of science as a human activity, and the power and limitations of scientific knowledge.

The study will relate the students' performance to factors such as home background and attitudes to school work. The test instruments were developed by an international expert group that included representatives from the Association for Science Education, the Open University, the Qualifications and Curriculum Authority and the National Assessment Agency. The Department for Education and Skills' own national expert group

also contributed to the survey.

The ongoing study is carried out on a three-year cycle. In 2000 the UK's results were generally above average, but they reinforced concern about the wide variation in performance and the strong impact that a pupil's background has on performance in the UK.

In 2003 the UK data could not be used because too few schools agreed to take part in the study. Based on feedback from schools, measures have been put in place for 2006 to make participation easier. For example, the testing period has been moved from the spring to the autumn term, and those schools selected to take part will be alerted much sooner. The hope is that these steps, and better information about the purposes and importance of PISA, will increase the number of schools that wish to take part.

To find out more about PISA go to www.pisa.oecd.org. For information about PISA in England, Wales and Northern Ireland contact: pisa_quk@nfer.ac.uk.

Richard Knox and Jenny Bradshaw

SCOTLAND

Annual meeting

The Association for Science Education Scotland's annual conference will take place at the Erskine Bridge Hotel, Erskine, on 3–4 March 2006.

The conference, which is called Increasing Engagement, Improv-

ing Achievement, is organized with the Supporting Scottish Science Education Through CPD initiative. Speakers will include Profs Brian Boyd and Paul Black.

Further details are available at www.asescotland.org.uk.

Catherine Wilson

COMPETITION

Opportunity to win revision aid for your class

In November the scientific consultancy Counting Thoughts will be running a competition to win copies of its formative assessment and revision software, SURE•Q•.

Entrants will be required to write a multiple-choice question on physics. They should state which curriculum the question pertains to (GCSE or Scottish Higher). The entry should comprise the question, the correct answer and four incorrect answers. It should also include a couple of sentences of constructive feedback for each incorrect answer, to indicate where someone giving that answer has gone wrong.

A copy of SURE•Q• software (for either the GCSE or Scottish Higher physics curriculum) will be awarded to the three entrants who submit the best questions. If sufficient entries are submitted they will be compiled into a SURE•Q• question pack, which will be available to schools for free. Competition entries will be judged on their originality, relevance to the curriculum, correctness and clarity.

The competition is open to UK residents, and will run from 1 to 31 November. Multiple entries are permitted and entry is free. Entries can be made at www.countingthoughts.com/competition.htm, where full details, including an example entry and terms and conditions, will be available from the opening date.

Peter Clive

UK

Humour and controversy at energy day

The Institute of Physics Education Group's Energy Futures conference involved the most interesting set of speakers I have listened to for a long time. There was just the right mix of interest, humour and controversy to make for a most stimulating day on 24 September.

The conference, held at the Institute of Physics in London, started with John Steed from the Department for Trade and Industry. He explained the energy delivery infrastructure in the UK, and included many snippets of scientific and anecdotal evidence.

That oil is used as an insulator in high-voltage cables was news to many of us, but tales of children being injured at electricity substations were not. Being in the presence of a person who has had to deal with such incidents is far more sobering than seeing it on a video.

After a discussion about the future activities of the Education Group, lunch and the AGM, Adrian Bull from British Nuclear Fuels gave a talk on nuclear power. The UK public's perception of nuclear energy and its disadvantages seems at odds with the possible advantages. This is in contrast with countries like Finland and Sweden, where informed debate has led to different courses of action but a better understanding of the issues.

The next speaker, James Beal from Renewables East, had some contrasting, but not necessarily conflicting, opinions to offer the audience and brought us up to date with much of the new technology in use within the sector.

The comparison created plenty



Energy Futures featured talks on nuclear energy and renewables.



Jonathan Hare (left) demonstrated some Rough Science. James Beal (right) talked about new technology in the renewables sector.



of food for thought as the participants headed for tea. They returned for a final talk that was designed to leave them enthused – Jonathan Hare from BBC2's *Rough Science* series explained some of the energy-related contraptions that he had built during the series. Not only was the talk peppered with demonstrations and video clips, but there was plenty of inside information, funny stories and, best of all, obvious enthusiasm.

Overall it was an excellent day. I must admit to spending most of the rest of the weekend discussing many of the issues raised with anyone who was willing to listen.

The Education Group committee will meet soon, when the next event will probably be initiated –

watch this space or go to the Education Group's web pages (see below). It is hoped that the electronic slides used by the conference speakers and transcripts of the talks will be made available.

Further information

Renewable energy:
www.renewableseast.org.uk/Index.aspx

BNFL:
www.bnfleducation.com

Jonathan Hare:
www.creative-science.org.uk
 IoP Education Group:
groups.iop.org/ED/index.htm

Rough Science:
www.open2.net/roughscience

Gary Williams

TRAINING

Teachers get to grips with telescopes

The Faulkes Telescope Project has been busy in recent months running training sessions for teachers. The sessions are funded by the Dill Faulkes Educational Trust, the Particle Physics and Astronomy Research Council, and the Department for Education and Skills.

The training days enable teachers to get hands-on experience of using the Faulkes telescope interface, as well as the software recommended for use with the various science projects being run.

Training has taken place at several places, including Warwick and Cardiff universities, Jodrell Bank Radio Observatory and the CPR Learning Space in Cornwall.

A typical training day includes the opportunity to learn about the two research-class telescopes run by the project, as well as to find out how the telescopes can be used to enhance the teaching of certain



The Faulkes telescopes can enhance the teaching of the curriculum.

aspects of the curriculum.

Topics covered include how CCDs (charge-coupled devices) work, making your own colour images from images taken through different filters, measuring the position of asteroids to determine their orbits, and using spreadsheet

tools to do image analysis.

The training days have been very popular and frequently oversubscribed. If you would like to attend, please contact david.bowdley@faulkes-telescope.com.

David Bowdley

SCOTLAND

Educators flock to Stirling 2005

With an attendance of around 250, the 31st Stirling Physics Meeting – held on 1 June at the University of Stirling – proved as popular as ever despite poor weather.

In his welcoming remarks, Gemmill Millar from the Institute of Physics in Scotland (IoPiS) congratulated Rhona Goss (in her absence) for her IoP Teachers' Award, which had been presented in London.

Millar was followed by Bob Kibble from Moray House, who chaired the morning session and

introduced Hamish Budge, Curriculum development officer from Western Isles Council. In 'Making physics interesting in S1 and S2' delegates were treated to a range of teaching aids, including eye-grabbing PowerPoint slides with multiple gif (animated) images on one slide, a small and inexpensive webcam microscope for field work and a scientific-report writing tool called Textease.

Concept cartoons were reviewed as excellent lesson starters and 'lemonade' was used in a live experiment using an electronic balance interfaced to a laptop. The Irn Bru (what else?) was opened and placed on the balance.

Whether the mass went up, down or stayed the same over time could be seen clearly by the projected data output from the balance. The combination of the concept cartoon, the data-capture and display technology, and the potential for class discussion and report writing made this a compelling demonstration.

Formative assessment

Louise Turnbull from West Lothian District Council gave a presentation on formative assessment and collaborative learning. The five aspects of formative assessment were described as:

- provision of effective feed-

back to pupils;

- active involvement of pupils in their own learning;
- adjusting teaching to take account of assessment;
- recognition of the profound influence that assessment has on the motivation and self-esteem of pupils;
- need for pupils to be able to assess themselves and understand how to improve.

Turnbull gave an account of her colleague's experience during the pilot. This included an audit of existing practice that highlighted, among other things, content being delivered mostly via direct teaching with little pupil or staff/pupil collaboration.

Self marking

Following a decision to create a collaborative learning environment Turnbull proceeded to use a range of collaborative techniques, such as traffic lights, concept cartoons, card sort tasks, odd one out, and matching tasks. Marking tests also became a collaborative exercise. Pupils were encouraged to devise their own marking scheme and mark the tests themselves.

Finally, fourth-year pupils wrote a 'Letter To Me', following their prelim examinations. This was posted to their homes and contained a self-evaluation of their performance and what they have to do to improve.

John Fleming from Bathgate Academy appeared alongside Louise Turnbull as a practising physics teacher. Involved in a pilot scheme with primary and secondary schools in West Lothian, he was impressed at how good primary pupils were at investigations and collaborative working.

In what was probably the highlight of the morning session, Dan Hillier, business centre manager at the Royal Observatory of Edinburgh, described the Faulkes Telescope project. He was supported by Dawn Knight of Dalkieth High School.

Funded by a £10 m grant from the Dill Faulkes trust plus other contributions (see preceding News item), the project comprises two research-quality telescopes, one in Hawaii in the northern hemisphere and one in Australia in the southern. Further information can be found at www.faulkes-telescope.com.

Dawn Knight described how the telescope had been used at Dalkieth High School as part of a workshop with pupils. She described some of the planning and research that had gone into the session and the excitement for all those involved.

The meeting was treated to some wonderfully clear and colourful images of the Eagle and Ring nebulae produced during their session. The presentation concluded with a live session. With very little time remaining, one monochrome image was obtained live and, following a nail-biting race against the clock, the second attempt timed out with seconds to go.

Ronna Montgomery, of Bearsden Academy and an area coordinator for the Teachers Network, gave an overview of the Physics Teachers' network in Scotland.

SPUTNIK was showcased as an excellent example of the collaboration and sharing of particularly high-quality support material for physics courses at all levels. A surprise presentation was made to

Dave Spittal for his considerable help in hosting SPUTNIK on behalf of the network.

David Saxon of Glasgow University, who chaired the afternoon session, introduced the IoPiS prize-giving ceremony. The winners were:

Advanced Higher Physics

1st: Richard Davison, Williamwood High School Glasgow (not present) and Daniel Scislowski, Oldmachar Academy, Bridge of Don, Aberdeen.

3rd: Kerr Johnson, Brae High School, Brae, Shetland.

Higher Physics

1st: Bo Zheng, The Glasgow Academy, Glasgow

2nd: George Bowler, Dollar Academy, Dollar

Miles Padgett, in the afternoon keynote speech, celebrated the centenary of Einstein's most famous year in 'Does God play dice with nature?'. Some of Einstein's papers from 1905 were discussed as well as ideas such as mathematical modelling involving photons that could not decide which way they wished to be polarized; the Bell Inequality; the experiments that solved the Bell Inequality and confirmed Bohr's view; quantum superposition; collapse of the wave function; quantum entanglement; action at a faster-than-light speed.

The presentation concluded with a lively question and answer session that could have simply kept going. In a far-reaching, well researched and highly engaging presentation, Miles Padgett – with his characteristic enthusiasm – re-ignited the flame that took us into physics all those years ago.

Michael McVey