The newspaper of the physics community

interactions

May 2005

Institute of Physics

Physics 2005 crosses frontiers

Ayala Ochert reports from Warwick, host to this year's biggest physics conference.

More than 600 physicists from 31 countries gathered at the University of Warwick on 10–14 April for the UK's biggest physics conference – Physics 2005, a Century after Einstein. The event, which was organised by the Institute in celebration of Einstein Year, brought together 116 invited speakers who gave a snapshot of current physics research.

In 1905 Albert Einstein published seminal works on special relativity, the photoelectric effect and Brownian motion. One hundred years later, at Physics 2005, his influence was still felt – of the four broad themes of the conference, three were inspired by Einstein's work: Light and Matter; Quantum Physics; and Relativity and Cosmology. The fourth – Physics in Biology – was chosen as an exciting new area of emerging research.

The format was new to the Institute and may serve as a model for future physics conferences in the UK. It aimed to cover as much physics as possible within the broad themes and included numerous internationally renowned physicists, including Nobel laureates Anthony Leggett and Steven Chu – both plenary speakers.

Leggett, who won the Nobel Prize for Physics in 2003 and is based at the University of Illinois, challenged participants to rethink their assumptions about quantum mechanics. He revisited the story of Schrödinger's cat, asking whether it might one day be possible to observe quantum interference at the macroscopic level – for example, to see a cat that was both dead and alive at the same time. Leggett was hopeful that such macroscopic phenomena would one day be observed, but argued that, if they were, "the whole reductionist system would break down".

Adrian Burrows

Stuart Palmer, deputy vice-chancellor and former head of physics at Warwick, addresses Physics 2005.

Turning physics on its head

Chu, who won the Nobel Prize for Physics in 1997, is currently on sabbatical from Stanford University to act as director of the Lawrence Berkeley National Laboratory (LBNL) in California. The title of his talk was "Biology as a solution to physics problems", turning on its head the usual assumption of physicists that physics underpins all of the other sciences. He gave several compelling examples of biological systems that had evolved to provide brilliant engineering solutions, including the human ear and ribosomes – the elements in cells that make proteins. The process of photosynthesis, in particular, has inspired Chu. Solar energy is a vast untapped resource that could solve the problem of climate change and our dependence on oil, and plants have been converting solar energy into chemical energy for a billion years. He described experiments at LBNL in which microorganisms are being used to create sustainable, carbon-neutral fuels for the future.

> "Einstein's name and ideas cropped up time and again throughout the four days of the conference."

Einstein's name and ideas cropped up time and again throughout the four days of the conference. James Hough of Glasgow University gave an overview of the search for gravitational waves, which are predicted by Einstein's theory of general relativity. Hough was confident that direct evidence for gravitational waves would be available within the next decade and along with it a powerful new tool for astronomy. Gravitational wave telescopes would be able to look at stars "from the inside out" and not simply rely only on the radiation that they emit, as existing telescopes must.

Lene Hau of Harvard University described her extraordinary set of experiments to slow down and even "stop" light using Bose–Einstein condensates. By passing laser light through this medium, she has been able to slow light down to the speed of a bicycle. She was then able to "freeze" the light within the medium – a phenomenon that might one day be exploited as a form of optical memory for computers. Another of the plenary speakers, Stanislas Leibler of Rockefeller University, described how bacteria cope with Brownian motion and how they actually exploit the phenomenon for their own survival.

The vision for Physics 2005 came from its chair, Sir Michael Berry, who has been working with the Institute on the programme for almost two years. He summed up his approach to the conference: "The idea of a meeting of physics for physicists really resonated with me because so often one encounters a wish to hear about anything but physics – physics and industry, physics and philosophy, physics and the school curriculum – anything but physics, unadorned, for its own sake. I wanted to make a meeting that was 'anything but anything but'."

Peter Main, the Institute's director of education and science, called the meeting a "great success" and said that he hoped that the Institute could put on a physics conference of this kind every two or three years. He was particularly pleased by the number of students – almost 250 – many of whom were there thanks to bursaries from the research councils.

"Physics 2005 will have given them the chance to see, hear and speak to some of the world's leading physicists. It's one thing to read about string theory, quantum computers and the physics of antibiotics; quite another to hear about it from people who are blazing trails in those areas," said Main.

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einstein year – Explore, Discover, Invent - Physics

www.einsteinyear.org

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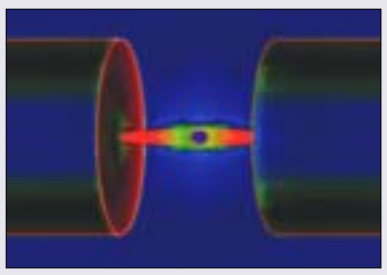
The inconstancy of the fine-structure constant

The fine-structure contact – one of the fundamental numbers that determines the type of universe that we live in – may not be constant after all. Also known as "alpha", it governs the strength of the electromagnetic force and, if its value had been slightly different in the past, life would not exist. Michael Murphy of Cambridge University presented new evidence at Physics 2005 in Warwick that alpha has changed by about 1 part in 200 000 during the last 10 billion years. He looked at billion-year-old light from distant quasars that had passed through gas clouds, comparing the absorption spectra with those obtained on Earth. Previous research indicated that alpha hadn't changed over time, but Murphy says that this is the most detailed survey so far. However, the case is not closed, he admits. "We are claiming something extraordinary here, and the evidence, though strong, is not yet extraordinary enough."

Stretching the stem-cell debate

The debate over the ethics of stem-cell research centres on the fact that embryos must be destroyed to create these special cells. But a new tool developed by physicists and presented at Physics 2005 could circumvent this problem. Embryonic stem cells have the potential to develop into any tissue in the body, so they hold the promise of a new class of regenerative medicine. Josef Käs and Jochen Guck of the University of Leipzig described a procedure through which they are able to extract and isolate embryo-quality stem cells from adult blood, which contains small quantities of these primitive cells. Until now, the only reliable way of identifying them involved marking them with a chemical dye, which rendered them useless. Käs and Guck used optical tweezer technology to make an "optical stretcher", which tests cells' elasticity in order to sort them. Stem cells, it turns out, are stretchier than others.



What goes around, comes around

Could the universe be stuck in a never-ending loop of big bangs followed by big crunches? Paul Steinhardt of Princeton University presented new research at Physics 2005 that indicates that it may be. Recent evidence suggests that the expansion of the universe is speeding up, which means that most of its energy is gravitationally repulsive "dark energy". According to Steinhardt, the current acceleration may be the prelude to a period of contraction – a big crunch. Experiments under way looking for gravitational waves could reveal whether or not the universe existed before the Big Bang.

Early universe packed with mini black holes

According to Astronomer Royal Sir Martin Rees, the universe may once have been packed full of tiny black holes. Martin Haehnelt, who works with Rees in Cambridge, presented evidence for this theory at Physics 2005. Most cosmologists believe that supermassive black holes grew up in big galaxies, accumulating mass over time. However, Haehnelt says that there is increasing evidence for a different view – that small black holes grew independently and merged to produce today's giants. He pointed to recent studies of the cosmic microwave background radiation – the "echo of the Big Bang" – that indicate that 10–15% of this radiation has been scattered since the early universe, suggesting a rewarming that nobody had expected. According to Haehnelt this could indicate an era in which small black holes were common. "Matter accreting around a black hole heats up," he said, "and this heating could be a sign that small black holes were widespread in the universe at that time."

Einstein takes to the big screen

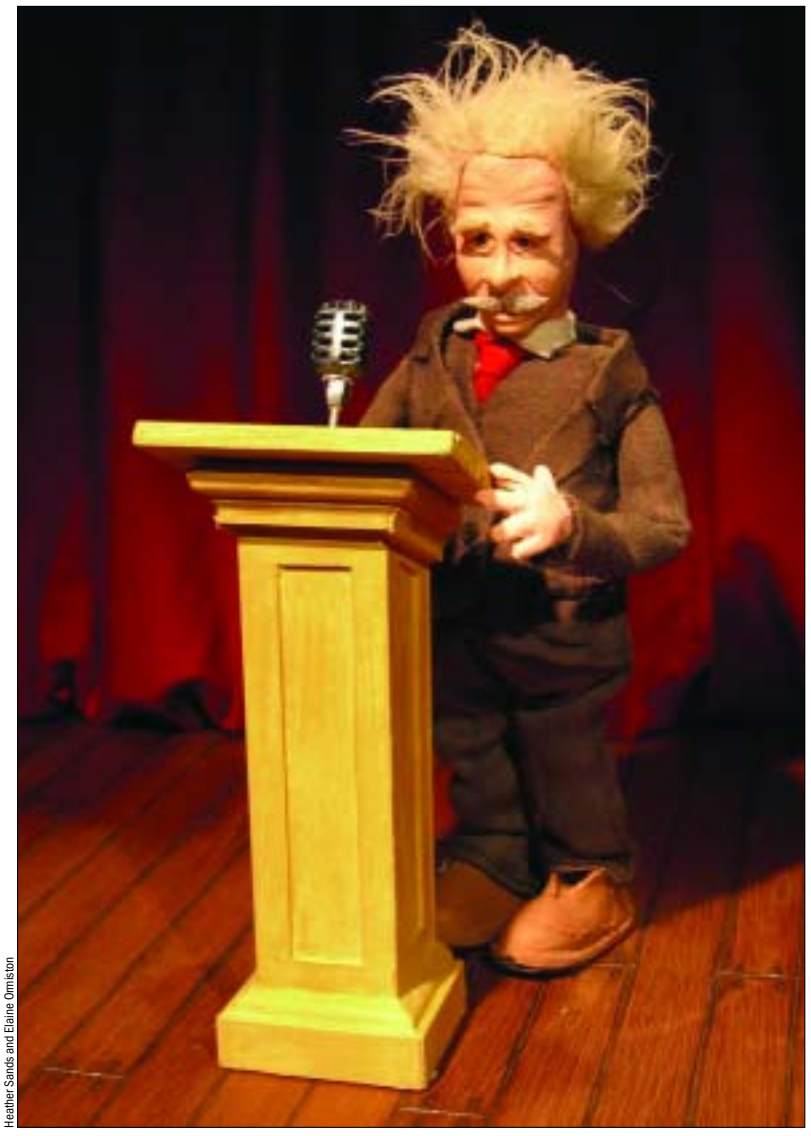
By Sally Fairclough

Einstein's impact on physics will be well known to members of the Institute, which is celebrating his achievements during Einstein Year. But it was his impact on cinema that was the subject of a weekend programme of events at the Watershed Arts Centre in Bristol in April. Einstein on the Big Screen included public discusssions as well as screenings of films inspired by the great man, and it was sponsored by the Institute of Physics Publishing, which is based in Bristol.

A highlight of the weekend was a series of short animated films created by third-year animation students at the University of the West of England (UWE). "This has been a great opportunity for the students to make a real piece of animation for a real client and for a real event," said John Parry, a senior lecturer at UWE, who coordinated the project. He had been approached by Institute of Physics Publishing, which issued an open call to UWE students for animations inspired by Einstein.

"It has allowed the students to demonstrate their understanding of science and the universe as explored by Einstein, and the work he carried out in his miraculous year of 1905. The project enlightened us about the principles of physics and how they might be presented creatively and originally," added Parry.

The film-makers' unique interpretations include an exquisite animated model of Einstein taking part in a press conference (right) by Heather Sands and Elaine Ormiston. Mauricio Orjeula, who made a multimedia film based on Einstein's work on Brownian motion, said of the project: "It opened my eyes to the implications of physics. Had I not been involved I might never have come to understand how physics is relevant in my day-to-day life. It has even helped me to improve my skateboarding skills!"



Heather Sands and Elaine Ormiston

Model movie star: Einstein has been the inspiration for a number of films.

During the weekend there were two lively panel discussions: "Why Einstein still matters" and "Einstein's impact on the arts and the cinematic imagination". There was also a screening of the cult movie *Donnie Darko* – in which a troubled teenager travels through time with the help of a physics book – and a double bill of the short film *La Jetee* and the feature that it inspired, *12 Monkeys*.

Also shown was *Riddles of the Dead: the Secret of Einstein's Brain*, a documentary presented by physicist Jim Al-Khalili and neurophysiologist Mark Lythgoe about their journey into the nature of genius as they follow the bizarre travels of Einstein's disembodied brain after his death in 1955.

Dublin hosts high-energy event

By Ronan McNulty

The first day of spring saw the start of HEPP 2005, the annual gathering of the Institute's High Energy Particle Physics group. Held at University College, Dublin, it was the first time that Ireland had staged the event. The country is experiencing a resurgence in particle physics, despite the fact that it's not a member state of CERN, the European centre for particle physics.

Nevertheless, developments at CERN dominated the discussions, in particular the Large Hadron Collider (LHC), its flagship project, which should start operation in 2007. CERN's "Lord of the Rings", Steve Myers, reported on progress, including the installation the week before of the powerful magnets that will bend the proton beam around the collider. Steve Lloyd of Queen Mary College, London, gave an update on progress towards the Grid, an ambitious project that is the next step beyond the World Wide Web (also created at CERN) and which will allow the seamless integration of computer resources throughout the world to analyse the vast amounts of data that will be produced by the LHC.

James Stirling of Durham University also described the latest theories for predicting what will happen when protons collide at the extremely high energies of the LHC. The elusive Higgs particle may be hiding inside the interactions that they predict.

The conference also addressed the biggest question of recent years: what makes up 95% of our universe? Three-quarters of it appears to consist of a strange antigravity repulsion that goes by the mysterious name of "dark energy". A further 20% is made up from unknown particles that have been christened "dark matter". These mysteries of the universe were presented first from an astrophysical angle by Joe Silk from Oxford University and then from a particle physics perspective by John Ellis of CERN.

The parallel sessions also included some 60 presentations from young physicists – mostly postdoctorates and PhD students – giving an impressive snapshot of the range and quality of particle physics research being carried out in the UK and Ireland.

The 2005 HEPP group prize was awarded to Nick Jelley of Oxford University, who has played a leading role in the Sudbury Neutrino Observatory (SNO), a heavy-water neutrino detector located 2 km underground in Canada. Recent results from SNO show that the observed deficit of neutrinos from the Sun is due to changes in them as they travel from the core of the Sun to the Earth.

Universities urged to specialise

Commons committee says some physics departments should become teaching-only.

By Heather Pinnell

Some universities should focus on research in the physical sciences while others should concentrate on teaching, according to a report in April from the Science and Technology Committee of the House of Commons.

The so-called "hub and spokes" model outlined in the report "Strategic Science Provision in English Universities" proposes that each region should have at least one major "research hub" in the core science subjects, including physics, and that the work of teaching students should be shared between research and teaching departments in each region.

The model is designed to prevent the spread of "physics deserts" – areas of the UK where it is impossible for undergraduates to study physics locally because so many departments have closed down – and similar shortages in chemistry, maths and engineering. The select committee added that the model would also prevent 130 universities from having to compete for both research and teaching funding "to the benefit of a small proportion but to the detriment of many".

Under the model, physics and chemistry departments would openly compete to be awarded the status of "research hub" on the basis of merit. Those not chosen as "research hubs" would be free to focus on research, teaching or knowledge transfer as they wished, and to bid for funds accordingly. For the model to work, universities would have to set aside their own interests and collaborate, says the report. It recommends that financial incentives be employed to encourage such collaboration.

The select committee also recommended that this new system be coordinated on a regional basis by a new Regional Affairs Committee within the Higher Education Funding Council for England (HEFCE), which would include representatives from each of the Regional Development Agencies.

In its earlier evidence to the committee, the Institute of Physics called for "rational and open planning" to identify how many research departments are required and where they should be. The haphazard closing of departments in response to various pressures – including the large disparity in funding between departments rated 4 in the Research Assessment Exercise and those rated 5 or 5* – has been harmful to physics as whole, the Institute argued. However, it questions the practicality of the committee's new proposal.

The other recommendations of the report include the introduction of a national bursary scheme – based on the Institute's own Undergraduate Bursary Scheme – to boost demand in shortage science subjects. The number of students taking physics has held steady over the last decade, during which time there has been a massive expansion in overall student numbers, so physics has decreased its "market share". In order to stimulate demand, the Institute has argued that schools must provide better careers advice, giving students a more realistic view of science and emphasising the higher earnings potential of physics graduates. The select committee report picks up on this recommendation, too.

The report also echoed the Institute in saying that the full cost of teaching sciences at undergraduate level should be met. The funding formula currently used by HEFCE does not properly reflect the high costs of teaching subjects like physics, so departments often find themselves cross-subsidising teaching with research funds. The select committee agreed that this was undesirable.

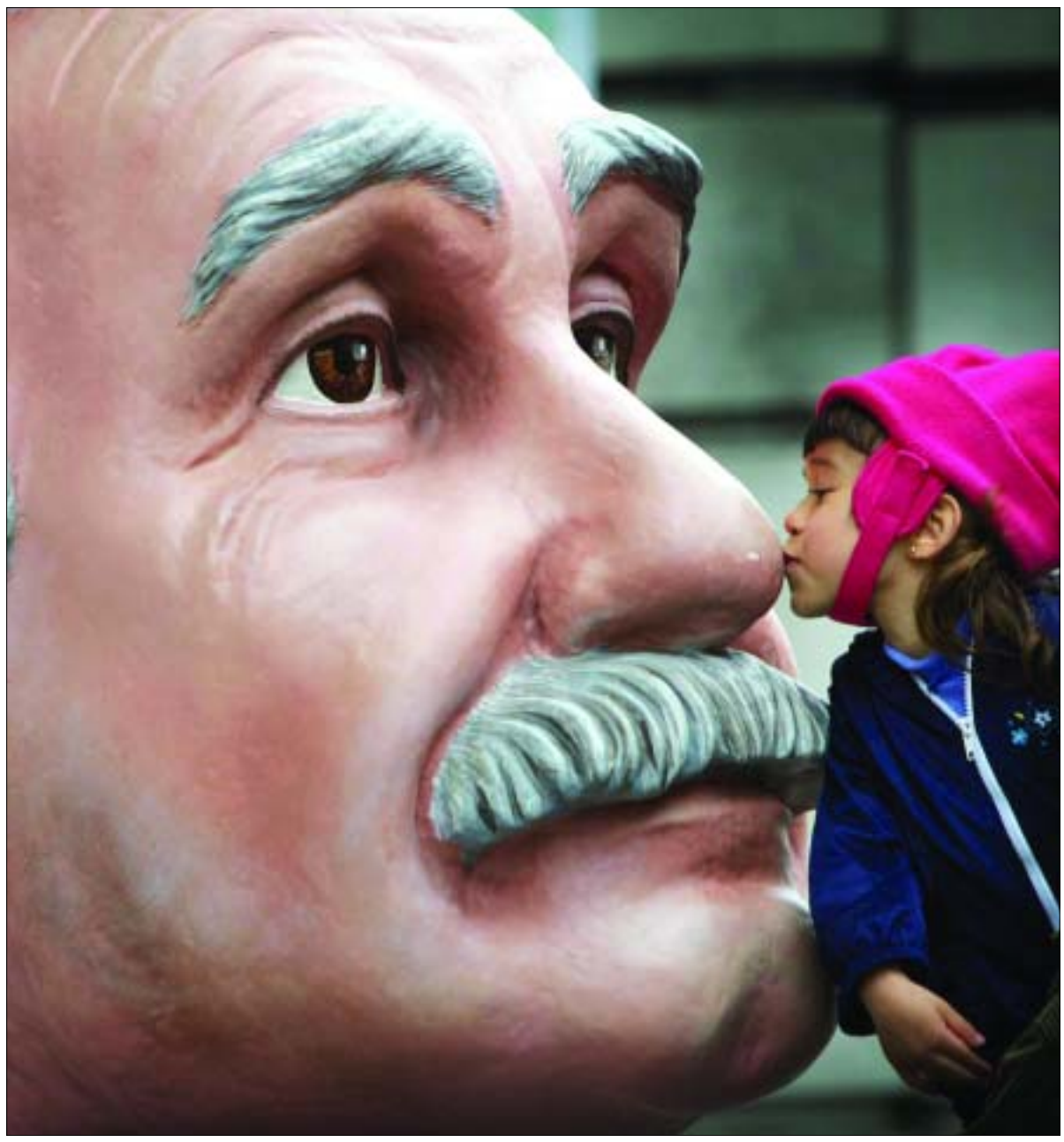
Next month HEFCE is due to publish its own report on strategic science provision, but it remains to be seen whether the new government elected in May will put in place the recommendations of either report.

Poor take-up of R&D tax credits

On 21 March business leaders met at the Institute to discuss the level of R&D spending in UK companies and ways to increase it. The meeting was the latest in the series of Key Insight Business Briefings and follows a recent government target for business to raise its investment in R&D from 1.9% to 2.5% of GDP over the next decade.

Mike Tubbs of the Department for Trade and Industry (DTI) gave the Institute's Business Partners a tour through the DTI's "R&D Scoreboard" – a ranking of 700 UK-based companies, which between them spend £16.6 billion on research. The UK appears to have half of the R&D intensity of the US, but Tubbs said that the true picture lies behind the numbers. Oil companies like Shell and BP spend a lot on R&D, but this is only a tiny proportion of their sales. When these "low R&D intense" companies are removed, the UK ranks much higher. Nevertheless, the UK still lags behind in the IT, software and engineering sectors.

Gareth Edwards of Deloitte gave detailed insight into the workings of the UK's R&D tax-credit system. While it is not as generous as those of some other countries, like Canada, there is scope for it to be used much more than it is currently. "Many companies don't realise that what they are doing is R&D so they don't claim the credits," he said. The definition of R&D for tax purposes is actually much broader than many think – it is defined as any area where a competent professional would consider that there is technological uncertainty. Edwards' advice to those involved in research – "don't leave it to the accountants".



Everybody loves Einstein: a young visitor to the Science Museum in London welcomes one of the exhibits for Move Over Einstein: the Next Generation is Here! which opened on 16 April. The Einstein Year exhibition targets 11- to 14-year-olds with hands-on exhibits that allow them to explore current research in physics. They can also literally "get inside Einstein's head" to find out more about his groundbreaking 1905 works. For full details of the tour schedule, visit www.moveovereinstein.org.

NEWSMAKERS

Humphry Smith OBE, former head of Time at the Royal Greenwich Observatory, was presented with a certificate in recognition of his 70 years as a member of the Institute. Smith, 91, who now lives in Bexhill-on-Sea, graduated in 1934 with a degree in physics from what is now Queen Mary College, London.

In the pre-war period he worked at Biggin Hill on "sound mirrors" as a means of detecting approaching aircraft. He moved to Greenwich in 1936 as radio began to take over as the most promising means of enemy detection. He remained there for the next 40 years.

He was directly involved in the introduction of atomic time and the establishment of coordinated universal time. He was also closely involved in the early development of Global Positioning Systems. For his accomplishments in international time coordination he was awarded the OBE. In his retirement, Smith remains actively involved and interested in physics.

Postgraduate student Lucy Heady has been appointed Institute of Physics fellow at the Parliamentary Office for Science and Technology (POST). During her three-month placement she will produce a *POSTnote* – a short briefing paper for MPs and peers that will give an overview of the UK's involvement in space science missions over the next decade. It will discuss the role played by the UK in international missions, its current space strategy, its approach to manned space flight and the role of space science in inspiring young people. Heady is currently a third-year PhD student at the Cavendish Laboratory in Cambridge, where she is looking at the electronic structure of biological molecules.

Astronomer Royal Sir Martin Rees has been nominated as the next president of the Royal Society, to succeed Lord May. Rees is master of Trinity College, Cambridge, and professor of cosmology and astrophysics at Cambridge University's Institute of Astronomy. His nomination is subject to a ballot of the fellows of the Royal Society. The result will be announced on 14 July.

The Gold Medal for Geophysics has been awarded by the Royal Astronomical Society (RAS) to Carole Jordan, professor of theoretical physics at Oxford University, for her pioneering contributions to solar and stellar physics, her role in opening up the field of ultraviolet astronomy, and her contributions to the teaching and promotion of physics and astronomy. Jordan was the first female president of the RAS in 1994/5 and she is currently the Institute's vice-president for science.

The real cost of military research

Stuart Parkinson

"Military involvement in science and technology can lead to a lack of openness in research."

At the height of the Cold War in the 1980s, half of the UK's public budget for R&D was spent by the military. So, when tensions between the West and the Eastern bloc eased in 1989, there was an expectation that science and engineering would be freer to pursue other paths, with military research making up just a small proportion of the total. Yet today the military still has a major influence on science and engineering in this country.

In 2003–2004 the Ministry of Defence (MoD) spent £2.6 billion on R&D – nearly one-third of all public research funds and almost five times the amount spent on science by the Department of Health. Only the US spent more last year. This year global military spending is expected to pass $1 trillion, yet approximately one billion of the world's population live in absolute poverty. The UN Development Programme and the World Bank estimate that extra annual spending equal to just a few per cent of world military spending could lead to a major reduction in poverty.

The military also exerts its influence in other, less direct, ways. In the UK the MoD and military corporations are heavily represented in government science and technology advisory committees. Joint research between the military and UK universities is also significant. In 2002 three new initiatives were started: Towers of Excellence, Defence Technology Centres and the Defence Aerospace Research Partnerships. These joined the existing University Technology Centres, run by Rolls-Royce plc – the UK's second largest military corporation. Currently, 29 top universities are involved in these four schemes, and many others are involved in a range of alternative military collaborations.

These close relationships help to drive narrow, technological, and often weapons-based, solutions to security problems – often increasing rather than decreasing the likelihood of conflict. Furthermore, it is becoming increasingly accepted that conflict has complex roots, with ethnic tensions, poverty and environmental damage often playing critical roles. Yet the MoD currently spends just 6% of its budget on conflict prevention, including work to understand the roots of conflict.

This emphasis on technological and weapons-based approaches to security is supported by the UK's military corporations, which are heavily involved in the international arms trade. Despite codes of conduct on arms transfers, the UK still sells weapons to countries whose regimes have been guilty of serious human rights violations. Recent examples include Saudi Arabia, Colombia and Algeria.

Military involvement in science and technology can also lead to a lack of openness in research. Such secrecy restricts public scrutiny of the ethics of this work and the free exchange of knowledge for the wider benefit of society.

Swords into ploughshares

Last year the government's chief scientific adviser, Sir David King, argued that climate change is "the most severe problem we face today – more serious even than the threat of terrorism". Since then, evidence that we are approaching dangerous levels of greenhouse gases in the atmosphere has further increased. Climate change can only exacerbate current high levels of global poverty. For example, within just a couple of decades it is estimated that billions more people will face water shortages and agriculture will face serious disruption. These consequences of global warming will increase global security problems, not least because of a massive increase in environmental refugees.

It is essential that much more scientific and technical expertise is directed towards tackling these problems. We need much faster development and deployment of technologies that can help to reduce emissions of greenhouse gases, including renewable energy and energy-efficiency technologies. We also need a more detailed understanding of the ways in which climate change will impact on our society so that we can take steps to adapt to it. Physicists are heavily involved in such work – whether in helping to develop and improve renewable energy technologies, such as wind turbines, solar photovoltaic panels and biomass-fuelled generators, or in assisting in climate-change measurement and modelling.

Greater involvement of physicists will be important in dealing with these problems, yet scientific and technical expertise is in short supply in the UK. This precious resource is being diverted towards narrow, weapons-based, security work – as much as 40% of government scientists work for the MoD. Meanwhile, pressing environmental and social problems are not getting the attention that they deserve. We urgently need to reallocate a large proportion of the resources – both financial and human – that are currently being channelled into the military. Not only will it be a more effective way to tackle international security problems, it might also improve the public image of scientists.

Stuart Parkinson is director of Scientists for Global Responsibility and coeditor of a new report entitled "Soldiers in the laboratory: military involvement in science and technology – and some alternatives", which is available at www.sgr.org.uk.

focal point: industry and business

Better support for our industrial members

Innovation – the translation of scientific ideas into new products and services – is vital to our economy, and the Institute is committed to improving conditions for physics-based industry. We've also got another reason to care about it – more than half of our non-student members in the UK and Ireland work in industry or business.

To ensure that they are well served by the Institute, the Industry and Business Board has been reviewing its strategy and programme of activities. It has identified two principal strategic goals – promoting the health of physics-based enterprise and providing greater opportunities for physicists in the workplace – and the following three strategic priorities that should allow these to be realised.

- Services Review. To ensure that the Institute is relevant to its community and to form the basis of a future Business Partner Recruitment Campaign, it will carry out a review of all existing services provided to our members and partners in industry and business. A survey of Business Partners is under way and preliminary results indicate that they would like us to improve its advocacy on behalf of physics and physicists. There is also a demand for better recruitment services and for the Institute to become *the* place to recruit physicists.
- Promotion of physics to young people. The Institute is already leading in this area, with initiatives such as Einstein Year. By emphasising the contribution of physics-based technology to areas such as healthcare, mobile phones and computer games, the relevance of physics to "real life" can be made clear. In communicating with young people, it is also important to point out the career opportunities that a training in physics can offer.
- Promotion of the value of a training in physics to business and business leaders. We need to make sure that businesses appreciate the value of Chartered Status and are aware of the broader analytical and problem-solving skills that a training in physics provides.

One of the first initiatives to follow from this strategy is the Institute's new Careers Fair, on 27 October 2005. This will establish us as a key player in the recruitment of young physicists to careers in industry and will also be an opportunity for them to pick up some valuable careers advice.

If you are among the one in two members who work in industry or business, we'd welcome your feedback on these goals and priorities, or on other ways in which the Institute can better serve you. Details of our services are at http://industry.iop.org.

Paul Danielsen is the Institute's director of industry and business. E-mail: paul.danielsen@iop.org.

profile: Robert Kirby-Harris

A world view of physics

Ayala Ochert meets the new chief at the Institute of Physics.

Robert Kirby-Harris became the Institute's new chief executive in April.

When Robert Kirby-Harris was 25 he joined the Navy, hoping for a chance to travel and see the world. But, after a very brief time at sea, he found himself posted in Fareham, Hampshire – 10 miles down the road from where he'd been living. The Navy was keen to make use of his strong background in physics and maths, so he spent the next eight years in naval schools around the south. He made it as far as Plymouth, teaching undergraduate maths to would-be engineers at the Royal Naval Engineering College in Manadon.

A decade later, in 1996, Kirby-Harris finally fulfilled his dream of travel when he took on the role of pro vice-chancellor at the University of Namibia, a position funded by the UK's Department for International Development. It wasn't simply the chance to work abroad that attracted him, it was also the opportunity to use his skills to make a difference where it was really needed.

Before his stint in Namibia, Kirby-Harris worked for a number of years at UK higher education institutions. He was director of Poly Enterprises Plymouth, the research and consultancy company of the then Plymouth Polytechnic. Later he became deputy vice-chancellor of resources at Middlesex University, where he was credited with pulling the institution back from the brink of closure in the early 1990s. "I'd always worked in Britain, but I realised that there are countries with vastly more need for higher education. It's critically important for training and educating the people who are actually going to run those societies," explains Kirby-Harris.

Training in science in particular is vital, he adds. "You've got to have a country that's scientifically educated in order to make the right decisions about which forms of technology it adopts and how to apply science to solve society's problems." For example, in a country like Namibia that has almost uninterrupted sunshine, it may be more appropriate to install solar energy than to extend the electric grid to remote villages, he says.

When he arrived in the country there was nowhere for geologists to train, despite Namibia's great mineral wealth and scarcity of water. During his six years at the university he set up geology and engineering courses, a distance-learning network for this vast country, and he created access courses to help disadvantaged students to study science. He was also responsible for opening up a second campus in the poor north of the country, thereby widening access to higher education.

Even as a young boy, Kirby-Harris firmly believed in the power of science to do good in the world, influenced in part by the science-fiction books that he read during his teenage years. At 18 he chose to study theoretical physics at the University of Kent at Canterbury – a new university – rather than Oxbridge, which was too "establishment" for the young Kirby-Harris, who was attracted to the radical student politics of the 1970s.

While at Kent he was persuaded by his supervisor, Lewis Ryder, to go on to Cambridge to study for its postgraduate Part III maths course, in preparation for an academic career in physics. But, after the course, he chose instead to become a teacher. "I was quite idealistic and I thought that I could do some good and improve the lives of young people," he says. He worked for several years at a large comprehensive school in a deprived district of Portsmouth, which he describes as "stimulating and interesting" but also "challenging". "There was turmoil in the school, class sizes were large and the atmosphere was not very conducive to learning," he recalls.

> "We've got moral obligations to do work in the developing world."

In his new role as chief executive of the Institute, Kirby-Harris plans to develop its international focus, following his experience in Africa. "The physics community is international, the problems facing the world to which physics can contribute are international, a major source of revenue for the Institute of Physics is international. So we cannot afford to be a parochial institute," he says. "In addition, we've got moral obligations to do work in the developing world."

He also hopes to use his experience in secondary and higher education (he has a PhD in higher education policy and management) to address some of the biggest problems facing the physics community: the quality of physics education in schools and the closure of physics departments.

Kirby-Harris returned to the UK in 2003 and spent two years as a director at the Royal Botanic Gardens, Kew. But now that he is head of the Institute, he feels he has come home. "I've always felt like a physicist, even when the work I was doing wasn't physics. It's always been a component of my intellectual make-up, the way I approach the world and solve problems," he says. "There's a sort of 'rightness' about coming back here."

OBSERVATIONS

Mark Whitaker joined a group of young members of the Institute one evening in March for a tour of the fusion research facilities at Culham Science Centre.

Having mixed up my stations (going to Waterloo instead of Paddington!), I somehow made it to Culham on time. The station appeared to be abandoned except for a fellow fusion enthusiast. Together we made our way along the country roads to the Culham Science Centre. The site was nestled sleepily in among some fields and farms, and there was little evidence of what goes on here except for a large number of pylons leading to it. At the end of one row you could see Didcot power station, which (we were later told) can feed the experimental reactors with a private power supply of around 2% of national consumption.

I am currently studying patent law at Queen Mary College, London, but I've been fascinated by fusion research since I was an undergraduate. The basic concept is simple – the reaction of tritium (from lithium) and deuterium (from seawater) to produce energy in much the same way as it is produced inside the Sun. I was here with 25 other members to find out more.

After warming up on coffee and biscuits we were whisked away into a lecture theatre for an introduction called "The Fusion Road Show". The statistics are perturbing: global population set to double, a coal-burning power station being built every three weeks, CO_2 emissions on the increase, consumption by developing nations catching up with that in the developed world. Fusion research offers the hope of limitless carbon-free energy.

After the lecture we were taken around the facilities. Our first stop was one of the best-known fusion experiments – the Joint European Torus (JET). The building housing the reactor was some 20 m high and contained two main sections, both reached via a number of long, cathedral-like corridors. JET itself stands in a huge concrete sealable arena.

Before reaching this experimental area we passed through the gigantic concrete sliding doors, each several metres thick – a reminder of the high-energy radiation that is emitted when it's in operation. The JET is a tokamak device approximately 12 m high and 15 m in diameter and – we were told – able to sustain plasma temperatures 10 times as hot as the Sun for more than 10 s. The power output is about 25 MW – impressive, until you realise that the input is 500 MW. The hope is that larger versions of JET that will use superconducting magnets should eventually shift the balance in the other direction.

We could not see inside JET as it was covered with pipes, electrical leads and massive orange supports. Close by, however, there was another area with a mock-up of the inside of the machine, where operators and engineers practise removing and installing components. We moved on to look at the control room, where a virtual-reality model of the reactor was being displayed. A snake-like robot inside JET was being controlled by operators conducting remote maintenance.

Our second major stop was MAST – the Mega Ampere Spherical Tokamak – a smaller-scale UK experiment, which our guide compared to a large lagged baked-bean can. It uses a near-spherical arrangement to push scientists' understanding of plasma configurations.

Work so far at Culham has shown that tokamaks will need to be scaled up by an order of magnitude. The next stage is the long-awaited ITER (International Thermonuclear Experimental Reactor), which will be built in France or Japan. If all goes to plan it will be ready in 2015 and will bring us one step closer to the dream of an electricity-producing fusion power plant.

If you would like to contribute to OBSERVATIONS, please send an e-mail with your idea to interactions@iop.org.

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interactions

Editor Ayala Ochert, Assistant Editor Heather Pinnell, Art Director Andrew Giaquinto
Institute of Physics, 76 Portland Place, London W1B 1NT, UK. Tel: +44 (0)20 7470 4800 ; fax: +44 (0)20 7470 4991; e-mail: interactions@iop.org; Web: http://members.iop.org

LETTER FROM

...the honorary secretary

I will confess that, although I have been a member of the Institute for more than 40 years, I had not made a careful study of our Royal Charter and Bylaws until I became honorary secretary in October 2003.

The first thing that surprised me when I did was the number of times that they had been amended – 19 in the last 30 years. The next surprise was the way in which some areas are covered in exhaustive detail while others are barely mentioned. For example, there is no clear provision for members to raise issues at the Annual General Meeting.

It was clear to me that the time was right for a comprehensive review of the Charter and Bylaws to provide a clear framework of governance, to remove obsolete rules and to bring the Bylaws in line with the modern standards that one would expect of a learned society and professional institute.

Some issues were simple to resolve, others less so. Members should of course be able to pass resolutions at AGMs, but this needs to be set against the legal responsibilities of Council members as trustees of the charity and their personal liability for its financial health. The review process has also involved extensive consultations with specialist lawyers and with Privy Council.

There is one proposed change that I would like to highlight. The current Charter contains several references to the Physical Society, following its merger with the Institute in 1965. It is time for another confession – I am one of the 193 members who has remained a "Former Fellow of the Physical Society" rather than transferring to become a fellow of the Institute. Our numbers are steadily declining, and this review of the Charter prompted me to reconsider this grade of membership.

The revised Charter and Bylaws should look to the future of the Institute, not the past, so I proposed that all references to the former Physical Society be removed. With Council's support I wrote to all my "fellow fellows" seeking their views and was gratified that, out of more than 100 replies, I received only one that did not support the proposal. Many of us still feel a great fondness for the Physical Society, but most agree that it is better to make a positive move forwards than to compete to be the last fellow standing.

John Beeby is the Institute's honorary secretary. The revised Charter and Bylaws will be voted on at the AGM on 22 July 2005. The draft proposals can be previewed at http://members.iop.org/governance.html or, for a copy, e-mail: john.brindley@iop.org.

Poor communication

I recently had the opportunity to become the "new face of science", when I took part in FameLab 2005 in Manchester. The competition uses the same recipe as talent shows such as *Pop Idol*, with contestants being given three minutes to wow the judges by communicating science.

Unfortunately, there was no Simon Cowell character at the end of the audition to tell you how bored and uninspired he was by your rendition of relativity. I say "unfortunately" because there really was no feedback at all. Failed contestants took nothing from the audition except a feeling of rejection, which is likely to make passionate young scientists retract from performing science to non-specialist audiences, even though that is what the competition is trying to promote.

Famelab seems to focus only on a person's "televisability" rather than on their ability to communicate real science in a fun way. Don't we already have enough "presenters" of science?

I would have thought there was a huge gap in the market for a really good scientist who can passionately engage an audience with real science. If such a person existed, I would certainly tune in.

Georgina Wilkins
Leeds

Happy shopper

The November issue of *Interactions* included an illustration of a new silver brooch, the design of which captured some of the key elements of the Institute's coat of arms, including Rutherford's nucleus and Bohr's orbiting electrons. My impulse to buy one as a Christmas present turned out to be a good one as the recipient was entranced by the overall effect.

May I congratulate whoever had the bright idea to commission such an item.

Ian Macpherson
Ingatestone, Essex

No life on Mars

You state that an unprotected human on the surface of Mars "would explode almost immediately" ("Particles", April). In researching material for my textbook *Modern Vacuum Practice*, I surveyed literature on this topic and found that the general consensus is that, provided that you do not hold your breath, exposure to vacuum for 5 to 10 s is unlikely to produce permanent injury (although it may cause problems in the eardrum).

Some degree of consciousness would be retained for up to 15 s, which is about the time it takes for oxygen-deprived blood to go from the lungs to the brain. During this time, the person exposed to the vacuum may become aware of the water on their tongue beginning to boil. As time progresses injuries would accumulate as the evaporation of water vapour causes the body to swell and cool. After four minutes they would finally succumb to asphyxia as the brain cannot survive without oxygen. But they would not explode, thanks to the containing effect of the skin and circulatory system.

Nigel Harris
Horsham, West Sussex

We'd like to hear from you. Please send your letters to interactions@iop.org or the address above. Letters may be edited for length.

notices

NEW FELLOWS

Paul Beecroft, Alan Beesley, Donal Bradley, Mark Breese, David Chambers, John Cleaver, Michele Dougherty, Michael Duffy, Anthony Hartland, Anthony Hey, Nigel Hussey, Hugh McCartney, George McClelland, Neil Pugh, David Ritchie, Martyn Sene, Roger Tyte.

NEW MEMBERS

Neill Bowler, David Burton, Paul Cain, Jessica Cheung, Stephen Dallison, Robert Davis, Richard De Grijs, Jonathan Eastwood, Olusola Fasunwon, Linda Ferguson, Sheila Gilheany, David Glover, James Hardings, Jacqueline Hough, Cigdem Issever, Richard Jenkins, Robert King, Stavros Komineas, Richard Lynch, Thomas McComb, Philip Moriarty, Nicola Morley, Sanghamitra Mukhopadhyay, Sellappulige Rosa, Craig Simpson, Dmitry Skryabin, Vaughan Stanger, Alexander Tapper, Jasmine Tickle, Andrew Whitehouse, Sharron Wormald.

IN MEMORIAM

Peter Arnold, Ruth Habens, Herman Mimura, Bryan Montague, Hubert Pugh, Emily Reynolds, Frank Scrimshaw, David Snell.

MEMBER NEWS

Glenn McDowell of Nottingham University has been awarded the Silver Medal for 2005 from the Institute of Materials, Minerals and Mining.

WANTED

The Institute of Acoustics (IOA) is seeking nominations for its new award for promoting acoustics to the public. E-mail: t.j.cox@salford.ac.uk or see www.ioa.org.uk/medals.asp (closing date: 31 May). The IOA also has a Young Person's Award for Innovation in Acoustical Engineering, which is open to people under 30 or in the early part of their careers. For entry forms, see www.iacl.co.uk (closing date: 15 July).

OBITUARY

Robert Chivers (1948–2004)

Robert Chivers, one of the founders of the Institute's Physical Acoustics Group, died at his home on 25 November 2004.

After reading natural sciences at Exeter College, Oxford, Chivers undertook research on the scattering of ultrasound by human tissues at the University of London's Institute of Cancer Research. In 1973 he was appointed lecturer in physics at the University of Surrey, where he spent most of his career, becoming reader in physics in 1993.

He taught acoustics to physics and Tonmeister students, and medical physics to nursing students. He also made key contributions to Surrey's medical physics MSc. In 1992 he was commended for his innovative use of the Socratic teaching method with a Partnership Award.

Chivers' research centred on the propagation of ultrasonic waves through inhomogeneous materials, which has applications in medicine and industry, including imaging, for which he was awarded the DSc of the University of London and the R W B Stephens Medal of the Institute of Acoustics. He chaired the Institute of Acoustics' education committee, was an elected fellow of the Acoustical Society of America and sat on the editorial boards of major journals of acoustics and ultrasound.

Robert Chivers retired in August 1996 because of ill health. In 2000 he married Pritilata Nayak, who nursed him full time until his death.

Remembered by Dave Cartwright

Visit whatson.iop.org for the Institute's full online calendar for the physics community or www.einsteinyear.org for Einstein Year public outreach events (indicated in blue).

MAY 05

Silent Witness: Babes in the Wood
IOP Merseyside, Liverpool Medical Institution, UK
5 May
davidm@liv.ac.uk

Indium Phosphide and Related Materials 2005
Glasgow, UK
8–12 May
www.IPRM2005.org

Nanotech 2005
NSTI, Anaheim, USA
8–12 May
www.nanotech2005.com

Biocomplexity VII
Biocomplexity Institute, Bloomington, Indiana, USA
9–11 May
http://biocomplexity.indiana.edu/events/bio7

SESHA 27th Annual Symposium and Exhibition
Semiconductor Environmental, Safety and Health Association, Scottsdale, Arizona, USA
9–12 May
www.seshonline.org

14th IEE Microwave Measurement Training Course
IEE, Middlesex, UK
9–13 May
http://conferences.iee.org/microwave

PANEL DISCUSSION

spiked

If You Could Teach the World Just One Thing...
Royal Institution, London, UK
10 May
For Einstein Year, *spiked* surveyed 250 renowned scientists, science communicators and educators, asking: "If you could teach the world just one thing about science, what would it be?". At this event some of them discuss their answers.
www.spiked-online.com/einstein

The Future of Nuclear Energy in Europe
EU Conferences, Brussels, Belgium
11–12 May
www.euconferences.com

● Lab in a Lorry
IOP, Balmoral Royal Ulster Agriculture Show, Northern Ireland
11–14 May
www.labinalorry.org

● The Hamble Wreck 'Grace Dieu'
The Guildhall, Winchester, UK
12 May
museums@winchester.gov.uk

The Physics of Road Accidents
Malvern, Worcestershire, UK
17 May
John Beale 07801 365 204

Techniques and Instrumentation in Low Temperature Physics
IOP Low Temperature Physics Group, Rutherford Appleton Laboratory, Didcot, UK
17 May
http://conference.iop.org/TILT

● May Play: Calculus
Trinity College Dublin, Ireland
17–19 May
priests@tcd.ie

Nonlinear Phenomena in Complex Systems (NPCS) 2005
National Academy of Sciences of Belarus, Minsk, Belarus
17–20 May
http://npcs.j-npcs.org/2005

Sensor Applications for Micro-Systems Technology
Sira, Newcastle, UK
18 May
www.sira.co.uk/courses

● A Guide to the End of the World: Everything You Never Wanted to Know
Richmond Scientific Society, Richmond, UK
18 May
Valerie Barkham 01784 259 198

● Einstein: Life, Science and Art
Millennium Galleries, Sheffield, UK
18 May
M.Navin@shef.ac.uk

● Einstein's Century of Physics
IOP in Ireland, NUI Maynooth, Ireland
19 May
science.dean@nuim.ie

● Awesome Electricity
INTECH, Winchester, UK
19 May
www.intech-uk.com

● Applied Technology
Hampstead Scientific Society, Hampstead, UK
19 May
www.hampsteadscience.ac.uk

Electric Fields and Discharges for Microbiology and Health Care Applications
IOP Electrostatics Group, London, UK
19 May
http://conferences.iop.org/EFD

17th International Conference on Fibre Optical Sensors
Bruges, Belgium
23–27 May
www.ofs17-Bruges2005.be

Laser Micromachining: Development and Applications
Association of Industrial Laser Users, Bangor, Wales
24 May
www.ailu.org.uk

Nanomeeting-2005
Belarusian State University of Informatics and Radioelectronics, Minsk, Belarus
24–27 May
www.nanomeeting.org

● Constant Speed by the Rambert Dance Company
IOP, Sadler's Wells, London, UK
24–28 May
www.rambert.org.uk

CIC2005: 2nd National Meeting of Quantum Computing and Quantum Information
SENUMA, Popayan, Cauca, Colombia
25–27 May
www.senuma.unicauca.edu.co

● Einstein Adult Learners Events
Science Museum/Open University, Science Museum, London, UK
28 May
john.bull@nmsi.ac.uk

ONE-DAY MEETING

Mechanics for Medical Device Development
76 Portland Place, London, UK
25 May
This event should appeal to industrial and academic practitioners of applied mechanics and to R&D managers in the medical device industry. Contact jasmina.bolfek-radovani@iop.org or visit
http://conferences.iop.org/MDD

● Dr Bunhead's Recipe for Disaster
Theatre Royal Winchester, Winchester, UK
28 May
www.theatre-royal-winchester.co.uk

● Mayhem, Murder and Mystery
INTECH, Winchester, UK
30 May – 3 June
www.intech-uk.com

● Eisteddfod Yr Urdd 2005: Science Pavilion
Millennium Centre, Cardiff Bay, UK
30 May – 4 June
cerian@angharad.fslife.co.uk

JUNE 05

Stirling Physics Meeting
IOP in Scotland, Stirling, UK
1 June
http://scotland.iop.org

● Your Brain and How to Use It!
INTECH, Winchester, UK
1 June
www.intech-uk.com

● Einstein Symposium 2005
Bibliotheca Alexandrina, Alexandria, Egypt
4–6 June
www.bibalex.org/Einstein2005

8th International Conference on Web Handling
Oklahoma State University, Oklahoma, USA
5–8 June
www.engext.okstate.edu/2005call.pdf

Central European Workshop on Quantum Optics
Bilkent University, Ankara, Turkey
6–9 June
www.fen.bilkent.edu.tr/~cewqo2005

Short Course on Laser Doppler Anemometry
Italian Association of Laser Velocimetry and Non-invasive Diagnostics, Ancona, Italy
9 June
www.aivela.org

● Automatic Person Recognition: Biometrics is the Key of the Future
INTECH, Winchester, UK
9 June
www.intech-uk.com

Biodetection Technologies 2005
The Knowledge Foundation, Baltimore, USA
9–10 June
www.knowledgefoundation.com

Short Course on Particle Image Velocimetry
Italian Association of Laser Velocimetry and Non-invasive Diagnostics, Ancona, Italy
10 June
www.aivela.org

Institute of Physics in Scotland AGM
IOP in Scotland, Glasgow, UK
10 June
http://scotland.iop.org

Plasmas, Surfaces and Thin Films
IOP Ion and Plasma Surface Interactions Group, London, UK
15 June
http://conferences.iop.org/PLS

Biological Surfaces and Interfaces: EuroConference on Biomaterials, Biosensors and Analytical Techniques
ESF Research Conferences, Sant Feliu de Guixols, Costa Brava, Spain
18–23 June
www.esf.org/conferences/pc05187

First International Symposium on Electromagnetism, Satellites and Cryptography (ISESC 05)
LET Laboratory/LAMEL Laboratory, Jijel, Algeria
19–21 June
www.univ-jijel.dz/Seminaire/ISESC'05/Home.htm

5th International Conference on Non-Accelerator New Physics
Joint Institute for Nuclear Research, Dubna, Russian Federation
20–25 June
www.nanp.ru

Drug Delivery and Diffusion through Polymers
IOP Polymer Physics Group, London, UK
21 June
http://conferences.iop.org/DDD

einstein year

For full details of Einstein Year events (indicated in **blue**) and to find out what's happening in your area, visit **www.einsteinyear.org/events**.

WFOPC2005: 4th IEEE/LEOS Workshop on Fibres and Optical Passive Components
IEEE/LEOS Mondello, Sicily, Italy
22–24 June
http://leos.cres.it/wfopc

Polymer Tribology
IOP Tribology Group/IOP Polymer Physics Group, University of Birmingham, UK
23 June
http://conferences.iop.org/PTG

● Fun with Physics
Shropshire SETPOINT, Shrewsbury, UK
25–26 June
n.moore.epb@connexionsstw.org.uk

Summer School: Instrumental Methods in Electrochemistry
Southampton Electrochemistry Group, Southampton, UK
26 June – 1 July
www.soton.ac.uk/~gd/summerschool.html

15th Interdisciplinary Surface Science Conference
Cardiff University, UK
27–30 June
daviespr@cf.ac.uk

Summer School for Physics Teachers
IOP in Scotland/SSERC/universities of Edinburgh and Glasgow, Glasgow, UK
27 June – 1 July
http://scotland.iop.org

JULY 05

● Cosmos and Creation
Winchester Cathedral, Winchester, UK
1–31 July
www.winchester-cathedral.org.uk

Ultrasound and Other Minimally Invasive Therapies
The Mayneord-Phillips Trust, Oxford, UK
3–8 July
http://mpss.iop.org/trust.html

● IOP Schools Lecture: Our Planet, Our Future
INTECH, Winchester, UK
5 July
www.intech-uk.com

MC7: Functional Materials for the 21st Century
Royal Society of Chemistry, Edinburgh, UK
5–8 July
www.rsc.org/MC7

Recent Challenges in Novel Quantum Systems
University of Camerino, Le Marche, Italy
6–8 July
http://fisica.unicam.it/nqs2005

1st International Conference on Diffusion in Solids and Liquids (DSL 2005)
Aveiro, Portugal
6–8 July
http://event.ua.pt/dsl2005

CONFERENCE

Novel Applications of Surface Modification
Chester College, UK
18–21 September
Join scientists, engineers and manufacturers to find out about present and future applications of surface modification, including reduced wear, increased corrosion resistance and improved optical properties. Organised by the IOP Applied Physics and Technology Division. Poster prizes and student bursaries are available.
http://conferences.iop.org/APTD

Ultrasound and Microsystems: Sensing, Streaming and Resonator Design
Ultrasonic Standing Wave Network, Southampton, UK
8 July
www.ucl.ac.uk/medicine/hepatology-rf/research/usw-net

IVNC 2005: 18th International Vacuum Nanoelectronics Conference
CCLRC, Oxford, UK
10–14 July
www.ivnc2005.org

5th International Conference on Inverse Problems in Engineering: Theory and Practice
Engineering Conferences International, Cambridge, UK
11–15 July
www.engconfintl.org/5ai.html

Taking a look at the comic side of the cosmos

Michelle Cain gets a fresh perspective on the life and works of Einstein from some "punkscientists".

Q: What do you get if mix a comedy ensemble called "punkscience", the centenary of Einstein's *annus mirabilis* and the Science Museum's Dana Centre?
A: *The Albert Einstein Experience* – a humorous sideways look at the great man's life along with some surprisingly lucid explanations of his physics.

None of the four "punkscientists" has a background in science. They started out performing in London's Covent Garden and have tackled topics from the world energy crisis to Father Christmas. In picking Einstein as the subject for their latest show, they had their work cut out to impress me – but not because of the tricky science. By the time I went to the performance, I had been working on Einstein Year projects for more than a year and was starting to tune out at the mere mention of his name. Not that I'm not fascinated by Einstein; I was just sick of all those articles and TV programmes that say the same old thing and tell the same old stories.

Bounding onto the small stage in the middle of the Dana Centre, three-quarters of the combo (Ben, Dan and John) greeted the audience with zeal, to the sound of drums courtesy of Bradford, the fourth punkscientist. The drums provided the sound effects throughout, adding plenty of energy to the performance.

They spent two minutes whizzing through Einstein's early life before they came to 1905, when they introduced Brownian motion, the photoelectric effect and special relativity, describing them as his "multiple orgasm". It was at this point that I realised that this was going to be a very different take on Einstein's life and works from what I'd been used to.

Starting with the least popular of Einstein's theories, Brownian motion, John described his crusade to get it some more appreciation. In a parody, perhaps, of some of the less well thought-out attempts at science communication of the past, he showed us photos of himself walking the streets of London wearing a "Brownian motion is great!" sandwich board.

His campaign reached its peak with an advert placed in his local paper, the *Romford Recorder*, proclaiming "2005 is Einstein Year, so take a moment to think about physics and remember Brownian motion is great!"

To show us just how exciting Brownian motion actually is, John got us to act as vibrating particles by moving our arms about, whereupon we were unexpectedly showered with beach balls from the balcony. A simple but effective explanation and, after a few drinks and some encouragement from John, hilarious.

The photoelectric effect was dramatised next, with a menacing-looking Ben wielding a softball bat (acting as a photon), aiming at a rather more timid-looking John, holding a softball (an electron). Quantum physics had never been so entertaining.

When they moved on to Einstein's best-known theory, special relativity, the performance flagged a little, and I found myself having to concentrate to keep up with the show, because both the science and the comedy got rather less obvious.

I woke up in time for their special guest, Mr Hugh Greenwold, a twin who was part of an experiment to demonstrate time dilation. (You guessed it: his brother was sent into space at close to the speed of light when they were young, and Hugh was now an old man.) I don't want to give away one of the best bits, but let's just say that they used this part of the show to milk the humorous potential of David Hasselhoff.

As well as Einstein's 1905 "triple whammy", they also explained general relativity, with the help of a big rubber sheet (space–time) and a volunteer (a "massive object"). It has to be said that the show did a great job of explaining some really complex ideas. "The most important thing to us – apart from having some jokes – is to ensure that the science content of every show is 100% accurate. We didn't want a half-arsed show that didn't have proper physics in it," say punkscience.

In between explaining the science, the team dipped in and out of Einstein's personal life, acting as marriage counsellors and sharing anecdotes. At one point they even compared Einstein to Cliff Richard. Why? Because he had lots of "hits" early in his career and then spent the next 30-odd years trying to find a unified theory of everything, but came up with absolutely nothing.

EMPICS

Quantum physics had never been so entertaining.

The show also made use of the Dana Centre's electronic voting system to ask such important questions as: "Who would win in a fight, Einstein or Jesus?" (Jesus got the popular vote). Then again, most of the audience thought that the statement "Einstein could control animals through the power of his mind" was true, which perhaps gives an indication of the kind of people who came to the show.

I imagine the show was more funny for the scientists in the audience, but I am sure that the non-scientists had plenty of laughs, too. For me it was the perfect antidote to all of those copycat programmes and articles on Einstein – an irreverent mish-mash of theoretical physics and absurdity, with a bit of singing and dancing to round it off.

Michelle Cain is the Institute of Physics communications officer.
The Albert Einstein Experience will be showing at the Dana Centre on 17, 24 and 31 May 2005. See www.danacentre.org.uk. punkscience are available for performances, e-mail punkscience@nmsi.ac.uk.

particles

Lifting the lid on freezers

David Taylor of Lilleshall, Newport, is puzzled by his chest freezer. After he closes the lid, he finds it very difficult to lift it up and has to wait several minutes before he can open it again. But if he closes the lid slowly, he has no problem. Apart from suggesting that he closes it slowly, can anyone help him out? Send your answers to interactions@iop.org. The prize for the most helpful answer, as selected by our judges, is a bottle of champagne or £30 worth of Institute of Physics merchandise.

Have your say on physics research

The Engineering and Physical Sciences Research Council (EPSRC) is consulting the physics community about plans for the EPSRC Physics Programme from April 2006 onwards. It is inviting physicists to contribute comments and ideas on several issues, including:

- the best way to deliver physics research in the UK in order to maintain and enhance the country's international standing;
- how the balance between core physics research and interdisciplinary work is influenced by research quality and/or peer review;
- how the physics programme can play a role in knowledge transfer and interactions with industry, other disciplines and the public.

Comments should be sent to physics@epsrc.ac.uk, or visit www.epsrc.ac.uk/ResearchFunding/Programmes/Physics.