The newspaper of the physics community

March 2005

interactions

Institute of Physics

Physics hit by double whammy

Peter Main explains why government must act now to keep physics departments open.

By now, every physicist in the country will have heard about the high-profile closures of university physics departments, along with chemistry and now maths departments. In fact, it's been a problem for many years – one-third of all UK physics departments have closed in the last decade – although the problem is only now getting the attention that it deserves.

Paradoxically, just as science departments are closing, there is now a broad consensus in society on the need to train more scientists, especially physical scientists. For example, to meet renewable-energy targets and reductions in carbon dioxide emissions in the coming years, many more physicists will be needed ("Renewable energy needs you", p3). The government has also identified science and innovation as key drivers of economic growth and the means by which the UK will be able to compete in the new global economy, and it has even promised an extra £1 billion for science over the next 10 years.

Even if it were not vital for our environment and economy, keeping physics departments open represents a sound investment. Last month the Institute published a report, together with the Royal Society of Chemistry, entitled "The economic benefits of higher education qualifications". This showed that physics and chemistry graduates earn between £185 000 and £190 000 more than non-graduates over a lifetime (only those studying medicine and law earned more). This translates to around £135 000 more to the Treasury in tax and national insurance for each physics graduate. Despite the fact that it costs £4000–6000 more to teach a physicist than an average undergraduate, this represents a return of 13% on the government's investment – a figure that competes well with a booming stock market, but with none of the risks.

One reason for department closures is that, despite all of the extra money promised by the government for science, undergraduate physics teaching is desperately underfunded. The funding formula that has been used by the Higher Education Funding Council for England (HEFCE) is seriously deficient. A recent review of the amounts given to different subjects has only made things worse, leading to a reduction in real terms of 1% in the amount paid per student. Yet in the long run it would be much cheaper to pay the true costs of teaching physics students and to safeguard departments from closure.

Physics deserts: as departments close, there are parts of the country where it is impossible to study physics.

HEFCE's research-funding formula is, sadly, no better. The last Research Assessment Exercise (RAE 2001) is having a devastating effect, with grade-4 rated departments particularly hard hit. The allocation per active staff member is just £10 376 for a grade-4 department, compared with £28 891 for a grade-5 department and £34 866 for one rated 5*. The University of Newcastle had a 4-rated department but, because it was small, the university did not feel that it could justify the investment needed to increase the grade. Instead, last December it announced that it would no longer be teaching pure physics.

"Paradoxically, just as science departments are closing, there is now a broad consensus on the need to train more scientists."

This "double whammy" of underfunding of teaching and research in university physics departments is largely responsible for the closures that we have seen and – unless something is done soon – we will continue to see. Some 5-rated departments are also reporting difficulties that stem from the uneven growth in higher education of recent years. Despite the huge increase in the number taking degrees, the number coming in to study physics has remained static. So, relatively speaking, the number of physics entrants has fallen by around 40% in the last decade. This has hit smaller departments hard, because the only way to mitigate the effect of the low figures paid by HEFCE per student has been to increase student intake. Some physics departments have achieved this, but largely at the expense of smaller departments. This has led in some cases to "physics deserts" – areas of the country where there is no local university that teaches undergraduate physics.

Of course, the physics community needs to look at ways of solving this "demand" problem, and the Institute is working with HEFCE to identify ways of attracting more students into the subject. Our own analysis is that, in the long run, if we could get women to participate at the same level as men, this alone would solve the problem (and, as a bonus, it would help to solve the shortage of specialist physics teachers). However, in the short term, physics departments in crisis will need some extra help to stay open, and we're urging the government to give that help now. If they wait until RAE 2008 to increase funding for 4-rated departments, for many it will be too late. The funding formula for teaching must also change as soon as possible to reflect the true cost of educating a physics undergraduate.

Implicit in recent funding decisions is the idea that there should be fewer research centres in physics, thereby enhancing quality at the expense of quantity. If this really is the government's intention then it should say so openly so that some sensible planning can be done, instead of the haphazard closures that we're seeing at present. Physics departments cannot continue to operate with this dagger hanging over their heads.

Peter Main is director of science and education at the Institute.

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INSTITUTE AWARDS 2005

Teachers of Physics awards

The following teachers were presented with the Institute's Teachers of Physics awards at the annual Awards Dinner on 20 January.

David Attrill has been teaching physics for more than 30 years and has been a popular physics teacher at Wilson's School in Wallington, Surrey, since 1995. As well as achieving excellent examination results, he is recognised for his "infectious enthusiasm for physics that captures the imagination of his students, stretching the able while inspiring the most reluctant learners".

Rhona Goss has been principal teacher of physics at Monifieth High School, Angus, since 1996, where she led a complete review of the physics curriculum and helped students to succeed in a number of prestigious competitions. She has arranged a trip to CERN and was one of the main organisers of the school's Duke of Edinburgh Award Scheme. She was also recognised as one of the key influences behind the Science Education 2020 Conference held in 2003.

Philip Hunt has been head of science at Adams' Grammar School in Newport, Shropshire, since 1996. He is recognised as "a dynamic individual who expends a great deal of time and energy in spreading and sharing his passion for physics among pupils of all ages, members of staff and parents alike". His students have taken part in many science clubs and competitions, including the Physics Olympiad.

Chris Robson was head of physics and science at St Bees School, Cumbria, between 1968 and 1999, after several years teaching physics in Uganda. He helped to make physics the most popular A-level choice at St Bees, with more than 40% of students taking the subject, and twice came out of retirement to fill a gap in the physics department.

Anne Barnes has taught at Netherthong Primary School, Huddersfield, since 1995. She became an Advanced Skills Teacher in 2002, helping other primary teachers to learn from her expertise. She also contributed to the school achieving "Beacon status" and has helped to shape the direction of primary science within the Kirklees area.

Joanne Hall has been deputy head of Blackhorse Hill Infant School in West Kirby, Wirral, for six years, during which time she has revolutionised its teaching of science. She has had a long association with the Centre for Research into Primary Science and Technology at Liverpool University and was a key member of the team that developed the Wirral Scheme of Work for Primary Science.

Young Professional Physicist of the Year award

The Young Professional Physicist of the Year award was presented for the first time this year by the Institute. It is given to a young physicist in industry, academia or elsewhere who has improved the public perception of physics, organised events promoting physics in their local area or worked in schools to aid the understanding of physics.The 2005 award goes to Wendy Sadler, who runs the science communication company Science Made Simple and is working with the Institute on its Lab in a Lorry programme. She was recognised for her excellent contribution to increasing public awareness of physics.

Physics 'risks failing its MOT'

By Ayala Ochert

Despite billions being earmarked for science and the demand for physicists being greater than ever, physics is in danger of failing its MOT, according to Institute president Sir John Enderby.

He made these remarks to an audience of more than 400 at the Institute's annual Awards Dinner at the Savoy Hotel in London on 20 January – the first major event to be held in celebration of Einstein Year.

Physics may appear to be in good shape, "but when one looks under the bonnet, the engine of physics – education – isn't working properly", said Enderby. "There continues to be a chronic shortage of well qualified physics teachers, A-level uptake is still declining and university physics departments are closing." This situation is incompatible with the government's own vision for UK science, he says.

Enderby referred to "systemic problems" in the way that university departments are currently funded, and called for a review of the system so that it reflects the real cost of teaching physics to undergraduates ("Physics hit by double whammy", p1).

He also told the audience that there are "fundamental flaws in the design and operation of the higher education market". The "market" is driven by student choice, but poor signals mean that students have little idea what employers want, says Enderby, who believes that careers advice in schools must be improved.

The Institute is doing its part to help to fix these problems, says Enderby. In particular, he highlighted the new Supporting Physics Teaching CDs that are being developed to help those who teach physics to 11- to 14-year-olds. He also spoke of the Undergraduate Bursary Scheme, which it is hoped will increase the numbers who choose to study physics at university.

Einstein Year, he said, is "an opportunity for the physics community as a whole to start to break down some of the misconceptions and barriers to physics amongst many young people".

Also speaking at the awards dinner was Sir Keith O'Nions, director-general of Research Councils. He told the audience that the UK policy on science was simple: "To improve the international standing of UK science and to improve the exploitation of the science base for the public good and for economic benefit."

While these have been the objectives of successive post-war governments, both in the UK and abroad, the difference now is that there is better evidence on how to achieve these outcomes, says O'Nions.

Good fellows (left to right): Masao Doi, Mildred Dresselhaus, Sir John Enderby, Lady Susan Enderby and Tony Scott.

New honorary fellows welcomed

By Heather Pinnell

Three new honorary fellowships were conferred by the Institute at its annual Awards Dinner on 20 January. This brings the total number of honorary fellows to 3 – a list that includes Nobel prizewinners and other physicists whose renown extends beyond the physics community.

In 2003 the decision was taken to expand the maximum number of honorary fellowships from 30 to 100. President of the Institute Sir John Enderby said: "The honorary fellowship is the highest honour that the Institute can bestow. Each of this year's recipients has made substantial contributions to physics across the breadth of the subject. It is particularly appropriate in Einstein Year to recognise Tony Scott for the creation of the Young Scientist Competition in Ireland, which is now in its 41st year."

Scott, who is also the Institute's honorary treasurer, helped to launch the competition in 1964 after seeing a science fair in New Mexico. Entries have grown from 230 to more than 900 this year. The competition formed part of a four-day exhibition at the Royal Dublin Society, which attracted 35 000 visitors.

On receiving the fellowship, Scott said: "I consider it a signal honour which was most unexpected. It is more a tribute to the Young Scientist Competition and the tens of thousands of young people who have taken part in the competition and the hundreds of people who have helped to run it over the years."

Also receiving honorary fellowships were Mildred Dresselhaus and Masao Doi. Dresselhaus has been a major contributor to the field of carbon nanotubes and the elucidation of the properties of liquid carbon. Her book on fullerenes and carbon nanotubes was influential in the development of the field of nanostructured carbons. She has also been a leader in promoting opportunities for women in science and engineering.

Doi has made fundamental contributions to the dynamics of complex fluids. He has also helped to develop the reptation theory of entangled polymer melts and developed a successful microscopic model for liquid-crystalline polymer solutions. His textbook *The Theory of Polymer Dynamics* has educated a generation of complex fluid rheologists and has proved useful for students and researchers alike. Doi is one of the leading figures in physics in Japan and is globally recognised for his work.

Renewable energy needs you

A report on low-carbon technologies says that physicists should lead the way forward.

Physicists have a key role to play in developing renewable energy technologies, says a new report commissioned by the Institute, but a lack of growth in the number of physics graduates and a shortage of postgraduate opportunities could prevent them from fulfilling their potential.

"The role of physics in renewable energy RD&D" was written by Judith Bates and Nikolas Hill of AEA Technology. It looks at the current state of renewable energy technologies and the technologies that support them (e.g. fuel cells, storage and transmission).

"The involvement of physicists in renewable energy RD&D [research, development and demonstration] is generally low, despite the fact that there are several areas where their skills and knowledge could enhance the research effort," wrote Bates and Hill. There are a small number of postgraduate degrees in renewable energy technologies and fuel cells, but the multidisciplinary nature of these courses can make it difficult to get funding, they say. They suggest including the physics elements of renewables in undergraduate courses and also raising awareness among physicists of the career opportunities.

In its 2003 energy White Paper the government set an aspirational target of generating 20% of the UK's electricity from renewable sources by 2020 – the "20–20 plan". While the potential global resource for renewable energy is huge – many times greater than world energy demand – the report lists technical, economic and social constraints that will need to be overcome.

Photovoltaic cells, for example, have great potential, even in the UK, but are currently too expensive. To compete with other methods of generation would require at least a threefold reduction in the cost per kWh. This is one area where physicists are already playing a critical role, through the development of second- and third-generation solar cells, which are more efficient at converting light into electricity. The UK could take the lead in R&D in this area, says the report, but it warns that "unless the market is backed by aggressive R&D, photovoltaics will not achieve the potentially substantial contribution it could make to the energy supply".

Physicists also have a significant role to play in the development of marine renewable technologies, including wave power, tidal and ocean current power – an area in which the UK is already a world leader. Physicists with expertise in computational fluid dynamics and methods such as wave diffraction modelling are needed in this field, as are those with experience in meteorological ocean forecasting.

The Department of Trade and Industry has announced a new Marine Renewables Development Fund, which is worth up to £50m, to "help to bridge the gap between R&D and commercial deployment for wave and tidal generation of electricity". It says that overall it will spend £500m between 2002 and 2008 on RD&D for long-term renewables and low-carbon technologies. But only a small proportion of this is aimed at research, for which the main source of funding is the EPRSC's Sustainable Power Generation and Supply programme (SUPERGEN), which amounts to £25m over five years.

For a copy of the report, e-mail: tajinder.panesor@iop.org

The answer is blowing in the wind: turbines like these may play a part in achieving the UK's 20–20 plan for renewable electricity generation.

Foreign students boost UK science

The government's chief scientific adviser, Sir David King, believes that the UK science base stands to gain from the large numbers of Chinese students now choosing to study in Britain. "If just 5–10% choose to stay here, that would be a significant benefit to the science base. I sincerely hope that happens," he said.

King made the remark at the Institute of Physics as the keynote speaker of the National Physical Laboratory's Annual Metrology Lecture on 10 February. In recent months, several universities, including Manchester and Oxford, have said that they plan to increase their numbers of foreign students, who are charged much higher fees than UK students. King's remarks come at a time when there are increasing questions about how the country will secure a supply of scientists while university physics and chemistry departments are closing.

Institute welcomes its new chief

The Institute has appointed a new chief executive, Robert Kirby-Harris, corporate director for operations and finance at the Royal Botanic Gardens, Kew. He replaces Julia King, who left in September 2004 to become principal of the faculty of engineering at Imperial College, London.

President Sir John Enderby said: "Robert is joining the Institute at a very exciting time and brings experience that will be vital in helping us ensure a flourishing future for physics in the UK." Kirby-Harris has a background as an educator, an industrialist and a university administrator. He has been a member of the Institute and a chartered physicist since 1986.

Graduating with first-class honours in theoretical physics from the University of Kent at Canterbury in 1973, he then obtained a postgraduate qualification in applied maths from Cambridge University, before training as a science teacher. He taught secondary-level physics and maths for two years, then joined the Royal Navy as a lecturer, finally becoming a senior lecturer in maths and operations research at the Navy's engineering college.

Kirby-Harris: takes up post on 4 April.

In 1985 Kirby-Harris became the executive director of Poly Enterprise Plymouth, the consultancy and applied research company of Plymouth Polytechnic. He moved to London in 1991 to become deputy vice-chancellor at Middlesex University, there establishing its successful commercial subsidiary. He then spent six years as pro-vice-chancellor at the University of Namibia in south-west Africa, where he established a second campus and introduced several applied science programmes. He returned to the UK in 2002 to complete his doctorate in educational policy and management, then took up the post at Kew.

About his appointment, he said: "I feel it's vital that we enthuse young people about the excitement and impact of physics. I'm particularly delighted to be joining the Institute at the start of Einstein Year, which has communicating this enthusiasm as its central aim. As a physicist and educator, I'm looking forward to working with colleagues in the Institute and partner organisations to make this a really memorable year for physics."

IN BRIEF

● **New Journal of Physics** (*NJP*) published the first of three special Einstein Year issues in February, entitled "Brownian motion and diffusion in the 21st century". The other issues will be "Spacetime, 100 years later" and "Focus on photoemission and electronic structure" – one issue for each of Albert Einstein's seminal papers. *NJP* is published by the Institute of Physics and the German Physical Society.

Brownian motion has inspired scientists to re-examine areas as diverse as soft-matter physics, solid-state physics, cosmology and econophysics. The special issue provides a snapshot of the present state of this interdisciplinary research field.

The issue includes research on stochastic resonance from Michael Schindler and colleagues at the University of Augsberg in Germany. They explain how noise in a system can sometimes amplify a signal rather than disturb it. Their model shows how it is that crayfish and paddlefish can navigate in murky marine environments. The same model could also be used to study the emergence of ice ages, say the authors.

A paper by Henrik Flyvbjerg of the Risø National Laboratory, Denmark, shows how optical tweezers could be used to confirm the existence of one aspect of Brownian motion – the back-flow effect. Here, the movement of a particle disturbs the fluid that it is in, which then bounces back to nudge the particle in return.

"It's like a boat that tries to stop and is then pushed by its stern wave when that wave catches up with it," explained Flyvbjerg. Optical tweezers use a focused laser beam to trap and study microscopic objects. "Optical tweezers sense the back-flow effect, but that also means that it can be studied with them," he added.

● **Bristol mathematicians Hinke Osinga and Bernd Krauskopf** have crocheted a model of the famous Lorenz manifold (below). Osinga, who has been crocheting since she was seven, realised that their mathematical models of chaos, published in the Institute's journal *Nonlinearity* (January 2004), naturally generated crochet instructions. The couple published the instructions, which involve 25,511 stitches, in the December issue of the *Mathematical Intelligencer*.

● **A new Centre for Excellence in Innovative Physics Teaching** is to be opened, the Higher Education Funding Council for England announced on 27 January. The centre – a collaboration between the Open University and the universities of Leicester and Reading – will offer students "new learning experiences that will make clear the power and fascination of cutting-edge physics and astronomy".

Council announces its 2005 nominees

In accordance with Bylaw 116 of the Charter and Bylaws of the Institute of Physics, Council has nominated the following candidates for election to serve on Council. Any five corporate members (members and fellows of the Institute or fellows of the former Physical Society) can nominate other candidates for Council. Nominations must contain the name of the nominee and their signed consent, along with the names and signatures of the five proposers and a brief biography of the nominee. No corporate member can nominate more than one candidate in any one year for any one vacancy. If no other nominations are received, then these nominees will be deemed elected at the Annual General Meeting on 21 July 2005. Nominations should be sent to the Clerk to Council, Christine Cornwell, and must be received no later than 4 April 2005. *For further information, contact John Brindley (e-mail: john.brindley@iop.org).*

President-elect
Peter Saraga OBE FREng CEng FInstP FIEE

To serve as president-elect from 1 October 2005 for one year, then president for two years and immediate past president for a further one year.

Peter Saraga was managing director of Philips Research Laboratories UK until his retirement in 2002. Since then he has been an independent adviser on R&D management, with particular expertise in the relationship between universities and industry. He serves on a number of boards of various organisations, including the Higher Education Funding Council for England and Wales, the Royal Academy of Engineering and the universities of Sussex and Surrey. He is vice-chair of the Institute's Industry and Business Board. He is also visiting professor in electrical and electronic engineering at Imperial College.

Saraga began work as a research scientist at Philips in 1964, developing image-analysis and compression systems for optical character recognition. His later work on high-definition television was recognised with an award from the Institution of Electrical Engineers, and he went on to become head of the informatics division of Philips Research Laboratories UK, before becoming managing director. While at the company, Saraga was also senior vice-president of Philips International Research, an organisation that employs 3000 people and has a budget of more than £200 m.

His recent assignments include a review of the functioning of Research Councils UK and advising on the future development of the Council for the Central Laboratory of the Research Councils.

Vice-president, membership and qualifications
Alan Pratt CPhys CSci FInstP

To serve from 1 October 2005 for four years.

Since 2004, Alan Pratt has been director of the Home Office Police Scientific Development Branch (PSDB), a 250-strong scientific and technical organisation at the heart of government that provides technical advice and operational support.

Pratt studied physics at Imperial College and in 1988 joined the Home Office, where he developed cutting-edge surveillance technology and earned himself an international reputation in the field. Since 2001 he has been the PSDB's chief scientist and has also been the Home Office's hard science co-ordinator. A fellow of the Institute, Pratt has served on its Professional Standards Committee since 2003. He is active in promoting the use of physics for solving "real-world" problems, and he gives frequent lectures at the Institute and at public events for varied audiences, including children, police and technologists.

Ordinary member
Dr Neville Greaves CPhys FInstP

To serve from 1 October 2005 for four years.

Neville Greaves is director of the Institute of Mathematical and Physical Sciences at the University of Wales, Aberystwyth. He began his career working in industry, before going to work at the Daresbury Laboratory, where he developed synchrotron radiation methods for use in geoscience.

Greaves has published widely on the physics of glass, an area in which he has an international reputation. He also has a strong background in solid-state physics. In his role at the University of Wales, he is currently involved in the creation of a new visualisation centre. In addition to teaching undergraduates, he is also committed to improving the public understanding of physics. A fellow of the Institute since 1989, Greaves has been a champion of physics in Wales, where he played a key role in the establishment of the Institute of Physics in Wales.

Ordinary member
Heather Reid CPhys FInstP

To serve from 1 October 2005 for four years.

A weather forecaster for both the Meteorological Office and the Glasgow Weather Centre, Heather Reid presents the nightly forecast on BBC Scotland television. After a BSc in physics and a masters in image processing at Edinburgh University, she joined the Met Office in 1993.

Reid regularly contributes to science festivals, university events and seminars across the UK. She also works part time at the Glasgow Science Centre, developing weather shows and workshops for schools and the public. She was chairman of the Institute of Physics in Scotland from 1999 to 2001 and is a fellow of the Royal Meteorological Society. She also holds an honorary lectureship in the physics and astronomy department of Glasgow University. Reid has been actively involved in organising the annual Stirling Physics meeting since 1998.

She has won a number of Institute awards, including a Public Awareness of Physics prize in 2001, the Chairs of Branches prize in 2004 and the 2005 Kelvin medal and award.

Ordinary member
Dr Kendrick Zetie CPhys FInstP

To serve from 1 October 2005 for four years.

Since 2001 Ken Zetie has been head of physics at St Paul's Boys School in London. Before he began his teaching career, he did a DPhil at the Clarendon Laboratory in Oxford and spent five years as a research fellow at Oxford and Yale universities, working in the area of atomic and laser physics.

In addition to his teaching work, Zetie has also written parts of A-level syllabuses in both physics and maths. He is reviews editor of the Institute journal *Physics Education* and a lead writer for the Institute's Physics Enhancement Programme, which helps non-physicists who want to train as physics teachers. In addition to his writing for refereed journals, Zetie has also had articles published both in *Physics World* and the *Guardian*.

focal point: council news

New vision for diversity in physics agreed

The Council of the Institute of Physics met on 20 January 2005 and discussed the following:

- Having approved a five-year strategic plan in October, Council agreed the detailed budget for 2005. In addition to Einstein Year, other major items included the creation of a permanently staffed office in Scotland (a pilot for similar offices in England and Wales), investment in the growth of the Business Partner Network and stronger support for modernising practical work in schools. Honorary treasurer Tony Scott said that, although the 2005 budget had been scaled back to reflect pressure on gift-aid income, a full programme of activities is in place for the Institute to deliver on its objectives and it is still operating a healthy surplus after investment income.
- Julie Corbett, chair of the Diversity Committee, gave a presentation to Council on the committee's vision and plans. In particular, Council endorsed a Diversity Vision for the Institute, which states: "We are aiming for an Institute which fully involves its members – male and female, young and old, of all ethnic backgrounds, any sexual orientation, regardless of geographical location, social or economic status, or level of achievement in physics, and which supports its disabled members to enable them to participate fully in the activities of the Institute and of the physics community at large. We will work towards an Institute which welcomes and represents the wider physics community and, furthermore, will actively promote physics to all, so that ultimately the physics community will welcome and be representative of the population at large, with no barrier to anyone participating in physics, as appropriate to their interest and ability."
- Keith Winters, vice-president for industry and business, led a discussion on the new Industry and Business Strategy. He highlighted the fact that more than 50% of the Institute's non-student members work in business, so the area of industry and business is key. Council endorsed the strategy, which focuses on "improving the health of physics-based enterprise" and "providing greater opportunity for physicists in the workplace".
- Council received an update on the Undergraduate Bursary Scheme (UBS) from John Beeby, chair of the UBS Steering Group. Good progress is being made on the scheme, which will offer means-tested bursaries of around £1000 per annum to British and Irish students studying for accredited physics degrees in the UK and Ireland from 2006. Details of the scheme will be put before Council in July for final ratification.
- A full review of the Institute's Charter and Bylaws has been completed. Most of the changes are minor – the most substantial proposed amendment is to delete all references to "former fellow of the Physical Society" and to make those individuals fellows of the Institute of Physics. The proposed Charter and Bylaws are available for all members to review, along with minutes of Council meetings, at http://members.iop.org/governance.html.

profile: Caitlin Watson

Physics is on the waves

Ayala Ochert talks to the woman behind radio's *Physics Line*.

Robin Chanda

Radiohead: Caitlin Watson is out to prove that science is part of culture.

As programme manager for Einstein Year, the biggest celebration of physics that the Institute has ever organised, Caitlin Watson has plenty to keep her busy. But every day she stops what she's doing for 10 minutes, dons a pair of headphones and takes a break to have a chat…about physics. That's because her other role is co-presenter of *Physics Line*, a daily slot on BBC Southern Counties Radio.

Commuters tuning in to the show can listen to Watson talk to drive-time presenter Dominic Busby about anything from bionic limbs to the Big Bang – if it has something to do with physics, they'll talk about it.

"You really can find the physics in everything," said Watson. "What's great about the slot is that we could be talking about food, or what's on at the cinema. We could be talking about anything – we just happen to be having a chat about physics."

The short segment began life in the mid-90s as a way of promoting Science Line – a science helpline for the public that answered questions from the perennial "Why is the sky blue?" to the more profound "Is there life on other planets?" Listeners to a number of radio stations around the country tuned in to have their scientific conundrums explained.

Before coming to the Institute, Watson worked at Science Line for several years, the last two as manager of the service before it ran out of funding in 2003 and had to close down. Shortly after she arrived at the Institute, she got a call from Busby from Southern Counties: Would she continue the slot? "Yes," she said, but on one condition: they had to change the name to *Physics Line*. Eager to carry on with the successful daily item, Busby agreed. He created a new (and truly dreadful) jingle, and *Physics Line* was born.

Sometimes the questions come from listeners, sometimes from Busby, sometimes from Watson herself. "It gives me an excuse to spend half an hour trawling the Internet, looking at books, trying to find things out, which is what got me started with physics in the first place," she said. "Every day I find out something that makes me go 'Wow!' "

Watson, who grew up in Leicester, was the only girl in her class to take physics at A-level, and she almost didn't study it at all. "I had a bit of a wobble as to whether or not I did physics or English literature because I always had a love of reading."

But she went to on study physics and German at UMIST, spending the third year at the Technische Universität in Berlin. It was there that she came across Fritjof Capra's book *The Tao of Physics*, which inspired her to take a final-year course in the history and philosophy of science. That was when everything started to gel. "I discovered that was where my interest was – how all these ideas in science link together and how they fit into the wider world," she recalled.

Science in context

In 1997 Watson went on to study for an MA in the history and philosophy of science at Leeds University. "I loved it – it was one of the best things I'd done. What I really enjoyed was being able to discuss opinions with other students; different theories about, say, the nature of an equation and its relationship to what it's describing."

By putting science into its wider context in the world, it also helped her to broaden her horizons. "It made me realise that science isn't something separate from culture; it's part of it, just as much as any of the arts."

"We could be talking about anything – we just happen to be having a chat about physics."

All too often, says Watson, people are too afraid to talk about physics because they think it's too hard and that they couldn't possibly understand it. "I'd like to see physics come down from this impression people have of a lofty activity done by really clever people and that there's just no hope of anyone normal understanding it."

And, every day, Watson proves that this is possible. Her chats with Busby on *Physics Line* sound like two friends having a conversation in the pub, except that in recent weeks they've been talking about the nature of the universe, what happened before the Big Bang and Michio Kaku's multiverses. More often, though, they will discuss the physics behind recent headlines. At the end of the slot, they give out the *physics.org* web address so that people can find out more, if they're interested.

Even though it takes her away from working on Einstein Year for a little while each day, Watson feels that it's all part of achieving the same aim – getting physics out there into the world and helping to make it more acceptable to the public.

"It also allows me to practise what I preach. During Einstein Year I'm going round saying to physicists 'get out there, talk to the public, share your work, share your passion'. And, with *Physics Line*, I can say that I'm doing my little bit every day."

OBSERVATIONS

Oxford astrophysicist Joanne Baker recalls her week in Westminster last October as part of the Royal Society's MP–Scientist Pairing Scheme.

Monday

I join a huddle of 25 scientists outside the Houses of Parliament on this cold Monday morning, each of us hoping to see first hand how science policy is made and how government actually works. As an astrophysicist, I'd also like to understand better why the public funds curiosity-driven science, including big, expensive telescopes. And, as a mid-career scientist, I'd like to know how I might influence policymakers in the future. This week we'll be shadowing the MPs in Westminster; later, the MPs will shadow us back in our labs.

Our visit kicks off with a tour of both houses. The Lords, swathed in gold leaf, feels heavy with the weight of the Establishment, but as we move through Churchill's war-bombed archway into the Commons, my overwhelming feeling is that parliament is very much alive.

At lunch I meet my MP – Dr Evan Harris, Liberal Democrat member for Oxford West and Abingdon. I chase this human whirlwind over to Portcullis House, feeling like Donna in the West Wing as we plan our week. That afternoon, from the Commons' Strangers' Gallery, I watch Evan artfully debating university admissions. I want to chip in as the debate heats up. Listening later to senior scientists defending GM research to the Parliamentary and Scientific Committee rams home for me the need for scientists to speak up more and become media savvy.

Tuesday

Representatives of the committees on science try to explain their roles to us this morning. There's the Science and Technology committees of the Lords and Commons, the Parliamentary Office of Science and Technology, the Office of Science and Technology and the Parliamentary and Scientific Committee. To the uninitiated they sound like the factions in Monty Python's *Life of Brian*. ("Judean People's Front? We're the People's Front of Judea!") Gaining in confidence, we challenge them on the lack of action in improving career paths for young scientists. Today, at least, we feel our opinions matter.

Wednesday

We attend a meeting of the Commons Science and Technology Committee on Human Reproductive Technologies, on which Evan sits. I am impressed by the forensic skills of the MPs as they quiz first medics and then lawyers about the ethics of infertility treatment. Although very few have any science background – 34 out of 659 – MPs clearly use scientific evidence to inform their policies.

I shadow Evan for the rest of the day as he juggles endless paperwork, his triple-booked diary and regular interruptions by the bell to dash off to vote in the Commons. Evan's constituency postbag addresses problems of real consequence and social justice. I envy his power to help people so directly.

Thursday

A quick trip back to Oxford in the morning for a police briefing on local crime prevention initiatives, then back to London for a discussion comparing healthcare funding in the UK and Germany. MPs have to parse vast amounts of information, but they are exceptionally good at picking out the key points, structuring arguments and seeing things from many sides.

At universities, young scientists often have little say, but here I feel my views and experience are valued. Evan, it turns out, is a campaigner for women in science and contract research staff. Seeing legislative change in action makes me think about how I can contribute and effect change myself. I've seen that it's possible to stand up and make a difference, and I hope to convey that message to my colleagues. I've also learned that MPs really do have the power to change things. Who knows, I may even think about becoming one myself one day.

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

interactions

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A load of tyres

Your solution to the tyre problem in the February issue (p8, "It's a hold up") doesn't answer the problem very clearly because it refers to the tyre being "stiffened" by the air pressure and so able to bear the load. This isn't the case. The reason a tyre supports the weight of the car is that the load on its upper surface is balanced by the tension in the side walls. This tension is absorbed by the reinforcing fibres in the rubber. The application of load to a tyre does not change the pressure inside but it does change the curvature of its walls. Incidentally, in the *Journal of Biomechanics* (1995 **28 (1)** 53–68), D S McNalty and I show that the mechanics of intervertebral discs in the human back is similar to that of the cross-ply tyre.

Robert Arridge
Oxford

OBITUARY

Eric Voice (1924–2004)

The Institute lost a unique individual on 11 September 2004 with the death of Eric Voice, a nuclear scientist at Dounreay. Born on 2 June 1924, he was 80 when he died.

Voice tenaciously pursued the causes in which he believed – especially nuclear power – and spoke with authority owing to his own experience of the effects of radioactivity. "There will in the future be a nuclear war or an accident and we should know how it is going to affect us," he said. He determined to prove it in the most dramatic way. In his 70s he was a human guinea-pig in an experiment at the AEA laboratory at Harwell, where he was injected with plutonium-237. Voice had begun his career at Harwell and then in 1956 became the first scientist at Dounreay, where he pioneered the development of their fast-breeder reactor programme.

A fellow of the Institute and the Royal Society of Chemistry (RSC), he was also involved with the

UKAEA

Eric Voice: nuclear power pioneer.

International Council for Science and the Scientific Committee on Problems of the Environment. He took an interest in the after-effects of the Chernobyl nuclear accident and more than once viewed the situation on the ground. Colleagues remember contributions that he made at international conferences on the lessons of Chernobyl.

In later years he was dedicated to maintaining relations between the British and Russian scientific communities, becoming a virtual one-person scientific Foreign Office. He campaigned for Russian chemists to become RSC members, paid the membership fees of several and helped them travel to the UK.

Voice also championed the RSC's Parliamentary Link Scheme and made a real contribution to the parliamentary understanding of science. He was assiduous, forever finding scientific issues to raise with his local MP for Thurso and with the Scottish Parliament. While insistent in championing his causes, he also built bridges between the scientific community and parliament.

Voice's death from motor neurone disease had a poignancy, coming as it did in the week when there was expression of alarm over global climate change and a renewed interest in the potential benefits of nuclear power. He is survived by his wife, Joan, and three children.

Remembered by **Stephen Benn**.

A quantum error

Oh dear. So poor old Bose has made a "quantum leap" into the limelight (p8, February). After all this time, all he can achieve is a minuscule jump up in fame! I am surprised that a learned institution like yours could make such a mistake. One can forgive politicians for getting it wrong, but not the Institute of Physics. I suggest you consult one of your current medal winners on the exact meaning of the word "quantum".

John Hodgson,
Barnet, Hertfordshire

Editor notes: *It is the notion of a step change, embodied in the idea of a quantum, that we were alluding to.*

Corrections

In the February cover story on the Institute's salary survey there were a number of errors. Where it said: "Analysis shows that salaries are comparable between the sexes at each age level" it should have read: "Analysis shows that salaries are comparable between the sexes at each age level up to about 40, when there is a statistically significant pay gap, which increases with age." In the table "Average salary of UK physicists" the entries "BA hons" and "MA" should have read "Bachelors degree with honours" and "Masters degree", respectively.

Write to interactions@iop.org or the address above. Letters may be edited for space.

notices

NEW MEMBERS

Karl Bergin, Jacinta Browne, Paul Featonby, Daniel Gregory, Benjamin Jones, Lefteris Livieratos, Epaminondas Mastorakos, Andrew Meso, David Parrott, Tanya Saunders, Jonathan Smith, Paul Williams, Pui Wong.

IN MEMORIAM

James Allen, Peter Farago, Thomas Gore, Kieran Hunter, David Iggulden, Thomas Johns, Leyland Shawe, Gerhard Soff, Theodoor Struys, Eric Voice, Brian Wade.

WANTED

Physicists for careers events at schools Come and talk about what being a scientist means to you, answer questions or give a talk. We receive many requests from schools for physicists, and we also exhibit jointly with other societies at careers fairs. More volunteers are needed to help. If you're interested, contact Nicola Hannam with some brief information about yourself (e-mail: nicola.hannam@iop.org).

Neutron facilities – your views UK scientists are invited to give their views on developing a strategy for future access to neutron facilities, whether or not they currently use neutrons for their research. The Council for the Central Laboratory of the Research Councils has been commissioned by the government to produce a strategy and is conducting a consultation and review. To contribute, register at www.neutrons.cclrc.ac.uk.

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**).

MARCH 05

● Science Open Day at Bletchley Park
Bletchley Park Trust, Milton Keynes, UK
5 March
www.bletchleypark.org.uk

● From Marconi to Mars: a Selected History of Radio Research in the UK
Oxford Branch of the British Association, Bletchley Park, Milton Keynes, UK
5 March
E-mail: catherine.gater@diamond.ac.uk

● Einstein Day
Acle High School, Norwich, UK
5 March
E-mail: jaustin@acle.norfolk.sch.uk

Millimetre Wave Scanner and its Application to Border Security
Qinetiq/IEE, Malvern, UK
7 March
John Beale, tel: 07801 365 204

Chirality in Molecular Physics
British Council, Paris, France
7–11 March
E-mail: ivan.powis@nottingham.ac.uk

Cosmology: So How Did It All Get Here?
IOP Yorkshire Branch, Hull, UK
8 March
http://yorkshire.iop.org/iop-london/

The Physics of Electro-mechanical Keyboard Instruments
IOP Yorkshire Branch, Sheffield, UK
8 March
http://yorkshire.iop.org/iop-london/

national science week starts 11 march 2005

Sensor Materials for the Detection and Identification of Radiological Substances
IOP Materials and Characterisation Group, London, UK
9 March
http://conferences.iop.org/SED

● BT Stardome
Mansfield Museum, Nottinghamshire, UK
9–10 March
E-mail: jhenshaw@mansfield.gov.uk

Festival of Science and Culture 2005
National Space Centre, Leicester, UK
9–13 March
www.festivalofscienceandculture.co.uk

Brownian Motion 100 Years after Einstein
Delft University of Technology, Oegstgeest, Netherlands
12–15 March
www.dct.tudelft.nl/pcmt/Einstein

Nuclear Power in Britain: the End of an Era?
Pershore High School, Worcestershire, UK
14 March
John Beale, tel: 07801 365 204

ONE-DAY MEETING

Microscopy of Catalysts
76 Portland Place, London, UK
27 April
Developments in electron microscopy have enhanced research efforts to develop better catalysts and they have provided improved understanding of their underlying mechanisms. Organised by the Institure's Electron Microscopy & Analysis Group.
http://conferences.iop.org/EMC

MHD Waves and Oscillations in the Solar Plasma
The Royal Society, London, UK
14–15 March
www.royalsoc.ac.uk

Laser Fusion
IOP in Scotland, Edinburgh, UK
15 March
www.phy.hw.ac.uk/~phydtr/iop

BioMicroWorld-2005, 1st International Conference on Environmental, Industrial and Applied Microbiology
Formalex Research Centre, Badajoz, Spain
15 –18 March
www.formatex.org/biomicroworld2005

E-teaching and E-learning in Physics at Edinburgh
University of Strathclyde, Glasgow, UK
16 March
http://phys.strath.ac.uk/information/colloquia.html

Cassini–Huygens Mission National Science Week Lecture
IOP Yorkshire Branch, Leeds University, UK
18 March
http://yorkshire.iop.org/iop-london/

● Computer Recognition of People by the Iris of the Eye
Cambridge University, UK
21 March
E-mail: csf@admin.cam.ac.uk

● Cosmic Fingerprinting
New Walk Museum, Leicester, UK
21 March
E-mail: berylallan@hotmail.com

Key Insight Business Briefing
IOP Industry & Business, London, UK
21 March
http://industry.iop.org/bpn/Events/forthcoming.html

Magnetic Resonance: Past to Present
IOP Magnetic Resonance Group, Abingdon, UK
21–22 March
E-mail: heather.rugg@magnex.com

Underwater Acoustics
NPL, Teddington, UK
21–22 March
www.npl.co.uk/acoustics/events/ioaconference2005

IOP HEPP Conference
IOP High Energy Particle Physics Group, Dublin, Ireland
21–23 March
www.ucd.ie/physics/iop05/info.htm

32nd IOP Annual Plasma Physics Conference
Culham Science Centre, Oxfordshire, UK
21–24 March
E-mail: Philip.Andrews@jet.uk

The British Carbon Group Workshop
Brighton University, UK
21–22 March
E-mail: J.P.Goss@newcastle.co.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

UK–Ireland Sol–Gel Meeting
IOP Materials and Characterisation Group, London, UK
22 March
http://conferences.iop.org/UKI

CONFERENCE

EMAG-NANO 2005 Imaging, Analysis and Fabrication on the Nanoscale
University of Leeds, UK
31 August – 2 September
As part of Einstein Year, the IOP's Electron Microscopy and Analysis Group and Nanoscale Physics and Technology Group will hold this timely conference.
http://conferences.iop.org/EMNA

NDT of Materials Using Pulsed Thermography Workshop/ Demonstration
L.O.T. Oriel Ltd, Bath, UK
22 March
www.lot-oriel.co.uk

The Origin of the Primordial Density Perturbation
IPPP Durham University, Lancaster, UK
22–24 March
www.ippp.dur.ac.uk/Origins05

Waste Minimisation and Resource Efficiency: the Role of Physics
IOP Environmental Physics Group, London, UK
23 March
http://conferences.iop.org/WMR

Time Travelling
IOP Yorkshire Branch, Sheffield, UK
23 March
http://yorkshire.iop.org/iop-london

Thin Films: the 100 Billion Dollar Industry No One Knows About
IOP in Scotland/IMechE, Paisley, UK
24 March
http://scotland.iop.org

● Fascinating Physics
Almond Valley Heritage Centre, Livingston, Scotland, UK
28 March – 10 April
E-mail: flo@almondvalley.co.uk

PHASE 2005 (PHysics and Applications of SEmiconductor LASERs)
Supelec, Metz, France
29–30 March
www.metz.supelec.fr/phase

Training Course on School Robotics
Hands-on Science Network, Pontevedra, Spain
29 March–6 April
http://hsci.no.sapo.pt/robocourse.html

APRIL 05

● Einstein Year Exhibition: Solar and Wind Applications
Doon Valley Museum, Dalmellinton, Ayr, UK
1 April – 31 May
E-mail: mark.klimek@physics.org

Edinburgh International Science Festival
Edinburgh, UK
2–12 April
www.sciencefestival.co.uk

Additives 2005: Optimising Automotive Power Trains
Royal Society of Chemistry, Dublin, Ireland
5–7 April
www.rsc.org/additives2005

Modelling, Simulation and Design of Dielectrics
IOP Dielectrics Group, Homerton College, UK
6–8 April
http://conferences.iop.org/MSD

METROMEET 2005
Innovalia Association, Bilbao, Spain
7–8 April
www.metromeet.org

25th Anniversary of Condensed-Matter Theory at ISIS and the Rutherford Appleton Laboratory
Rutherford Appleton Laboratory, Didcot, UK
8 April
www.isis.rl.ac.uk/conferences/theory25

Physics: a Century After Einstein
IOP, University of Warwick, UK
10–14 April
www.physics2005.iop.org

Advances in On-line Instrumentation for Materials Characterisation in the Metals Industry
IOM Communications Ltd, London, UK
11–12 April
www.iom3.org/events

14th International Conference on Microscopy of Semiconducting Materials
Royal Microscopial Society, Oxford, UK
11–14 April
www.rms.org.uk/MSMXIV

● Einstein and the 21st Century
Birmingham Library Services, UK
16 April
E-mail: Stephen_Morley@birmingham.gov.uk

● Stars at Stockwood
Luton Museum Services, UK
17 April
E-mail: jarrettJ@luton.gov.uk

Commercialising Research for Bio-technologies
IOP Industry & Business, London, UK
19 April
http://industry.iop.org/bpn/Events/

The Heart of Building Acoustics: What Makes It Tick?
Institute of Acoustics, Oxford, UK
19–20 April
www.ioa.org.uk

4th CCM International Conference on Pressure Metrology
CCM/NPL, London, UK
19–21 April
http://conferences/iop.org/ICPM

Computer Languages for Scientific Computing
IOP Computational Physics Group, London, UK
22 April
http:/conferences.iop.org/COL

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Various venues
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http://teachingphysics.iop.org
Institute of Physics

Wear of Materials 2005
Elsevier, San Diego, US
24 –28 April
www.wom-conference.elsevier.com

The IEE Seminar and Exhibition on MEMS Sensor Technologies
IEE, London, UK
25 April
www.iee.org/events/mems.cfm

● Cosmic Collisions
The National School, Hucknall, Nottinghamshire, UK
26 April
Dave Taylor, tel: 0115 9635 667

Ferroelectrics UK 2005
University of Paisley, Renfrew, Glasgow, UK
26–27 April
www.paisley.ac.uk/ferroelectrics

Einstein on the brain...and on the television

Jim Al-Khalili tells the story of his strange trip across America in a red Cadillac in search of the truth about Einstein's brain.

Among the plethora of programmes that have been on television and radio in celebration of Einstein Year, you may have caught one that put you off your tea. *The Riddle of Einstein's Brain* on Channel 4 was a slightly oddball film that I came to be involved in about the after-life adventures of the great man's grey matter following its removal during Einstein's autopsy in April 1955. It wasn't the first time that this fascinating story had been told – several film documentaries had been made and at least two books written. However, I for one was still curious to find out just how much of the story was apocryphal and how much was based in fact.

My own part in the story began in late 2003 when the then-head of Channel 4's science and education programming, Simon Andreae, invited me – and several other science communicators and would-be television presenters – to a reception to meet some documentary makers. Unaccustomed to seeing so many media types together in one room, I quickly gravitated towards one of the few people whom I recognised – Mark Lythgoe, a neurophysiologist whom I knew well from the science festivals circuit.

Mark and I soon got talking to a producer from Bristol-based Icon Films, and by the end of the evening the three of us had thrashed out an idea for a programme exploring the nature of Einstein's genius. The documentary, which, importantly, had Andreae's blessing, would be a light-hearted road movie with the flavour of Hunter S Thompson's classic *Fear and Loathing in Las Vegas* (but without the drugs). We would travel across America in search of the mythical brain, interviewing various scientists along the way. I would be responsible for the physics, Mark the brain science.

Einstein's brain had apparently been kept for almost half a century by pathologist Dr Thomas Harvey in two glass jars, sliced up into hundreds of sections and preserved for later analysis. Harvey had for all that time harboured the hope that he would initiate neuroscientific research that would one day uncover the origins of Einstein's great intellect. (One or two controversial papers have been published on Einstein's enlarged left parietal lobe and the large number of glial cells that it contains.)

And so it was, a few months later and with the National Geographic Channel on board as co-sponsors, that Mark and I found ourselves in America for the filming. On arrival, and in true *Fear and Loathing* style, we hired our transport: a huge red 1976 Cadillac Eldorado convertible that we nicknamed "the Beast". We didn't actually drive from coast to coast – we only had about a week to complete the whole trip – though, of course, it was made to look that way for the documentary. During those driving scenes the director, Tom Cholmondeley, and the cameraman would hunker down in the back of "the Beast", filming us chatting about relativity theory, parietal lobes and the origin of genius and creativity.

The filming was hugely enjoyable, but if I seem a little distracted during the scenes in the Mojave Desert, that's probably because I had one eye on the ground, looking out for rattlesnakes (the Mojave rattler, I am told, is the most dangerous snake in North America). And I spent most of my interview with physicist Michio Kaku on a New York ice rink trying desperately not to fall over. Our trip finally led us to Princeton, where we found Harvey, now 93, with three ex-wives to his name and currently living with his sprightly 70-something girlfriend, Cleora. Far from being the villain of the piece, as he's sometimes been portrayed (he took the brain without the family's consent), Harvey was a hugely likeable (and very deaf) old rascal. The scene in which we finally came face to face with the brain for the first time was quite surreal, but was inevitably made somewhat less dramatic by the fifth take.

Some of our planned interviews, like the one with Einstein's granddaughter in California, never happened. Others, including one scene in a Boston hotel that was straight out of *The Blues Brothers*, didn't make the final cut. The enjoyable afternoon that I spent with Roger Penrose at his home in Oxford suffered the same fate, probably because it contained too much physics for a documentary of this sort. However, there was enough of Einstein's science interwoven into our journey to keep an academic like me happy.

"Einstein's brain had been kept for almost half a century in two glass jars."

Amid all of the programmes this year obsessed with the nonsense of how $E = mc^2$ led directly to the invention of the atom bomb, I was glad to be part of a more refreshing take on the greatest icon of the last century. I also have a great souvenir from the programme – I'm now the proud owner of a replica model of Einstein's brain, created using laser lithography from a three-dimensional reconstruction of photographs to micrometre accuracy. It's cast in resin and its transparent orange glow makes it a big hit at Halloween parties.

Jim Al-Khalili is a theoretical nuclear physicist at the University of Surrey. Together with Mark Lythgoe, he will be touring the country throughout Einstein Year giving lectures based on their documentary, which will air again on the National Geographic Channel on 26 March at 11.00 p.m.

particles

How to keep that special sparkle

Peter Graham of Caddington, Bedfordshire, asks:
To make a good gin and tonic you need sparkling tonic water, but the smallest bottle is 1 litre. If my wife and I use 330 ml between us, how can we best preserve the sparkle for three consecutive days?

Graham says that he's tried various techniques to keep him in G&Ts but hopes that his fellow Institute members can provide him with some refreshing answers. **Send your solutions to interactions@iop.org. The prize for the most refreshing answer, as selected by our judges, is your own bottle of sparkling champagne or £30 worth of Institute of Physics merchandise.**

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Alternatively, you could be a winner every time. Pay by direct debit and save £5 a year. Log on to http://members.iop.org and download a direct-debit mandate form.

The winners of the prize draw held at the end of 2004 were Angela McKeown (Linlithgow); Leonard Lewell (Hitchin); Richard Hoad (Fleet); Peter Hine (Leeds); and Mark Tiana (Leighton Buzzard). Each wins an iPod.