Institute of Physics
PHYSICS SOUTH-WEST
The newsletter of the South-West branch of the Institute of Physics
Issue 4 September 2006

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Plenty to look forward to

This year – in keeping with the zeitgeist – we are planning one semester at a time. In October, November and January we have two series of lectures.

For November we have consciously constructed a programme of lectures on energy. Energy is the political, technological, scientific and social topic of our time. It has become like the air we breathe: vital to our lives and yet easy to ignore except when things go wrong, or threaten to do so.

All four lectures are at the H H Wills Building at the University of Bristol, and each starts at 7.30 p.m. Don't forget to be there early – there is always good conversation to be had, and often refreshments, too!

November Energy series

We begin the series on Thursday 9 November with a lecture on "Energy options" by Prof. Max Irvine. This, if you like, will set the scene for the other lectures, on specific options for energy supply. While it is true that there are commercial decisions to be made within a political context, the technological application of physics is often the determining feature in practice.

On Wednesday 15 November, Prof. Sir Chris Llewellyn Smith, director of UKAEA Culham Division, will speak on "The fast track to fusion power". At the last two lectures I attended on fusion power, a decade apart, commercial generation was said to be 20 years away in each case. At the second of these, if I remember correctly, it was claimed that the break-even point, where more energy is liberated than put in, had been achieved, if only for a fraction of a microsecond.

These two lectures are joint offerings with the Bristol branch of the Institution of Engineering and Technology (IET).

On 22 November we welcome David Kerr of Sir Robert McAlpine, who will talk about marine energy. With the Severn Barrage once more on the agenda, at least for discussion, this is a vital topic. Germany, in a quest to avoid the nuclear option, is apparently committed to a full coastal programme.

Finally, on 29 November, Prof. Keith Ross of the University of Salford looks at "Energy futures: the hydrogen scenario".

All in all, a set of talks that is guaranteed to advance our understanding of our joint energy future.

Future of Physics series

While we didn't plan it as such, wrapped around the Energy Series are three lectures that address important areas for the future of physics research.

Branch vice-chair Dr Vince Smith leads our autumn programme with a discussion entitled "Hunting for the Higgs boson at CERN's Large Hadron Collider". Vince, of the University of Bristol, has just returned from one of his regular visits to CERN and will be bang up to date.

This lecture is on Tuesday 17 October at our usual Cheltenham venue, the Elwes Building on the Park Campus, 7 for 7.30 p.m. It is offered in conjunction with the IET's Gloucestershire branch.

A lengthier period to update on an even bigger bang entices us into the New Year: Thursday 25 January at 7.30 p.m., at the Elwes Building, as guests of the University of Gloucestershire. Prof. Matt Griffin of Cardiff University will talk on "The history of the Universe: from the Big Bang to the present day". I am a real sucker for the last 10 minutes of astrophysics lectures, when we get to "recent challenging observations".

The following Wednesday, 31 January, at 7.30 p.m., we are back in Bristol for "Breaking the Dirac code" with Peter Rowlands of the University of Liverpool. I first came across Peter through his article on accessing the key predictions of general relativity via a simpler route. Later I found him doing the same for quantum theory. What will he have for us on this occasion? Note that this is at Dirac House, a nerve centre of the Institute. You don't need a code to get in, just speak nicely to the receptionist.

February newsletter

We are planning a full programme for the second half of the academic year. If you cannot wait for our next newsletter, keep up to date via our website at sw.iop.org.

AGM & Festival of Physics

Put this date in your diary if you like up-to-date accessible physics and Vince's ice cream: Saturday 3 March 2007.

Stop press

Additional lecture on 23 October: "The Sun – our superstar", by Dr Lucy Green, at the H H Wills Building.

Roger Brewis newsletter editor

NLO expansion provides centre for astronomy teaching in south-west

The Norman Lockyer Observatory (NLO) in Sidmouth has recently built a 100-seat science lecture hall. Volunteers raised most of the funds, but local charities helped finance the project.

Construction of the Donald Barber Theatre began at the end of last summer and the hall was in use by November. It has given the NLO a flexible suite of rooms for its activities. The library has been refurnished, displays upgraded, the car park extended and the buildings given an external paint and polish. The East Devon District Council managed the project, using the same architect and contractor as for the 1995 expansion.

The value of the new building was demonstrated at a recent gathering of Open University students, and at a public day course. Institute of Physics branch members will remember their visit to Sidmouth in 2004 to commemorate 100 years since the invention of the radio valve. As the Fleming celebrations came to an end, volunteers fetched the Spitz projector from Greenwich, which the Royal Observatory had generously donated to the Sidmouth planetarium. The replacement equipment was installed by New Year 2005 and the planetarium reinaugurated at a joint meeting with Royal Observatory staff. The NLO's previous equipment was passed on to Torquay Boys' Grammar School, whose team was a runner-up in the Institute's Paperclip Physics competition.

THe NLO's new lecture theatre will open the doors to more visitors.

The NLO's growth has been remarkable. In 1988, its volunteers, aided by the District Council, took over two dilapidated telescopes in three old domes. They have progressively developed the facilities for public education, adding rooms for small classes and amateur radio in 1989, an exhibition hall and planetarium with kitchen and toilets in 1995, the new Victoria dome and telescope in 1999, and last year the new theatre.

Meanwhile, volunteers have restored Lockyer's 6 inch telescope, with which he discovered helium; the Kensington 10 inch refractor, which was used for Lockyer's groundbreaking work on the star spectra and temperature; and the McClean 10/12 inch refractor, as well as many other items of scientific and historic interest.

Yet, when one realises that these achievements are largely due to the unsupported efforts of volunteers, it seems a uniquely British enterprise in Lockyer's entrepreneurial tradition. The NLO's members have an infectious enthusiasm for science, but also cut the grass, trim the hedges, maintain the instruments, lecture in the planetarium, point the telescopes for visitors (especially on the coldest of clear winter nights) to entertain queues of visitors in the dark with an informative commentary.

Most importantly, the unpaid volunteers have time to talk science with their visitors. Maintaining and increasing this happy band is paramount to the observatory's continued success. Membership is open to all and help is most welcome.

The new theatre allows the NLO to open its lectures to visitors and it aims to expand its range of sciences. They wish to present lectures for children with demonstrations and experiments, and also tell the whole story of evolution from Big Bang to heritage coast to area of outstanding natural beauty.

However, the main thrust of the lectures will always stem from Lockyer's discoveries and his great gifts to science. He was a leading advocate for science education in the 19th century and for government investment in science research. He was the founder and editor for more than 50 years of the science journal *Nature*. Yet the Observatory does not see itself as a museum or a memorial, but rather as a working observatory and a centre where people can meet and enjoy science. The NLO looks forward to hosting further joint meetings with the Institute.

Gerald White

The deadline for your contributions to the next issue of this newsletter is:

Friday 5 January 2007

Please e-mail your materials to rogerbrewis@breathemail.net

Exeter hosts regional final of Paperclip Physics competition

On Friday 24 March, eight teams from across the south-west took part in the Grand Regional Final of the Paperclip Physics competition – an annual event now organised by the Institute of Physics on a regional basis. The final was held at the Met Office in Exeter, and involved teams from Cheltenham, Colyton, Plymouth, Trowbridge, Exeter and Bideford.

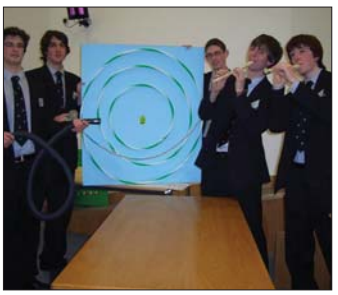
The teams had five minutes to explain, using only props found in an average home, any physics principle or application to a panel of judges. The panel consisted of our chair Peter Ford, Dr Pete Vukusic and Prof. Roy Sambles, both from Exeter University, and the non-scientist judge Sue Odell.

Cheltenham Ladies College set the ball rolling (not quite literally) with their talk "Inertia", and managed to perform the impressive tablecloth trick not just once but twice (on Peter Ford's special request).

Next came the boys from Plymouth College with their presentation entitled "Do lie there quietly!", in which they explained the very complicated physics behind MRI scans. A "patient" was led through the meaning of the term Nuclear Magnetic Resonance Imaging, using some impressive home-made visual aids.

In contrast, the girls from Plymouth High School chose gravitational force as the subject of their talk on "Universal attraction", and used a dustbin lid and rolling marbles, among other things, to show the audience the principles at work.

The youngest team in the final, from Colyton Grammar School,



Students from St Augustine's College, Trowbridge, impress the judges with their demonstration of the Doppler effect.

then took to the stage to give a most impressive explanation of nuclear fission. The Met Office insisted that their fire officer stood by with a fire extinguisher, in case the team's chain reaction, using a bank of lit matches, got out of control. Fortunately for all concerned, the demonstration was executed safely, and the building did not have to be evacuated (as it had been in the morning due to some burnt toast setting the smoke alarms off!).

St Augustine's College from Trowbridge then gave a talk on the Doppler effect, using moving conveyor belts, hula hoops controlled by ducks and alarms whirled around on string. An ambitious demonstration of beats using two recorders was also used when discussing the principle's many applications.

The team from Devonport High School for Girls was the last of the Plymouth teams to perform. The girls, dressed in all the colours of the rainbow, conducted a whistle-stop tour of the entire electromagnetic spectrum, guiding the audience from radio waves, through microwaves and visible light, to ultraviolet and X-rays.

The winning team members from Exeter School show off their prizes.

Exeter School continued with its display entitled "Pressure sucks!" Some ingenious models involving vibrating ping-pong balls, a siphon and a car vacuum cleaner were used to get a very clear explanation of the topic across to the judges.

The team of three students from Grenville College in Bideford had to wait a long time to perform their act, but "Team mobile" gave a very colourful and imaginative demonstration of the transmission of digital signals used in microwave phones using a game of Twister and some tubes of paint.

Finally it was time for the judges to disappear and make the difficult decision on the winners. The teams were so close in merit, but it was the students from Exeter School who most impressed the judges. They each received a digital camera as a prize. St Augustine's College came second, earning each of them an MP3 player. The prizes were presented by Dave Griggs, director of the Hadley Centre at the Met Office, which proved to be a most prestigious venue for the event.

Jean Pope

JOIN @BRISTOL

The new Science Learning Centre is committed to producing innovative continuous professional development for science educators from Key Stage 1 to post-16. Programme director Bryan Berry is looking forward to working with teachers, technicians and teaching assistants across the south-west, and would welcome contact from members who might be interested in becoming involved (e-mail bryan.berry@at-bristol.org.uk).

Please check your e-mail address in your Institute details on the Web to ensure that you receive the e-mails we send you

www.iop.org

South-west committee makes major changes

Over the last 18 months we have seen big changes in the make-up of your branch committee. In the last newsletter we profiled Nick Boyall and Neil Dennis-Purves. Neil has now ascended to branch treasurer, taking over from the excellent John Peck (who is also the person to thank for most of the photographs in this and recent issues).

In March, Claire Bedrock took over as branch secretary from Mike Wilson, who has also done a fine job for several years. Mike remains on the committee, while John will continue with his other, equally essential role, of producing and distributing posters advertising meetings.

In this issue we bring you profiles of Claire and another member who joined the committee in 2005, Bryan Berry. There are also three other new committee members: Prof. James Annett and student member Anne Pawsey, both new in March 2006; and Laura Jackson, co-opted onto the committee in 2005 with her colleague at Institute of Physics Publishing, Claire Bedrock. She will also assist Claire with her role as secretary.

Several other members remain, providing continuity, including those two long-time pillars of strength, your chair Peter Ford and your vice-chair Vincent Smith. These two provide far more than "institutional memory", as they have been responsible for suggesting and organising most of the many excellent lectures enjoyed by members over the past decade.

For full committee details see our website at sw.iop.org.

Roger Brewis

New committee member Laura Jackson will help the secretary.

Student member Anne Pawsey.

Bryan Berry has joined the team.

New member Prof. James Annett.

Berry brings varied skills to branch

Second-year committee member Bryan Berry has fairly recently taken up the post of programme director for the newly launched Science Learning Centre South West, based in @Bristol. Bryan arrived at this important post via the RAF and a degree with the Open University – mechanical engineering in both cases.

In between he completed a postgraduate certificate in education at the University of Exeter and spent 10 years at John Cabot City Technology College in Bristol, where he began as a teacher of physics and science, and rose to become head of science and then assistant principal responsible for curriculum and assessment (picking up an MA in Education Management along the way).

Bryan's interests include the use of ICT-based simulations and models in secondary science teaching, and developing new E-learning approaches. His hobbies include playing guitar, scuba diving and skiing.

Claire Bedrock takes on vital secretary role

Claire Bedrock takes over as the south-west branch secretary.

Claire moved to the south-west in 1992 to study physics at Bath University. Alongside her undergraduate degree she also completed her PGCE and a six-month industrial placement at Sharp Labs in Oxford.

Inspired by the research atmosphere at Sharp she decided on a research career and continued to study for her PhD (also at Bath University). During her PhD she became president of the student branch of the Institute of Physics.

At the end of her PhD she applied for various jobs, and her first offer came from The Engineering and Physical Sciences Research Council's engineering directorate. While she enjoyed working in science administration, she did not like working with civil engineers, and so started to look for work back in physics. At the perfect moment, five years ago, a vacancy was advertised at Institute of Physics Publishing to work on their optics titles, and Claire happily made her move to Bristol. She now works on *Journal of Optics A: Pure and Applied Optics*, *Semiconductor Science and Technology* and *Plasma Sources Science and Technology*.

Check out the branch website at http://sw.iop.org

Balloons, skydiving and levitation: Festival of Physics talks aim high

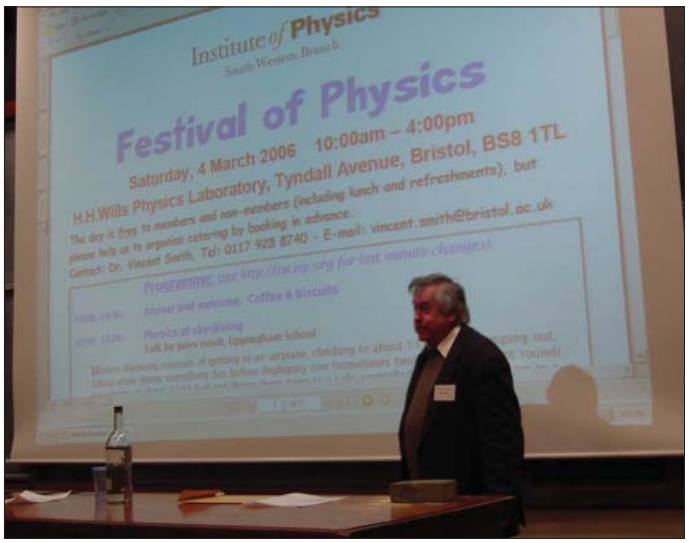
An audience of at least 80 people, including several parties of school pupils, attended the annual Festival of Physics held at the H H Wills Laboratory at the University of Bristol on Saturday 4 March. After light refreshments, the morning talks were given by Jules Hoult (p6) and Don Cameron (p7). A free buffet lunch was provided by Margaret Smith and her helpers.

During lunch, Peter Ford used magnetic levitation to demonstrate the properties of new materials that are super-conducting at the temperature of liquid nitrogen. Sally Divall, helped by students from Stonar School, demonstrated standing waves on giant bubble films and in the microwave oven. Chris McGraw and Christos Stavrou, final-year undergraduates at the University of Bristol, gave a table-top display of cosmic-ray detection using a scintillating fibre detector for which they are developing software. Following tradition, Vince Smith made ice cream using liquid nitrogen, including this year, by popular demand, vanilla in a pretty shade of blue.

The AGM

Twenty-eight members of the branch, including the president and the chief executive, plus a number of visitors, attended the AGM immediately after lunch. Peter Ford and Mike Wilson gave reports on various aspects of the branch's activities during the past year. Einstein Year had seen a special lecture, "Einstein's 1905 revolution in physics", delivered in 30 schools across the branch (including in the Channel Islands). The main Institute of Physics Schools Lecture "Our planet, our future" also visited seven schools, from Callington to Cheltenham. Lab In A Lorry, another innovation for the year, toured five Gloucestershire schools in five days in conjunction with Gloucestershire SETPOINT, as well as visiting Midsomer Norton, Plymouth and the Cheltenham Science Festival.

Members gather for the 2006 Festival of Physics, surrounded by pictures of former Bristol University physicists.



Chair Peter Ford opens the proceedings at the H H Wills Laboratory.

Vice-chair Vince Smith was back by popular demand making ice cream.

The treasurer's report reflected on the new ventures arising from Einstein Year. John Peck emphasised that money will not be a restraint if members have ideas that they wish to pursue and bring forward to the committee for consideration.

Electing the branch committee

Election of the new branch committee followed. Secretary Mike Wilson and treasurer John Peck had both served for five years and were standing down. Claire Bedrock, who works at Institute of Physics Publishing (IOPP) in Bristol, was elected as secretary and Neil Dennis-Purves from Tiverton as treasurer. Peter Ford and Vince Smith continue as chair and deputy chair, respectively.

Among the existing committee members, the newsletter editor Roger Brewis and Webmaster Pete Vukusic have both served four years, but were re-elected by special resolution.

During the year we have lost the services of Bernard Taylor, who is now teaching in the north-east, and shortly Laura Pickard who was a student member will be graduating. Colin Hutcheson has also recently stepped down.

Four new committee members were elected. Laura Jackson, who was co-opted during the past year and works for IOPP, will be assistant secretary. Anne Pawsey is a student at the University of Bristol and James Annett is a professor working on the theory of high-temperature superconductors. Mike Wilson has been recycled and will continue to organise activities in Cheltenham and Gloucestershire.

The chief executive of the Institute of Physics gave an address, which is reported separately on p7. The day concluded with Robin Marshall's talk on Einstein and his visit to Britain.

Written & collated by John Peck

Skydiving: the physics behind it

The first presentation at the 2006 Festival of Physics, entitled "The physics of skydiving", was given by Jules Hoult of Uppingham School. Hoult is a seasoned skydiver with more than 120 skydives under his belt, so he is well placed to give a fast-paced introduction to the physics behind the sport. He commenced with a short video to familiarise the audience with what skydiving is, and then proceeded to discuss why skydiving is performed in the manner it is and why certain equipment is used.

The first question he tackled was why skydivers jump from 1300 feet – why not higher or lower? We learned about the exponential decay of the percentage of oxygen in the atmosphere, the dangers of hypoxia and asphyxiation, and the problems the body has with low pressure. The decrease in oxygen was used as an example of exponential decay and the maths was smoothly integrated into the talk.

Once the correct height has been reached, the skydiver then has to reach the ground. Starting from Newton's second law, the equations governing motion in free fall were derived. A discussion of how tricks are performed by holding different positions during flight followed, illustrated by videos and Hoult himself.

The last part of the talk discussed how skydivers are able to perform such safe and controlled landings. The dangers of round parachutes were graphically demonstrated with a video. The essential difficulty with a round parachute is that it is impossible to steer – it merely slows your descent, leaving you to fall anywhere.

A rectangular parachute, like those used by today's skydivers, is effectively a collapsible glider. The fabric is stiffened by air columns within the chute itself and its shape then generates lift, allowing the skydiver to steer themselves to the landing ground and then land gently.

Skydiving expert Jules Hoult shows how to deploy a parachute.

The physics of deploying a parachute and the reasons for a pilot parachute and a backup chute were discussed. The deployment of a parachute is complicated by the turbulent flow of air behind the skydiver – the chute needs to be deployed into clear air to avoid it becoming tangled. The pilot chute is used to pull the main chute clear of the turbulence behind the diver (who throws it to the side) and pulls the main chute out behind it.

A second chute is needed as a backup in case the strings on the first chute get tangled and the diver goes into a spin. The chute has to be cut away and a new one deployed. The forces on the diver while this is happening are large and the parachutist needs some form of mechanical advantage to cut the first chute away. The second chute can then be deployed. Again, the maths of the forces was incorporated into the discussion and videos were used to great effect.

The lecture provided an enjoyable introduction to the principles of skydiving that did not shy away from using maths to explain the physics. However, I don't think I could bring myself to try out the sport...

Anne Pawsey

Robin Marshall discusses Einstein's later years

Following the AGM, Prof. Robin Marshall from Manchester University gave an entertaining talk on Einstein's life after his 1905 papers. Certain key events of the subsequent 50-year period were explained.

A dinner was held in honour of Einstein on the 28 October 1930 at the Savoy Hotel in London. Einstein's wife told reporters: "My husband doesn't understand English, he doesn't even understand bank books." Einstein talked about Middle-East politics – in German. Inevitably, most of the eminent guests did not understand. Prof. Marshall showed a picture from the dinner with Lord Rothschild frowning and George Bernard Shaw looking puzzled. This was our introduction to the Einstein–Rothschild–Shaw paradox. This picture appeared subsequently throughout the talk whenever there was a complicated equation or other difficult concept to understand.

The "Einsteinly speaking" lecture covered Einstein's visit to London.

Robin Marshall concludes his talk.

We were shown general relativity in terms of 3D geometry. Years after the publication of *General Relativity*, Arthur Eddington's observations confirmed Einstein's theory over the Newtonian model. When asked by a reporter if it is true that there are only three people who can understand relativity, Eddington jokingly replied: "Who's the third?"

Marshall also derived the principle of $E=mc^2$, and at different points during the presentation managed to explain special relativity and the twin paradox to us by B (Brigitte) riding her moped past A (Angelica the arts student)!

Neil Dennis-Purves

Chief executive announces latest on Institute's plans to further physics

The Institute's chief executive, Dr Robert Kirby-Harris, presented the current status of the new strategic plan for 2006–2010 at the Festival of Physics meeting. He had initiated work on this shortly after taking up office early last year. The main aim of the plan is to create greater clarity around mission and goals of the Institute, with the objective of improving the effectiveness of their delivery.

The vision is for the Institute to be a strong organisation that makes a great contribution to advancing physics and ensuring that it delivers significant economic and social benefits; in brief, "Promoting physics, supporting physicists". The goals of the Institute were summarised as:

- **Members** – to attract a larger, broader, more diverse and more engaged membership, encompassing all those who are interested in physics.
- **Impact** – to promote and support physics in furthering scientific knowledge and delivering economic and social benefits.
- **Opportunities** – to increase the number of people with a knowledge and understanding of physics, by promoting opportunities for all to benefit from a high-quality physics education.
- **Communication** – to be the leading communicator of physics to all audiences, increasing awareness of and participation in physics.
- **Capability and reputation** – to ensure that the Institute has the capability, reputation and resources to achieve its goals.

Dr Robert Kirby-Harris promises an exciting future for the Institute.

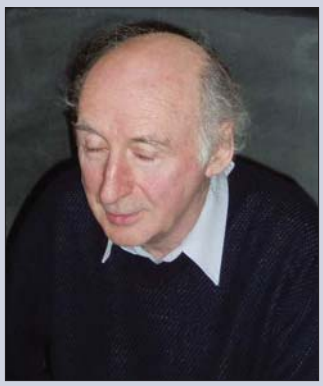
Steps to achieve these goals would include:

- more outreach to Scotland, Wales, Ireland and the English regions
- more financial support
- a membership expansion plan
- increased impact via, for example, more involvement in sustainable development
- further expansion in support services for physics teaching and the campaign for physics teachers
- an increase in the quantity and quality of journals
- staff development at the Institute, including achieving "Investors in People" status and, for the first time, sending Institute managers on management development courses.

Physics is an exciting subject with an exciting future!

Mike Wilson and Roger Brewis

LECTURE



Top: A Cameron Balloon in flight. Bottom: Don Cameron.

The "Lighter than air engineering" lecture at the Festival of Physics was presented by balloon expert and entrepreneur Don Cameron of Cameron Balloons.

Summer visit: keeping cool in an aircraft hanger

On a hot sunny afternoon in June a small group of members and their guests met at a former airfield in Wiltshire for a visit to the Science Museum reserve collection. We visited two of the former aircraft hangers, which were pleasantly cool.

In the first hanger, which housed a transport collection, our guide started logically with the first "technological" land transport – the bicycle. We were introduced to the "bone shaker", which made no attempt at suspension and had many other problems, and were then shown the evolution of various improvements. The "ordinary" or "pennyfarthing" also had variations, but the most interesting aspect was probably its wide use by all classes for touring and racing. Several methods of mounting were described; each was rather dependent on the social class of the rider. Dismounting methods were more democratic, particularly the emergency stop methods, one of which consisted of riding into a wall and hoping to land on something soft. Physicists will already recognise the democracy of Newton's laws and gravity.

A hanger in Wiltshire houses the Science Museum reserve collection.

Logically, we were then shown the motorcycles, British and foreign, with comments on the effect of technological innovations – notably pressed steel – on the development of popular foreign models.

There were a number of aircraft on show, several of which were manufactured by companies that originally made bicycles. It was pointed out that often the model arose because a customer approached the manufacturer with a need and price in mind. A good example of this was an early passenger transport eventually used in the Scottish islands but originally commissioned by an Essex coach-tour operator who wanted to extend his business with excursions to France.

In the second hanger the collection was undergoing reorganisation and was somewhat jumbled – but no matter. We were shown a sonar surveying system made at Southampton University, which is used by the oil industry worldwide and has been a huge commercial success. Later versions were even more successful, so haven't made it to the reserve collection yet.

There were many historic fire engines and some more aircraft and missiles complete with their control panels. Of particular interest to me was a single-deck trolley bus, apparently built and used only in my home town of Ipswich. I do not know if the manufacturers originally made bicycles, but they are certainly better known for lawnmowers!

John Peck

Institute of Physics

SOUTH-WEST BRANCH CALENDAR OF EVENTS

2006–2007

Welcome to our calendar of events for October 2005 – January 2006. We hope to see you and your guests at some of these meetings. If you have any suggestions about future events, let a committee member know.

Full details, along with any last-minute changes, will be published on our website at http://sw.iop.org or can be obtained by contacting the chair or honorary secretary.

You will receive by e-mail updates and reminders of meetings, with full details, if you have registered your current e-mail address with the Institute. We do urge members to register. This can be done at http://members. iop.org. Click the red "Log On" button and log in using your membership number (on a card with your annual renewal notice) and surname. Proceed to "Your record", insert or amend e-mail details and then click "Send changes to membership department".

All meetings are free to members and visitors, and light refreshments are usually provided before the event. Most meetings are suitable for sixth-form students. Anyone planning to bring a group of more than about six people is requested to contact the chair or honorary secretary beforehand. (Of course, we are delighted to welcome such groups!)

OCTOBER

17 October
Hunting for the Higgs boson at CERN's Large Hadron Collider
Dr Vincent Smith (University of Bristol)
7.30 p.m., Room TC014, Elwes Building, University of Gloucestershire, Park Campus, Cheltenham, GL50 2RH
Joint meeting with IET Gloucestershire.
In the next year work will be completed on the Large Hadron Collider at CERN. In our first lecture this October Dr Vince Smith will explain why and how the collider was built and will pose some questions that it is hoped the experiments will answer. He will also give us an idea of what the particle physicists themselves expect to find.

23 October
The Sun – our superstar
Dr Lucy Green (Mullard Space Science Laboratory)
7.30 p.m., HH Wills Lab, University of Bristol, Bristol, BS8 1TL
Continuing the theme of high energy physics, Dr Lucy Green will tell us about the more aggressive side of our Sun. It may be the source of energy and light for humans but it can also have a devastating effect on our power grids and communications. Come along to hear about the largest explosions in the Universe and how the Sun has been studied using the latest technology.

NOVEMBER

ENERGY MINI-SERIES

The subject of energy supply is one of the biggest political stories of our age. In November we bring together four top experts to talk on different energy topics ranging from nuclear fusion to marine energy. We are also going to hear from Professor Max Irvine, who has been appointed by the Scottish parliament to report on Energy Options, and he will open our mini-series which will run throughout November.

9 November
Energy options
Prof. Max Irvine (University of Manchester)
7.30 p.m., HH Wills Lab, University of Bristol, Bristol, BS8 1TL
Joint meeting with IET Bristol.

15 November
The fast track to fusion power
Prof. Sir Chris Llewellyn Smith FRS (Director, UKAEA Culham Division)
7.30 p.m., HH Wills Lab, University of Bristol, Bristol, BS8 1TL
Joint meeting with IET Bristol.

22 November
Marine energy
David Kerr (Sir Robert McAlpine)
7.30 p.m., HH Wills Lab, University of Bristol, Bristol, BS8 1TL

29 November
Energy futures: the hydrogen scenario
Prof. Keith Ross (University of Salford)
7.30 p.m., HH Wills Lab, University of Bristol, Bristol, BS8 1TL

JANUARY 2007

25 January
The history of the Universe: from the Big Bang to the present day
Prof. Matt Griffin (Cardiff University)
7.30 p.m., Room TC014, Elwes Building, University of Gloucestershire, Park Campus, Cheltenham, GL50 2RH
In our first lecture of the New Year Prof. Matt Griffin will explain how astronomers have been able to build a picture of the history of our Universe using telescopes and instruments which detect infrared light (which is invisible to the human eye). This "invisible" light can reveal many things about the Universe. For example, it can give us information on what happened in the big bang and how galaxies formed when the Universe was very young. It can also reveal whether planets around nearby stars harbour life.

21 January
Breaking the Dirac code
Dr Peter Rowlands (University of Liverpool)
7.30 p.m., Institute of Physics Publishing, Dirac House, Temple Back, Bristol, BS1 6BE
The power of the Dirac equation seems obscured by complicated mathematical apparatus. In order to gain a more direct knowledge of the fermionic state, the equation's mathematical "code" must be broken. Dr Peter Rowlands shows us that from this comes new insights into particle and quantum physics.

FUTURE EVENTS

The second half of our programme will follow with the next Newsletter in January. However, you don't have to wait for that. Just keep an eye on our website as that is where you will be able to find the most up-to-date information.

An important date for your diary:

Saturday 3 March
AGM and Festival of Physics
HH Wills Lab, University of Bristol, Bristol, BS8 1TL

Got an idea for a branch event? If so, let us know

E-mail: rogerbrewis@breathemail.net