

Institute *of* Physics
PHYSICS
ON MERSEYSIDE

The newsletter of the Merseyside Branch of the Institute of Physics

Issue 5 Spring 2005

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Welcome message

2005 will be a busy year for the Merseyside Branch because there is a full and varied programme, which includes a public lecture by Jim Al'Khalili, a meeting at the Liverpool Medical Institution and two meetings at Daresbury, one of which is a talk by Frank Close and the other a special event suggested as a result of our survey of our industrial members.

Additionally it is Einstein Year, which means that there will be extra activities both locally and nationally. Please do join in! There will be several opportunities for you to take an active role. These include Lab in a Lorry and helping children to observe asteroids.

However, the best way to get involved is to join the committee. The **branch AGM** will be held on 24 February. Why not put your name forward? The present committee is enthusiastic but there are places for new members because some must move on. We would welcome your ideas.

I hope that you enjoy the newsletter and find the programme of events interesting. Ann Marks, **Chair**



The 2005 Annual General Meeting of the Merseyside Branch of the Institute of Physics

will take place on 24 February 2005
at the Surface Science Centre, University of Liverpool
(building 47 at www.liv.ac.uk/UniversityPrecinct/precmap.html).

It will follow the talk **Particles probe the past** by Manolis Pantos.
See programme (p2) for further information on this talk.

Nominations

Members are invited to nominate officers and committee members. Nominations shall be proposed by not less than two branch members and be accompanied by the consent of the nominee.

Only branch members shall be eligible to be officers of the branch in accordance with the bylaws of the Institute.

Nominations should be sent to the Hon. secretary, David Martin (e-mail: davidm@liv.ac.uk), in advance or proposed from the floor of the meeting.

Agenda

1. Minutes of the 2004 AGM
2. Chair's report
3. Treasurer's report
4. Election of officers
 - Chair
 - Vice-chair
 - Honorary secretary
 - Honorary treasurer
5. Election of committee members
The Committee shall comprise the officers and 12 ordinary members in the following capacities:
 - the past chairman
 - a representative for education
 - a representative for media and publicity
 - a representative for industry
 - a student representative
6. Any other business

Merseyside branch prog

Unless stated otherwise, talks start at 6.00 p.m. with refreshments available from 5.30 p.m.

UoL = University of Liverpool
www.liv.ac.uk/UniversityPrecinct/precmap.html.

(SSRC) Surface Science Research Centre = building #47 on map.

(CLT) Chadwick Lecture Theatre = building #42 on map.

DL = Daresbury Laboratory, near Warrington www.clrc.ac.uk/Activity/ACTIVITY=DLMaps.

LMI = Liverpool Medical Institute
114 Mount Pleasant, Liverpool, opposite Metropolitan Cathedral, entrance in Arrad Street.

3 February 2005

UoL, SSRC

R-D Herzberg

Alchemy in the 21st century: the quest for superheavy elements

A chemical element is characterized by the total number of positively charged protons in the atomic nucleus. Thus in heavy elements the strong repulsion between the protons reaches a similar magnitude to the strong nuclear force binding the protons and neutrons into the nucleus. The question of the largest number of protons and neutrons that can thus be bound has been at the heart of nuclear structure research for several decades.

A major challenge is the creation of such heavy nuclei, because the end-product is such a delicate object that it only very rarely survives the process. Currently the record for the heaviest man-made element stands at 116 protons and 176 neutrons, produced in Dubna, Russia. A grand total of three individual atoms were produced.

This talk covers the history of superheavy elements, introduces some key experimental methods, offers plenty of illustrated examples and cites some recent results in this exciting field.

17 February 2005

DL, 6.30 p.m., with tea/coffee from 6.00 p.m.

Frank Close

The particle odyssey: a

journey to the heart of matter

Why is there anything in the universe at all? Where did matter come from? This will be a highly illustrated presentation on how our understanding of the nature of matter developed through the 20th century and will highlight the big questions facing us in the 21st.

This is a joint meeting arranged by Manchester Branch, which will be followed by a buffet.

24 February 2005

UoL, SSRC

Manolis Pantos

Particles probe the past

This talk is a personal account of the speaker's involvement in archaeological and cultural heritage research, bringing the application of synchrotron radiation (SR) in these areas to the attention of both the SR and the archaeological communities.

The application of SR in the study of archaeological and cultural heritage material has now come of age. The whole spectrum of SR techniques, from the infrared to the very hard X-rays, has been used. The target materials have varied from soft tissues and textile fibres to pigments, ceramics, glazes, bone, wood, metal and even intact museum objects, studied non-destructively.

This talk will give an insight into how physics-based techniques can become relevant to a range of arts-based disciplines and will be of interest to students studying both science and humanities subjects.

For more information, including a Web presentation, see <http://srs.dl.ac.uk/arch/>.

This meeting will include the **Merseyside Branch Annual General Meeting**. Please see the notice on p1 for full details and the agenda.



9 March 2005

UoL, SSRC, 2.00 p.m.

Mike Houlden

Einstein, the photon and fundamental interactions

Schools Lecture



Einstein's 1905 postulate that photons existed was greeted with scepticism that lasted for more than 15 years. The eventual acceptance of this idea led to a way to understand all of the interactions in nature that we know about today. Now the search is on for the final piece in the puzzle: the Higg's boson.

All members are very welcome to attend this lecture.

17 March 2005

UoL, CLT

Jim Al'Khalili

Black holes, wormholes and time travel

This is a public lecture, so do bring a friend.

Is time travel possible? Science fiction has had a monopoly on this question for far too long, but now it's becoming a respectable topic of research that is being taken seriously by scientists.



This lecture will cover some of the most fascinating topics in modern physics that led from Einstein's Theory of Relativity, such as the Big Bang, black holes, wormholes through space and time, and how they might one day be used to build a



time machine. It will aim to provide answers to questions such as "Are black holes real?", "Do parallel universes exist?", "How can we slow time down?" and, most fascinating of all, "Will we ever be able to travel back in time?"

Dr Al'Kalili has written popular books about science and has made numerous television appearances.

21 April 2005

DL, 7.00 p.m., with tea/coffee from 6.30 p.m. There will be a buffet after the talk and all who attend the talk are welcome. Neil Parkinson and Keith Hodkinson

Protecting and exploiting intellectual property

Intellectual property (IP) in its various forms can be of great, and in many cases, critical commercial importance. Maximizing the commercial value of available IP protection requires an appreciation of the forms of protection available and the manner in which exclusive rights can be obtained and exploited.

This presentation will provide an overview of the protection that is available for various forms of IP and how IP rights can be commercially exploited. The provisions governing qualification for, and the procedures for obtaining, patents, design rights, trademarks and copyright will also be discussed.

The scope of protection offered by the various rights will be contrasted; some common pitfalls leading to the loss of potentially valuable rights will be addressed; and different strategies for commercially exploiting available rights will also be outlined.

Both this topic and the start time of the talk have been suggested by industrial members of the branch and we hope that a good number of them will take the opportunity to join us for this meeting. Members of the Manchester and District Branch have also been invited to attend.

ramme Nobel Laureate unveils new university facilities

5 May 2005

LMI, 7.30 p.m., refreshments and tours of the Medical Institution from 6.30 p.m.
Anna Ellison

Silent witness: babes in the wood

After the successful event last year, this is the second joint event with Liverpool Medical Institution.

Anna Ellison of the Forensic Science Service, Major Incident Unit, at Chorley will talk about the role of forensic science in crime solving, including a case-study of a recent murder where the only witness was the deceased's two-year-old son.

There will be a buffet after the talk for which a small sum will be charged.

The Medical Institution is an interesting historic building and is situated at 114 Mount Pleasant, Liverpool, opposite the Metropolitan Cathedral, with the entrance in Arrad Street.

18 May 2005

Visit to British Aerospace, Warton



If you would like to join the tour, please inform the secretary as places are limited.

14 June 2005

Conference for all who teach physics

30 June 2005

Annual Liverpool Physics Teachers Conference

12 October 2005

2.00 p.m.
Our planet – our future
Travelling schools' lecture

Turn to p6 to see what education events are planned for this year.

Many of the talks in our programme of events are of a level that is suitable for sixth-formers, and we are pleased that small groups of students from several schools now regularly attend some of our branch meetings.

Prof. John Charles Polanyi has unveiled the new surface science facilities at Liverpool University's research centre.

Polanyi, who was winner of the 1986 Nobel Prize for Physics for his work on reaction dynamics, officially opened the new facilities at the Surface Science Research Centre, which is now home to



Prof. Polanyi who won the Nobel Prize for Physics in 1986.

new scanning probe microscopes. These microscopes enable scientists to obtain images of individual molecules and atoms on a variety of surfaces.

Louise Ellman, MP for Riverside, gave a presentation at the event on promoting science and

technology in the North-West. A number of new studies at the

centre were also launched, including work on chirality, ozone holes in the atmosphere, quasicrystals, electronics and biomaterials.

The Surface Science Research Centre is the largest centre of its kind in the UK and is internationally acclaimed for its use of experimental and theoretical methods to capture events at the nanoscale.

Visit <http://svr.ssci.liv.ac.uk/> for more information.
Steve Barrett, **Vice-chair**

Reminder: IOP's careers surgeries come to Merseyside in February

One of the services provided by the Institute is careers advice. To bring this benefit to the wider membership, Vishanti Lall, the Institute's careers adviser, will be touring the country in the next few months to hold surgeries in the branch areas. She is planning to come to Merseyside on 9 and 10 February, holding the surgeries in the afternoon and evenings in order to enable any member to attend.

Vishanti can provide advice on a range of topics, including changing careers, redundancy, taking a career break, retiring and updating your CV. The



Institute careers adviser, Vishanti Lall, will be touring the country to offer advice to branch members.

branch surgeries are in central Liverpool and the Daresbury area. If you are interested in attending, then please get in touch with John Bradshaw to make an appointment (tel: 01257 452 280; e-mail: John.Bradshaw@iop.org).

If you would like further information about the careers services provided by the Institute, follow the relevant links at www.iop.org.

For further information about Vishanti, see http://careers.iop.org/Templates/mission_statement/teamprofile.html.

John Bradshaw, **Branch support officer**

Careers information: did you know...

...that there are career break grants for conferences?

People sometimes need to take breaks from their careers. The Institute's Career Break Grants help our members to stay in touch with developments in their fields by contributing to the costs of members' attendance at relevant conferences and similar events. Visit <http://careers.iop.org/Resources/Awards.html>.

...that those on career breaks can attend Institute conferences at the student rate?

Membership subscriptions during career breaks are at the low-income rate, which is currently £10. E-mail membership@iop.org.

...why graduates and experienced staff are graduating to chartered status?

Continuing professional development enables professionals to maintain and update their knowledge. Chartered status signals a commitment to maintaining competence and moving ahead with the times. See <http://careers.iop.org/chartered/index.html>.

...that mentoring is accessible for everyone?

As part of the Institute's commitment to maintaining high professional standards for physicists, mentoring has been taken out of a purely graduate-orientated structure and is now accessible to all members. See <http://careers.iop.org/Pdev/mentor1.html>.

● Explore the Institute's careers website and find out more. Visit <http://careers.iop.org/>.

PHYSOC: past, present and future

The Physical Society at the University of Liverpool was founded in 1889 and Prof. Oliver Lodge was elected its first president. It was founded for the advancement and study of physical science and it is interesting to note that there were four women among the first 100 members.

The Liverpool Physical Society lasted eight years before being merged with a newly formed student society. Its role over most of the last century has been to arrange talks and a few social occasions.

However, today's PHYSOC has developed so that its role is predominantly a social one, with pub crawls, trips to theme parks

and paintball sessions included in the society's programme of events.

PHYSOC has been trying to change its image by joining forces with other bodies, such as the Institute of Physics, the British Association for the Advancement of Science and the Interdisciplinary Forum.

Events are advertised to the members of the society, all of whom are warmly invited to attend. Over the last few years the Institute's Merseyside Branch has invited students onto its committee and has taken up undergraduates' suggestions for meetings. The most recent of these was the talk on F1 racing cars by Prof.



More social than physical: the current PHYSOC committee.

David Clark, which included numerous demonstrations and the opportunity to try out Nigel Mansell's drivers' seat – it was very uncomfortable!

The membership has changed over the years: when it was founded the society is reputed

to have discouraged students from joining, whereas today the student-run society invites university lecturers and other staff to become more involved.

However, PHYSOC today, being largely student based, must cater for the students, many of whom are more concerned about having a good night out than going to an evening talk.

My recommendation to attract more students to PHYSOC would be to change its name to something that is still physics related but reflects the breadth of the activities that it offers to its memberships. Any suggestions are welcome.

Valerio Ribeiro, **PHYSOC president**

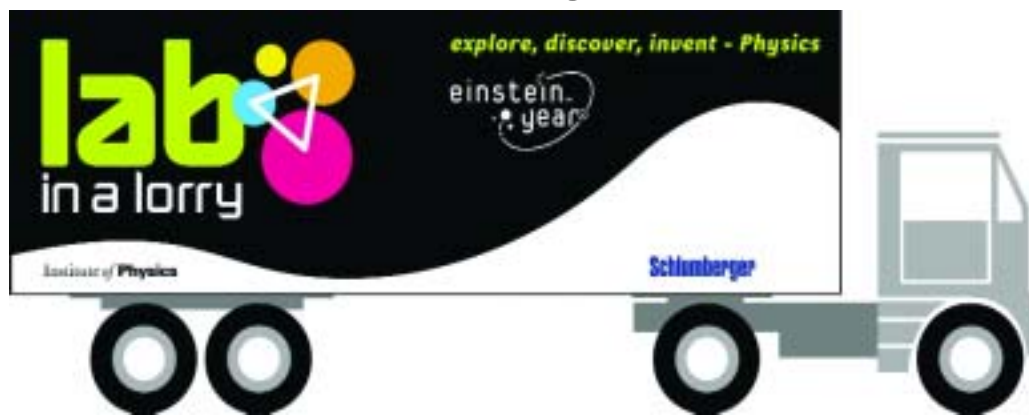
Lab in a Lorry goes on the road to offer experimental physics for all

Have you heard it said that "Physics is boring!?" One of the aims of Einstein Year is to change that view and show the fun and satisfaction that can be gained from physics. One of the "vehicles" for this is the "Lab in a Lorry" initiative.

Three trailer units have been set up by the Schlumberger Foundation and the Institute to hold three different experiments and the necessary support equipment. The experiments are aimed at 11- to 14-year-olds, but anybody can play.

The idea is two pronged. One aim is to park the trailers where they are easily accessible by schools and invite parties of 18 pupils at hourly intervals, divide them up into three groups and let them loose on one of the three experiments for an hour under the guidance of a resident physicist. The other is to park up at a public place (e.g. a supermarket car park) at a weekend a let the general public in to "have a go", again in hourly slots.

We have the opportunity for the lorry to visit the branch during Einstein Year and again in future years, but we'll need



volunteer physicists to guide and explain the activities to the visiting experimenters, five per trailer at any one session. Simply, it needs you!

However, you cannot simply turn up and do it. To show that the visitors' safety has been properly considered and to protect the volunteers, the Institute is collaborating with the local SETPOINTS to provide Criminal Records Bureau (CRB) records checks and some training. This will coincide with an opportunity to become familiarized with the experiments in the lorry. As a result of the training by

SETPOINT and CRB, you would become a Science and Engineering Ambassador (SEA) and as such you would then be covered by SETPOINT's insurance. As an SEA, myself, I can assure you that neither the CRB check (a simple form) nor the training is in anyway onerous or difficult. Neither are the kids, as long as you don't take them too seriously. Once you are an SEA, there are lots of other opportunities through SETPOINT to have plenty of fun and persuade your employer (truthfully) that you are developing a lot of interpersonal skills as well as promoting their

social good name. Not that being employed is a prerequisite – retired members and particularly students and postgraduates are most welcome.

If you are interested, visit www.labinalorry.org and contact me (tel: 01257 452 280; e-mail: John.Bradshaw@iop.org) without any commitment.

Information about your nearest SETPOINT can be found on the SETNET (Science, Engineering and Technology Network) website at www.setnet.org.uk. John Bradshaw, **Branch support officer**

Schoolteachers share their experiences of visit to CERN

A competition was held last March for Merseyside schoolteachers to win a sponsored visit to CERN in September 2004. As part of the sponsorship conditions, each winning teacher was asked to write a short report. This article has been constructed from extracts from these reports.

Perhaps the first thing that strikes a visitor to CERN is the lively cultural atmosphere. Young students and mature professors, drawn from all of the developed world and beyond, mingle in a soup of nationalities, given an opportunity to share, debate and research ideas.

The word “hostel” conjures up a vision of bunk beds and shared rooms, so it was a very pleasant surprise for me to find that we were all allocated to en-suite rooms with a telephone.

Next stop was the Microcosm exhibition, which was full of interesting insights into CERN, and one simple demonstration involving a plasma lamp and a fluorescent tube that I am going to try with my year-11 class next week. On the way out of Microcosm I was able to take photos of bubble chambers that I have talked about with sixth-form classes every year, but without ever seeing one.

A pleasant interlude followed as we met Peter Butler from Liverpool University who has been seconded to CERN. Over a drink outside, he elaborated on the work he is doing and the aims and objectives of CERN. Then he patiently answered our questions.

Next morning, the formal CERN tour started with a lecture. The amount of ground covered in an hour was incredible, yet because the lecturer was so good it was not a problem. He covered everything from basic particle physics to the structures required to detect interactions and why. We were then taken round the construction area for the ATLAS detector for the Large Hadron Collider, again with



Winning schoolteachers and their guides during the visit to CERN.



Construction area for the ATLAS detector – part of the formal CERN tour.

thorough explanations of everything. The size and complexity of ATLAS is awe inspiring – it’s the size of a house! The coils we saw were made from niobium-tin alloys encased in aluminium and able to carry up to 30 000 A. Interestingly, we saw them

being tested. They must be tested in pairs, because singly they would have such a strong attraction for the girders of the building that they could cause distortion of the roof.

After lunch: ISOLDE. This was a facility for, among other things, producing exotic nuclei.

It can take protons from the PS and fire them into a target, producing a range of particles, including unstable ones, and then accelerate them again to fire at a target, producing even more exotic particles. They had also developed a method of finding the mass of individual atoms, even ones with ridiculously short half-lives.

Leaving ISOLDE by car, chauffeur driven by our next guides for the day, we crossed the border into France to visit the second site at CERN. We were shown round the complex of the SPS (super proton synchrotron) by John Poole and Robin Laukner, originally from Daresbury.

“It allowed me to pick up many anecdotal references to flavour my daily teaching.”

John Shale

“The exhibitions, laboratories, control rooms and huge warehouses bring a new dimension to studying particle physics.”

Glen Wilson

“In a lifetime of teaching the subject I have been on many courses and have left the majority of them with the feeling that it had largely been a waste of time. On this occasion I can say with all sincerity that it has been a wonderful experience and one that I shall long remember. Now that I know the ins and outs of getting there I would like to take a party of sixth-formers to CERN, and I am sure that it will enhance their understanding of physics and inspire more of them to go on to university to study physics or related subjects.”

Terry Sanderson

“An inspirational and impressive visit. Many thanks to all involved.”

Adam J Patchett

Having arranged the visit and agreed to accompany the teachers as an Institute Teacher Network Coordinator, I would like to thank all who acted as our guides and also the staff at CERN for their help.

Ann Marks, **Chair**

EDUCATION EVENTS

2005 is Einstein Year!
February 2005

Paperclip Physics

A record number of teams have entered this year, so there will be a heat held in Liverpool on 2 February and the Regional Final will be on 22 February at Daresbury Laboratory.

For more details, visit <http://education.iop.org/Schools/suptstu/paperclip.html>.

9 March 2005

Einstein, the photon and fundamental interactions

Mike Houlden has kindly agreed to give this special Einstein Year talk, which will be suitable for sixth-formers and first-year undergraduates. He's renowned for his clear explanations of particle physics, so don't miss the chance to bring a group. See the main programme for more details and contact the secretary, David Martin (e-mail: davidm@liv.ac.uk) to reserve places.



14 March 2005

Go Observing Workshops on Einstein's birthday

The Institute of Physics and the

Astrophysics Research Institute of Liverpool John Moores University have combined forces to produce a workshop that will bring the heavens into City Learning Centres around the country. On this day in March, children all over the country will be hunting for asteroids. Why not get involved?

This Merseyside initiative has been awarded an Einstein Year Grant. For further information, visit www.schoolsobservatory.org.uk/einstein or contact Andrea Fesmer (e-mail: andrea.fesmer@talk21.com). Members are welcome to help children to make these observations.

14 June 2005

KS3 & 4 Physics Teachers' Conference

Last year saw the first Liverpool conference for teachers of KS3 & 4 physics, entitled Physics can be Easy, organized by the Merseyside Physics Teachers' Network. Feedback rated it highly and voted for another conference in 2005.

This will be a meeting for all who teach physics at these levels, including non-specialists, PGCE students and NQTs, as well as the specialists.

The programme will include opportunities to explore the new Institute CD-based course SPT 11-14, try fun demos, share ideas that work well. etc.

If you have any requests, contact Ann Marks (e-mail: mtnc@amarks.co.uk). Watch out for full details later. Why not book your place today by e-mailing Ann?

30 June 2005

The Annual Liverpool Physics Teachers' Conference

This popular and informative event for physics teachers will be held at the University of Liverpool. All teachers are welcome to attend free of charge. Speakers cover a range of topics interspersed with discussions and hands-on activities, and opportunities to question a panel of physicists. Feedback from previous years indicates that the events provide a good opportunity to network, update and sort out problems together.

12 October 2005.

The Institute Travelling Schools Lecture

Our planet – our future

Can scientists build a sun here on Earth? How will futuristic cars work? Will extreme weather wreak havoc on our world?

This show will look at the ways in which science and technology are helping us to understand the impact that human life has on the planet.

Exciting demonstrations will

be used to bring the material to life and will incorporate cutting-edge research and technology.

The audience will be personally involved in deciding the content of the lecture, through the use of an interactive "choose-your-own-lecture" format.

They will also have the opportunity to vote on the best solutions to ensure that we can plan for a healthy and happy future here on Earth.

This lecture is likely to generate as many questions as it answers and should definitely not to be missed.

Karen Bultitude has appeared on BBC *Learning Zone* and *Scrappy Races*, presented the IEE Faraday Lecture, and works with the University of the West



of England.

Laura Grant has presented for the BBC and 4Learning, is involved with

outreach programmes at Liverpool University and held an Institute Physics

Communication Fellowship. If you would like to take a party to this event, contact David Martin (e-mail: davidm@liv.ac.uk).

For further information, contact Neil Heritage, Education Secretary (e-mail: neilheritage@kingschester.co.uk).

Education news

Einstein Year

For news of more Einstein events in 2005, visit the site at <http://www.einsteinyear.org/>.



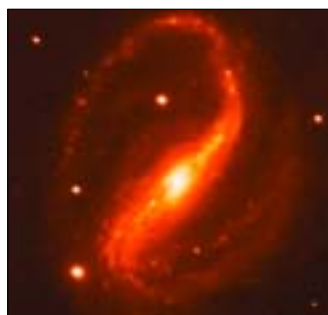
Teachers' Network

The Institute's Merseyside Teachers' Network is growing rapidly. If you teach physics to any age from 5 to 18, then contact Ann Marks (e-mail: mtnc@amarks.co.uk) to join the mailing list and receive regular updates about activities.

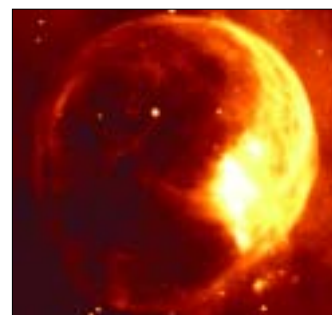
Also, contact Lucas Hayhurst (e-mail: lht@blueyonder.co.uk) to find out about the next twilight sessions.

Liverpool telescope

Schools can now observe the universe for themselves from the classroom using the LT, which is sited more than 2000 miles away and 3400 metres above sea level on an extinct volcano in the Canary Isles. The LT is a world-class fully robotic research telescope owned and operated by Liverpool John Moores University. Pupils select



Left: the Spiral Galaxy NGC7479. This image was first taken for a school by the Liverpool Telescope. The galaxy is more than 100 million light-years away. Right: part of the Bubble Nebula, showing the bubble of gas blown from a giant, young hot star about 7000 light-years away.



objects to observe using a unique user interface, Go Observing, found on the National Schools Observatory website. They submit their requests, monitor the status of

the observations and download the telescope image data for display, analysis and discovery.

For more information, visit the NSO website at www.schoolsobservatory.org.uk.