Institute of Physics

LANBRIA

The newsletter of the Lancashire & Cumbria branch of the Institute of Physics

Issue 16 June 2005

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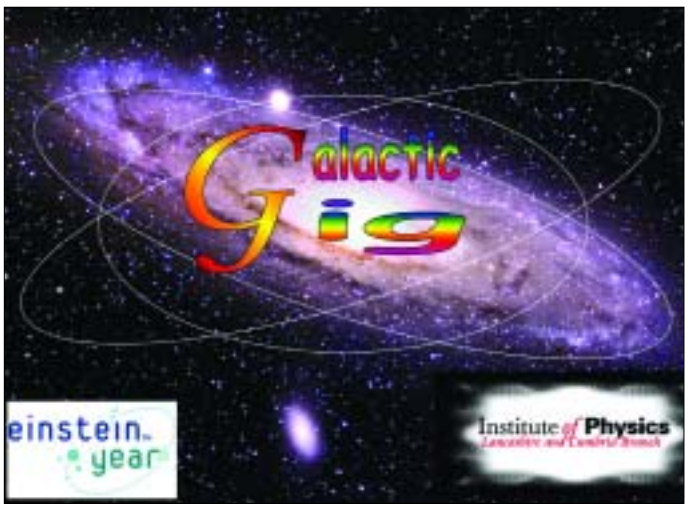
Galactic Gig roadshow gets ready to blast off

As part of Einstein Year, members of the branch are producing a drama, Galactic Gig, which will tour schools in the week 13–17 June. Galactic Gig is the Physics and Music show for which we have received £2000 funding from the Institute.

Although the exact list of venues was not available at the time of going to press, it is expected that there will be two days of presentations to primary schools in Cumbria, followed by three days at Lancashire schools. SETPOINT managers Barbara Tigar and Tony Gill have helped us to identify strategically located secondary schools to host Galactic Gig and invite their feeder primary schools to watch it.

The drama features an extraterrestrial traveller called Zubi who arrives on planet Earth from Zuben-el-Genubi, a distant star in the Milky Way. Lacking any ears, he communicates only by radio waves. Naturally he is fascinated to learn about sound, and especially music, and makes contact with two Earth citizens, Cynthia and Hermione. Cynthia is a brilliant young scientist who is doing a project on the planets of the solar system. She agrees to teach Zubi in return for a trip in his spaceship to visit the planets. Hermione is Cynthia's friend and a musician too. Along the way, a rap artist who seems to be Albert Einstein provides some zany diversions.



Albert Einstein™ HUJ, www.albert-einstein.net

Galactic Gig is a Physics and Music show that takes pupils on a voyage exploring the nature of sound and the planets of the solar system.

Both live and recorded demonstrations of sound are part of the show, along with fun facts and pictures of the planets to support Key Stage 2. At the end, there will be opportunities for the pupils to experiment with the equipment used under expert supervision.

This event is a major undertaking for the branch. It has involved script writing, planning and constructing a mobile set, choosing actors, learning lines, rehearsing scenes, and hiring and making costumes, among other things. In addition, SETPOINT Lancashire has provided training and the background checks appropriate for "ambassadors" working with schoolchildren.

Full details about Galactic Gig can be found on the branch website. It is hoped that there will be a special performance that branch members will be able to attend. This is being planned for Saturday 18 June, and if it goes ahead, there will be announcements about the time and venue by e-mail and on the website.

Visit the branch website at http://lancashire.iop.org

The editor's lines on the leaves

This month the main focus of the LANBRIA newsletter is on providing information about the Galactic Gig. This Physics and Music roadshow is our branch's big contribution to Einstein Year. Hopefully the Institute's new chief executive will be able to travel up from London to watch one of the performances. Naturally we intend to include photos and a full report of the event in the next issue (August) of this newsletter.

The Physics Fun Day on Sunday 19 June will NOT be taking place at Lancaster University because of the work going into the Galactic Gig. However, we intend to provide a public performance of the drama, possibly in a shopping centre in Preston, on the day before instead. If this plan gets off the ground, members will be informed by e-mail and via the branch website.

Finally, you will find the promised article on the history of the Eureka! competition on pp3–4. This activity will continue as before, but will now be fully integrated into the branch.

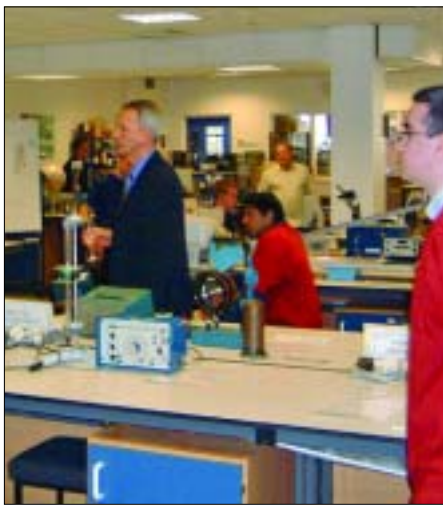
Chris Bowdery Chair

LANCASHIRE AND CUMBRIA BRANCH ACCOUNTS 2004

Income	
Balance at 1 Jan 2004	£1395.69
Interest	£48.07
HQ grant	£2250.00
HQ – Einstein Year	£2000.00
Total receipts (including starting balance)	**£5693.76**
Expenditure	
Meetings	£886.43
Committee	£115.24
Media	£319.40
AGM	£86.20
Secretary	£33.75
Lancaster University (stores items)	£126.24
Schools	£40.28
LUPAS	£130.00
Conf. costs (Young Physicists@Glasgow)	£103.60
Schools lecture	£100.00
Total expenditure	**£1941.14**
Balance at 31 Dec 2004	**£3752.62**
Balance at 12 May 2005 (latest figures)	**£4887.82**

Senior IOP perso North West's Jou

The president and the new chief executive of the Institute of Physics paid a visit to the North West on Wednesday 11 May 2005 for the opening of the Joule Physics Teaching Laboratories at the University of Salford. Professor Sir John Enderby CBE FRS, IOP president, performed the unveiling of a plaque (see photo) and later gave an inspiring lecture on Einstein and Dirac as part of the celebrations marking the substantial investment in new physics facilities at Salford.



Sir John's choice of subject was guided by the fact that 2005 is Einstein Year, and also by the Bristol connections that Paul Dirac and Sir John share. Sadly, while the whole world has heard of Einstein, very few people in this country have heard of Dirac, although he was a man of comparable genius.

There was also a splendid lecture by Dr Mervyn Black (Salford) on James Joule, who was born in Salford and carried out his famous research there. Mervyn and his assistant Gary were both dressed in authentic Victorian costume to give the audience (a mixture of visiting school pupils, invited physicists and local staff) a memorable overview of Joule's work using demonstrations and original drawings.

I know all of this because I was fortunate enough to receive an official invitation to attend the event in my capacity as branch chair. Besides taking the photographs shown here and enjoying the fine hospitality (a Joule free lunch, one could say!), I managed to obtain my first chance to speak with Dr Robert Kirby-Harris, who has recently taken up the post of IOP chief executive.

Having done his PhD at Lancaster University in educational research, Bob is no stranger to our region. And if all goes to plan, he will be coming to visit Lancashire for one of the superb performances of Galactic Gig later this month.

Chris Bowdery Chair

Above rig unveiled Bowdery

Beware the amateur boffin...

The slogan for Einstein Year is "Explore, Discover, Invent Physics". This is an excellent idea and there are quite a few people out there who are beavering away doing just that. What is somewhat disturbing, however, is how seriously some amateur physicists are taking the "inventing" side of things.

Earlier this year I was passed a letter from one such amateur enthusiast. He was convinced that Einstein was wrong about relativity, and that his own aether theory could explain space–time effects at least as well, in addition to predicting the accelerated expansion of the universe. It would be easy to dismiss this person as an isolated crank, but a simple search of the Web shows that there are many like him, often with detailed aether theories or other unusual ideas.

Such people often have a background in electrical engineering, and seem to share a passionate concern that professional physicists have been led astray by their teachers, a belief that common sense shows that they are right, and a feeling of injustice that they are being ignored.

These amateur physicists are gaining a voice via the Web. Some are publishing their own books and getting advertising through Google, some of which even appears on the Institute's own Web pages. Others are discussing the books in online physics forums that are not being visited by professional physicists, so misunderstandings are multiplying.

The time appears ripe for professional physicists and the Institute to use Einstein Year to try to bring the amateurs on board, and find a way to exploit their enthusiasm for physics. This might mean listening to their theories and gently pointing out the shortcomings. Or if that is not possible, we could respond to their websites and books with some appropriate Web material of our own – the counter-arguments to aether theories have probably been around for decades.

If we do nothing, we might one day find the public believes the word of the amateurs over that of the professionals.

Pla to Ein

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ht: Professor Sir John Enderby, IOP president, a plaque at the Salford Joule labs. Above: Chris (left) and Dr Robert Kirby-Harris (right).

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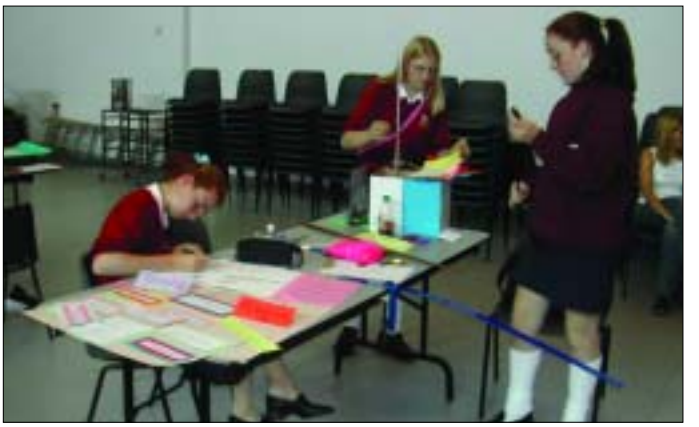
v.einsteinyear.org/ involved/funding

A history of the Eureka! competition

On a Saturday morning in April 1988, more than 100 Lancashire children gathered at a Blackburn school to take part in the first ever Eureka! Physics Competition. It was organized by the physics section of STEEL (Science, Technology & Engineering Education in Lancashire). STEEL was the local SATRO, or Science & Technology Regional Organisation, a body devoted to the promotion of science and technology education in Lancashire county.

STEEL's various sections already organized school lectures, examination meetings for teachers and lecturers, demonstrations of new apparatus and equipment, industrial visits and a variety of other activities. Eureka! was the first schools competition. An education–industry link was set up with it, as the competition was sponsored by ICI Chemicals & Polymers Group of Darwen, manufacturer of Perspex.



Previous Eureka! competitors work on their ideas.

The first competition

As an innovation in the activities of STEEL's physics section, the first Eureka! competition proved highly successful. A total of 36 three-person teams from 16 secondary schools took part, with the competition being aimed at middle school pupils in their pre-GCSE year.

One aim of the event was to plant the word "physics" into the minds of the students, most of whom were due to take Dual or Combined Science GCSE (which had been recently introduced to replace the individual science subjects) over the next couple of years. Another goal was to show them a link between science lessons and the workings of an industrial company.

The original idea was inspired by *The Great Egg Race* and similar competitions which were appearing on television at the time. However, Eureka! would be different – it would be a problem-solving exercise, with each team being given exactly the same apparatus/equipment and materials to tackle a challenge they had not met until the day of the competition. Even teachers would not be informed of the problem beforehand.

Contact with ICI Chemicals & Polymers indicated that they would be willing to sponsor the competition in terms of materials and prizes, the latter being engraved Perspex trophies for members of the first three winning teams.

It was also decided that every entrant should receive a certificate of attendance. This could then be placed in their Record of Achievement, which all pupils were building up. Four judges were invited to assess and mark the teams. Witton Park High School, Blackburn, volunteered to host the event.

This first competition involved measuring the intensity of light passing through transparent sheets of Perspex. Each team was provided with a light-intensity measuring system consisting of a photoresistor in series with a battery and a 100 μA meter. Teams were asked to bring along pens, pencils, adhesive tape, Blu-tak, scissors, a lamp and paper for posting up ideas and results.

On the day, problem sheets were circulated and the teams were given 45 minutes to think about the problem and to produce some ideas to solve it. They then had to post up their ideas on noticeboards next to their working tables. A break of 15 minutes was held to enable the judges to mark the teams' ideas, while competitors enjoyed the refreshments provided by the host school.

Teams were then called back and had one hour to take measurements, draw diagrams, plot graphs, analyse results and come to a conclusion, before finally posting up their results and decisions. There was another break with refreshments while the judges finished their marking. The winning team was Bury Grammar School A Team.

Later competitions

Subsequently the competition has been held every year, apart from 1997; in that year no school volunteered to act as host venue. Many schools have acted as hosts, some a ▷

number of times. Over 25 schools have entered the competition at some stage. The number of teams entering has varied considerably from 14 to 40, with some schools regularly sending team(s) whilst others are less frequent participants. Essentially, whether a school enters appears to depend on the enthusiasm of its science teachers for the competition and their promotion of it. As a school's staff changes, so does its interest in competing.

Comprehensive, grammar and private schools have taken part, and no single school has dominated the competition. A couple of schools have put forward a winning team three times, and a number have won twice. Rarely does one school have more than one team in the top three in any one competition. The home team(s) seem to have no advantage, and all-boy teams, all-girl teams and mixed teams have won over the years. The format has remained essentially the same as it was for that very first competition.

Following the first event, the physics section committee devised a variety of problems for the teams to solve. All have involved using Perspex samples in different forms, donated by ICI. Problems set have included measuring the bending of loaded Perspex strips (in cantilever arrangement, supported at two points and sagging, or supported at two points and bowing upwards), measuring the refraction properties of transparent Perspex blocks, the focusing properties of other types of Perspex sheets with a pyramidal surface finish, and timing Perspex pendulums. Some of these problems are now being recycled, since each year new pupils take part.

Finding new ways to deal with the challenges of Perspex.

After several years, ICI was no longer able to provide engraved Perspex trophies for the top three winning teams and the physics section then provided more usual trophies, as well as giving book tokens. About six years ago, following a change of management in ICI's acrylics division (the new name for the Perspex production line), sponsorship of the competition was withdrawn completely. The physics section had sufficient funds to run the competition for a couple more years, before the Lancashire & Cumbria branch of the IOP agreed to support Eureka! financially. In addition, some Perspex samples had been kept back and these continue to be used in the competition.

Marking the entries

Eureka! is marked by invited judges, who are provided with a suggested marking scheme at the start of the competition. Marks are awarded in each of four categories:

- Initial display of ideas: how would the team tackle the problem presented?
- Experimental procedures: experimental technique, use of equipment, safety aspects and team working
- Final decisions and reasons: consistency between measurements and results, do the team's results tie in with accurate values, use of averages
- Presentation: well-laid-out diagrams, tables, graphs, clear explanations, layout and general presentation

A team may be awarded up to 10 marks per section, so that the total possible score is 40. Last year final marks ranged from 19 to 32, with the winning team being All Hallows RC High School A Team. The competition was hosted by St Wilfrid's CE High School.

We are indebted to all those who have acted as judges for Eureka! over the years. Three who have done sterling service on many occasions are Dr Peter Bates (University of Central Lancashire), Dr Graham Barlow (retired head of physics, Blackburn College) and Mr Denis Tobin (retired physics teacher).

2005 competition

This year the competition will begin on Saturday 2 July at 10.30 a.m., and is to be hosted by All Hallows RC High School, Crabtree Avenue, Penwortham, Preston. For further information contact Dr Chris Walton, Business Services, Preston College, Fulwood Campus, Preston PR2 8UR, Tel: 01772 225266 or e-mail cwalton@preston.ac.uk.

Chris Walton Competition organizer

The deadline for your contributions to the August 2005 issue of this newsletter is:

Friday 8 July 2005

Please e-mail your materials to chris.bowdery@physics.org

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