

EAST ANGLIA BRANCH NEWSLETTER

The newsletter of the East Anglia branch of the Institute of Physics

May 2006

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New venue for branch AGM at Bury St Edmunds

The branch AGM will be a bit different this year. We're trying out a new day, a new time and a new venue. It will take place on Saturday 17 June, from 2.00 p.m. until 5.00 p.m. at the Conference Centre attached to St Edmundsbury Cathedral in Bury St Edmunds. The speaker will be Dr Mark Lewney of the UK Patent Office, winner of Famelab 2005. (See <http://www.famelab.org/finalists/1/> for more information about Dr Lewney.) Those who have had the good fortune to attend one of his lectures tell me that he's well worth seeing.

We're planning to have the Planetarium there – we sponsor it, and it has been very popular during the December Event and the Cavendish Laboratory's Science Festival. There's lots to see and do in Bury St Edmunds, with sights including Mary Tudor's grave, the oldest domestic town house in East Anglia (Moyses House Museum), and a Georgian mansion (Manor House Museum, which includes a collection of old clocks and timepieces). Oh, and don't forget to pay a visit to the



St Edmundsbury cathedral in Bury St Edmunds, scene of this year's AGM.

Cathedral itself – it looks old, but in fact it was only finished last year. There are also several other churches in Bury that are well worth a visit.

If you prefer something lighter in the way of entertainment, there is a Saturday market for lots of shopping, as well as the Green King brewery. Visit the Abbey gardens (gorgeous in June), or how about the Hidden Gardens of Bury St Edmunds?

We're planning to lay on a bus from Cambridge, for those who don't want to drive. For details, please contact the vice-chair, Jeannette Fine (jeannette.fine@

finerandd.com, or see contact details on masthead) closer to the date. If there is sufficient interest, we could run a bus from Ipswich. (If this might be of interest to you, please let us know as soon as possible so we can see if the numbers are large enough to make the bus viable.)

We will send out an information pack by e-mail on things to see and do in Bury closer to the date of the AGM. If you would like a paper copy, please contact Jeannette Fine.

Light refreshments will be provided before the meeting.

Author xxxxx

Visit the branch website at
<http://anglia.iop.org>

Perse School for Girls wins Paperclip Physics finals 2006



Electrons get friendly with the nucleus: the runners-up, team 2 from Norwich High School for Girls, explain the atom.



The Perse School for Girls team explains radiation in its winning presentation – here, things start escaping the nucleus.



The King's School, Peterborough team demonstrates overcoming the energy barrier on the way to fusion.



Will it or won't it? The Peterborough High team watches a particle approach a black hole.

This was the first year of the Paperclip Physics finals being organized on a regional basis. This had its disadvantages (no national final) and advantages (better prizes at regional level).

Historically, the East Anglia branch has held its regional final at the world-renowned Cavendish Laboratory. This venue has particular cachet and houses a fantastic museum of physics, but it is lacking in historical context – it is a 1970s building that is best described as “not inspiring”, either inside or out. Given the importance of making the day special, the branch thought it might be able to do better! We decided to opt for a Cambridge college instead, which wasn't as easy as it

looked. Buildings dating from the middle ages are not set up with space for competitions. Modern buildings tend to be dull (see above), or to look like hotel conference centres inside. However, we found a reasonable compromise in Selwyn College, a 19th-century creation. Although slightly inconvenient, it had all the right ambience.

This year we started out with a record number of 16 teams from nine schools, and were expecting the usual decrease in numbers before the day. This duly happened, but to an alarming extent, with one team even dropping out on the final day! (We presume it was a communication problem.) Reasons given for withdrawal

tended to be “team(s) have been over-ambitious and can not deliver”, “pressure of exams”, or a mixture of the two. On the day of the final we ended up with eight teams drawn from six schools – a mixture of state and public schools.

At Selwyn College we had two rooms (unfortunately across the road from each other), each perfectly suitable for our purposes. In the morning, we held two heats of four teams, with the top two teams from each heat going forward to the finals in the afternoon.

We initially looked for celebrity judges but our prime hope in this department, a TV presenter on Look East who in a former life was an acquaintance

of the organizer, came to nothing. However, we did well in the end. Our non-scientist judges included a planner, Richard Ward, the Director of Suffolk Preservation Society; John Gannon, a linguist; and Lucy Boussarova, a Bulgarian.

A new dimension

Interestingly, one of our teacher judges was Gerry Blake, who had hosted our successful team for the national finals last year (the Sir John Leman School, Beccles, which did not enter a team this year). He has now retired from teaching, but has become an author – on education in science, of course. He brought an entirely new dimension to the judging in one

of the heats, which seemed to work brilliantly and which we adopted in the final. He got all of the teams in the heat to arrange rows of seating and each team to present at the front. The enthusiasm of the kids was a joy to behold as they effectively had a stage to offer their wares from! Accordingly, we took this same approach in the finals. This again worked exceptionally well. I should add that Gerry also initiated talking with the kids afterwards and giving them tips for the finals, which also helped make our finals exceptionally good. The branch would strongly recommend these approaches for future finals as they increase involvement and foster improvement.

Our scientist judges were also particularly helpful and supportive of the competitors and were certainly right for the competition. They included an astrophysicist from Cambridge, a hospital physicist and someone from the defence industry.

In the final, the presentations were on black holes (Peterborough High School); nuclear radiation (Perse School for Girls); the atom (team 2 from the Norwich High School for Girls); and fusion (King's School, Peterborough). All of the presentations were very good, but one was without doubt the universally acclaimed front-runner. The Perse School for Girls team with its simple but elegant exposition on nuclear radiation was selected as the winner, and the Norwich High School for Girls (team 2) with its explanation of the atom was clearly the runner up.

Finally I come to prizes. We distributed books to the competition entrants, while the major prizes for the top two teams were outstanding digital cameras. So good were they that, after the first one had been presented, the rest of the team assumed that it was a group prize and started to walk away. When the presenter stopped them, they were astounded to realize that each participant was to have one. Indeed, one team member was so amazed that she lost her footing and fell over! I think the Institute got this one right. Well done all!

Author xxxxxxxxxx

The Intel Science Talent Search: a model scheme?

More news from overseas. In the last issue, we told you how Ireland is encouraging an interest in science among teenagers. This time, it's America's turn. In the US, Intel sponsors America's oldest and most highly regarded pre-college science contest, the Science Talent Search (STS). Eligible students include high school seniors in the US and territories as well as American students attending school abroad. Each year more than 1500 students enter, with finalists competing for the top prize, a \$100 000 (£57 000) scholarship.

In all, 1558 students entered the competition this year, representing 486 high schools. Students ranged in age from 15 to 18, with girls representing 53% of the total entrants. From these entries, 300 semi-finalists were chosen. More than 100 top scientists from a variety of disciplines reviewed all the entries to narrow the field down to 40 finalists. They examined each individual's research ability, scientific originality and creative thinking.

The 40 finalists completed the final phase of the competition, including extensive interviews by the judging panel, in April. The winner was Shannon Babb of American Fork High School, Highland. She will take her place among alumni that include six Nobel laureates, three National Medal of Science winners, 10 MacArthur Foundation fellows

and two Fields Medalists.

Combining research and remediation in environmental science, Shannon, 18, conducted a six-month study identifying water-quality problems in the Spanish Fork River. She analysed chemical and physical properties along the river drainage system and concluded that people, both through urban and agricultural use, had reduced the quality of water in the river. She contends that water quality could be improved by a combination of restructuring and educating the public that household chemicals should not be poured down storm drains.

Yi Sun, 17, of The Harker School in San Jose, California, received second-place honours and a \$75 000 scholarship. Sun discovered new geometric properties of random walks, a mathematical theory with applications to computer algorithms and polymers. Yuan "Chelsea" Zhang, 17, of Montgomery Blair High School in Rockville, Maryland, received third prize, a \$50 000 scholarship. Zhang studied the molecular genetic mechanisms behind heart disease, implicating CX3CL1 molecules as contributing to plaque build-up in the arteries. This knowledge could lead to the development of new medicines for atherosclerosis.

Intel says it is committed to improving education around the world. Company chairman Craig

Barrett praised the contributions of the entrants. "The talent represented at Intel STS is a dramatic illustration that investing in science and math education will pay great dividends for the future of American innovation," he said.

The runners up

Other top 10 finalists received \$20–25 000 scholarships for their projects: "Character Sums and Ramsey Properties of Generalized Paley Graphs"; "When the brain doesn't hear what the mind does: a lexical approach to McGurk adaptation"; "Quantum tunneling effect of electron bubbles at the liquid-vapor interface in liquid neon and its application to a time projection chamber neutrino detector"; "Bounding sphere images: a parametric bounding volume hierarchy for collision detection on the GPU"; "The effects of age on brown dwarf spectral features in the near-infrared"; "A computational study on new krypton- and argon-bonded molecules"; and "A partial characterization of Ehrenfeucht-Fraïssé games on fields and vector spaces".

The remaining 30 finalists each received a \$5000 scholarship, and all received a notebook computer.

In Ireland it's BT, in the US it's Intel. I wonder who we could get to sponsor us? For more information on the scheme, visit www.intel.com/education.

Please send your contributions to the next issue of this newsletter to: clark.fine@clara.co.uk

Order and CHaOS at Science Week

Once again, the Cavendish has excelled itself. Its contribution to Cambridge Science Week was almost too busy. The crowds were waiting eagerly in the lobby when I got there at 1.45 p.m., and we practically had to use force to get the last few out of the door at 5.30 p.m.

The Planetarium was booked solid within half an hour of opening. It will definitely be back again whenever we can get it. We used a different booking system for it this year: booking opened at 2.00 p.m. for all of the sessions, so you knew immediately if you were going to get in or not. This meant no-one queued up perhaps two or three times and still failed to get in.

This year, we had two devices to build – a balloon-driven hovercraft and a propeller-driven car – with competitions to see who could make their device go the furthest. Even with several enthusiastic assistants



The Planetarium is always popular with visitors to Science Week.

frantically cutting wheels out of cardboard boxes and axles out of dowels, we still were completely out of supplies by 4.00 p.m. (N.B. Next time, we'll get twice as much in the way of

supplies as we think we'll use.) CHaOS supervised these activities very well indeed. (CHaOS supervising chaos?)

The lecture this year on plate tectonics, by **????????????????**,

may have been aimed a bit too high – our spies report that one mum enjoyed it, her daughter (aged 14) less so. The wineglass resonance experiment returned after a year's absence; we managed to break two glasses, but six remained intact, much to people's disappointment. (Need to find a supply of cheap wineglasses with bass voices.)

A Super Scooter – a battery-driven vehicle that goes at 12 miles per hour and reacts to body position – was consistently popular and good fun. The usual spinning chair experiments were also popular, as were various light demonstrations. Outside was a water-rocket and a suspension bridge, but these were less popular as anyone wishing to get to them had to wade through CHaOS.

The students who volunteered to help out also enjoyed the day – and there was free pizza for everybody involved.

How to survive the Science Festival

What's it like to be a volunteer at the Cambridge Science Festival? I ran the resonance experiment, so I know a little bit about it. My first tip is to get there in plenty of time – they provide a lunch of sandwiches, soft drinks, crisps, fruit and chocolate bars, and you don't want to miss (or rush) that. You will also want to make sure that the demo you are doing is set up properly and is working.

Help is available if you need it, and training sessions beforehand can be provided where necessary. (Do ask a couple of weeks in advance if you think a bit of training wouldn't hurt. I had done the resonance experiment several times before, but the equipment I used was new this year. Cue requests for help.)

Expect to be busy from the moment the first people get in (usually about 15 minutes before official opening time) until at least half an hour after official closing time. In my experience, the kids will be a bit shy at first, so have a few questions ready to

draw them in. There will also be bits of the demo – for me it was the teddy bear on a swing – that even the littlest ones can do themselves, and which get them going nicely. I also have a few amazing-but-true stories ready to draw them in further, such as: did you know that a man got the Empire State Building swaying by hitting it with a hammer? These can come from anywhere (I got mine from my father); the Internet is a good source. Just make sure that any story can withstand eager questions.

Try to have the kids do as much as possible. With some of the demos, like the spinning chair, that is easy. With the wineglass experiment, I can get three involved, one to hold the glass, one to "ping" it, and one to hold the microphone. Then I turn load the glass into the holding apparatus and get a fourth child to hold the strobe, pointed at the wineglass. I explain what the strobe is for, then turn up the loudspeaker as high as it will go. If I'm lucky, the glass breaks within about 30 seconds. If I'm not, it sits there and vibrates – sometimes with the rim moving as much as half a centimetre – for several

minutes, and stubbornly refuses to break. Ah, the joys of doing real physics.

Expect people to wander over in the middle of the demo. If you're lucky, they won't wander away. At the end of the afternoon, you will be tired and your throat will be dry, but you will have the satisfaction of knowing that a lot of people know a little more about some aspect of physics because of you, and that they had some fun doing it. Don't go away yet – there are plenty of pizzas and soft drinks awaiting you in the Cavendish canteen, and good pizzas they are, too.

It sounds like hard work and it does keep you busy, but I very much enjoy seeing the look of fascination on the children's faces as they watch the Tacoma Narrows Bridge gyrating and their pleasure when they get Teddy swinging high up in the swing. They aren't the only ones – I always get a laugh from the adults when they find out that the Tacoma Narrows Bridge was not insured because a crooked clerk pocketed the premium. Fun and satisfaction – what more can you ask for from an afternoon?

Author xxxxxxxx

Website for primary school physics goes live

The Physicists and Primary Schools Project website is now live. Please do try it in your local primary school. The URL is http://teachingphysics.iop.org/primary_outreach.

The development team would like to hear your feedback. We also would like you to pass on any feedback from teachers.

If you have difficulty linking with schools we recommend that you contact your local SETPOINT (<http://www.setnet.org.uk/cgi-bin/go.pl/setpoints/index.html>). There is a large amount of helpful information on the Guidelines page of the website.

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