

NEWSLETTER

May 2008

Branch reaches for the stars



Steve Chambers

A spectacular panoramic view of the North American and Pelican nebulae, as enjoyed by members of the Norwich Astronomical Society.

If you live in the Norwich area and are interested in astronomy, you may want to check out the Norwich Astronomical Society (NAS). The group meets every Friday night during the winter at its site near Seething, which is about 20 minutes' drive from Norwich. It has excellent equipment and amazingly dark skies for a site so near the city.

The last of this season's

public open nights were held on 11 and 12 April. There was a talk entitled "Optical equipment for beginners with demonstrations" by Andrew Robertson, a guide to telescopes, optics and observing aids for beginners.

After the talk, people had the opportunity to have a look through the club telescopes on site. Each one was set up to point at different areas of

the sky, allowing guests to view a variety of objects. Club members were more than happy to answer any questions that the visiting public had about what they had seen.

The next season of public open nights will be held on 10 and 11 October, details of which will be announced on the NAS website. The open nights and club evenings are held at the

group's Seething observatory on Toad Lane, Thwaite St Mary, Norfolk NR35 2EQ.

For more information, visit the NAS website at <http://www.norwich.astronomicalsociety.org.uk/> or contact Dave Balcombe (52 Folly Road, Wymondham, Norfolk NR18 0QR; tel 01953 602 624; e-mail drbalcombe@tiscali.co.uk).

Jeannette Fine, editor

Cambridge experiences CHaOS

The weekend of 15 and 16 March saw Cambridge filled with families from across East Anglia who were keen to find out more about the world around them, as departments threw open their doors once again as part of the Cambridge Science Festival. In the Department of Zoology, Cambridge Hands-On Science (CHaOS) took over the teaching laboratories and lecture theatre for the biggest “Crash, bang, squelch!” event yet.

Families roamed from the Body Bits zone, with its array of anatomical models and demonstrations of the physical principles of breathing and speaking (not forgetting the eyeball dissection, carefully shielded to protect the squeamish), via hands-on demonstrations of wings, surface tension, how chemical hand-warmers work, why bread rises and why the sky is blue, to an opportunity to look at some insects, pondlife and some of the parasites found around the house. More than 100 student volunteers were on hand to guide children, parents, grandparents and assorted unaccompanied adults through the science at work in each experiment and to discuss its application to “the real world”.

As in the past, there were more keen visitors arriving at the doors than we could let into the laboratories. Fortunately the weather, despite the unpromising forecasts earlier in the week, was neither cold nor wet, so disappointment was avoided by putting some of the larger experiments, such as the build-it-yourself arched bridge and the human gyroscope, outdoors.

In parallel with the hands-on event in the laboratory space, Dave Ansell, Isobel Piper and Adam Bromby gave a series of lectures incorporating demonstrations too delicate for public access. These included the effects of cutting off the blood supply to the hand of a final-year physics student, what happens when a light bulb is microwaved, the spectra of different light sources, and a



A captive audience learns how to extract the DNA from a kiwi fruit.



Order out of CHaOS: setting up equipment for the demonstrations.

vacuum cleaner-based bazooka. CHaOS could not run its popular “Crash, bang, squelch!” event without the regular financial contribution of the East Anglia Branch of the Institute of Physics. We (and, judging by the feedback we get, our visitors) are very grateful for the support. **Rosy Hunt**

On Sunday 16 March the physics department had its open day in the Cavendish Laboratory. CHaOS was again on hand to educate and entertain with its exciting hands-on

demonstrations. The afternoon started out well, with the lecture by Prof. Peter Littlewood, “In synchrony: why things hang together”. Prof. Littlewood told us how spontaneous synchronisation is at the heart of many natural phenomena. For example, the human heartbeat is maintained by cells contracting in a synchronous wave. Some cicada species avoid predators by timing their emergence to repeat in a cycle of prime-number years. Unplanned synchrony can lead to unstable bridges or epileptic

seizures, and examples of this were shown. Quantum synchronisation is responsible for lasers and superconductors, and it is the accepted theory (the Higgs mechanism) for the existence of all mass in the known universe.

Then came what, for many of the children, was clearly the more exciting part of the afternoon – the hands-on experiments. The planetarium was, as usual, extremely popular, although the first session, at 2.15 p.m., was a bit quiet. Subsequent sessions booked out rapidly, however.

The hands-on experiments included resonance (breaking wineglasses with sound) and the Hele–Shaw cell (how to get oil out of a reservoir, and what happens if you try too hard) from Lab in a Lorry; making dragster racing cars; and an unstable bridge to walk on.

At the end of the afternoon, I was left with only a few of my many Marvin and Milo cartoons (having been asked by the Institute’s Outreach team to break up the packs). I also took along a tornado tube and potato straws, which were very popular. One measure of the success of the event is that I was far too busy (and frequently too squashed) to take photographs.

Our thanks must go to the CHaOS team for its invaluable help, and to Harry Druiff, who once again managed to find the time in a very busy schedule to organise the whole event and did his usual excellent job.

People might be interested to know that there are videos, plus audio and podcasts of some of the Cambridge Science Festival lectures and demonstrations available on the University of Cambridge’s excellent website at <http://mediaplayer.group.cam.ac.uk/CSF>.

Descriptions of the tornado tube and potato straw experiments are available online at http://www.iop.org/activity/outreach/Resources/Putting_on_your_own_event/Things_to_do/page_19207.html under “Physics Tricks”.

Esther Haines

Physics resonates with students

The Suffolk Engineering Showcase is becoming established as an annual event for students from Suffolk schools in their GCSE year. It is organised by Paul Nicholas of the Suffolk Education Business Partnership, with the objective of showing students what career opportunities are available to them in the fields of science and engineering. Exhibitors include professional organisations and institutes as well as excellent representation from local engineering and science-based companies covering subjects as diverse as construction, oil exploration and telecommunications.

Last year, the Institute of Physics East Anglia Branch arranged for Lab in a Lorry (LiaL) to be in attendance and demonstrate some of the physical principles that underpin engineering practices. The LiaL experience went down so well with the attendees that the organisers were desperate that we should attend again this year. Unfortunately, although it was

developed by visionaries in our branch several years ago, LiaL is no longer available for use in the East Anglia region. Nevertheless, the committee decided that we would endeavour to do as much as was possible to offer our support for the event.

To that end, Jeannette Fine and Esther Haines kindly agreed to make the journey over to Ipswich to spread the message about the Institute and perform some attention-grabbing demonstrations based on the experiments that had been available through LiaL.

A video clip (available from <http://www.enm.bris.ac.uk/research/nonlinear/tacoma/tacoma.html>) of the destructive oscillations of the Tacoma Narrows Bridge just before it collapsed into the water in 1940 amazed many students, with shouts of “Wool!”, “No way!” and “Hey, just come and look at this!”

Fine neatly explained that poor engineering can result in unwanted resonances building up in structures with

the terrible effects seen on the video. So it’s absolutely essential that engineers have a good understanding of the physical principles that are likely to come into play in whatever they are doing, and it’s even more important that they are able to model all of the conditions so that they can be certain that they understand how things will perform in practical extremes.

To add extra emphasis to this, she went on to demonstrate resonance in a wine glass. The students were shown how to measure the resonant frequency by pinging the wine glass and capturing the resonant peak on a spectrum analyser.

Fine then placed the wine glass in a soundproofed box and excited it with a high-power audio speaker. As the frequency of the audio signal approached the measured resonance frequency, the glass was seen to vibrate violently. The huge distortions of the resonating glass were captured clearly by using a strobe-lighting gun to

alias the vibrating frequency down so that the bowl of the wine glass appeared to be slowly pulsating. Students and teachers alike were absolutely amazed at the amount of lateral movement and distortion that the glass could exhibit without actually breaking. However, on two occasions the vibrations did become so fierce that the glass eventually shattered, resulting in the audiences being even more impressed by the experiment.

This proved to be a very productive day with more than 300 students attending the event. Paul Nicholas thanked us for our involvement and said: “The student feedback is outstanding and teachers were delighted at the quality of exhibits presented and the enthusiasm of those exhibiting. Several teachers commented that, not only were levels of student interest high, but that this was maintained throughout their visit – a sure sign of a successful event and a credit to the dedication of all of those involved.”

Paul Millar

Particle physics expert to lecture at key event

The Women in Science, Engineering and Technology Initiative (WiSETI) Annual Lecture, sponsored by Schlumberger Cambridge Research, will be given by Prof. Christine Davies, of the Particle Physics Theory Group in the Department of Physics and Astronomy, University of Glasgow. “My life among quarks” is on Tuesday 6 May at 5.00–6.00 p.m. in the Auditorium, Robinson College, Grange Road, Cambridge CB3 9AN. Prof. Davies’ research involves using lattice quantum chromodynamics (QCD) to calculate hadron masses in

order to test the Standard Model. Methods developed about five years ago focused on the up, down and strange quarks that make up the “everyday” subatomic world, being constituents of, for example, the proton and the pi meson. These quarks are very light, the up and down quarks in particular weighing almost nothing.

Now Prof. Davies and collaborators have improved the method so that it works well for charm quarks too. This improves the accuracy hugely and increases the predictive power. For example, they have

determined the mass of the D-meson and its cousin, the D_s-meson, for the first time.

They obtain an accuracy of better than 0.5%, and good agreement with experiment. They have also calculated the decay constants for the D-, D_s- and pi mesons in the same calculation.

This lecture will be for a general audience, including senior school students. For more information about the event, contact WiSETI (tel 01223 764 091; e-mail wiseti_events@admin.cam.ac.uk).

Jeannette Fine, editor



Prof. Christine Davies, who will give the WiSETI Annual Lecture.

**The deadline for contributions to the next newsletter is:
Friday 29 August
E-mail your material to: jeannette.fine@finerandd.com**

May talk will focus on legend's life

In the Ipswich area on 15 May there will be a talk on Fred Hoyle by Dr Simon Mitton, fellow of St Edmund's College, Cambridge. This will be at BT Labs, Martlesham, and will be in collaboration with the Institute of Telecommunication Professionals. It will start at 7.00 p.m., but refreshments will be available free from 6.00 p.m., when members of each organisation can socialise prior to the talk. All members are encouraged to come to this free event, especially those of

us on the eastern fringe of the region, to show that events don't need to be Cambridge based. Members can bring guests, but all attendees will have to book their places in advance to get access to the BT labs site. Places can be booked online at www.theiop.org/Events.

For more information, contact Paul Millar (tel 07720 435 558; e-mail paul.millar@btinternet.com) or Esther Haines (tel 07919 035 851; e-mail Esther.Haines@iop.org).

This should be an exciting lecture because Dr Mitton has both theoretical and practical knowledge about his subject. On the practical side, his postdoctoral career started under Sir Fred Hoyle at the Institute of Astronomy in Cambridge. On the theoretical side, after working in high-energy astrophysics, he turned to the history of astronomy. Dr Mitton's biography of Sir Fred Hoyle was published in April 2005.

Jeannette Fine, editor.

Star lecturer will celebrate man's journey in space

The Centre of Physics in Science (COPHIS) at the University of East Anglia in Norwich will be hosting the lecture "Astronomy in the 21st century" given by David Balcombe of the Norwich Astronomical Society on 2 June in LT2 at 6:15 p.m. This is the last talk in the series and we look forward to seeing what

COPHIS will bring us next year.

The lecture will briefly highlight some of the major achievements in the 20th century as a launch pad for understanding the major questions to be answered in this century. Planned space missions and the major facilities, including the largest telescopes in the world and their objectives will be touched upon. These will include the grand unification theory, black holes and life in the universe.

Balcombe is an amateur astronomer and secretary of

the NAS. As a schoolboy he was inspired by the space race and the moon landings. He is interested in cosmology and observing deep space objects, and he frequently presents talks and hosts group visits at the NAS observatory.

The COPHIS talks are free and no booking is required. For more information, contact Dr Martin Loftus (c/o Faculty of Science, University of East Anglia, Norwich NR4 7TJ, e-mail cophis@uea.ac.uk or tel +44 (0)1603 592 539).

Jeannette Fine, editor.

Branch looks forward to big event

Physics in the Field is one of the Institute's outreach efforts. It aims to bring physics to the general public through festivals and other non-science events throughout the summer. It uses handheld (and hands-on) demonstrations that have the "wow" factor and illustrate areas of physics, such as putting kebab sticks through balloons without popping them; finding out how to turn a glass of water upside down over someone's head without anyone getting drenched; and making Alka Seltzer rockets.

The branch provided the volunteers to man a very successful stall at the East of England Show last year, which



Physics in the Field at last year's East of England outreach event.

attracted around 4000 visitors, and we hope to repeat the success this year. The event will be held on 13–15 June from 8.00 a.m. – 6.00 p.m. at the East of England Showground, west of Peterborough.

We can always do with volunteers, so if you would

like to spend a couple of hours helping people to experience the world of physics, contact Esther Haines (outreach officer), Institute of Physics, 76 Portland Place, London W1B 1NT (tel 07919 035 851, e-mail esther.haines@iop.org).

Jeannette Fine, editor

Correction

I put an article in the last issue for the 9th Skills Open Day (held in 2006). I'm not sure how I managed to miss the year, but I did. Cavendish Outreach found that the event, although popular, was not functioning as intended and has discontinued it. If you are a teacher, check out the next School Workshop, Opposites Attract at <http://www-outreach.phy.cam.ac.uk/workshop/>.

Jeannette Fine, editor.

AGM NOTICE

3 June

Pippard Theatre, Cavendish Laboratory, Cambridge
Refreshments from 6.30 p.m.
Speaker 7.00 p.m. then AGM.
For more information, contact Bill Proud (tel 01223 337 205, e-mail wgp1000@cam.ac.uk) or Jeannette Fine (tel 01553 679 378, e-mail jeannette.fine@finerandd.com).

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