UK businesses benefit from CERN technology

Whilst CERN is best known for its pursuit of fundamental knowledge about the building blocks of the Universe, there are many examples of its technologies becoming commercially useful. CERN technologies are of value to industry because particle physics experiments demand ever-higher levels of technical performance. Current areas of interest include:

- Non-evaporable getters for improving the pumping speed of vacuum systems;
- High-speed imaging cameras for optical testing and inspection;
- ChemicalVia – a new method to make high-density microvias on printed circuit boards with reduced requirement for capital equipment;
- OpenLab – an open industrial collaboration, giving companies access to the development of new-generation data 'Grids' for high-volume data management.

The appointment of a UK Technology Transfer Coordinator for CERN in September 2002 was enabled with the support of a grant from the UK's Office of Science and Technology. Since then, we have seen the following highlights:

- We have started a series of technology commercialisation seminars for CERN staff and visitors. These have so far focused on evaluating the potential of technology, business partnerships and the formation of spinout companies.
- We have received the first PIPSS applications with CERN as the academic partner, and involving UK companies.
- Three technology surveys in the field of information technology (these are available for download from the PPARC website).
- Two industry briefings – one on vacuum technology and the other on e-business software available from CERN.
- Several companies have visited CERN in order to be briefed on specific technologies.
- Support for a CERN spinout company.

As a result of this activity, the number of companies dealing with CERN as a source of technology is increasing every month.

To find out more about working with CERN, please visit the PPARC Industry website at www.pparc.ac.uk/In/cerntt.asp, the CERN technology database at www.cern.ch/ttdb, or contact ***Nathan Hill****, e-mail: nathan.hill@qi3.co.uk tel: 01223 422405.*

EDUCATION

Academy for gifted children

PPARC officials visited Deborah Eyre, director of the new National Academy for Gifted and Talented Youth in June

The Academy is targeting gifted children, as there is less provision for them than for talented youth (for example, in music). It runs summer schools and shorter outreach events, and is very interested in adding programmes in 'big science'. Young people – roughly the top 5 per cent – can be nominated to become Academy members by their school, parents, or by themselves. The current age range is 11-16, with 16-19 year-olds being added next year, and primary school youngsters after that. An issue is that very bright youngsters like continuous intellectual challenge, and can drop out of subjects like science.

Projects discussed with Professor Eyre included masterclasses at CERN, the Rutherford Appleton Laboratory and Jodrell Bank, collaboration with the Faulkes and Liverpool Telescopes for schools, joint work with the 'Excellence in Cities' programme for inner-city schools, 'space schools', and collaboration with the Pupil Researcher Initiative. PPARC publications will be offered free to Academy members. We will be glad to put Academy staff in touch with interested researchers.

"We aim to engage some of the UK's best young minds with the big sciences, both for the renewal of the PPARC research community and for wider recruitment into UK science and engineering," said Robin Clegg, head of PPARC's Science and Society programme.

The Academy's website is at www.warwick.ac.uk/gifted
For further information contact ***Robin Clegg, e-mail:*** *Robin.Clegg@pparc.ac.uk*

The large spiral galaxy Messier 81 in the constellation Ursa Major (the Great Bear) in which school students are hunting for the tell-tale signs of novae. The image is a composite of three separate images in different colours taken specifically for this project with the telescopes of the Isaac Newton Group, La Palma

Bristol particle physicists offer portable cosmic-ray detector

The University of Bristol Particle Physics Group now has a portable cosmic-ray detector which researchers are welcome to borrow for giving talks and demonstrations to schools and public events. The device is a hand-held particle-tracking detector based on scintillating-glass, fibre-optic plate technology. It is housed in a light-tight box and is powered by a 9-volt battery. The output screen of the image intensifier can be viewed directly by eye under low-level room light conditions or via video imaging with a CCD camera. It reveals the presence of cosmic-ray muons and electrons; it can also be used to view particles produced by a radioactive source.

The detector was purchased in part by a PPARC PUS Small Award. There is a small fund available for travel, so please contact me if you would like to make use of it.

Kate Mackay, e-mail: *k.mackay@bris.ac.uk*

SPEAKERS FOR SCHOOLS

Bristol particle physicists are also willing to give talks to schools:

Helen Heath (helen.heath@bristol.ac.uk)

Small is beautiful: a look at size from us to the proton
Probing the proton: the ZEUS experiment at HERA
The basic building blocks of matter and how they were discovered
Hunting the Higgs: the Large Hadron Collider at CERN

Vincent Smith (vincent.smith@bristol.ac.uk)

Quarks and leptons: the Standard Model of Elementary Particle Physics
Relativity and the twin paradox
Wave particle duality: is the electron there when you are not looking?
Matter and antimatter

Kate Mackay (k.mackay@bristol.ac.uk)

Cosmic-ray studies

Physics on Stage 3

The third European festival of physics teaching will take place at ESTEC, the research centre of the European Space Agency in the Netherlands, during the European Science Week, 8-15 November 2003. It is organised by EIROforum, a consortium of seven of Europe's major international research organisations.

The theme of this year's event is 'Physics and life', emphasising the increasing links between physics and the life sciences. In a year which sees the anniversary of the unravelling of the DNA molecule by physicists Francis Crick and James Watson, it is appropriate to use these links in the classroom to motivate and enthuse students. As in previous years, Physics on Stage will feature an exciting range of demonstrations, presentations and a fair in which teachers from across Europe can display and share their work. In many ways, however, the key to the event's success is the coming together of 300 physics teachers from 22 countries and the resulting exchange of ideas and approaches to teaching. Some of these ideas have been showcased in the UK at the ASE annual meeting and at other events for teachers.

There will be 30 delegates from the UK at the event and, at the time of writing, they are being chosen from the list of applications received. The UK National Steering Committee represents teachers' organisations, professional bodies and research councils (including PPARC which is providing support for the Committee). For more information about the event, please contact the UK coordinator, Kerry Parker (e-mail: kerry.parker@iop.org).

Andrew Morrison, e-mail: *morrison@innotts.co.uk*

School students discover new exploding stars

Pupils recently got a chance to carry out some real astronomy, working with staff of the National Schools' Observatory (a PPARC-funded project) and using data gathered specifically for them by astronomers using the Isaac Newton and Jacobus Kapteyn telescopes on La Palma in the Canary Islands.

The aim of the project, called 'Excitement of Science', was to discover exploding stars – novae – in the galaxy Messier 81. Novae are caused by runaway thermonuclear explosions on the surface of white dwarfs as it sucks material from a companion star. A nova is up to 100,000 times more luminous than the Sun. In our own Milky Way, about three novae of this type are discovered every year. We think there are many more, but these go undiscovered partly because dust clouds in the disc of our Galaxy obscure our view. Observing other galaxies can reveal many more novae.

At an event in June at the Royal Institution, the 400 school students from 100 schools across the UK were told that they had discovered four previously unknown novae in M81. In addition, using these observations combined with observations of novae in M31 (gathered as part of PPARC research student Matt Darnley's PhD work at Liverpool John Moores University), we determined the distance to M81 'live' with the students. The value derived (3.6 megaparsecs, or 11.7 million light years) agreed very favourably with estimates made by totally different methods. The project will continue with observations from the newly commissioned Liverpool Telescope (see p.27).

Further information can be obtained from: ***Andrew Newsam****, National Schools' Observatory (e-mail: amn@astro.livjm.ac.uk; tel: 0151 231 2905) and* ***Michael Bode****, Liverpool John Moores University (e-mail: mfb@astro.livjm.ac.uk; tel: 0151 231 2920*