



This was the first anniversary of what has become the largest distributed computing experiment ever undertaken, and (spookily) this coincided with achieving 2 million participants throughout the world. If you want to find out more – or help the project reach its 3 millionth user, visit <http://setiathome.sslberkeley.edu/>

Live webcast

Sixth formers, science staff and particle physicists from RAL joined schools from around Europe in logging in to the first live webcast from CERN (birthplace of the World Wide Web) last month. The students learned first-hand about antimatter and how it is made and used at the European Laboratory for Particle Physics. RAL scientists Mike Seymour and Tim Adye were on hand to answer questions and add extra insight.

The webcast, which lasted an hour, used the Internet to transmit live video from CERN. It was even possible to submit questions live by email to the presenters in Geneva. The RAL link-up came about through the year-long collaboration between them and St. Augustine's, Oxford, in which sixth formers are developing physics web pages for use in teaching younger children. The students said it was an "exciting and amazing event to be in on". "It was great to be able to see what is going on at CERN", and "When can we go there?" Physics teachers Adam Easton and Paul Cartwright commented, "This is exactly the sort of thing that brings physics to life. It was absolutely brilliant".

DL's Gavin Dobling and Mark Roberts were among 270 young researchers from the UK who presented posters at 'Taking Science, Engineering and Technology to the House of Commons' recently. The event involved scientists under 36 years of age from laboratories across the UK presenting their work at special receptions. (DL00/45/51)



The judges will be looking for the best images of science in action from professional and amateur photographers. The pictures can illustrate a scientific or medical advance or simply bring science to life in an original way. They must depict the power of science and the positive impact it can have on our lives. Any type of equipment can be used, from an inexpensive compact camera to a scanning tunnelling microscope, and the picture can cover any aspect of science: biology, chemistry, physics, medicine, technology, engineering or maths. There are 4 categories: photos taken by a) professional photographers b) amateur photographers c) people working in the science or healthcare field, d) people under the age of 25 yrs. Prizes are £7000 worth of cameras from Kodak - closing date 31 July. Get clicking!

- 11 July Visit to RAL by delegates from the British Physics Olympiad
- 13 July Visit to RAL by delegates from the International Conference on Residual Stresses
- 27 July Visit to RAL by Southampton University
- 1 August Visit to RAL by delegates for the London International Youth Science Forum
- 1 September Visit to DL by Eindhoven University of Technology, The Netherlands
- 15 September Visit to RAL by Eindhoven University of Technology, The Netherlands
- Visions of Science Here is a photographic competition you might consider entering. It has been organised by Novartis and the Daily Telegraph and



DARESBUURY LABORATORY

Articles, ideas and letters are very welcome!
Articles to the Editor or Correspondent by 15th of the month.

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LAB NEWS

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Let's go exploring

Following on from the successful 'Exploring Space' day held during National Science Week, two more departments have recently run

'Exploring' days for schools. The highlight of 'Exploring Radionaves' held at Chilbolton Observatory was the opportunity to clamber around the impressive radar dish. Thirty students and their teachers from Winton School and Harrow Way School (both in Andover) thoroughly enjoyed the interactive day. There were workshops about radar and about the research performed on the interaction of radionaves with the weather. The students also had the chance to work out the most cost-effective places to site radio masts to give good reception for mobile phones - very topical in view of the recent auction of radio frequencies to mobile phone companies.

'Exploring Molecules' aimed to show students just how important molecules are to the work of ISIS, to us as human beings and to us as consumers. Fifteen Year 10 pupils from The Downs School thoroughly enjoyed learning about the beauty of crystals and the value of symmetry. Then they got to work finding out how oil and water can be made to mix using



(00RC2516)

INSIDE: APPRENTICES. SEE PAGE 4

the right surfactant. In a final session they found out that the difference between right and left-handed molecules can be the way they smell! Spearment and caraway are the same molecule but our noses respond to them differently. As one participant commented, 'the day for me was very insightful into the world of applied chemistry which was very enjoyable and interesting and I would like to come again'.

The interactive 'Exploring' days aim to give the students a taste (or maybe the smell) of the excellent science that goes on at CLRC. By showing the relevance and importance of the science they learn in school we also hope the days will encourage some of them to go on to study science at A level and beyond.

Janet Hagglett



(00R/C2512)



(00R/C2538)



(00R/C2547)

CSE Department at Supercomputing '99

The Computational Science and Engineering Department at CLRC acts as a UK focus for the development, application and support of research in computational science and engineering. Last year we decided to promote our activities further on the international stage by taking a booth at Supercomputing '99, held in November in Portland, Oregon.

The Supercomputing series of conferences is the premier world event for all aspects of what used to be termed 'supercomputing', but which now encompasses high-end computational science and the underlying technologies of high-performance computing (HPC), data management and network communications. The conference features a range of activities including a program of technical presentations, tutorials given by world-leading experts, and an exhibition comprising industry and research exhibits. A state-of-the-art network, built each year especially for the conference, provides a

rich environment for real-time demonstrations. At our booth, Computational Science and Engineering at CLRC, we presented our work with the UK academic community, focusing in particular on scientific highlights from the collaborative computational projects and our high-performance computing activities, including:

- High performance quantum chemistry applications
- Modelling mechanisms for DNA fragment transport across cell membranes
- First principles molecular dynamics simulations of water adsorption on oxide surfaces
- Modelling high temperature superconducting properties



Mike manning the booth Photo courtesy: Mike Astinorth

Computing Centre, hosts of the previous flagship service. The EU Technology Transfer Network booth presented a European perspective of the impact of HPC on small- and medium-sized enterprises and several other European centres, such as Stuttgart, Jülich and Vienna, were also present. The conference was staged at the Oregon Convention Centre on the

- Reynolds stress laminar flamelet models of turbulent premixed combustion
- Parallelisation of FLTEAD - an irregular grid whole aircraft Euler solver
- PARASOL - an integrated environment for parallel sparse matrix solvers
- Computers by Design - virtual benchmarking of parallel systems in real applications

We had a laptop running a continuous demo from the APEX CD - an interactive guide to the use of HPC and Computational Fluid Dynamics in the process industries - and gave away our stock of CDs. Brochures of highlights from the Department's Annual Report were also available.

Our location, next to one of the bars, certainly helped draw the crowds on the opening night, and we were impressed by the range of backgrounds of the people who dropped by for a chat.

The leading US computer vendors and the National Labs naturally dominated the exhibition but there was a significant European presence. Also representing the UK scene were Manchester Computing Centre, who run the UK national HPC service on the Cray T3E, and Edinburgh Parallel

banks of the Williamson River overlooking downtown Portland. Portland advertises itself as the wind surfing capital of the world (not a great attraction in November) and us having more micro-processors per capita than any other city in the world. Much more like it after a hard day manning the booth!

Our intention is to present an even better display at Supercomputing 2000, which will be held at the Dallas Convention Centre. A quick look at the SC2000 website reveals the claim that Dallas has more stores per capita than any other US city - well as they say "When the going gets tough, the tough go shopping!"

Mike Astinorth

<http://www.cse.clrc.ac.uk>

Start-up businesses at RAL

Many of you may have seen Bookham Technology in the news recently, as the company floated on the stock market with great success. A PhD student, Andrew Rickman, working in the Central Microstructure Facility, started the company just over a decade ago. During its formative years the company was based at RAL, until relocation to Milton Park in 1997. It now employs

more than 470 staff, has offices in France, Japan and the US, and, when the company floated two months ago, was valued in excess of £3 billion, with Andrew Rickman's personal stake being more than £800 million. Unfortunately CLRC didn't have an equity share in the business!

CLRC has more recently been involved in two new start-up businesses: NEOS Interactive and PETRRA. NEOS Interactive, formerly

the Interactive Media Corporation (IMC), started in business a year ago, having bought the rights to a software product jointly developed by CLRC and Trinity College, Dublin under a three-year European programme. The product replaces the TV in hotel rooms with a PC monitor, and provides the guest with digital video-on-demand, digital TV radio, high-speed internet access, music, email, business applications, guest services and

shopping. PETRRA's product is a special camera for medical imaging, and was developed jointly by the Instrumentation Department and the Institute for Cancer Research. The company will hopefully soon be based at RAL. Having learnt its lesson from Bookham Technology, CLRC owns an equity share in both of these companies.

As part of the Government's drive to promote entrepreneurship, CLRC is encouraging staff to be entrepreneurial

and to commercialise their research. So if you've got a great idea, don't let it stagnate - turn it into a commercial reality. For guidance, contact the Marketing and Business Development Department.

As Lord Sainsbury, Minister for Science, said recently: "A first class science base is not enough, we also need world-leading scientific entrepreneurs."

Dawn Morris



Liaison Offices

For many years the UK Liaison Offices - at CERN run by Mary Shewry and DESY run by Susan Ketels - have played a crucial support role to the UK Particle Physicists, providing a valuable service covering housing, finance and travel assistance as well as helping to resolve a myriad of administrative problems. In 1999 Ken Peach established Liaison Offices at SLAC (Stanford Linear Accelerator Centre, California) and at Fermilab (near Chicago) to support the growing UK programmes at these centres and appointed Karen Wolfman and Olivia Vizcarra, respectively, to carry out similar support roles.

Whilst all had visited RAL separately, their visit in May was the first opportunity for the four to meet each other, to compare notes and to hold discussions with their colleagues in Particle Physics, Finance and HR. Their last day concluded with a meeting of the Particle Physics Users Advisory Committee, and they had the opportunity to meet and talk to key representatives from most of the universities involved in the particle physics experimental programmes.



(00RC2569)

The four days proved to be remarkably successful for all concerned, so much so that Ken deemed this should be an annual event!



(00RC2567)

First year apprentice outward bound course

In the week before Easter RAL apprentices Dan Wilson, Joe O'Dell, James Loose and Paul Amos, and Darisbury's Kevin Rimmer and James Stirling joined two Oxford Instruments at the Plas-y-Brenin mountain centre in Snowdonia.

The lads thoroughly enjoyed the challenge of mastering the techniques of canoeing, abseiling, rock climbing and traversing rope bridges - all under close and well qualified supervision. Many had to overcome fear and self doubt, but nothing prepared them for the trauma of making a presentation about the course to a massed audience of parents, tutors and sponsors on Thursday 11 May in the Lecture Theatre. However, they had nothing to fear as they made an excellent job of charting their progress by each giving a short presentation using slides of each day's activities, accompanied by entertaining dialogue. It was a very successful team-building exercise and will prove very beneficial when applied to workplace situations.

Joe Haskins

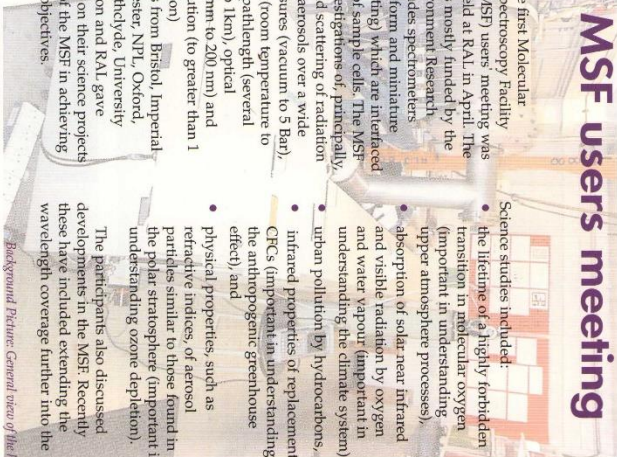
The apprentices with Ann Theoby, Support Secretary to the Trade Union and the Apprentice Training Scheme. (00RC2738)



First MSF users meeting

The first Molecular Spectroscopy Facility (MSF) users' meeting was held at RAL in April. The MSF, which is mostly funded by the Natural Environment Research Council, includes spectrometers (Fourier transform and miniature diffraction grating) which are interfaced to a number of sample cells. The MSF is used in investigations of, principally, absorption and scattering of radiation by gases and aerosols over a wide range of pressures (vacuum to 5 bar), temperatures (room temperature to 77K), optical pathlength (several centimetres to 1km), optical wavelength (nm to 200 nm) and spectral resolution (to greater than 1 part in 1 million).

MSF users from Bristol, Imperial College, Leicester, NPL, Oxford, Reading, Strathclyde, University College London and RAL gave presentations on their science projects and the role of the MSF in achieving their science objectives.

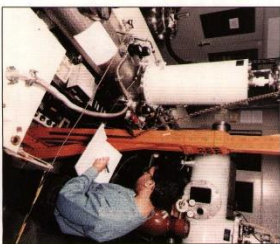


Background Picture: General view of the high resolution Fourier transform spectrometer in the MSF

Science studies included:

- the lifetime of a highly forbidden transition in molecular oxygen (important in understanding upper atmosphere processes),
- absorption of solar near-infrared and visible radiation by oxygen and water vapour (important in understanding the climate system),
- urban pollution by hydrocarbons,
- infrared properties of replacement CFCs (important in understanding the anthropogenic greenhouse effect), and
- physical properties, such as refractive indices, of aerosol particles similar to those found in the polar stratosphere (important in understanding ozone depletion).

The participants also discussed developments in the MSF. Recently these have included extending the wavelength coverage further into the



MSF being used to record laser temperature (136 C) spectra of methane in the near infrared.

Eagle eyed students discover water leak at DL

During the mass invasion of DL by schoolchildren during National Science Week (see last issue of

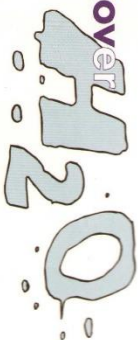


LabNews), a group of pupils from The Grange Primary School were in the SRS Control Room hearing from the SRS crew how the beam was managed from there. They were challenged, in fact, to find a leak using the remote control cameras. Smiles were soon wiped from the faces of the crew when the pupils did just that. The leak was a large one and resulted in the SRS being shut down for several hours for repair!

As a thank you, the group returned to the Laboratory to check that the repairs were completed. It was a clear day so they took the opportunity to experience the view from the top of the tower and were lucky enough to see a peregrine falcon hunting nearby. They finished their visit with refreshments in the Science Centre before returning to school. Thanks to Cheryl Hodgkinson and the SRS crew for helping out with the visit.

Aime Humphreys

Pupils from Grange Primary School with the remote control camera.



DARTS hits the target on the exhibition trail

Daresbury Analytical Research and Technology Service (DARTS) took stands at three exhibitions over the Easter season. Starting in sunny (but cold) Edinburgh at the British Crystallography Association's conference held on the Heriot-Watt campus then transferring to Cirencester's Royal Agricultural College for Materials Congress 2000. In parallel with the latter, the DARTS team also flew the flag at Warrington's own Business Connections 2000 exhibition.

With the recent publicity surrounding the new synchrotron decision still reverberating round the town, the DARTS stand was the star of the show. There were visits from the Mayor, from local MP Helen Southworth and from local press. The stand was the only one to gain coverage in the Warrington Guardian's report of the event. The article is reproduced below, together with a picture of the stand, manned by Elizabeth Marland (DARTS) Bridget Murphy (SRD) and Arne Green (IMD). Scientists promote Lab's work Daresbury Laboratory used Business Connections to raise its profile. For the first time, the Lab took a stand



(D/00342)

promoting its commercial arm, Daresbury Analytical Research and Technology Service. Research scientist Bridget Murphy said the Service was a growth area. Daresbury is now looking to its long term future and a number of strategy panels have been set up. Bridget said scientists at the Lab had

been asked to put forward ideas for projects that would help to keep the laboratory in business. "The exhibition has given us a chance to forge links with the local business community" she said.

C / Pickles

RAL staff go 'off the wall'

On Sunday 14 May five brave souls threw themselves off the top of the John Radcliffe Women's Centre, Oxford. Before you get worried, it was a sponsored event in aid of The Cancer Research Campaign. The daring (or deraigned!) team were Dawn Bidgood, Tim Durkin, Eric Johnson, John Sherman, and me. Our mascot Puglesley, a Staffordshire Bull Terrier, came along to back his encouraging up.

In the days leading up to the absent most of us only had a few worries about the jump but on the day we all looked green, thanks to the CLRC leashes we were wearing! The nerves did not start to show until we were all kitted up and ready to make our journey to the roof. This involved a lift to the top floor and then climbing a ladder to our last stop, before we made

our way back to terra firma - via a different route. Our nerves were made slightly worse by seeing the weights that would support us on our way down, although the view from the top made up for it. The worst part, for me, was going over the edge; leaning back into thin air is not a natural thing to do, especially with the ground about a hundred feet away! Once on my way down I found it surprisingly easy to keep going, but was both pleased and mildly disappointed at how quickly I reached the bottom. Dawn, the only one who had jumped absent before, found it a real buzz, especially as "it was for a very worthwhile charity, as members of my family have been hit by cancer". Most, if not all, of the group found it "good fun" and "would do another absent given the chance". The



Clare Hoskins-Jones

Dear Natalie

Mo and I would like to thank everyone who contributed towards making my retirement day a fabulous occasion for both of us. I knew what to expect but she didn't. It was a great pleasure to experience the friendship and goodwill of you all, something that has made working at both Appleton Laboratory for the first 20 years and RAL for the final 20, such a pleasure. We have many happy memories gained over the years working both at home and overseas

at which many of you were present. Thank you again for the gifts - we will now head west with a GPS in one hand and a dead pheasant in the other. Anyone passing by is most welcome to drop in for a jar and a chat either here or in our new home (when we eventually get settled in Cornwall).

All the best for the future to you! all

Geoff Douglas

Retirements

Peter Bradford

Peter Bradford retired from DL on 28 April 2000 after nearly 30 years of service. Pete's career started at Daresbury in 1970 when he joined the Heavy Gang. He then went on to supervise the gang and eventually became training co-ordinator for mechanical services in the SR Department.

He says he has enjoyed his time at Daresbury enormously and while here he became very involved in Laboratory social events - for many years he was a member of the social outing section and helped to run many of the coach trips. He is also well known for his contribution to the bonfire night display and used to be an active member of the Fea-



walking Club where it was on one of the walks that he met his wife, Margaret. In his retirement Pete's many hobbies - which include drawing and painting, gardening, photography and caravanning - will keep him busy.

I am sure everyone would like to join me in wishing Pete a long and happy retirement.

Nicky Elliott

Geoff Douglas

On Friday 28 April Geoff Douglas' colleagues gathered to say farewell!

Geoff started his career as an electronics apprentice at the Royal Radar Establishment in Malvern. However, his interest in space was awakened a few years earlier when, two days after Geoff's 17th birthday, the Sputnik satellite orbited the Earth for the first time. This enthusiasm led him to join the Radio Research Station in Slough in 1962, where he worked on cosmic ray experiments. As a sailor, he didn't object to his various postings around the globe: Singapore, the Falklands and Hawaii, to name a few. In between the



(00R2355)

postings he worked on several space projects, including the quality assurance for the ULE satellite - which rewarded him with 18 years of faultless work in orbit! In 1994 Geoff started the ISO 9000 quality assurance project, which culminated in SSTD receiving the ISO 9001 certificate in September 1999.

At the retirement party Geoff was presented with framed photographs, a GPS system for his yacht, and a full size model of the Kamikaze pheasant which tried to destroy SSTD's PA section! Geoff's wife Maureen was presented with a bouquet of flowers.

Learning and Development

Project Management Training Programme

The CLRC corporately funded Project Management Training Programme is now well under way. Courses are held at Eynsham Hall, near Witney, Oxfordshire and the Park Hall Hotel, Chorley, near Preston. All courses are residential.

Course details

Project Practitioners
A 3 day residential workshop based around a generic stimulation, which allows participants the opportunity to run a project from start to finish in a 'safe' environment. For project managers, project team members, and possibly project sponsors.

Learning objectives

- to experience the whole of the project life cycle
- to be able to use the 'technical' tools of PM, such as critical path analysis
- to acquire a basic understanding of the people skills needed for successful PM
- to understand how CLRC methodology reflects best practice in PM

Course dates

- 3-5 July Eynsham Hall
- 20-22 September Eynsham Hall

Congratulations to the delegates who successfully completed the NEBS Management Introductory Award Programme at RAL. Seen here collecting their awards from Richard Lawrence, Wilson Orr, Christina Handley-Gomez, Mike Birnie, Robin Middleton, Declan Kelly, Frank Robinson, Nicki Hepburn, Pat Coan and Sarah Matthews. Dave Sweeney and Keon O'Neill also completed the programme but were unable to attend the presentation (09RCC2401)



Learning Lunches

Learning lunches are two-hour long interactive sessions held over the lunchtime period with light refreshments, including sandwiches, provided, though please feel free to bring along your own lunch though if you would prefer! They are open to anyone with an interest in the topic of the day. The sessions cover aspects of management and are delivered in an

informal, interactive way. Sessions are designed to be both informative and enjoyable. If you would like more information about the learning lunches please contact Marica Griffith, Learning and Development Manager at RAL on 5783. If you wish to reserve a place please contact Mary at RAL on ext. 6018 or Margaret at DL on ext. 3600.

JULY

- 4 Facilitated discussion group about the knowledge, skills and attitudes of a good manager within CLRC (DL) Science Centre
- 5 Facilitated discussion group about the knowledge, skills and attitudes of a good manager within CLRC (RAL) R12
- 12 Who wants to be an Entrepreneur? (DL) Conf Room 2

SEPTEMBER

- 13 Learning styles (RAL) R12
- 27 Learning styles (DL) Science Centre

OCTOBER

- 4 Ten tips for perfect presentations (DL) Conf Room 2
- 18 Ten tips for perfect presentations (RAL) R12

NOVEMBER

- 15 Basic interview techniques – for the interviewee (RAL) R12
- 22 Basic interview techniques – for the interviewer (DL) Conf Room 2

Programme of forthcoming courses at RAL

Further information, including full course outlines and objectives are available from the Learning and Development team on ext. 5783.

JUNE

- 29 **Effective communication workshop** One-day workshop to help delegates develop the vital skills of effective verbal communication.

JULY

- 11 **Time management** One-day workshop to help you make the most of your time.

SEPTEMBER

- 6 & 7 **Selection and recruitment interviewing** A mandatory course for anyone involved in interviewing at all levels.
- 26 **Basics of business English** Fun one day session to refresh you in the basics of business English.

OCTOBER

- 17 & 18 **Coaching for performance improvement** This workshop is designed to help people who manage staff. It will help you to get the best from your staff by developing your coaching skills and techniques.

NOVEMBER

- 1-2 **Presentation skills** A one-day course with half a day further coaching. This course will provide you with the confidence and skills to improve your presentation whether one to one, in meetings or in a formal presentation situation.
- 21 **Report writing** A one-day course aimed at helping you to understand your english grammar and improve your report writing skills.

The Programme for Daresbury will be published next month; if you need any information in the meantime please contact the Daresbury Learning and Development team on ext. 3600.

Daresbury's all weather golfers!

For many golfers the US Masters tournament heralds the start of a new season. With the televised pictures of this event fresh in their minds, 17 members of the Daresbury Golf Society assembled at Hill Valley golf and country club in Shropshire on Wednesday 12 April, to welcome in the start of the new season and to witness the new captain, Jim Clarke, drive into office.

This year the society has decided to reduce the number of outings from 6 to 4 to try and increase the turnout at each event. This has resulted in the competition being split into two, with the society better ball and team competition held over 9 holes in the morning and the individual competitions held over 18 holes in the afternoon. So as Wednesday morning saw the start of the first 9 holes of Hill Valley's Sapphire course, it also saw the start of the miserable weather which was to feature throughout the day. However, it didn't dampen spirits and by lunchtime the better ball Stableford trophy had been won by Steve Dobson and Bob Bate, but only after a hard playoff with the reigning better ball champions Mike Dykes and Pat Ridley. Both

partnerships had a better ball total of 21 points, but Steve and Bob clinched the title with a back 6 score of 16 points against 13. After a light lunch of pasty and chips and a touch of drying off they all set off again to battle it out for the Red Castle cup, this time over the championship course. This is one of the Society's most prestigious trophies and is played for over 18 holes. As the afternoon wore on the weather deteriorated from showers to persistent rain and the course became heavier and heavier. However, as always one man paid no attention to the conditions, and this year that man was Martin Holbourn who carried a net 80 to take the trophy (and the bar bill) in a fine exhibition of golf.

After a rather disappointing evening meal we all headed for the bar to congratulate the winners and to discuss the next outings.

- Friday 21 July Captains day at Wexham golf club
- Wednesday 20 September Oswestry golf club

If anyone would like to join the Golf Society then please contact Dave Kunder for details on 01925 603560/3387



Prize winning work



Nobel Prize winners 1976 to 1990

N 1976
The prize was divided equally between **BURTON RICHTER** and **SAMUEL C. TING** for their pioneering work in the discovery of heavy elementary particle of a new kind.

N 1977
The prize was divided equally between **PHILIP W. ANDERSON**, **SIR NEVILLE E. MOTT** and **JOHN H. VAN VLECK** for their fundamental theoretical investigations of the electronic structure of magnetic and disordered systems.

N 1978
The prize was divided, one half being awarded to **PIOTR LEONIDOVICH KAPITSA** for his basic inventions and discoveries in the area of low-temperature physics and the other half divided equally between **ARNO A. PENZIAS** and **ROBERT W. WILSON** for their discovery of cosmic microwave background radiation.

N 1979
The prize was divided equally between **SHELDON L. GLASHOW**, **ABDUS SALAM** and **STEVEN WEINBERG** for their contributions to the theory of the unified weak and electromagnetic interaction between elementary particles, including inter alia the prediction of the weak neutral current.

N 1980
The prize was divided equally between **JAMES W. CRONIN** and **VALL L. FITCH** for the discovery of violations of fundamental symmetry principles in the decay of neutral K-mesons.

N 1981
The prize was awarded by one half jointly to **NICOLAAS**

BLOEMBERGEN and **ARTHUR L. SCHAWLOW** for their contribution to the development of laser spectroscopy and the other half to **KAI M. SIEGBAHN** for his contribution to the development of high-resolution electron spectroscopy.

N 1982
KENNETH G. WILSON for his theory for critical phenomena in connection with phase transitions.

N 1983
The prize was divided equally between **SUBRAMANYAN CHANDRASEKHAR** for his theoretical studies of the physical processes of importance to the structure and evolution of the stars, and **WILLIAM A. FOWLER** for his theoretical and experimental studies of the nuclear reactions of importance in the formation of the chemical elements in the universe.

N 1984
The prize was awarded jointly to **CARLO RUBBIA** and **SIMON VAN DER MEER** for their decisive contributions to the large project, which led to the discovery of the field particles W and Z, communicators of weak interaction.

N 1985
KLAUS VON KLITZING for the discovery of the quantized Hall effect.

N 1986
The prize was awarded by one half to **ERNST RUSKA** for his fundamental work in electron optics, and for the design of the first electron microscope, and

GERD BINNIG and **HEINRICH ROHRER** for their design of the scanning tunnelling microscope.

N 1987
The prize was awarded jointly to **GEORG BEDNORZ** and **K. ALEXANDER MÜLLER** for their

important breakthrough in the discovery of superconductivity in ceramic materials.

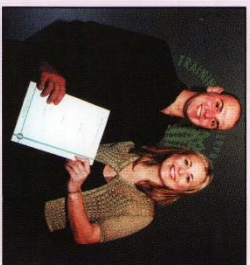
N 1988
The prize was awarded jointly to **LEON N. LEDERMAN**, **MEYVIN SCHWARTZ** and **JACK STEINBERGER** for the neutrino beam method and the demonstration of the doublet structure of the leptons through the discovery of the muon neutrino.

N 1989
One half of the award was given to **NORMAN F. RAMSEY** for the invention of the separated oscillatory fields method and its use in the hydrogen maser and other atomic clocks, and the other half jointly to **HANS G. DEHMELT** and **WOLFGANG PAUL** for the development of the ion trap technique.

N 1990
The prize was awarded jointly to **PEROM I. FRIEDMAN**, **HENRY W. KENDALL** and **RICHARD E. TAYLOR** for their pioneering investigations concerning deep inelastic scattering of electrons on protons and bound neutrons, which have been of essential importance for the development of the quark model in particle physics.

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1991-1999
to follow
next
month



Congratulations...

is considerable interest in developing a better understanding of space weather to help us cope with those problems, for example by designing more resilient technologies or by developing operational procedures to reduce risk.

Mike Haggood of SETD will be leading one of two ESA projects to assist European organisations whose operations could be affected by space weather. The European partners in the project, which includes DERA and Astrium (a new European space company formed by the merger of Matra Marconi Space and other space companies in Europe) from the UK, will review our current scientific understanding of space weather and establish ways that this knowledge can be used to protect vulnerable systems in space, on aircraft and on the ground. They will then outline the facilities (including spacecraft and their ground support) required so that protective action can be taken. The study will also look at the prospects for co-ordination of space weather activities in the ESA member states. The end result of the study will be a proposal for a European Space Weather programme to establish those facilities.

Mike Haggood said, "We are delighted to win this contract. There is a huge interest in the effect the Sun has on the Earth's environment and space weather is an important subject, but it is in danger of becoming a handbag. This is an excellent chance for us to establish what is really important about space weather so that we can help those who might be affected."

It is obviously important to analyse user needs and benefits from a possible space weather programme, so one of the first events to be organised will be a 'virtual' on-line workshop which will be held during June and July. The workshop will bring current and potential users of space weather services together into small discussion groups on the Internet in order to identify user requirements and benefits, and to debate relevant issues. The initial draft of the CLRC website for this project is <http://www.wdcln.ac.uk/SWstudy>

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British physicists research

An international panel of physicists has examined the quality of UK physics research in comparison with international standards and has found that: "At its best, research in physics and astronomy in the UK is at the very highest level world-wide". The comparative survey, which included a trip to KfU, was carried out at the request of the Office of Science and Technology and is the second of its type (engineering research was surveyed in 1999). The panel's findings have been welcomed by the four bodies sponsoring the survey, the Institute of Physics, PPARC, EPSRC and the Royal Astronomical Society, especially as the report's conclusions come from an independent panel of eminent research-active scientists. The full report is available at http://www.iop.org/Policy/iop_jrp_0rt.pdf

Section 3.7 looks specifically at central facilities. Although the panel felt that CLRC needed a more extensive study before it could make a thorough assessment, it commented that "the Panel believes that, under the constraints of present funding, these Laboratories [RAL and DJ] are providing a valuable underpinning to significant components of UK physics research. They must continue to play an essential role in major future projects, both on and offshore."

New name
At a recent workshop on fundamental physics in space, organised jointly by ESA and CERN, the meeting organiser called on delegates to think of a suitable name for physicists who carry out fundamental research in space. The name suggested? Cosmophysicist.

SETI milestones
On 17 May, the screen saver searching for signs of extraterrestrial intelligence achieved two milestones.