

NOTICEBOARD

CLRC Notices

The Enterprise Forum
A new series of seminars kicks off with 'Delighting our customers - how to treat them so they keep coming back', a talk by David Hall (pictured), who many of you will have seen at the Laboratories in the past.

The seminars, by invited speakers, will take place regularly over the next few months in the Lecture Theatres.

31 March 10:30 RAL
15 April 10:30 DL



You are warmly invited to attend any of the meetings. In particular, the new series on the life of Jesus may be of interest if you do not normally attend. For further information, please contact Jonathan Wheeler, RZ7, ext. 5189.

Missing inventory equipment

Precision Liquid Solder Dispenser RS Components part No.552-179 Ser No SD000109, RAL43326. Also, Casio fx-451, 98 function solar powered calculator, RAL42933. Both items missing from R88. Contact Jim Taylor on ext. 5120 jtaylor@rl.ac.uk

RAL Notices

RAL lectures
All lectures are held in the Pickavance Lecture Theatre at 9pm.

1 April
Beagle 2 - a voyage of discovery
Prof C Pillingier, Open University

Rutherford Appleton Laboratory Christian Fellowship
"... Jesus of Nazareth, who was crucified. He has risen."
All meetings are held in CR11, R3 unless otherwise stated.

March
11 The life of Jesus: The entry to Jerusalem
18 What jobs we do at RAL
5 The life of Jesus: The crucifixion
April
1 Communion service

DL Notices

DCI seminars
All seminars are held in Conference Room 1 at 2pm unless otherwise stated:

23 Mar
Electrostatics of random alloys and the broadening of core level photoemission spectra
Professor P Weightman, Surface Science Research Centre, University of Liverpool

Books for Romania

Do you have any copies of the Oxford English Dictionary, cookery or catering books, Shakespeare and other Classics (in good condition) which you would like to donate to Romania? If so, please contact Jane Whittington on ext. 3346.

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

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LABNEWS

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Upbeat upgrade keeps to time!

The SRS gets £4.4M for two new beamlines

A project to upgrade the SRS was officially initiated in February 1997 with £4.4M from BBSRC, EPSRC, MRC and The Wellcome Trust to provide two new multipole wiggler insertion devices and beamlines on the SRS. The beamlines will equip the SRS with two new advanced protein crystallography stations and a sophisticated new facility for studying photon interactions with molecules, nanodusters and surfaces called Phoenix-UV. In order to accommodate the new insertion devices, a substantial rearrangement of the SRS storage ring was required including the relocation of all four RF cavities and the installation of new narrow gap vacuum vessels made of titanium to sit in the 'jaws' of the new 2 Tesla multipole wigglers.

Early in 1997, intensive physics and engineering work started on the detailed design of the beamline facilities, the insertion devices themselves and all the detail of the storage ring modification. The pace of work built up steadily throughout 1998 in preparation for the major upgrade shutdown of the SRS which started in October. Planning the shutdown started a year earlier and was a major activity in its

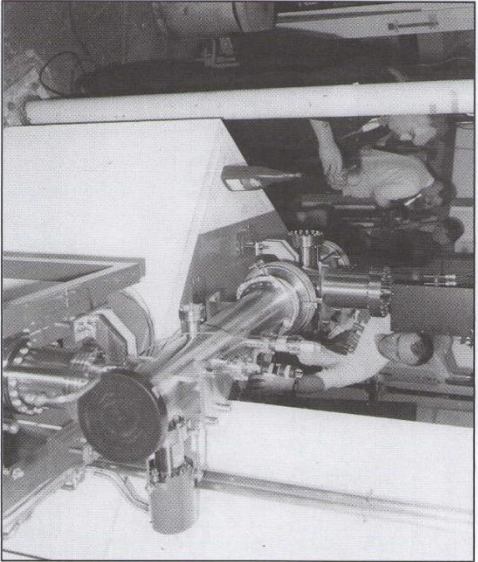


One of the mechanical engineering teams responsible for the major storage ring modifications. (DL58/TL42)

own right, bringing together dozens of individual design and manufacture activities to deliver new systems at the correct time for installation. On 1 October over 100 DL staff adopted a specially arranged intensive work pattern of long days and weekends to complete all the modifications in time for comprehensive system tests before Christmas. Their efforts were well rewarded by the achievement, ahead of programme, of electrons circulating around the storage ring on 22 December.

Continued overleaf

Upbeat upgrade continued



Assembly of the new beam line from multiple wigglers 14 to the new protein crystallography stations (D198/11/24)

After a well earned Christmas break attention shifted to accelerator physics and the control room. Briefly electron beam circulation was quickly

followed by RF capture and survival stacking, ramping and steering, making the facility ready to deliver beams for users on 25 January. This

represents record progress for the recommissioning of the storage ring with the added difficulty of steering through the two new narrow gap insertion device vacuum vessels. Equally significant is the fact that the SRS returned to user operations with ten fully functional beamlines demonstrating the successful planning and execution of many individual secondary work programmes.

The upgrade continues though, with the next step being to wind the insertion devices into their minimum gap and to re-optimize and steer the storage ring. The new protein crystallography stations are in an advanced state of preparation and commissioning will start in April. Construction of Phoenix-UV beyond the SRS shield wall will take place later this year and will be ready for users early in 2000. However, there can be no doubt that the most critical phase of the project has been successfully

completed and SRD management wish to thank the large number of staff from all departments who have been involved in the planning, preparation and execution of the main upgrade shutdown for their first class contribution to this vital project.

Richard's hot new project in Chile

Richard Wade has been appointed project manager for a new project - the Large Millimetre Array. He has recently moved from Instrumentation Department to Space Science Department and it was there that *Labnews* caught up with him to ask him more about the project.

What is the Large Millimetre Array (LMA) ?

LMA is the merger of two major ground based astronomy projects: the Millimetre Array being developed by the US National Radio Astronomy Observatories, and the European Large Southern Array, instigated by the European Southern Observatory (ESO). The project consists of an array of 64 twelve metre antennae operating at wavelengths of around 1 mm. The site selected is a flat region near Cerro

Chajnantor in the Atacama Desert of northern Chile.

Why build it?

Some of the most interesting regions of our Galaxy are at very low temperatures from just a few up to a few tens of degrees Kelvin. Others, in particular star forming regions, are shrouded by thick clouds of obscuring dust. To study these regions we need to observe them at wavelengths of around 1 mm. We also need to observe

at these wavelengths if we want to understand the process of galaxy formation by observing some of the most distant objects in the universe. The problem with observing at such long wavelengths is lack of angular resolution: if we want to produce images of similar resolution to those obtained by the Hubble Space Telescope (about 0.1 second of arc) we need a telescope with a diameter equivalent to 3 km - precisely what the LMA aims to be.

Who are the partners?

At present the project is seen as a 50/50 collaboration between the US and Europe. The Japanese are also interested and discussions are taking place between the three groups. The European end of the partnership has now been cemented by a Memorandum of Understanding (MOU) covering the three year R&D phase which has been signed by the current European members of the project including the UK. The other signatories are ESO, Germany, France, and the Netherlands.

What is CLRC's role?

CLRC is in an almost unique position of being able, potentially, to contribute technically to virtually every aspect of the LMA project. At present the

European R&D programme is being defined and the UK needs to bid for a suitable package of work. CLRC's contribution is likely to be in the areas of software, particularly antenna control, development of the local oscillators, which are essential components of the receivers and micro-electronic and systems design of the correlators which are used to process the signals to produce images.

In addition to the technical contribution, CLRC will host the UK project office. As project manager I will be the main point of contact with the rest of the international project and will be responsible for the delivery of the UK contribution.

We wish Richard luck with the project and look forward to hearing more developments in the coming months.



(99)CLC(652)

JREI adds spice to high pressure research

Daresbury-Manchester-Cambridge-London consortium has beaten off strong competition to land an upgrade to the Daresbury SRS high pressure station 16.4. The upgrade has been funded from the joint Research Equipment Initiative (JREI) and marks a significant milestone since this is the first time that JREI money has been allocated for SRS station upgrades.

The station will change from white beam to monochromatic operation. This will allow researchers to probe the structures, stabilities and melting relations of minerals and rocks at the temperatures and pressures found deep in the Earth. In particular, studies on hydrous and carbonate minerals which contain volatile compounds will give much-needed information on how these compounds are lost from the minerals, and the melting processes that occur in subduction zones at the edges of the plates on the Earth's crust. This will ultimately allow a better understanding of the natural hazards of earthquake activity and volcanic eruptions.

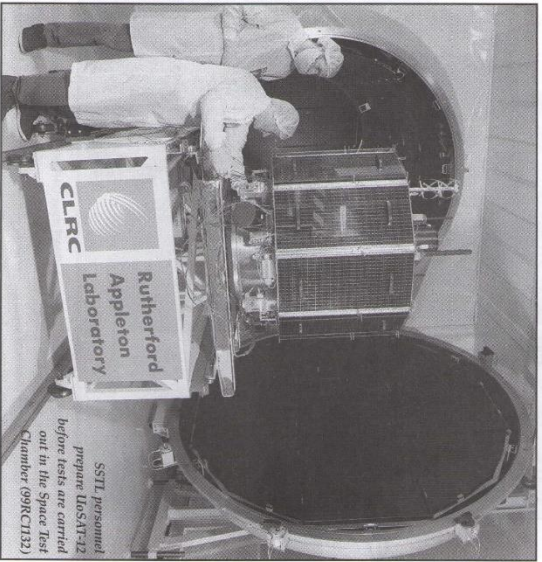


Three of the successful team are pictured above celebrating their success in station 16.4. They are (left to right) Simon Clark (DL), Alison Fradley and Mike Henderson (both Manchester, Earth Sciences). Good luck to the success of the project and let's hope that the Earth moves for them too! (D199/2/4)

Satellite complexes thermal vacuum tests

An experimental and educational minisatellite which is due to be launched in April has recently completed thermal vacuum testing at RAL. UoSAT-12, owned, designed and manufactured by Surrey Satellite Technology Limited (SSLT), will demonstrate advanced low Earth orbit communications and Earth observation payloads. Weighing 350 kg, the minisatellite carries novel propulsion, attitude control and navigation experiments, and has a five year design life.

The tests involved the satellite being placed inside the huge, 3 m diameter Space Test Chamber. All the electronics were wired up, the doors closed and the tank evacuated of air leaving the satellite suspended in a vacuum. The tank was heated to +55 degrees C and cooled to -35 degrees C and the electronics were tested at these temperatures.



SSLT personnel prepare UoSAT-12 before tests are carried out in the Space Test Chamber (9SR/C132)

"These are essential tests for any instruments destined to work in space" commented Graham Toplis from SSLT who is in charge of the tests, "Space is a very hostile environment and if there are going to be any problems, it's better to find out before the launch so that modifications can be made."

In December, the satellite completed the acceptance vibration tests at Mafra Marconi Space in Portsmouth where the satellite was subjected to a range of vibrations to check the construction of the satellite. UoSAT-12 will now be transported to the Baikonur Cosmodrome in Kazakhstan where preparations will commence for its launch.

SSLT's website: <http://www.sslt.co.uk>
RAL's website for thermal vacuum testing: <http://www.sst1.ac.uk/envest/tvtf-detail.html>

£400k investment in structural biology centre will provide unique facility

Daresbury Laboratory's world-leading expertise in studying the way that proteins fold has led to an award of £400,000 from the Biotechnology and Biological Sciences Research Council (BBSRC) and a nomination as one of four new UK centres for structural biology.

The award is for the construction of a beamline at the SRS which will be the focus of the centre and unique in the world. BBSRC hopes the centre will consolidate the UK's strength in protein folding research with Daresbury Laboratory's existing expertise and experience.

Circularly polarised ultraviolet light from the SRS at Daresbury Laboratory allows researchers to get new insights into the way that proteins fold. It has already been used to study the formation of anomalous protein fibres called plaques that form in the brains of people suffering from Alzheimer's or Creutzfeldt-Jacob disease (CJD). Understanding how the anomalous protein fibres that make up these plaques are folded is a key step in understanding the disease, and hence developing new treatments for them.

Dr Carath Jones, Assistant Director of the Synchrotron Radiation Department with responsibility for Life Sciences, said "This extra funding will allow us to capitalise on new facilities on the SRS for studying protein folding, keeping the Laboratory and the UK in a world-leading position. I am certain that we will discover a great deal about biology at the molecular level which will assist in the fight against disease."

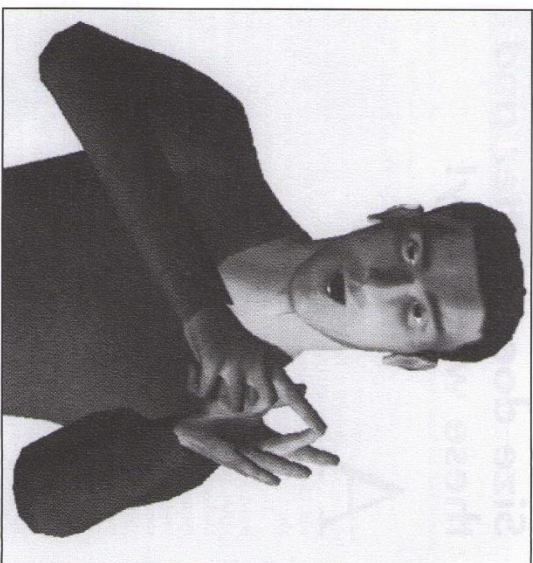
Virtual seminar

On 20 January, RAL hosted a seminar on 'Perceptual interfaces for human media interaction in virtual environments', part of an ongoing programme of seminars organised by the UK Community Club for Visualisation and Virtual Environments (VVECC).

So, what are perceptual interfaces? Most interaction with computers takes place by using some kind of 2D pointing device - usually a mouse - and observing a computer display offering a 2D picture. Even when using virtual reality software, many users worldwide at present use conventional desktop technology. Perceptual interfaces offer the potential of more productive ways of interacting with computers and can offer a way in for people unable to use conventional technology.

The seminar provided a forum for leaders in the field to speak about present state-of-the-art possibilities. One theme was to improve the presentation of the virtual world interactively. Matthias Unbescheiden (Darmstadt, Germany) described experiences with the CAVE at his institute, comparing it with other 3D systems. A CAVE can project a virtual world onto five of the six faces of a 2.4m cube, allowing several people to be convincingly immersed in a virtual world at the same time. German industrialists are extremely interested in the CAVE, but at present installation can only be economically justified in a research institute where the use can be shared. Nick Holliman (from Sharp Laboratories of Europe, Oxford) described and demonstrated a 3D LCD display being developed at Sharp.

Another theme was the ability to track the user's head and hands - freeing them of encumbering devices - which is becoming possible with improved computing speeds, low cost imaging devices and algorithms (David Hogg, Leeds University). Conventional computer technology and broadcasting excludes people with



The virtual human 'Simon' - Teletirtual Ltd

loss of vision or hearing. The Teletirtual company are developing a system for television which allows an animated virtual human, 'Simon', to use sign language based on speech input (described by Mark Wells, Teletirtual). Simon will use the teletext subtitle signal which accompanies many broadcast programmes, allowing a greater proportion of television programmes to be signed which is currently limited by the number of available experts. By contrast, BT and the University of Hertfordshire are working on tactile interfaces which, among other uses, assist the visually impaired. It was found that Braille-like devices did not have high enough resolution and other techniques such as force feedback needed to be investigated.

John Wann (Reading University) spoke about the capabilities of the human visual and perceptual system and the implications for design of virtual environments. The day was rounded off with some short presentations including one from Bob Essert from Ove Arup who outlined a system for simulating acoustics in building design. The meeting was fully subscribed with over 70 attendees; 20% from

The Community Club is organised by the Advanced Interactive Systems Group (AISG): <http://www.dci.diac.ac.uk/Group/DICSEAS>

Advanced Interactive Systems Group, <http://www.dci.diac.ac.uk/Group/DICSEAS>

VVECC events (including online proceedings for this event): <http://www.dci.diac.ac.uk/Activity/CCEvents>

Julian Gallop

Size does matter and these were tiny!

As a roving reporter for *LabNews* (or at least a member of the Press and PR team!) I spent a day with Chris Mann to find out more about millimetre wave technology.

The Millimetre Technology Group is part of the Space Science Department at RAL and is headed by Dave Matheson. Over the past few years improvements in radiometer technology has meant that scientific research and commercial applications have been able to use millimetre, sub-millimetre wavelength regions of the EM spectrum. These applications include radio-astronomy, atmospheric physics and industrial process control. Chris and his colleagues are responsible for the development of components and systems at these wavelengths using the Millimetre Wave Development Facility, state of the art design and test facilities, and their personal expertise.

Chris's face is one that most people at RAL will recognise, indeed I've often seen him zooming around the corridors, and after spending a day as his shadow I knew why...

Our first stop was Terry Mawby's office. Terry as a member of the Commercial Office is responsible for the register of patents on developments at CLRC. Chris was seeking his advice on a new technique he had just developed. My presence at this meeting made Terry nervous, but even I can keep a secret!

We were then off to the lab where the instruments using millimetre wave technology are built. One of the instruments is the Microwave Airborne Radiometer Scanning System (MARSS) which is used by the Met office to measure humidity. At the moment the instrument is collecting information on two frequencies, but with the expertise of Brian Moyna and Matthew Oldfield this is being increased to five. The group are also working on the CTO Sesame campaign which Brian will take up in a plane to collect data on ozone depletion by checking gases in the atmosphere. These gases have always been recorded over the arctic circle where scientists expect to find

evidence of ozone depletion. To prove their theories they need to confirm that areas of little ozone depletion do not have the same harmful gases present.

Our next stop was the development facility to look at the JPL 2.5 THz mixer, the key component of a microwave limb sounding RF receiver. It was here that I found out some of Chris's responsibilities.

At any one time he may have up to seven commercial projects running concurrently and might be responsible for everything including the design, development, fabrication, assembly and testing, collating ideas and communication between the facility, the mm wave group and the customer.

We took the JPL mixer to the mm wave clean room where we donned paper overalls, plastic shoe covers and a rather fetching but somewhat itchy paper hat. With great care Chris put the mixer into a scanning electron microscope to see if the recent soldering was okay. It was perfect and looked even to my untrained eye. It looked incredibly neat - it's amazing that this perfect soldering was not visible to the human eye. We did notice one huge discrepancy though - a blob - would it matter? Thankfully Chris identified it as yeast cell, easily removed with a quick wash... phew.

We'd just finished when Chris's bleeper went off. It was someone in the facility: they thought they'd damaged a feedhorn. I was getting nervous: had I chosen a bad day to shadow? Was I fit? Would Chris lose his temper? Would there be tears? When we got back to the facility, Chris examined the feedhorn and confirmed it was fine. It wasn't until everyone heaved a huge sigh of relief that I realised just how worried they'd been.

After lunch we went back to the facility where Chris supervises the cleaning of a feedhorn mandrel for SRON. It's serious stuff, John Spencer is wearing a white coat and goggles. He immerses the mandrel in a concoction of chemicals and waxes. After a couple of minutes he cleans it with water and then dries it with an air gun. Now to



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the microscope to see if it's clean...

Afterwards, a quick stop in Chris's office so he can check his email and then over to R71 to see Sylvia Fones. Chris is in the process of recruiting a Japanese researcher who will be on secondment from RIKEN for a year. We're taking the finished forms to Sylvia to see if they had been completed properly and could be processed.

At 5pm we got a very welcome sit down whilst we waited for an American colleague of Chris's to arrive. At 5.30pm Steve Jones (the American) arrives and he and Chris will be working for the next couple of hours writing software on simulating how the new devices work. Time for me to turn from Chris's shadow back in to jacket!

I really enjoyed my day with Chris and his colleagues. The commitment to their research made me feel quite humble. Chris doesn't just work here to earn a salary, he's here to make a difference. The technology developed by the group helps provide information about ozone depletion and global warming that may eventually influence the policies of governments all over the world and help secure the planet environment for future generations.

Obviously the group contribute in a direct way to this end goal but they are not the only members of CLRC that influence its successful realisation! Time is running out, ozone depletion affects every living thing, so even the person who orders or takes delivery of the tinnest, seemingly unimportant, unrelated component has a huge responsibility, delays quite literally could cost lives!

Jacqui Brough

SNIPPETS

Inspect launch

The Library is holding a video-linked lecture about the Inspex database on Thursday 11 March at 2pm in the RAL and DL Lecture Theatres. Mr Ray Lewis from Inspex will talk about and demonstrate the database, a powerful research tool for doing literature searches in physics, computing and electronics. It is now available to all CLRC staff at their desktops. After the lecture there will be refreshments in the Libraries and the chance for some 'hands-on' on Inspex. At RAL this will be followed by a short 'opening' ceremony of the new rolling stacks.

Prospering Through Science, the British Association Festival of Science 11-17 September 1999, Sheffield

The British Association Festival of Science is a unique annual event bringing together scientists, public and private sector professionals, students and the public to foster discussion of developments in many areas of science, engineering and technology. Anyone can come to the festival. Many visitors come to rub shoulders with the country's leading scientists and engineers and prominent figures from public life. Many scientists attend to meet and debate with their peers the scientific and ethical questions that they face.

In addition to the main programme of lectures and seminars, the Festival also includes exhibitions, debates, hands-on activities for young people, special evening lectures and a social programme to reflect all that Sheffield has to offer. As plans develop, the programme will be updated on the British Association web site at <http://www.britisassoc.org.uk>

For further information contact Sandra Koura 0171 973 3075 or see the British Association web site.

Chinese State award for RAL based researcher

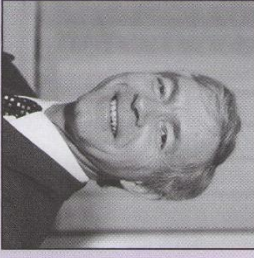
Professor Jie Zhang, who has been based at RAL and the Chemanon Laboratory, University of Oxford for the last seven years, has been awarded the Chinese Excellent Young Scientists' Medal and Prize for Physics by a State body which includes the Chinese Academy of Sciences. The Prize is one of the most important awards for young Chinese scientists and has categories in physics, mathematics, chemistry, life-sciences, earth-science, technical science and management. The medals are only presented every two years and are awarded based on excellence in science via nominations to the Academy.

Jie Zhang was nominated for his outstanding contribution to X-ray laser research, high field physics and non-linear optical processes, the experimental aspects of which were undertaken at the Central Laser Facility.

Jie Zhang who left RAL in January to return to China said, "My stay at RAL and Oxford University has been very enjoyable and I would like to thank the X-ray laser consortium for extremely fruitful collaborations and for the help and support of all the staff within the Central Laser Facility".

APR training

It is approaching the time of year for the Annual Performance Review and Training is responding to requests from staff by organising some half day courses called 'Successful APR Reporting'. These are designed to help Reporting Officers and Countersigning Officers with appraisal reporting and will be held between mid March and early April, dates to be announced. If you are interested in attending please forward your name to Training on ext. 6018 (RAL) or ext. 3600 (DL).



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Jie Zhang pictured on his last day at RAL (0981 227/4)