Bulletin
of the Rutherford Appleton Laboratory 3 Nov 1986 No.12

Well done PETRA

At 7 am on 3 November, the Positron Tandem Ring Accelerator (PETRA), at DESY in Hamburg, closed after eight exciting years of operation. For all of us from RAL and the British Universities who have worked there, this will be the culmination of a great experience. For those fortunate enough to have been involved from the start, it will be the rewarding conclusion of an adventure in science.

From the day the first few events trickled out in October 1978, until the end of the mammoth 9½ month high-luminosity run of 1986, PETRA has been the highest energy electron-positron collider in the world - a situation that has kept it throughout at the forefront of research. It was the first of the large modern storage rings, introduced many of us to big international collaborations. And to working with confidence in a group of almost 100 people, drawn from institutes in six countries and from three continents.

Rutherford Laboratory was involved with the experiments from the start. Construction started in 1976 on JADE (Japan - Deutschland - England) with Lancaster and Manchester Universities and TASSO (Two - Arm - Spectrometer - Solenoid) with Imperial College, London and Oxford. Later the Glasgow group joined the PLUTO experiment to study two-photon physics, followed by CELLO. TASSO-UK planted a colony at Bristol and Queen Mary College, London.

Building the equipment was the largest hardware project most of us had undertaken. The challenge was increased when it became clear that PETRA would be ready several months early. The experimental halls became scenes of frantic activity to meet the deadlines. The JADE magnet heat shields, and the question of finding which wire was number zero in the TASSO cylindrical proportional chamber, in turn assumed overwhelming dimensions. We remember with admiration Laurie Lintern's epic journey across a fog-bound Germany in a bus by night, bearing two suitcases of cooling fans for electronics.

The scientific impact of PETRA was immediate. At Nimrod, (which closed just weeks before PETRA opened), many of us prodded bags of quarks (protons) and studied how such an excited bag of tricks behaved. In electron-positron annihilations at PETRA it was conjectured that quark-antiquark pairs would be created, freed from the confines of the nucleus, and that these would make two collimated jets of particles. Would we see them? Yes - they were obvious. The great bonus that excited us all was to see three-jet events. It is a crucial prediction of Quantum Chromodynamics (QCD) that gluons, the "gauge particle" which binds quarks together strongly in the nucleus, could be shaken free in electron-positron annihilations to produce a third jet. Until 1979 we knew of only one gauge particle, the photon, or quantum of light, responsible for electricity and magnetism. With the discovery of the gluon at PETRA we had at last a valid theory of nuclear forces. The subsequent discovery of the W and Z particles at CERN completed the set, and the whole face of man's understanding of nature was changed.

A wealth of new things followed. Each physicist has his own personal discovery story. For one it was to show clearly that the Z^0 couples to the very heavy beauty-quark. For others to show to universal surprise, that protons and antiprotons are produced in fair numbers in electron-positron annihilation or to measure

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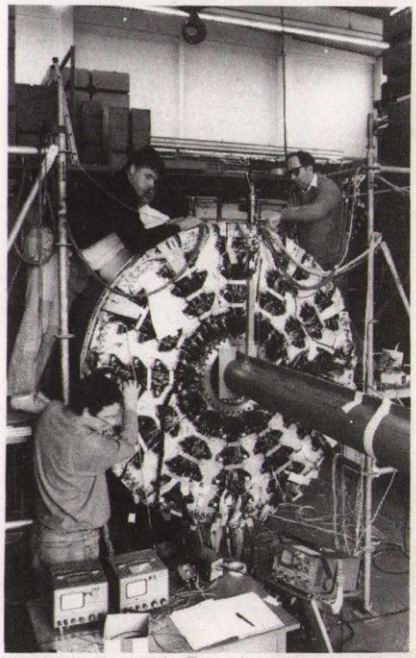
JADE and TASSO reunion.
Group leader Robin Marshall (2nd left) and David Saxon (3rd left) get together with colleagues who were in on the two projects from the beginning in 1976. 86RC4875



Don Clarke and Jim Hawthorne cable up the JADE outer Z-chamber during installation at DESY in 1984. (Photo DESY)

Well done PETRA

(cont'd from p1)

the lifetime of the τ-lepton and see that nature has indeed made the third generation of leptons in the image of the first two. Another scattered light on light and produced jets of particles. Both the old hands and a generation of students learned a new way of thinking at PETRA.

As PETRA closes, the pace quickens. Within the month, the world's largest e^+e^- collider opens in Japan, to be overtaken in 1987 by a Z^0 factory in California and then by the giant LEP e^+e^- collider at CERN. Experts in apparatus and analysis who learned their trade at PETRA are moulding the new projects, and RAL is heavily involved in three LEP experiments and in the high-tech Stanford Linear Detector (SLD) project for California. Many PETRA scientists have chosen to continue at DESY where the builders of the new accelerator HERA (RAL Bulletin No. 8 1986) are eagerly waiting for us to vacate the real estate.

But physics is not only an intellectual activity but also a human one. Craftsmen, engineers, technicians and scientists alike can take pride in the successful operation for over 25,000 hours of equipment they installed so long ago. We've had fires and floods but the 1986 run has been the best ever. DESY director Volker Soergel and the groups have combined to make a welcoming and stimulating environment where American and Russian, Spaniard and Chinese, English and Argentinian, Arab and Israeli have worked together for a common purpose. In these difficult times, that is no small contribution to human understanding.

Its been a lot of fun too. Hamburg has become home to many. We had a vogue for Scottish dancing and night shifts were enlivened by Alan Campbell's bagpipe practise in the experimental hall. We learned not to stand on draughty Dammtor station wearing a kilt and no-one ever found out where the Reeperbahn is. Some of us married German girls and live happily ever after. In the years to come, we will all remember our time at PETRA with affection and pride.

David Saxon

Film Badge Notice

It is period 12. Colour srip BLUE
Please be sure you are wearing the correct dosimeter and return all beta-gamma films and fast neutron badges promptly.

NEXT FILM ISSUE
Monday 1 December

RAL Colours

The next lecture in this series will take place on Thursday 6 November 1986 at 3.15 p.m. in the R22 Lecture Theatre.

"PRINCIPLES OF COLOUR PHOTOGRAPHY"

by

Dr N E Milner

Research Division

Kodak Limited

A colour photographic material is composed essentially of silver halide layers individually sensitized to blue, green and red light coated on a support.

After exposure the dye images are formed either by processing the three sensitive layers in three separate developers containing the individual colour formers, or, if the colour formers are incorporated in the sensitive layers, by one colour development step. Current materials depend upon the superposition of positive images (imagewise filters based on the subtractive primary colours yellow, magenta and cyan).

It is hoped that the following demonstrations will take place - successfully.

- Light sensitivity of AgX
- The properties of colours light filters
- Maxwell's colour photograph
- How cyan, magenta and yellow filters combine to make a colour picture
- How cyan, magenta and yellow dyes are made.

Thanks

Fred Wilshaw wishes to thank very sincerely all who so generously contributed to his retirement gift - a cheque in favour of the British Heart Foundation.

He very much regrets not being able to call on his friends to thank them in person, for reasons they will all understand.

In particular he would like to be remembered to all the project engineers and DAOs throughout RAL, ROE and RGO with whom he liaised on numerous construction projects in the past 14 years.

We have received a letter from the British Heart Foundation thanking Fred Wilshaw and all his colleagues and friends for their kind donation of £140.18.

'This support of our work is much appreciated', they write.

BNSC Moscow talks

A team from the British National Space Centre led by its Director General Roy Gibson and including RAL Associate Director Dr John Harries, recently returned from a visit to the Institute of Space Research in Moscow. During the visit representatives discussed the terms on which UK instruments may be launched on Soviet rockets.

A possible consequence of that meeting is that a British instrument may be proposed for the Soviet X-ray satellit Roentgen - due to be launched in the 1990s. Other possible collaborations are to be studied. The participants exchanged information and identified areas of common interest such as; solar-terrestrial physics, planetary sciences, radio astronomy and investigations in the infrared and microwave regions.

Christian Fellowship

Meetings are held in R2 Conference Room at 12.30 every Thursday unless advertised otherwise. All are welcome

Nov.	6	Bible study - Dennis Willi
	13	Prayer meeting - Ray Powell
	19	'Faith in a Scientific Age' - Rev.Prof D C Spanner
	28	Music & praise - S Walters

*NOTE:- The 19 November meeting will be in R22 Lecture Theatre.

An informal get-together has been arranged for Wed 5 November at 12.30 pm in the R1 Coffee Lounge.

For more information, please ring Mrs Margaret Summers, Ext. 5617.

Internal Events

NEUTRON DIVISION SEMINARS
R3 CONF ROOM_ - 1300hrs

25 Nov R Holt/RAL
Photon compton Scattering

9 Dec J Chalker/Southampton
The Quantum Hall Effect

ASTROPHYSICS SEMINARS
R61 CONF ROOM - 1400hrs

12 Nov Dr D H Lumb/Leicester
CCDs for X-ray Observations

26 Nov Prof Ian Robson/Lancashire Poly
Far Infrared Astronomy
an Overview

RAL Space at Science Museum

It doesn't take long to become a museum piece these days. IRAS, AMPTE, GIOTTO, the white-hot space technology of a few short months ago; all are represented in the newest gallery at the Science Museum.

With the theme 'Exploration of Space' the gallery was opened by HRH The Duke of Kent on Tuesday 21 October and shows the historical development of spaceflight from the earliest Chinese gunpowder rocket to the age of manned space stations.

Rockets and satellites, from the Museum's own collection together with hardware lent by other organisations, including RAL, form the nucleus of the gallery. Visitors can see Skylark, Britain's most successful rocket, familiar to RAL staff who took part in the high latitude auroral plasma study campaign of the '70s. Other exhibits feature IRAS, the infrared sky mapping satellite, discoverer of new comets and embryo planetary systems; Giotto, the immensely successful mission to Halley's Comet and AMPTE which studied the space plasmas in the regions between Earth and the Sun and produced the first artificial comet.

Many examples of RAL developed space-project instrumentation are also incorporated in the displays. Audio visual and interactive presentations add to the enjoyment.

With models of the Lunar Lander, Space Shuttle, Black Arrow, Apollo 10, and a V2 rocket on show, the gallery is very impressive. The children will love it. Do take them along and show them your part in the Space Age.

Museum open : Mon - Sat 1000 - 1800
Sun 1430 - 1800

Model of the Solar Maximum Mission satellite on show at the new gallery. RAL was a major contributer to two of the satellite's experiments to investigate the Sun's flares. 86RC 4893.

Columbus explorers

Participants attending a workshop at RAL to discuss the possibilities for experiments in solar terrestrial physics offered by the various low-inclination and polar orbiting spacecraft of the Space Station and Columbus programmes.

The meeting, held on 14 and 15 October was sponsored by ESA, CNES and BNSC attracting delegates from 11 countries.

86FC 4876

Jim Dossett's Farewell

Jim shows everyone the barometer which Roger has just given him. 86PC4635

Nine months ago Jim Dossett slipped into retirement while the rest of us were busy with our mince pies. It has taken all this time to prize him away from his new house in Taunton to demonstrate how much we appreciated his work and friendship. Clearly he is enjoying his new life, and the proximity of Somerset County Cricket Club.

Like so many of his Nimrod colleagues, Jim is an ex-naval man. He served throughout the war and retired in 1953 as Chief Aircraft Artificer on the carrier 'Eagle'.

His Nimrod career began in 1961, when on joining NIRNs he was immediately shipped north to inspect magnet components at English Electric. Nimrod built, he joined the hydrogen target group maintaining targets on the beam-line, followed by a spell of development work on the still-born EPIC machine. Then, on to the very demanding task of building the ceramic vacuum vessels for the ISIS accelerator, and round full circle back at English Electric (now GEC) inspecting magnets for ISIS. In the last year or so he has gone into space, inspecting ISAMS components.

Jim is a very pleasant person to work with, and a particularly professional inspector, 'said Roger Bennett as he presented farewell gifts from Jim's friends and colleagues. 'We thank him for all he has done for us and wish him well for the future'.

Thanking everyone for the gifts of a barometer, book on cricket and Ray Roberts card, Jim said how much he'd enjoyed the work and the company of Roger and Co on ISIS. "I can't say anymore than plain thank you", he concluded.

RAL Sunday XI

On 5 October RAL Sunday X1 visited East Hendred (reputedly not one of the Upper Thames Valley Leagues strongest sides), and for the first half were totally out-played.

Having no answer to the home sides 'Kick and rush' play RAL attempted the same tactics and were lucky to concede only 2 goals, mainly due to the excellent goal keeping of Barry Brett.

The second half once again produced the opposite. We have been nicknamed "The Draw Specialists", but the 45 minute team would be more appropriate. RAL threw everything at East Hendred. How they survived is a miracle. The crossbar was struck no less than 5 times and the penalty area was like a pin-ball machine as shots were deflected everywhere. RAL did finally gain some reward for their pressure when Dave Rippington and Simon Lees scored. Another 2-2 draw, and still unbeaten, but a lost opportunity and valuable point.

Sunday 13 October found RAL at home to Cholsey United in the Berks and Bucks Trophy. Not being in the same league as RAL, Cholsey were an unknown quantity and their early attacks warned of possible danger, but it was RAL who scored first through Duncan McLure, who drew the keeper and fired into the net from an acute angle. Suddenly it all went wrong for RAL, and Cholsey rattled in 3 goals bringing the half-time score to 3-1.

Another soft goal was given away to Cholsey early in the second half. Then, a complete turn round. With the midfield taking control and the forwards rounding the Cholsey defence almost at will, dropped heads perked up and RAL began believing in themselves again. They were walking tall when Simon Lees scored to make it 4-2 and positive giants when Steve Morley forced the ball home to make it 4-3. With Cholsey defence in panic, try as they might RAL could not get the equaliser they so richly deserved.

It was a thoroughly enjoyable game, second half. Even the referee, a very experienced official, said as much. A disappointment but certainly not a disgrace.

RAL 7-a-side

Will anyone interested in starting a team or just playing, please contact Alan Saxby, Ext. 6635.

Harwell ex-apprentice reunion

A reunion to mark the 38th anniversary of the Harwell apprenticeship scheme is being held at Harwell Restaurant on Saturday 6 December 1986.

Please contact R Wise, Building B501, Harwell, Ext. 5951 for further details.

Sales to Employees

The sale of scrap materials to RAL staff will take place on 14 and 28 November from 1200-1230 hrs in the R24 Scrap Compound.

Bulletin

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