

Bulletin

of the Rutherford Appleton Laboratory

6 Mar 1984 No.4

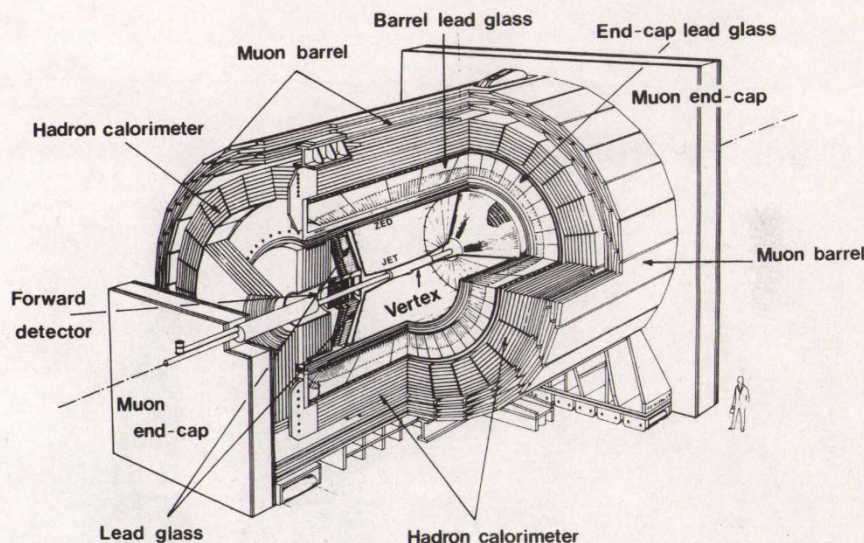
OPAL

The third in this series of reports on LEP experiments is devoted to OPAL (Omni Purpose Apparatus for LEP). This apparatus is being built by physicists and engineers from 20 institutes in 8 countries including, from Britain, RAL, Queen Mary College, University College/Birkbeck College, London and the Universities of Birmingham, Cambridge and Manchester.

OPAL is similar to Aleph and DELPHI in that it consists of separate specialised detectors arranged in concentric cylinders (the barrel detectors), complemented by a set of planar detectors at each end (the end caps), as shown in the figure. However the distinguishing feature of OPAL is that wherever possible the design chosen for a given detector is based on a technique which has already been proven in a present generation experiment. This approach has been adopted to ensure that OPAL will be ready to produce physics results as soon as LEP starts up, and it was in this spirit that the LEP Experiments Committee recommended that OPAL should begin operation with a solenoid wound from conventional water cooled aluminium conductor rather than with a superconducting magnet.

The volume of OPAL is about ten times greater than that of similar detectors at lower energy accelerators and despite the decision to make the design as conservative as possible, considerable problems are encountered in extrapolating even proven techniques to this scale. Furthermore state-of-the-art read-out electronics are being designed at RAL and elsewhere to obtain the best possible performance from the drift chamber detectors. Finally, completely new photo detection devices are being developed, as described below. For these reasons the research and development programme for OPAL is as intensive as for the other LEP experiments.

We now turn our attention to those parts of the experiment for which British groups are responsible.



The Vertex Detector

This is a cylindrical drift chamber with very high spatial resolution, whose purpose is to detect the decays of short lived particles. Cambridge and QMC, together with the Electronics Group at RAL are responsible for providing the readout for this device, which is designed to sample particle tracks with a spatial accuracy of 50µm, enabling particle lifetimes to be measured down to 10^{-13} seconds.

Among the physics objectives of this part of the experiment are studies of the properties of heavy quarks by measurement of events in which muons are emitted.

The Muon Detector

The muon detector consists of a cylinder, with four layers of drift chambers being built at Manchester University, and two end-caps which are the responsibility of Birmingham University. Construction of drift chambers has already started at Manchester and in parallel, a test programme is underway using cosmic rays. Birmingham are evaluating prototype detectors on a cosmic ray test set-up at RAL.

The Forward Detector

The forward detector consists of tracking chambers followed by an electromagnetic calorimeter. Its purpose is to identify a particular class of events in which two photons are exchanged and to measure the luminosity of the LEP machine.

The detector is the joint responsibility of groups from Bologna, Maryland and UCL/Birkbeck. Development work is underway at UCL/Birkbeck where a CASE student is working on gas filled photodetectors.

End-cap Calorimeter

One of the principal features of the OPAL experiment is its excellent electron/photon detection, provided by a system of lead glass counters covering 99% of the solid angle. This system will be capable of identifying electrons and photons and measuring their energy with high precision, allowing rare processes involving the elusive Higgs and other possible new particles to be studied.

A group from Tokyo is responsible for the barrel part of the lead glass system and Cambridge, QMC and RAL are

(cont'd on p3)

INTERNAL Events

HEP SEMINARS

R61 - CONF ROOM - 1100 hrs

- 14 Mar Dr D N Hari Dass/NIKHEF-H
'Rayleigh-Ritz Approaches to the Spectrum of Lattice Theories'
- 21 Mar G Kalmus, R J N Phillips and T P Shah/RAL
'Report from the Rencontre de Moriond on "New Particle Production at High Energies"'
- 28 Mar N Booth/Oxford
'Tackling the Solar Neutrino Problem'

NIMROD LECTURES

R61 CONF ROOM - 1400 hrs

- 19 Mar L P Mapelli/CERN
'Latest Results from UA2'

ASTROPHYSICS SEMINARS

R61 CONF ROOM - 1400 hrs

- 21 Mar Dr William Glencross/UCL
'Far Infrared Studies of Molecular Clouds'
- 4 Apr Dr Thomas J Millar/UMIST
'Molecular Formation in Interstellar and Circumstellar Clouds'

Carousel to Hawaii



The Millimetre-wave Telescope carousel, stripped down into its component parts, being loaded aboard the 'Odin Ace' at Gravesend prior to shipment to Hilo, Hawaii on 14 February.

Erection of the carousel on the Mauna Kea site is due to start at the end of March.

External Events

PHYSICS COLLOQUIA

HH WILLS LAB - BRISTOL - 1700 hrs

- 19 Mar Dr J M Irvine/Manchester
'From the Big Bang to Prehistoric Nuclear Reactors'
- 26 Mar Dr M G Edmunds/UCC
'Quasars and Active Galaxies'

ELEM PART PHYS SEMINARS

NPD - OXFORD - 1430 hrs

- 15 Mar Dr J Barrow/Sussex
'High Energy Constraints from the Early Universe: How Certain are They?'

Missing

Would all HEP Users please check their labs at RAL and abroad, for a Tektronix 475 oscilloscope, serial no. 708709, RAL no. 15493.

Information on the present whereabouts would be welcome by HEP Electronics Loan Pool, Ext: 6185.

An electric handsaw No. 14/4988 has disappeared from R28 workshop. Any information, please, to E T Gourley Ext: 5573.

building the end caps. Since the end caps are inside the solenoid magnet, conventional phototubes cannot be used to detect the light from the glass. Single stage phototubes (vacuum phototriodes) are therefore being developed, which have gains of between 10 and 20 in a magnetic field of 1 Tesla. These devices are used in conjunction with a high gain, low noise amplifier designed at RAL.

The first major milestone in this project was reached last autumn when an order for almost half a million pounds was placed for the lead glass.

Data Acquisition and Computing

Data will be collected from the OPAL detector by a microprocessor system being developed at Saclay, and will then be passed for final processing to large Vax computers which are the responsibility of Canada and RAL. Work is underway to determine which items of hardware and software may be developed jointly by OPAL and other LEP teams. Within the UK, a strong software group has been set up, with representatives from several institutes working on Online and Offline software.

Physicists from Cambridge and QMC are also collaborating with the electronics group at RAL on the design of a microprocessor system which will provide part of the trigger for OPAL.

Design and Installation

In addition to their direct involvement in the design of the items listed above, engineering and technical staff at RAL are playing a leading role in the overall planning of OPAL. One of the major problems that is being tackled is to schedule the entire installation of this complex detector in the short period of 15 months, between the time when the underground cavern becomes available and the LEP accelerator starts operation at the end of 1988.

Bob Brown

Film Badge Notice

It is period 3 Colour Strip BROWN Please see that you are wearing the correct dosimeter and return all old ones.

NEXT FILM CHANGE.

Monday 26 March 1984

Joining the RecSoc

It seems that new staff on site are either unaware that RecSoc exists or are having difficulty finding out how to join a club that suits their particular interests. So - here, we hope, is the complete guide to the RecSoc.

The RAL Recreational Society, known at RAL usually as the RecSoc, exists to provide and promote sports and social facilities and activities at RAL for employees of SERC and some Associate Members. The RecSoc includes a variety of component Clubs which specialise in particular interests and organise their own activities using the RecSoc facilities. A full list of these clubs and representatives to contact appears on page 25 of the RAL internal telephone directory. At present they include:-

Bridge, Bowls, Camera, Chess, Crib, Cricket, Croquet, Darts, Fishing, Folk Dancing, Football, Golf, Model Railway, Music, Radio, Radio Control Model, Remap, Sailing, Snooker, Table Tennis, Tennis, Volleyball, Weight Training and Yoga.

There is a RecSoc Committee which controls the facilities used by these clubs and provides insurance, equipment, grants and loans, and liaison with site management. It also organises general social events and will manage the club bar when this becomes available, hopefully in 1984.

The cost of membership is at present 56 pence per month, taken directly from pay. This is set by the CSSC, (Civil Service Sports Council).

HOW TO JOIN

SERC employees must take out at least one share in the CSSC to join the RecSoc by filling in a CSSC Membership Application Form and sending it to the current RecSoc Membership Secretary (who is T Morgan, R12). On the form, the 'Govt. Dept' is SERC, 'Pay Office' is RAL. Pay slip numbers may be obtained from Wages Office if necessary.

On the selection boxes, delete all but 1 share for Civil Servants. Note that to join certain National Civil Service clubs, such as the sailing association (CSSA) two shares are needed. Holding one share also entitles members to use any other Civil Service Sports Club in the country.

ASSOCIATE MEMBERSHIP

Employees of UKAEA, NRPB, MRC and RAL students and visitors are eligible for Associate Membership at £3.00 per annum. Forms for associate membership can be obtained directly from the RecSoc Membership Secretary for non-SERC employees.

Facilities

THE CLUBHOUSE

The RecSoc has almost exclusive use of the R58 building at RAL as its clubhouse. This building includes a GAMES HALL used for table tennis, folk dancing, keep fit classes, etc;

a TABLE TENNIS ROOM with two tables permanently in position; the GYM with exercise equipment and weights; a SNOOKER ROOM with full size billiards table; LADIES AND GENTS SHOWERS AND CHANGING ROOMS, available to all RecSoc members; the LOUNGE at present awaiting redecoration and furnishing (this should occur during 1984 together with the provision of a club bar); a MUSIC ROOM, used for practice by the Music club; the MODEL RAILWAY ROOM with two semi-permanent model layouts and PHOTOGRAPHIC DARKROOMS with facilities for black and white and colour printing.

Elsewhere on site is a Radio Hut, used by the amateur radio club and a workshop hut, used by the Remap Group. Pitches and Courts are provided for football, cricket, netball, volleyball, hardcourt tennis, croquet and golf.

Barn Dance

The RAL Barn Dance Club have arranged a FOLK-DANCE for Friday 30 March, at Drayton Village Hall, commencing at 8 pm.

The caller, John Chapman, is renowned for his American square and contra dances and is usually booked two years in advance! The band, Kafoozalum, will be providing the high standard of playing needed by such a caller. A bar will be available and a ploughman's supper is included.

A limited number of tickets are available from Mike Courthold, R12, Ext: 6462, at £3.50 (For RAL RecSoc or EFDSS members the cost is £3).

Sales to Employees

The sale of scrap metal and plastics will take place on 16 and 30 March at the R40 scrap compound at 12.30 pm.

Library Notice

Six catalogues issued by the LABORATORY FOR ELECTRONIC DEVELOPMENTS OF THE ARMED FORCES TNO, mysteriously turned up in an office in R25. They have been handed on to the main library and can be claimed from there. Just ask at the Issue Desk for 6 large blue volumes!

OOPS!

As it is obvious that Jean Banford doesn't know her left from her right (amongst other things), in future all captions indicating direction will be labelled port and starboard.

My apologies to all concerned for last issue's mental aberration.

Logging Off

Les Harding

Les Harding and HPDs are synonymous in the minds of RAL's high energy community. The experience and knowledge he has of this bubble chamber film measuring equipment is vast, probably outstripping that of any other HPD operator. He was in on the birth of HPDs and stayed to the end.

With the demise of the HPD2, Les decided that it was time for him to go too; his health being, unfortunately, not too good. "We are sad about both losses", said George Kalmus at a Farewell Ceremony held for Les by his colleagues on Friday 17 February.

Presenting Les with gifts of an electric hedge-trimmer and bottle of 'elixir,' George remarked that it had been a great pleasure to have worked with Les, he would be very much missed and that all were grateful for his years of invaluable service. "We all wish you well in your retirement."

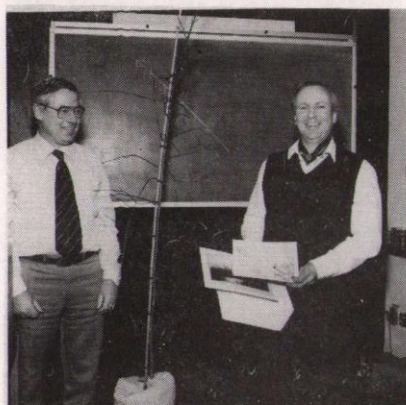
Les thanked all his friends for their generous gifts. He was, he said, at a loss for words but thanked everyone very sincerely.



A farewell handshake between George and Les (left).

A further two colleagues also left us this month - this time destined for the big outside world of commerce. Peter Davey, who has made his mark at RAL in robotics has decided to build up a company to practice what he has been preaching, and Alan Armstrong is taking his vast computer aided engineering design capabilities to Oxford Magnet Technology.

Alan Armstrong



Man with Tree.

Alan was feted and given our blessing on Wednesday 22 February, when Bill Trowbridge outlined his distinguished career at RAL from his days fresh from Balliol, through his Nimrod period as designer of superconducting magnets for synchrotrons and the development of computational techniques for magnet design, to his involvement in the development of new methods for numerical solution of electromagnetic field problems with Computer Applications Group. Bills' memories seem to dwell more fondly though, on Alan's more human qualities; his sense of humour, widely known and appreciated; his skill as a linguist, and his wide and varied interests and hobbies. "He is a marvellous travelling companion," Bill assured us and related a delightful story of a trip to the States they had made at Halloween, when Alan had become 'the fastest pumpkin carver in the West.' "We shall miss him," he said, presenting Alan with a Weeping Willow, a case of Medoc '77 and, at Alan's request, a generous donation to Oxfam. "We have many reasons to be grateful to him."

"I have been preparing for this lecture for 19 years," Alan typically began his reply. The tree, he rationalised was a powerful reason for not going - "I go home on a bus!" He had wondered if he should begin his farewell address by reminiscing, but on balance had decided that it might be embarrassing to all. "What I hope you all will do," he concluded, "is, come to see the tree when it is growing vigorously beside the Evenlode at my home at Badon."

Peter Davey



Peter Davey admires his gift.

After a university career which included parking an Austin 7 on the roof of Senate House, Cambridge it was more or less inevitable that Peter Davey's academic life was not going to be conventional. He joined the HEP world, first in California and then at Heidelberg before becoming involved in film analysis and computing at Oxford.

In 1978 he brought his enthusiasm to RAL as Head of Interactive Computing Facility; turned his attention to robotics and in '79 became Coordinator of SERC's Robotics Research Programme.

Now, he avers, he is attempting to raise the level of Industrial Robotics research. To this end he has floated his own company Meta Machines, which will be producing second-generation "intelligent robots" at Abingdon.

Geoff Manning, presenting Peter with a coffee set on behalf of his many friends and colleagues, wished him the best of luck in his brave venture and thanked him for the enormous part he had played in computing and robotics at RAL.

Peter replied that he was overwhelmed by the size of the crowd that had come to see him off. He had enjoyed his years at RAL and had learned a "hell of a lot," and worried a little about "what I gave." He was going to need a lot of luck, but was sure he had chosen a good team. "I am immensely flattered, touched and honoured to see so many people here, and the coffee set is very suitable. Thanks for 6 marvellous years," he ended.

Bulletin

Editor: Jean Banford
Building R1
Rutherford Appleton Laboratory
Chilton, Didcot, Oxon OX11 0QX
Abingdon (0235) 21900 ext 5484

Deadline for insertions: