Bulletin
of the Rutherford Appleton Laboratory
21 Feb 1984 No.3

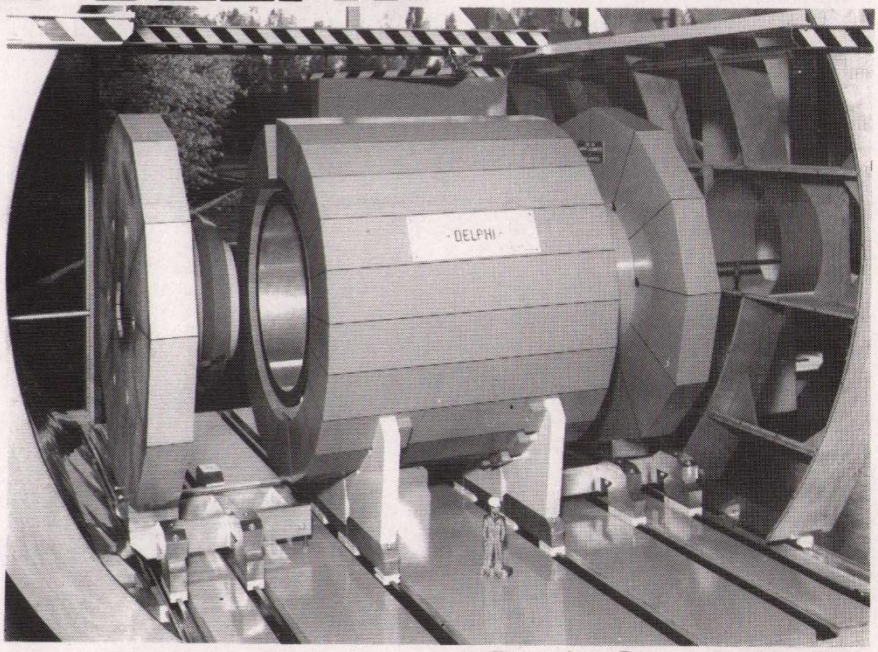
More about DELPHI

In the last issue of the Bulletin, the Super Conducting Coil which is being designed and manufactured for DELPHI by an RAL team under Peter Clee was described. In this issue the rest of the work undertaken by RAL on the DELPHI Detector is described.

DELPHI, an acronym for Detector for Electron Photon and Hadron Identification, is one of the 4 large detectors which will be built for use with the Large Electron Positron (LEP) storage rings at CERN. Of the three universal or general purpose detectors, DELPHI is probably the most sophisticated and complex providing three dimensional measurements together with particle identification.

The physics aims are as broad and varied as might be expected from a detector designed to be in place at start up of a new accelerator exploring a new energy regime. Some of the topics that will be covered are the investigation of the properties of the recently discovered Z^o particle, a search for new quark flavours (such as top), search for other new particles predicted but not yet observed (Higgs scalars) and later, when the energy is increased, to investigate the properties of the $W^{\pm}$ bosons (the charged partners of the Z^o).

The photograph shows a model of the DELPHI detector being developed by a large international collaboration for use at LEP. Three UK groups are involved in DELPHI, these being from Liverpool, Oxford and RAL and they share major responsibilities for important parts of the detector.



252-10-82 Photo CERN

The Outer Detector

This is a 4m diameter barrel comprising 2,500 drift tubes, each 5m long, which provide both a very precise knowledge of the position of charged particle tracks (to better than ½mm in one direction) and form part of the system used to trigger the whole detector.

The Outer Detector is a joint Liverpool, RAL, Paris VI responsibility and the project is led by Dr Paul Booth of Liverpool. The RAL responsibilities cover a wide area and include electrostatic calculations, survey of drift gases, design of a position monitoring system, control and monitoring of the gas and high voltage systems, the investigation of the mechanical assembly of the drift tubes, the production of mechanical prototypes and the design and manufacture of parts of the associated electronics.

Muon Chambers

The Muon Chambers are a joint Oxford, Belgium, RAL responsibility with Dr Alan Segar (Oxford) being the Project Leader. The Muon Chambers, as their name implies, are used to identify and track mu-mesons originating from the collision of e^+e^- particles in LEP. A total of 2,000 drift chambers in 3 layers around the outside of the overall detector are involved. About 2/3 of these will be designed, manufactured and installed by the Oxford/RAL groups. Each of these chambers will be 4m long and 0.2m wide. The RAL effort will be largely concentrated on mechanical assembly, the support system and the installation, together with some electronics.

Data Acquisition System

The control, monitoring and collection of data from the many component particle detectors comprising DELPHI will be implemented by use of a distributed computer system. In this system, each component such as the Outer Detector will be provided with its own mini computer and slave micro computers. All such computers, together with a large more powerful central system providing more computer power and data base facilities, will be linked by a local area network and a new high speed data highway called FASTBUS. The mix of computers will span a whole spectrum of performance, ranging from mainframe power normally associated with the laboratory central computing facility, down to that of home micro computers. The overall system will cost over a million pounds.

The basic design is new and innovative and was conceived originally at RAL in a group led by Dr John Barlow. This same group will have responsibility for the implementation of major sections of the system.

(Cont'd over)

DELPHI (Cont'd from p1)

HPC Project

Apart from these three areas of work, prototype work on a new type of electromagnetic calorimeter, the so-called High density Projection Chamber (HPC) was undertaken at RAL and completed over the past 18 months. This project, which involved learning new techniques for punching, handling and glueing lead sheets as well as drifting electrons over long distances in narrow slots, was instrumental in the decision taken by the DELPHI collaboration to adopt the HPC with its superior pattern recognition compatibilities for its barrel electromagnetic calorimeter rather than more traditional techniques.

The people from RAL involved in the work described above are from the Bubble Chamber group in HEP Division, Physics Apparatus Group in Instrumentation Division and Electronics Group of Technology Division.

G Kalmus

Comings & Goings

'Bulletin' Office

The 'Bulletin' office has moved to Room 2.66, R1. The telephone extension number remains the same, as does the delight with which the Editor accepts articles, information and suggestions for improvement. Come up and see me sometime!

Scientific Admin

The Public Relations section of SAG have also moved to R1. Mrs Marjorie Sherwen (Conferences and meetings) and Mrs Sheila Davidson (Visits) can be found in room 2.62. Mr Robin Elliott (Information Officer) in room 2.6A and Dr Brian Jones (Group leader) in 2.77. For the time being Mr Peter Wroath remains in his old haunt in R20.

Wally Bray

Friends of Wally Bray, who remember him from the old Nimrod days when he was greatly involved in the accelerator's high vacuum system and was a member of the Radiological Protection Group, will be delighted to know, he's back!

After his years of wandering away at Central Office, Swindon, where he was Secretary to Staff Side and more recently part of the Information Technology Directorate he has arrived back at RAL where he took up his new post as Transport Officer on Monday 6 February.

Welcome home!

Suggestions Awards

Innovative thought seems to be the order of the day in RAL's workshops, to which the recent crop of lucrative suggestions bears witness.

Del Forsyth of R2 Mechanical Workshop is in the news again, this time aided and abetted by Nigel Jones of R12 Instrumentation Workshops. Both received £150 each from David Gray (Head of SNS) on Wednesday 1 February for their novel and labour saving magnet module aligning device. By using this set of adjusters, half a days work per module was saved - a very important consideration in the extremely tightly scheduled SNS building programme.

On Friday 3 February Mark Pitts of Physics Apparatus Group received his award of £555 from Dr Geoff Manning (Director RAL) for a simple but cost-effective method of cleaning the resin-head on the special dispensing unit used in the manufacture of the panels for the millimetre wave telescope.

The awards received represent half the savings made in materials or man-hours made by implementation of the suggestions. These, as illustrated, can be quite substantial.

Congratulations to Del, Nigel and Mark - and to all other inventors on site, get your ideas down on paper - you never know!

Del (right) and Nigel (left) delighted with their success. *84RB1418*

Mark with the Director displays his good fortune. *84RB1419*

Obituary

Mr D(Dave) Craddock

It is with very deep regret that we announce the sudden death of Dave Craddock on Saturday, 4 February.

Dave worked at the Laboratory for the last 25 years. During this period he made valuable contributions in the design and installation of many major projects with deep personal commitment and dedication to carry his work through to a successful conclusion.

Dave was also a keen sportsman, playing cricket for the Laboratory, and hockey and cricket for a Reading Club.

Dave's determination and drive showed in both professional and sporting activities and his warm and cheerful personality will be deeply missed by us all.

We extend our sympathy to his widow, Rosemary, and his three daughters, Helen, Marion and Rachel, in their bereavement.

20 Years at Cosener's

Mrs Myrna Belcher cutting her 'celebration' cake at a ceremony held at the Cosener's House on Tuesday 17 January to mark her achievement of 20 years ministery to the comfort of SERC's many and varied guests. She also received gifts of flowers, and wedgewood bone china - and the congratulations and thanks of all her colleagues. *84RB1286*

Great Wall in the Atlas Centre

Recent visitors to the Atlas Centre may have noticed a new 'picture' in the entrance foyer. The 'picture' is actually a woven silk tapestry, showing the Great Wall of China. It was given to the Computing Division as a token of friendship by their visitors from the High Energy Physics Institute in Peking, Hu Jia-Liu and Shi Wei-San. Hu Jia-Liu is staying with us for a year to study VAX computer systems. His colleague Shi Wei-San was also here for a year, but he has now returned to Peking. He was working with Kate Crennell on database management problems and also on computer languages, particularly those for 'Forms Design' and for the computer processing of mathematical texts. The photograph shows Hu learning English from several of his Computing Division friends while explaining to them about the Great Wall, using the tapestry now seen hanging in the foyer.

84RB1282

Staff in the Atlas Centre have many years of experience in helping Chinese visitors learn to use our computer systems. The first visitor was Dr J T Yu, the Director of the Computer Centre of the University of Hong Kong, who spent some sabbatical study leave with us in 1975. He and Kate made a system for writing Chinese texts using the ICL 1906A-. He wanted to combine it with the Atlas library book cataloguing system to make a system for their library in Hong Kong. Another visitor was Lee Kei-Fat a native of Hong Kong, who was a graduate student from the University of Leeds. He used Atlas concordance programs to study the changes in the Chinese language between 1934 and 1960.

Computing Division is not the only one to welcome Chinese visitors. Three years ago, Wang De-An from the Institute of Atomic Energy in Peking joined the Bubble Chamber Research Group to work on microprocessor systems. In his 2½ years stay at RAL he produced a voluminous amount of computer software paralleled only by his huge circle of friends. Arriving at the same time as Wang, but only staying at RAL for one year, was Chin Chi Zhu from the Institute of High Energy Physics in Peking. Chin Chi worked on the analysis of data taken with the RMS spectrometer at CERN.

Two relatively recent arrivals to HEP Division are Zhao Wei Ren and Wang Dian Rong also from the Institute of High Energy Physics in Peking. They are both working together on the ALEPH - LEP experiment, Zhao working on particle detector development and Wang on computer software.

In Technology Division the Tropospheric Propogation group has just said farewell to Ming Goa Zhang who for two years had been engaged on analysing data produced by the dual-polarisation radar at Chilbolton and calculating cross-sections for rain drops and airborne debris from stubble fires for their effect on microwave communications.

In the field of astronomy the Chinese have been making astronomical observations for many years. Some of these are of great interest to the astrophysicists because they contain the earliest records of supernova. D H Clark (S&A Division) has worked on these and is accumulating a computer database to make them more accessible to English scientists in future. D H Willis (G&R Division) is interested in Chinese observations of sunspots which tend to occur in cycles and these early records are very important.

Those of us who have had the pleasure of working with these guests to RAL have much enjoyed the experience. We hope they too have found their visit rewarding.

K Crennell et al

RAL TECHNOLOGY LECTURES

The next lexture in this series will be held on Thursday 1 March at 3.0pm in the Lecture Theatre

PICOSECOND AND FEMTOSECOND

LASER TECHNIQUES

by

Dr W Sibbert

Imperial College

The current availability of frequency-tunable, picosecond and femtosecond light pulses together with compatible diagnostic techniques has made time-domain spectroscopy in the ultrashort temporal regime a practical reality.

Recent reports have in fact shown that molecular lifetimes $\sim$ 70fs can be measured. In this talk it is planned to briefly review the main characteristics of the mode-locked lasers with which the ultrashort/hypershort pulses are produced either directly or indirectly. Relevant aspects of nonlinear and linear detection/measurement techniques will be outlined so that a general overall description of presently-used laboratory methods can be presented. The exploitation of such combined source/detection systems in a few representative experiments will also be surveyed.

For your diary: On Thursday 29 March, Professor Gerald Musgrave, Brunel University will speak on "Computer Aided Design"

UK HEP Forum

5-6 April 1984

The subject of the next UK HEP forum will be "Signature for Susy and GUT's". Topics to be discussed include experimental searches for supersymmetric particles (at DESY and the $p\bar{p}$ collider at CERN) together with the current status of rare processes , such as proton decay, neutrino oscillations and neutron-antineutron transitions, which are predicted by these new theories. In addition, there will be theoretical talks covering the ideas underlying Susy and GUT's and their phono-menological implications.

This meeting is open to all members of the UK HEP community, both theoretical and experimental. Those interested in attending should contact Dr E R Hancock at RAL, Ext 5647, before 1 March 1984.

Farewells

Harry Bevan

Harry (left) and Eric admire the card. *84RB1430*

Harry Bevan joined DSIR in 1947. Two hundred and sixty satellites and 300,000 miles later (so he calculates) on 30 January 1984 he found himself accepting the plaudits and thanks of his colleagues at a Farewell Ceremony at RAL.

Making the presentation to Harry of a watch, cuff-links, a card and a selection of pertinent reminders of his days at Slough, Winkfield and RAL, Eric Dunford (Project leader IRAS) thanked him for all he had given to the field of 'space'.

He had, Eric told us, joined DSIR after success in a Reconstruction Competition. History is none too clear as to what he was reconstructing (and it would spoil the story if it did) but we surmise that with Harry's talents, it was England! In 1954 Harry transferred to Inverness - to reconstruct Scotland? Having managed that by 1957 he then joined the Ditton Park teams at Slough, before beginning, in 1961 at Winkfield, his conquest of space. IUE (International Ultraviolet Explorer) sucked him in and a 2 month attachment lengthened to years, until as Director Winkfield he saw Ariel 6 to a most successful conclusion. On the merger of the Appleton and Rutherford Labs he was snatched to join the IRAS team. The IRAS projects outstanding success provided the crowning achievement to his career and few would argue that this owed much to Harry's expertise and dynamism.

"We are going to miss him," said Eric, "as a colleague and a friend. We have been through some grim periods together as well as good. We wish you a very happy retirement - please leave your telephone number."

Harry thanked everyone for the gifts and good wishes. He had had a thoroughly enjoyable working life, he said. People he had worked with down the years had all been fun and he had been fortunate to be in at the beginning of the space-age. Being involved in one way or another with 260 satellites had been an exciting career.

"I will miss you all, but will be coming back" he promised.

Ray Davidson

Ray Davidson will probably always best be remembered at RAL for his prompt, effective and courageous action at the time Nimrod alternator failed in 1965, and we were reminded of this episode in his career at his retirement ceremony on Tuesday 31 January.

Dr Gordon Walker (Division Head Instrumentation) spoke of this and Ray's many other achievements as he presented gifts of a miniature camera, and a 'Ray Roberts' card to Ray on behalf of his many friends and colleagues.

Ray appeared on the Lab scene in 1961 and became shift manager, responsible for operation of Nimrod power supplies in 1967. From 1978 when he joined Instrumentation his talents have been widely used in many different areas. He was involved in the installation commissioning and operation of both Betatrons, counter work for TASSO, development of test equipment for the SNS high voltage crowbar circuits and more recently on the Fluidised Combustion Bed Facility, the Millimetre Wave Telescope, The Long White Cell and the SNS Test Beam Facility.

Ray receives his camera from Gordon (right). *84RB1426*

Ray was also a leading light in I[illegible] affairs, having held the posts of Secretary, RAL branch, Vice Chairman SERC branch, and Chairman RAL Local Staff Side and Whitley committee.

"It gives me great pleasure to be able to present you with this gift and card to remind you of your time with us. We wish you a long and happy retirement" Gordon concluded.

In Reply, Ray thanked everyone for the generous gift. "Thanks for the card Ray, you've done your research thoroughly" he said. "It has been a privilege to work with such fine colleagues and I wish you all well for the future."

Cricket Club AGM

The AGM of the RAL Cricket Club will take place on Friday 24 FEBRUARY in R3 Conference Room at 12.30 pm. Everyone is invited. Any enquiries to Russell Newman Ext. 5538.

SERC Indoor Sportsday

The 1984 Indoor Sportsday will take place on Friday 30 March at Crystal Palace National Sports Centre, London. The usual events will take place, but this time with a limit on the number of teams any one establishment may enter. For the complicated rules governing this, please read the posters which are scattered about the site and then contact A Forster R2 before Thursday 1 March to place your entries.

The events will be followed by a buffet supper and get together from 7-9pm. Tickets are £1.50 per head and must be ordered (and paid for in advance) from A Forster.

Darts Competition

The Civil Service Sports Council Southern Region Darts Competition will be played on Sunday 13 May at Winchester Civil Service Sports Club. A team will consist of 5 players and the entry fee is £1 per team. Will teams of darts players wishing to compete please contact A Forster R2 by Saturday 31 March.

Bulletin

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

Deadline for insertions:

21 Feb 1984

SUPPLEMENT

INTERNAL Events

ASTROPHYSICS SEMINARS
R61 CONF RM - 1400 hrs.

7 Mar. Dr R J Dickens/RAL
'Helium Abundances and Ages for Globular Clusters'

21 Mar. Dr W Glencross/UCL
'Far Infrared Studies of Molecular Clouds'

CONDENSED MATTER SEMINARS
R3 CONF RM - 1330 hrs

23 Feb. P Richmond/ARC Norwich
'Physics and Chips'

6 Mar. G W Neilson/Bristol
'Neutron Scattering Studies of the Dynamics and Structure of Aqueous Solutions'

13 Mar. A Millar/Edinburgh
'Why Biologists want Neutrons'

HEP SEMINARS
R61 CONF RM - 1100 hrs

7 Mar. D H Saxon/RAL
'Final State Hadrons in e^+e^- annihilations'

14 Mar. Dr N D Hari Dass/NIKHEF

21 Mar. G Kalmus, R J N Phillips, T P Shah/RAL
'Report from the Recontre de Moriond on New Particle Production at High Energies

EXTERNAL Events

ATMOSPHERIC PHYSICS SEMINARS
CLARENDON LAB - OXFORD - 1615hrs

1 Mar Dr D E Miller/Met Office
'Future Development of Meteosat'

8 Mar Dr D R Pick/Met Office
'The Contribution of the Meteorological Office to the Advanced Microwave Sounding Unit

PHYSICAL RESEARCH COLLOQUIA
MET OFFICE - BRACKNELL - 1600hrs

14 Mar Dr J A Eccleston/Met Office
'The Use of METEOSAT Imagery for Mapping Precipitation'

SEMINARS IN PLASMA PHYSICS
DEPT ENG SCIENCE - OXFORD - 1615hrs

28 Feb Mr M L Lea/Oxford
'Mass Spectroscopy of Optically Pumped Discharges'

6 Mar Dr D Mosher/ONR London
'Light Ion Inertial Confinement Fusion'

PHYSICS COLLOQUIA
CLARENDON LAB - OXFORD - 1615hrs

2 Mar Prof H E Grove/Oxford and Rochester
'Accelerator Mass Spectrometry - New Dating Method'

ELEM PART PHYS SEMINARS
NPD - OXFORD - 1430hrs

23 Feb Prof R H Dalitz/Oxford
(a) $Z^0 \rightarrow e^+e^-\gamma$, and
(b) perhaps another topic unrelated

1 Mar Dr R Devenish/Oxford
'Charmed Quark Fragmentation' in TASSO

8 Mar Dr R Marshall/RAL
'Separation of Flavours in e^+e^- Reactions and its Applications'

ELEM PART THEORY SEMINARS
NPD - OXFORD - 1430hrs

9 Mar Dr J Hock/RAL
'Normalisation of Currents in Lattice QCD'

Film Badge Notice

It is Period 2 Colour strip GREEN. Please be sure you are wearing the correct dosimeter, and return old ones promptly.

NEXT FILM ISSUE

Monday 27 February 1984

Missing

The following items are the subject of loss report, and any information concerning them should be relayed to the people named.

Casio Calculation Type Fx 550
missing from room 1.1, R51.
Contact D J Price, Ext 6678.

Socket Set
Disappeared from Shipping Container, R7.
Contact P K Green, Ext 6534.

Stopwatch No 64/220
Lost in Atlas Centre
Contact W A Knowles Ext 6680.

Trade Exhibition

There will be a one-day exhibition by Gould Electronics Ltd on Thursday 8 March in R20 Conference Room from 10.00-1600hrs. Oscilloscopes, both real-time and digital storage will be exhibited as well as analysers and strip chart and XY recorders.

7-a-side Football

The Rutherford 7-a-side football championship is over with R2 retaining top spot for the third year running. They acheived this herculean feat despite losing one of their mega-stars at Xmas. This meant they had to rely heavily on experience and the 'youthful exuberance' of their reserves. They were also aided by an amazing display of good fortune on the part of their goal-keeper, and a very strange decision by R18 who substituted their best player whilst in a winning position - still that's football!

My previous diatribe was obviously well received as it stung STORES into action - they won their final three matches.

The best match was between R2 and STUDS which ended in a 2-2 draw thanks to a bravely awarded penalty to R2 - when they never looked like scoring (Thanks KEVIN!) Most matches were played in wintery conditions which would account for the poor crowd attendance (admission is still free). The competition was generally played in a good spirit and those few watching where heard to make a comparison with the halcyon days of Ron Lawes and C&A.

TEAM REPORTS

R18. They promised much but their heavy (gang) weight defence was often caught floundering in the mud.

R25. Played good football but found themselves lacking against the top two teams - still one good point, no own goals - Eh Ken!

ATLAS Tried to win the league with only 6 players and despite finding a new goalkeeper in K Lewis, the extra man always told in the end.

HEP. Suffered the same problem as ATLAS, perhaps someone (without a Phd) should tell them that 5 players do not make 7 although no doubt they could prove otherwise in theory.

STORES. Started badly, finished (not quite so) badly but if their improvement continues at its present rate, they should win the league in 1994 (when the rest of us have taken VPR).

STUDS. The only international team in the league. With stars from such exotic places as Sunderland and AERE their skills should have made them invincible but you cannot play with 6 forwards and 1 goalkeeper (?).

R2. Only the BEST team wins the league - "nuff said".

LEAGUE TABLE

	P	W	D	L	GOALS FOR	GOALS AGAINST	PNTS
R2	6	4	2	0	27	8	10
STUDS	6	4	1	1	18	10	9
R25	6	4	0	2	22	10	8
STORES	6	3	0	3	11	28	6
ATLAS	6	2	0	4	15	14	4
HEP	6	1	1	4	6	22	3
R18	6	1	0	5	12	19	2

I Expect So

From a dissatisfied contributor to the Annual Report?

SUB-EDITED NETWORK STUFF AS 'AGREED' BY AGREEING PEOPLE BUT NOT VERY AGREEABLY. THE AGREED COPY HAS TAKEN LONGER TO AGREE THAN WAS ORIGINALLY AGREED DUE TO THE LEVEL OF AGREEMENT REACHED BEFORE THEY AGREED TO AGREE TO DOING THE AGREED WORK.

Stamps Please

Mrs M Smith and Mr T R Amos both of building R26 would be grateful for used postage stamps which they are collecting on behalf of The Foundation for the study of Infant Deaths to assist their funds into 'cot-death' research.

RAL Lectures

LATE NEWS

RAL LECTURE

This will take place on 15 March 3.15 pm in the Lecture Theatre

'THE PICOSECOND REGIME IN PHOTOSYNTHESIS'

by

Sir George Porter, FRS

Photosynthesis is not only the most important of all photochemical and indeed, chemical reactions but its primary photochemical processes all occur on the sub-nanosecond time scale. The two principal phenomena are light harvesting of the absorbed energy in the antenna pigments of the photosynthetic unit and electron transfer chemistry in the reaction centre to which this energy is transferred. Picosecond studies of the former are mainly by time resolved fluorescence measurements on algae and the chloroplasts of green plants, and in the latter by absorption measurements on the isolated reaction centres from photosynthetic bacteria.

In the early experiments, high intensities led to unexpected results but these are now well understood and the effect can either be utilised or eliminated. The subject is developing very rapidly and further progress is more dependent on the availability of well characterised biological or model systems than on further developments of laser technology.