

# Bulletin

of the Rutherford and Appleton Laboratories

12 Jan. 1981 No.1

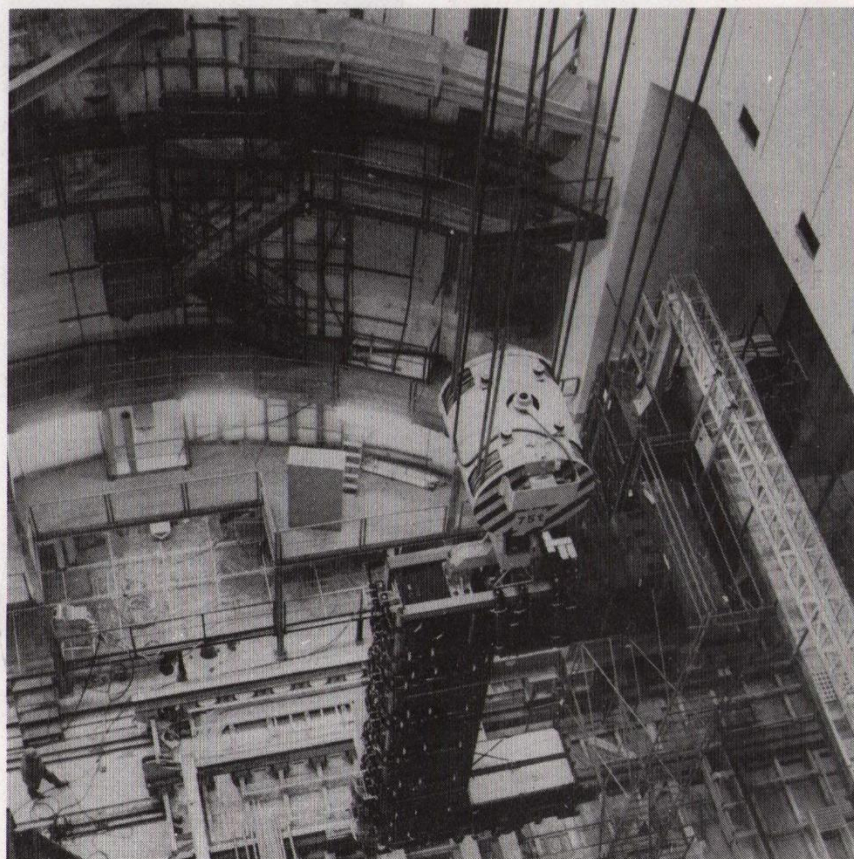
## The Pace Hots Up for 'UA1'

In June 1978 CERN took an important decision and gambled - perhaps for the first time in its history. Persuaded by the physics arguments of Carlo Rubbia, and encouraged by the early results on stochastic cooling of beams masterminded by Simon Van Der Meer, the management undertook to convert the Super Proton Synchrotron (SPS), a smoothly operating machine only a couple of years old, into a colliding beam facility with antiproton-proton collisions at 270 GeV on 270 GeV. At this new energy frontier (160TeV) it should be possible for the experimenters to discover the quanta of the electroweak  $W^\pm$  and  $Z^0$  and, perhaps even more exciting, to study in the laboratory some of the phenomena which cosmic ray events might be revealing.

### Massive Detector

Six months before the above date UK physicists from the University of Birmingham, Queen Mary College, London and Rutherford & Appleton Laboratories had joined a large group designing an apparatus capable of reaping the physics rewards from this unexplored energy regime, known as UA1. The massive central component in the final detector emerged as a dipole spectrometer magnet, which would provide a 7KG field over an effective volume of 7m x 3.4m x 3.4m. This was to be no ordinary magnet, since the laminated return yoke (of 5cm iron slabs) would form the world's largest hadron calorimeter. CERN would supply the steel, and the UK groups took on the responsibility of turning it into a calorimeter. The timescales were extremely tight: approval in June 1978, pre-assembly scheduled for Spring 1980, with final re-assembly in a new underground experimental area before the end of 1980. "You're mad" said the RAL engineers. "We know" said the physicists, "but at least, let's give it a try!" The continuing dialogue stemming from these different views has produced an exciting project, which could be said to have had "never a dull moment".

The volume of the magnet is formed from 16 C-shaped return yokes, 8 per side, each weighing about 50 tonnes, (Bulletin 5 1980) with the ends closed by 12 I-shaped end caps. In order to convert this massive iron skeleton into



*The first of the C-shaped return yokes of the magnet, which is also a hadron calorimeter, being lowered into the underground area at LSS5 at the CERN SPS.*

*CERN 120-11-80*

a calorimeter, 40 tonnes of scintillator had to be provided in the shape of 6000 plates, readout via 10,000 wave-shift bars, each viewed by a light guide whose transmission was checked at production - 10 kilometers of shaped perspex! Some 1500 photomultipliers were checked for linearity with the gains measured, bases checked out, support brackets provided etc. etc. A laser-based calibration system used 150 kilometers of quartz fibre (Bulletin 19 1980). This was a physics experiment of industrial proportions never really experienced before by any of the people involved. All the items had to be shipped to CERN over a period of about 10 months, phased in

with the needs of an installation crew from CERN, helped by UK technicians, with every item finally checked and calibrated by the UK team. In parallel, test modules were proved in a beam. "Prototypes" they were called - the relief at their successful operation was considerable!

### All at C

Of course the project had its moments. Installation was due to start in August 1979; it was September before any amount of equipment appeared, only to reveal that half the light guides on a 'C' would not fit. Some were

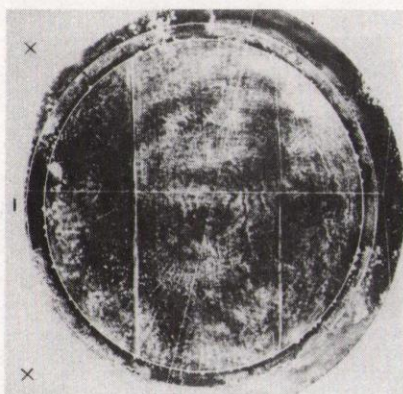
*contd p 3*



## First Tracks for RCBC

On November 21 1980, exactly four months after the Rapid Cycling Bubble Chamber (RCBC) assembly was delivered to CERN, the first photographs of cosmic ray tracks were obtained.

Although detailed design studies were made during 1976, the project really began in May 1977, on the signing of an agreement with CERN. The iron structure, which supports both the chamber and the superconducting magnet which surrounds it, was delivered at the end of 1978. Delivery of chamber accessories and components began during the second half of 1979 culminating with the chamber assembly in July 1980 and the components for one complete optical channel in September 1980.



Cosmic ray track photographed during test run in November 1980. Spurious bubbles are produced by the temporary inflatable gasket.

Cooldown and filling were completed in November 1980 with few problems. During the test programme, despite having a temporary main window gasket, operation was mostly at 10Hz (typically for one or two seconds every 10 seconds) though some operation was performed at 18Hz.

In total, some 113,000 expansions were made under sensitive conditions over a range of temperatures from 24.5 to 26°K. Since the SPS was not operational, cosmic ray particles were used to demonstrate sensitivity, with a system of scintillation counters to indicate entry of the particles during the limited sensitive period (about 1 milli-second) at the minimum pressure of the expansion cycle.

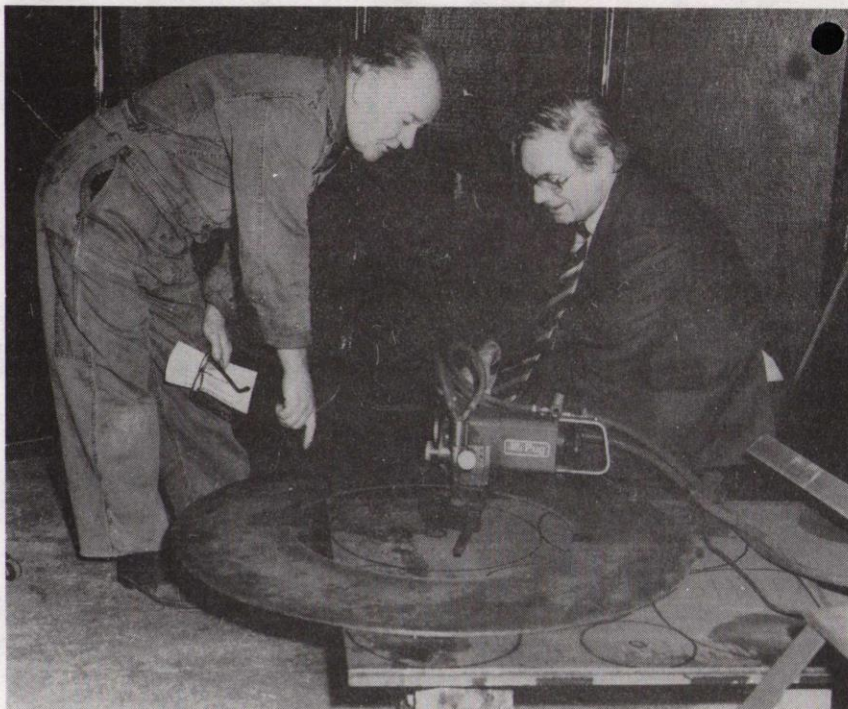
Further tests, with the complete optical system will be carried out during the first half of 1981 in anticipation of a particle beam in the middle of the year.

Thanks once again to Dr Ron Newport.

## SPEED LIMIT

THERE IS A SPEED LIMIT OF 20 MPH ON THE CHILTON SITE. THIS INCLUDES THE OUTSIDE CAR PARKS AND ROADS LEADING TO THEM.

## Good Ideas Rewarded



Wilf Buxton demonstrates the new set-up to David A Gray.

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Winning Suggestions Awards is no new experience for Wilf Buxton of R2 Mechanical Workshop. He has had several since he joined us in 1964 - and they get better all the time. On 19 December his latest inspiration bore fruit, when he was presented with a cheque for £340 for two ideas for the more efficient flame cutting of sheet metal.

Cutting circular discs from plate has always been a wasteful and sometimes impossible task. The cutting machine tracked around on the plate itself and discs had to be cut far enough apart for the machine to track round on solid metal. Now, an independent track is fitted over the plate, large or small, and it can then be cut with maximum utilisation of material, a technique which can be used on plate up to 3" thick.

The safe and efficient cutting of square pieces of steel has not been overlooked either, and a cutting frame for Pug operations has received his attention. A frame has been made which is safer and can be used in continuous operation, enabling many cuts to be made without further setting up.

Making the presentation David A Gray congratulated Wilf on his clever and beautifully simple solutions, and thanked him on behalf of the Laboratories. "They are of genuine benefit to our programme" he said. "May I take this opportunity to wish all of you here today, a very Merry Christmas, and say that I think we can look forward in SNS to a satisfactory new year."

Wilf (an R2 chess master) thanked David for the cheque - his final remark "Is this what you call 'cheque'-mate", being, quite rightly greeted with heartfelt groans.

The following awards were approved by the Local Suggestions Awards Committee at their meeting held on 10 December 1980.

Mr P R Lay	R40	£100
Mr J B Child	R18	£10
Mr R P Hogan	R9	£80
Mr B G Holland	R18	£10
Mr R Powell	R9	£10
Mr W Buxton	R2	£220
Mr W Buxton	R2	£120
Mr C Greenhalgh	R2	£10
Mr D Morgans	R2	£25
Mr K J Summers	R8	£10

## Slimming Club

The club meets every Wednesday between 12.30 and 1.00pm in the East Wing Conference Room of R1. We start again on 14 January. Why not make 1981 your year to lose weight? We exchange ideas, and give prizes to the best losers. New members are always welcome.

For more information contact Gill Waters Ext 6331.

## Film Badge Notice

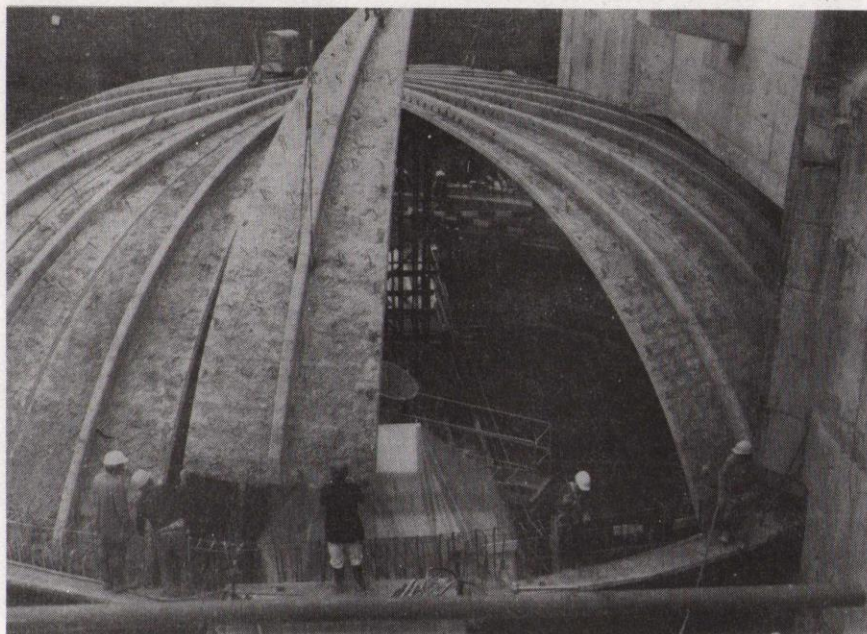
Period 1.(1981) commences on 1 January, colour strip BROWN. Please change your film as soon as possible after returning from holiday.



## 'UA1' *contd from p 1*

"boded" on the spot, the firm involved rapidly reformed jigs and final products were flowing by November. The first tests of a 'C' revealed the light tightness, so vital to the operation of the calorimeter, to be "useless" and "expensive". A new scheme was invented and implemented in days, costing half the price and taking a third the time. Spring '80 passed, but instead of a successful mapping of the magnet in June, it occurred in August 1980. The photograph shows the first of the completed 'Cs' being lowered into the experimental pit on 10 November - the promised day - on time and equally important on budget.

All the UK team - physicists, technicians, plus RAL groups involved can feel justly proud of their achievement. The spirit which has lifted the project from impending disaster and delay, to its final completion on time has deserved the success with which it has been rewarded. However there is no respite for the physics group - they must learn to drive their monster to be ready for collisions in September 1981. No rest either for Rutherford support: the electronic trigger logic for the whole experiment, designed and built at RAL, will move to CERN early in 1981. For this success story you must watch future issue's!



Assembling the roof over the circular hole where the experiment is housed.

## RAL Lectures

The next lecture in this series will take place in the Lecture Theatre on Thursday 22 January at 3.15 pm.

"THE IMPACT OF SCIENCE ON ARCHAEOLOGY"

by

Dr M S Tite

British Museum Research Laboratory

Two main areas in which physics is applied to archaeology will be considered: that is, physical methods of age determination which can provide an absolute chronology for archaeology and the examination of artefacts in order to gain information on the raw materials and techniques used in their manufacture.

The principles and difficulties associated with radiocarbon dating of organic materials and thermoluminescent dating of pottery will be discussed. The results obtained from neutron activation analysis, thin section petrology and scanning electron microscopy on the clay sources, firing temperatures and surface finish used in the manufacture of pottery will be considered. Finally, the results obtained from the examination of gold coins, gilded metals and millefiori glass from the Sutton Hoo ship burial will be presented.

## Trade Exhibitions

There will be a one-day exhibition by Telonic/Berkeley UK on Tuesday 13 January from 10.00 to 16.00 hrs in R12 Conference Room of filters, attenuators, swept frequency generators, RF amplifiers and digital instruments.

Wallis Electronics Ltd, "The High Voltage Specialist" will be holding an exhibition of their range of high voltage DC power supplies on Thursday 22 January in R12 Conference Room from 10.00 to 16.00 hrs. Units with output voltages from 1kV to 100kV at powers ranging from a few watts for modular units to kilowatts.

## Internal Events

### HEP LECTURES

LECTURE THEATRE - 1100hrs

14 Jan Dr P Scharbach/RAL  
'Gauge Invariants and Perturbative QCD'

### NIMROD LECTURES

LECTURE THEATRE - 1400hrs

19 Jan Dr P R Norton  
Title to be announced

### ASTROPHYSICS SEMINARS

CONF. R1 2 261 - 1400hrs

21 Jan Dr Paul Murdin/RGO  
'Cosmic X-ray Background from Faint Sources - Quasars and Halo Stars'

## Missing

Would anyone knowing the whereabouts of the following item please contact Eva Dawson Ext 424.

Ademco Merrett Desk Trimmer  
Label No. R006076.

Peter Banks, Ext 6665, would like to trace AWO 8 SN-155957-363, please can anyone help.

A Fluke 8020A Digital Multimeter has been removed from the Laser area in R1. B Lester on Ext 291 would like it returned, please.

L Harris of R18 Store on Ext 369 would like to know where his Wolf 1" Percussion Drill No 7896 is now residing.

## Training

Information is available from Training section, R20 on the following conferences to be held at Savoy Place in 1981.

### IEE CONFERENCES

17-20 Mar. "Telecommunication Transmission - into the Digital Era."

14-15 Sept. "First European Conference on Integrated Optics."



## A New Chapter for Bob

A new literary talent may be about to burst onto the scene. Robert Gover promised us as much at a farewell ceremony on Friday 12 December.

Presented with a typewriter on behalf of all his friends and colleagues by David A Gray, Bob remarked that whatever else one said about RAL, there had always been a lot of "characters" about, and he was sure he could write a few good yarns with such material to draw upon.

The Chilton site is not the only place Bob had met interesting people. Apprenticed at Cammell Laird, Birkenhead, he later went to sea as ships engineer with the Bibby Line. He also had several jobs as maintenance fitter in Cheshire and a spell at Capenhurst before joining the Nimrod team in 1962. In 1965 he started work on High Voltage Separators and remained in charge of their construction and development right up to the Nimrod shut-down. He finished off the job by dismantling them for Nimdis.

David thanked Bob for all he had done over the years and especially for the way he had always been willing to pass on his knowledge and experience to younger craftsmen who came under his supervision. "All the best in your retirement", he wished Bob "and Thank you."

Bob thanked all his colleagues for the gift, for their support and friendship, and reminded them of a concept in life that had always smoothed his dealings with people, and which he now recommended to them - tolerance. "Goodbye and Goodluck" he concluded.

## Lunchtime Music

Wednesday, 14 January at 12.45hrs  
Lecture Theatre

### LED ZEPPELIN - LED ZEPPELIN II

One of the original heavy rock groups, formed in the early sixties, Led Zeppelin recently announced that they were breaking up following the death of drummer John Bonham. Plant, Page, Bonham, etc had stayed together throughout the life of the group and they decided that John was irreplaceable. Listening to the drum solo on "Moby Dick" (a track on our album) this decision is understandable.

Led Zeppelin II was recorded in 1968 and as well as "Moby Dick" includes "Whole Lotta Love", one time 'Top of the Pops' theme and included in the LSO "Classic Rock" album.

## Coffee at Cosener's



Wives of RAL staff enjoying a pleasant break from routine at the Christmas Coffee at Cosener's meeting.

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The children get together too!

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The next Coffee Morning for Rutherford and Appleton wives will take place on FRIDAY, 6 February at The Cosener's House, Abingdon, from 10.30 till 12 noon. This was the only date available in February - we hope that many wives will still be able to attend.

As an experiment, the March Coffee Morning will be held in the Coffee

Lounge next to the R22 Restaurant at the Rutherford Laboratory on Tuesday 10 March, and we hope that wives from the Didcot/Wantage area may find this easier to attend than a meeting in Abingdon.

On the 1 April we shall once again be meeting at The Cosener's House. For any further information telephone Ann Corbett, Abingdon 20434 or Mary Rousseau, Wantage 3676.

# Bulletin

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