

Rutherford Appleton Laboratory Bulletin

Editor Tony Rush

11 January 1988

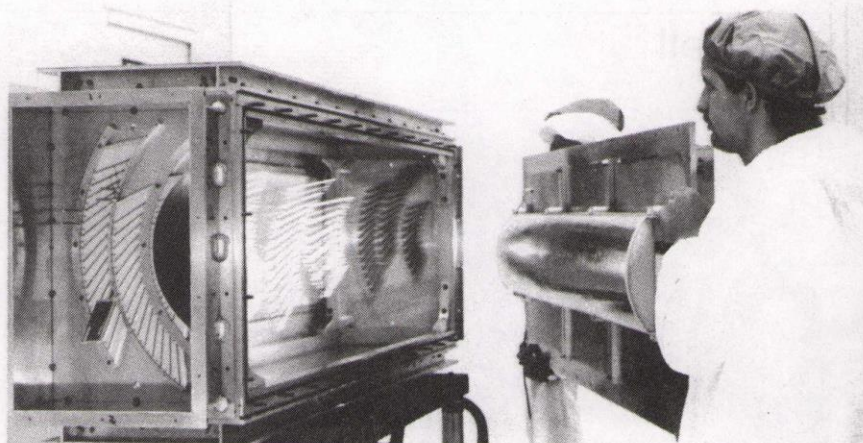
CENTAUR AT ISIS

One of the pleasures of working on scientific projects is thinking of appropriate names for detectors. For the HERA (Hadron Electron Ring Accelerator) electron-proton collider being built at DESY, the UK physicists in ZEUS (Zearch to Elucidate Underlying Symmetry (pardon our spelling!)) are building the central tracking detector and its readout. This is a drift chamber of 85cm radius and 2m active length, involving the stringing of 24000 wires of 30 micron to 300 micron diameter through two endplates. We are also responsible for the design and manufacture of the readout electronics to cope with a 500 GHz raw data rate - a new e-p crossover every 96ns. To develop the mechanical and electronic techniques for the construction it was decided to build a full length prototype, called CENTAUR (CENTral Tracking Apparatus Under Review).

Designing, building and equipping CENTAUR has been a close collaboration, involving RAL staff in the electronics and engineering divisions of the Technology Department as well as the Particle Physics Department, together with Bristol and Oxford Universities, and staff from Imperial College and University College, London. The chamber was constructed in a purpose-built clean room at Oxford Nuclear Physics Department. It has sectors of three superlayers, each superlayer having several cells with eight sense wires - 104 active sense wires in all. The wires in the middle superlayer are inclined at 5° to the chamber axis, to provide stereoscopic measurement.

In the final chamber there will be nine superlayers (instead of three) and a complete cylindrical structure, giving 4608 channels.

Assembly of the chamber involved mechanical design and testing of 100 micron-bore crimped feedthroughs, the development of dimensionally accurate plastic insulators and precision drilling of endplates. This ensured that the error on the location of each wire does not affect the positional measuring accuracy of 100 microns on each passing particle. After assembly, the chamber was equipped with preamplifiers and high voltage distribution, and gradually inched up to the required high voltage. One has to establish the



The Centaur chamber, three superlayers showing, about to be sealed by the cover plate (Photo: J Fraser, UCL).

chamber operating conditions, and then use it as a test bed for the electronics development - amplifiers and pipelined FADC (Flash Analogue to Digital Converter) readout, together with measuring the co-ordinate along the chamber by timing the propagation of signals down the chamber wire. For all of this one needs a beam of test particles, and this is obtained from ISIS.

The idea for the test beam was based on the use of a target which dips into the beam halo during the acceleration process in ISIS. The vertical size of the proton beam is at a maximum during the injection and trapping process, subsequently the beam damps down in size. Therefore, to allow full aperture for injection the test beam has to vibrate 50 times a second in time with the ISIS cycle of 50 pulses per second. A small amount of ISIS beam, which would probably be lost anyway, is intercepted by the vibrating target over a period of a few milliseconds. Secondary particles are produced which are taken by a beam line to the old (refurbished) NIMROD injector hall (RS.2) where the high energy physics equipment can be tested.

The novel target was designed and commissioned by Neil Cunliffe and Mike Percival from Technology Department. The design modifications to the synchrotron, the layout of the beam and the installation of target and beam line were done by members of

ISIS groups. The target was commissioned during the summer and the beam tuned so that at the start of the running period on Monday 16 November, a negatively-charged beam of 200 MeV/c was put through the chamber. Tracks were seen on-line and 30000 events recorded to tape in the first shift of operation.

Since then, a beam of 300 MeV/c negative particles has been established, and the ZEUS Group have been active using it in debugging and commissioning electronics, and in recording data to tape. A group from University College London, working on the OPAL forward detector, are also using the beam.

After nine years, we again have an accelerator delivering beam to high energy physics apparatus. This facility puts RAL in a strong position for constructing and commissioning apparatus, and will be of use to groups throughout the UK. Meanwhile, the ZEUS Group have a lot of electronic design decisions to make quickly to be ready for installation at DESY in 1989, and a heavy programme of tests to do on CENTAUR to achieve this. Speaking as an old NIMROD physicist - it's great to be wearing a film badge again.

David Saxon

Trophy Time

The presentation of the 1987 Indoor and Outdoor Sports Days commemorative trophies took place in the Rec. Soc. Lounge Bar on Monday 30 November.

A total of 31 glittering replicas were presented by RAL Director Paul Williams to the winners who had been involved in a total of 9 events ranging from Volleyball to Croquet and Badminton to Crib.

Paul congratulated the winners on their achievements and then raised the question of next years presentation should he win the Snooker!



Trophy winners flanked by Acting Deputy Director Gordon Walker (left) and Director Paul Williams (right).

Farewell

Betty Buxton



A shy smile from Betty as she and John examine her card.

Betty Buxton's farewell took place on Friday 4 December. John Bellis, making the presentation, recalled one of Betty's early claims to fame. It appears that on joining the Laboratory in 1976 she worked in R9 Workshops and was renowned for the high quality of her tea. With the withdrawal of the "tea service" in July 1979 Betty became a Messenger and John reminisced on the occasion he and Betty spent trying to decipher a foreign visitor's name on letters. In true Yorkshire style, John claimed, she turned to him and said "that sounds like a social disease not a name".

Her conscientiousness, humour and attention to detail were but a few of her many attributes, which led to her popularity throughout the site.

On making the presentation of a television set (a gift from her friends and colleagues) and commemorative card John wished her well in her retirement.



RAL LECTURES

The next lecture in this series will take place on Thursday 14 January in the R22 Lecture Theatre at 3.15pm

THE MANAGEMENT OF CHANGE
by
ALISTAIR GRAHAM
Director Industrial Society

Thanks

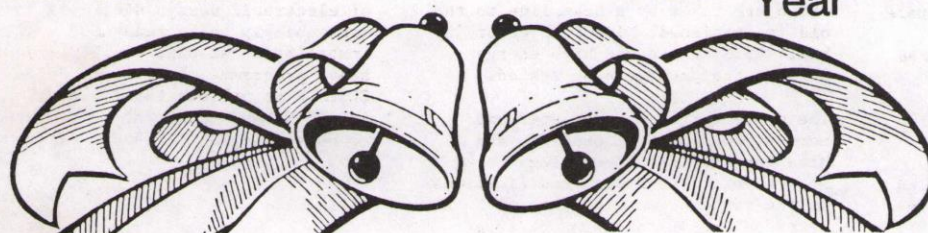
Yolande Ewart would like to thank all her friends and colleagues for the lovely present and wonderful send-off given to her on leaving the Laboratory.

Sales to Employees

The sale of scrap metal to RAL staff will take place from 1200-1230 hours in the R24 Scrap Compound on 15 and 29 January.

Readers will have noticed that the Bulletin Heading lacks colour. This is due to temporary production difficulties.

Happy
New Year



Film Badge Notice

It is Period 1 strip GREEN.

Please ensure you are wearing the current dosimeter and return all old ones to Jenny Coates, R12.

Astrophysics Events

These seminars are held at 2pm on Wednesdays in R61 Conference Room.

- 13 January "Electron Acceleration in the Aurora: a new perspective" - Dr Duncan Bryant (RAL)
3 February "The Great Attractor" - Dr Malcolm Currie (RAL).

Carol Service

The annual Laboratory Carol Service was held on Friday 11 December. The Rev. Jeff Taylor of Didcot Baptist Church led the service which included two solos from Jimmy Darius and readings from Grace Brown and Dennis Williams.

A short concluding message about the significance of peace between God and man this Christmas being available to all through faith in Jesus Christ was brought by Jeff Taylor.

Chris Reason accompanied on the piano and approximately 120 attended.

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