RUTHERFORD Bulletin 3

13 - 27 February 1978

21st Birthday Issue

In The Beginning

A statement by the Financial Secretary to the Treasury, made in the House of Commons on 14 February 1957, announced the Government's decision to set up the National Institute for Research in Nuclear Science. The following extract needs no further comment:

"The main object of the Institute will be to provide, for common use by universities and others, facilities and equipment which are beyond the scope of individual universities and institutions carrying out research in the nuclear field".

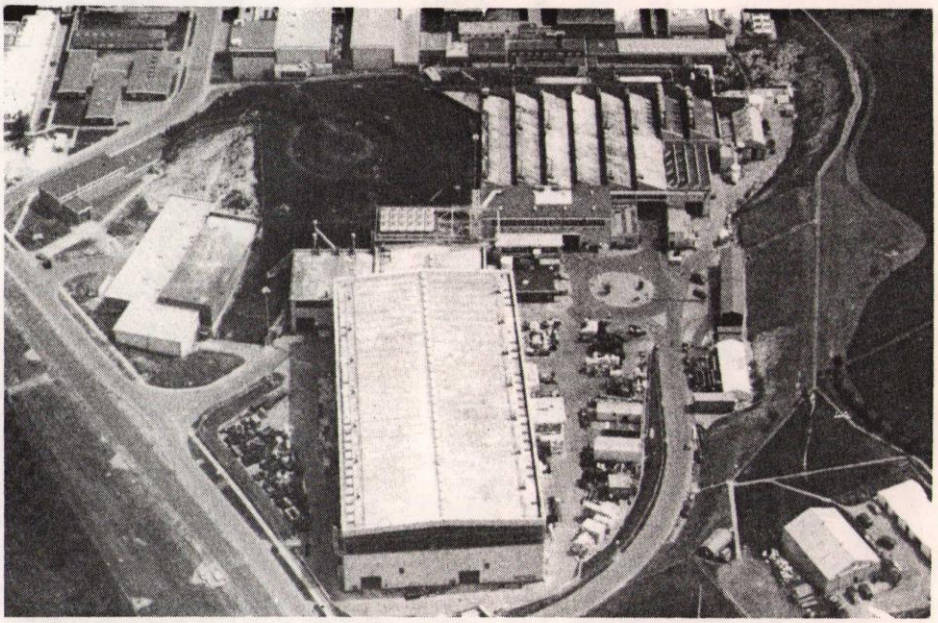


Photo: Aerial view of Nimrod Complex

The first of the Institute's research establishments, the Rutherford High Energy Laboratory (as it was then called), received its official title that same year, two proton accelerators being planned to provide national facilities for nuclear research at this centre. Work on the Proton Linear Accelerator had commenced in the Spring of 1955 and the Atomic Energy Authority's offer to transfer the machine to the Institute was accepted.

In April 1965 the Science Research Council was set up with the responsibility for the entire national effort in pure nuclear science by its support of the Daresbury and Rutherford Laboratories, nuclear research in universities, and by participation in overseas research facilities.

With the construction of an electron accelerator at the Daresbury Laboratory, completed in 1966, the SRC was successfully operating three first-class facilities for nuclear research for a large community of university teams, and was supporting the UK participation in the research programme at the CERN Laboratory in Geneva.

Rutherford's first machine, the 50 MeV Proton Linear Accelerator, ran successfully from April 1960 until October 1969 - providing 42,658 hours of beam time for nuclear physics experiments, producing over 40 PhD theses and over 130 published scientific papers.

NIMROD - The Mighty Hunter

The construction of a high-energy proton synchrotron at the Rutherford Laboratory was approved early in 1957. Its parameters contained "all the sevens": a 7 GeV synchrotron was to be built for £7 million, using a 7000 ton main ring magnet, with a 0.7 sec current rise time, etc. A competition was arranged to pick a name for the new machine. Although the name HEPTATRON was the winner, the machine was named "Nimrod" ("A mighty one in the earth" - "a mighty hunter", Genesis 10, 8-12) after a late-entry was received from Dr W Galbraith.

The construction of Nimrod was completed in 1963, the design energy of 7 GeV was achieved in August 1963 and, by running the magnets at maximum current, even 8 GeV was reached! The research programme of high-energy physics experiments officially started in February 1964.

There were some early teething problems, as with most new arrivals, and the rotating alternator problem in 1965 resulted in a short period of 2 GeV running directly from the grid supply. Otherwise the machine has performed smoothly and reliably over the past fourteen years, throughout an exciting period of high energy physics discoveries.

A variety of experiments have been successfully completed, yielding significant results on, for example, high-precision particle scattering data, detailed studies of resonance states and the discovery of new states, accurate data on spin-dependent effects, and checks on possible violations of the physical laws in weak and electromagnetic interactions.

Large-scale and complex sets of equipment have been developed and operated, including polarised targets, bubble chambers and magnetic spectrometer facilities.

Priorities

With the increasing costs of maintaining first class experiments in nuclear research at a time when the country was undergoing financial difficulties, the SRC allocation of funds has suffered a substantial decline over the past few years. This led to a natural grouping of physicists into larger collaborations and, where possible, cost sharing by forming international collaborations.

With the decreasing funds and the commitment to the European accelerators at CERN, the stage was soon

reached when a choice had to be made to fulfill and maintain the international commitments at the expense of the home-based facilities.

As a result, Daresbury's electron accelerator "NINA" had to be closed on 1 April 1977 after a highly successful physics programme resulting from over 40,000 hours of beam time since December 1966.

In June of this year, Nimrod too must be switched off for the last time, bringing to a close the era of high-energy physics machines in Britain. Over the period from 1964 to 1978, the machine has provided more than 56,000 hours of realised time for high-energy physics research, in the course of which a total of 80 million beam pulses (or 1.7 x 10^{20} protons) have been delivered. This birthday issue of the Bulletin carries a special article entitled "NIMROD TODAY" in which we review the current physics programme at the 7 GeV proton synchrotron, and outline what can be achieved in the final months of operation.

NIMROD TODAY

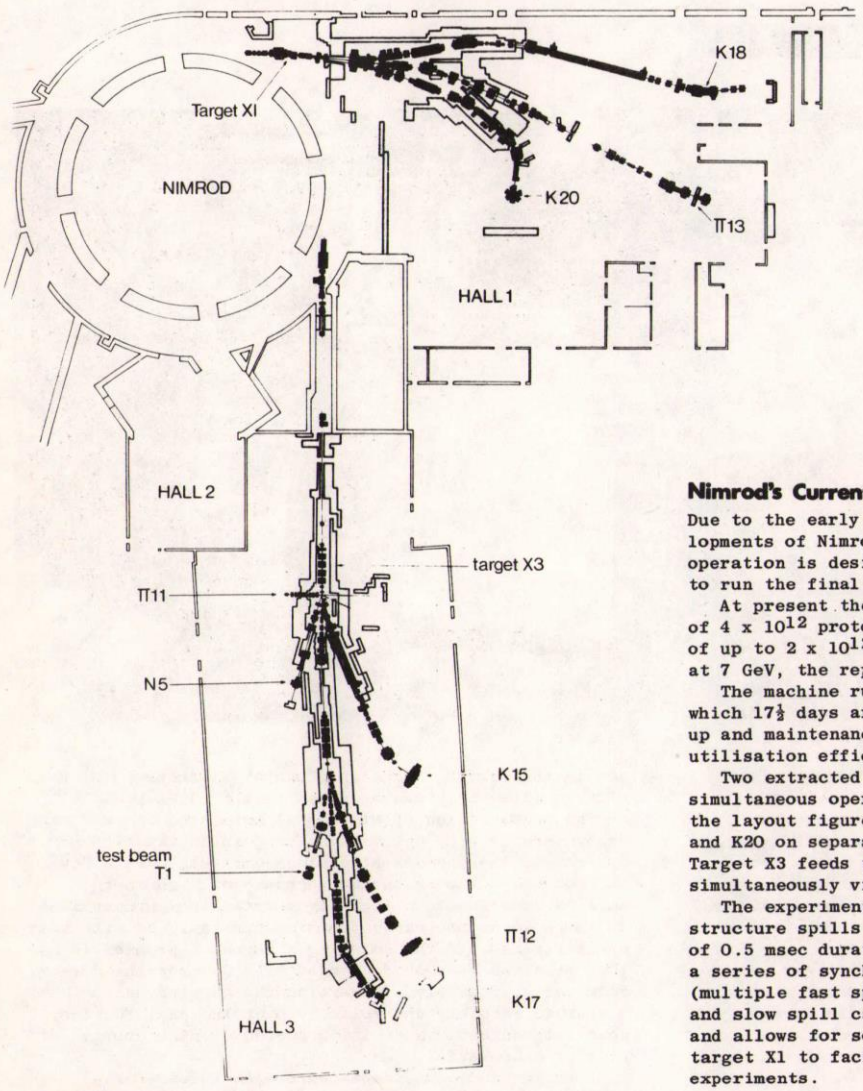


Photo: Layout of the experimental beamlines

Nimrod's Current Operation

Due to the early closure date, all improvements and developments of Nimrod have been stopped and the machine operation is designed to maximise the beam time available to run the final series of experiments.

At present the machine operates with an internal beam of 4 x 10^{12} protons per pulse and with an extracted beam of up to 2 x 10^{12} protons per pulse. For normal running at 7 GeV, the repetition rate is 20 pulses per minute.

The machine running is based upon a 3-week cycle in which 17½ days are for experiments and the rest for start-up and maintenance. This mode of operation leads to utilisation efficiencies of over 85%.

Two extracted beams are in use, providing for the simultaneous operation of several experiments. As seen in the layout figure, target X1 feeds the beamlines K18, π13 and K20 on separate machine pulses using switching magnets. Target X3 feeds the beamlines K15, π12, K17, T1, N5 and π11 simultaneously via 3 in-line target stations.

The experimental requirements call for either slow, low-structure spills of up to 700 msec length, or fast spills of 0.5 msec duration. The bubble chamber on K18 requires a series of synchronised fast spills for up to 700 msec (multiple fast spill). A composite arrangement of fast and slow spill can cater for most of target X3 requirements and allows for some "peeling off" of the slow spill onto target X1 to facilitate setting-up and data-taking of other experiments.

Experiment Just Completed

During November 1977, the data-taking was completed for an experiment to test whether a high magnetic field could turn off the CP violating decay $K_L^o \to \pi^+\pi^-$. The Imperial College (London) and Rutherford Collaboration used a short pulse-length (500 μsec) neutral beam of K_L^o and unwanted neutrons, which passed down the axis of a solenoid magnet capable of producing fields in the region of 30-40 tesla. The decays, producing two pions in the fiducial region immediately after the solenoid, are detected and measured by a spectrometer consisting of multiwire proportional chambers, drift chambers and trigger counters. Data-taking runs were performed with the high field pulsed "on" and "off" during alternate Nimrod beam pulses, in order to subtract background events. The data are presently being analysed.

The Present Programme

There are seven experiments presently data-taking and hoping to complete their programmes before the June shut-down. There follows a brief description of the activities on each beam line.

The Rapid Cycling Vertex Detector (RCVD), a 30 cm diameter bubble chamber cycling at up to 60 Hz, has been undergoing tests since July 1976. This detector operates with an external counter system in a hybrid mode to provide detailed information of the vertex of an interaction. Because of the early closure of Nimrod, it is no longer practical to use this detector for a physics experiment. However, tests are still proceeding to commission the chamber, and it is providing valuable information for the design of future vertex detectors.

continued on p.7 & 8

RUTHERFORD LABORATORY LECTURE

The next lecture in the series, again to be held on a Tuesday, will be given by Mr B W Oakley of the Department of Industry. During his Army career (1945-58), Brian Oakley spent 3 years at a telecommunications research establishment working on microwave valve development, followed in 1953 by a 3 year appointment to the Air Ministry Scientific Advisory Department. He then moved to RRE where he was concerned with research on data handling equipment for defence and civil aviation requirements. He continued to work at RRE after leaving the Army until 1969 when he joined the Ministry of Technology to work for 3 years in the computer sponsorship branch.

Since 1972 he has been with the Department of Industry where he is presently Head of the Research and Technology Requirements and Space Division.

Mr Oakley's talk, to be given in the Lecture Theatre at 1515 hours on Tuesday, 21 February, is entitled "ROTHSCHILD REFORMS - IN RETROSPECT". He has kindly supplied the following abstract:

The Lord said: 'Let there be light - and you could see for bloody miles' - The Lord was, of course, Lord Rothschild and the quotation reflects the interpretation of Sir Ieuan Maddock who was, at the time, Chief Scientist of the Department of Industry. The Rothschild reforms entailed the transfer of substantial funds from the Research Councils to the customer Departments, with the notable exception of the Science Research Council.

Mr Oakley was responsible for establishing and running the Requirements Boards which were the bodies established in DOI to determine how the Department's Research funds should be spent. He will look back over the five years of experience, reflecting on whether the reforms have achieved their purpose. Would the work in progress now have been much different in objectives or organisation if the changes had never been instituted? Should the reforms be extended to the Science Research Council funds?

SPEAKERS & GUIDES FOR LAB VISITS

Would anyone interested in guiding school parties around the Laboratory, or speaking about the work of the Laboratory to visiting groups, during weekends, please contact Mrs M Sherwen, Bldg R20, Ext 553. A fee is payable for working out-of-hours.

COFFEE LIQUEFIED

With effect from Monday, 13 February 1978 the provision of coffee in Conference Room 3 (R61) will cease until further notice due to staff shortage.

NUMBER CHANGE

Please note that the telephone number of the Appleton Laboratory Winkfield Field Station has changed to Winkfield Row (STD 03447) 5625/6.

FILM BADGE NOTICE

It is Period 2. Colour Strip - BROWN for $\beta\gamma$ films and neutron packs. Please check that you are wearing the correct dosimeters. Also make sure that all previous dosimeters are returned to enable the records for 1977 to be completed.

OVERSEAS VISITS

Dr D H Saxon and Mr K W Bell, to Hamburg, 12-14 Feb, to attend TASSO collaboration meeting at DESY.
Mr G P Warner, to France and Switzerland, 12-15 Feb, for discussions at Saclay and CERN and for work at ILL.
Dr A D Taylor, to ILL, 12-20 Feb, to work on approved experiment.
Dr T G Walker, Dr M Edwards, Dr P H Sharp, Dr J E Bateman, Mr P R Dotts and Mr B T Payne, to Vienna, 13-17 Feb, to attend Multiware Chamber Conference.
Dr J Carr, to CERN, 13-24 Feb, to work on EMC experiment.
Dr G L Greene, to ILL 14-24 Feb, for experimental work on two projects.
Dr C J S Damerell, to CERN, 14-18 Feb, to attend meetings on Charmed Meson Proposal.
Dr W Venus, to CERN, 14-23 Feb, for run on experiment WA24.
Dr I F Corbett and Mr R T Nickson, to CERN, 19-22 and 20-22 Feb, respectively for discussion on advanced data acquisition systems.
Mr D A Gray, to CERN, 19-21 Feb, to attend ECFA meetings.
Mr L Phillips, Mr P O'Brien and Mr R Blatchford, to DESY, Hamburg, 20 Feb-3 March, for preparation of TASSO iron yoke.
Dr C J S Damerell, to CERN, 20 Feb-2 March, to work on WA3 and single electron proposal.
Dr G E Kalmus and Dr W Cameron, to CERN, 22 Feb-5 March, setting up and running experiment WA30.
Dr L C W Hobbis, to Dresden, East Germany, 28 Feb-3 March, to give lecture on the SNS at Spring School on Neutron Scattering.

CHOCOLATE VENDING MACHINES

Over the last few weeks the Restaurant has had difficulty in keeping the Kit Kat Machines fully stocked, hopefully this matter will be put right shortly.

The Restaurant Manager has been informed by the Makers of Cadbury's Dairy Milk that the cost of the usual vending bar will have to be increased to 20p. It has therefore been decided that this service will be stopped and the Machines will be removed.

NEWSPAPERS

There is a substantial loss each week because of unsold newspapers. In future newspapers must be ordered by the customers. The shop will carry no extra newspapers or magazines.

FOUND

A copy of "Proceedings of the International School of Physics, Enrico Fermi XXII, Semiconductors" has been left in the Library. It may be collected from the Issue desk in R61.

TIE-LINE CHANGE

The existing tie-line system within Rutherford Laboratory for dialling (74) direct to State House, London will cease on 23 March 1978 and reopen as a tie-line from Rutherford Laboratory to the new SRC building in Swindon on 28 March 1978. The present tie-line dial code of 74 will remain when the change over is completed.

INTERNAL EVENTS

NIMROD LECTURE SERIES
Monday 13 February
1130
Lecture Theatre

Review of Quantum-chromodynamics and Quark Confinement

M B Green/Oxford

SAFETY FILM SHOW
Tuesday 14 February
12.30 and 13.15
Lecture Theatre

Take Care of Yourself, a 20 minute colour film which illustrates many aspects of Industrial Safety. A number of typical accidents are shown, including those caused by loose clothing, unsuitable footwear, wrong handling methods, incorrect ladders, etc.

HEP SEMINAR
Wednesday 15 February
1100
R61 Conference Room

Some Applications of Renormalization Group

Yan Tung-Mow/CERN

NIMROD LECTURE SERIES
Monday 20 February
1130
Lecture Theatre

Deep Inelastic Lepton Scattering at FNAL

T Quirk/Oxford University **(this lecture not yet confirmed so watch TODAY notice boards)**

HEP SEMINAR
Tuesday 21 February
1100
R61 Conference Room

Partons in the Bag

R J Hughes/Liverpool

RUTHERFORD LABORATORY LECTURE
Tuesday 21 February
1515
Lecture Theatre

Rothschild Reforms - In Retrospect

Mr B W Oakley/D.o.I **(see 'news' section for details)**

HEP SEMINAR
Wednesday 22 February
1100
R61 Conference Room

π^-p Physics at the CERN Ω Spectrometer

P L Woodworth/RL

COMPUTING SEMINAR
Friday 24 February
1400
Cockcroft Hall

A Prototype Knowledge Refinery

Professor D Michie/Edinburgh (a joint seminar with AERE, in Cockcroft Hall)

Evidence for the appearance of a new useful art, computer aided codification, will be presented. Worked examples will be given from chess endgame knowledge and supporting illustrations cited from problem areas in computational chemistry and pathology.
If preliminary indications continue to be borne out, it will be difficult to resist a case for establishing a prototype knowledge refinery in the United Kingdom. It would stand in the same relation to existing codifications of technical know-how as an oil refinery stands to crude oil.

NIMROD LECTURE SERIES
Monday 27 February
1130
Lecture Theatre

Recent Developments in High p_T Physics

R Baier/Bielefeld

EXTERNAL EVENTS

ELEMT PART PHYSICS SEMINARS/NP DEPT, OXF - 1430 hrs
17 Feb: Dr A Schorr/Oxf - Models and mechanisms for non-topological quark bay with first order phase transition.
24 Feb: Prof K J Barnes/Soton - New symmetrics for elementary particles.

THEORETICAL PHYSICS SEMINAR/CLARENDON LAB, OXF - 1615 hrs
23 Feb: Prof G Ravenhall/Illinois & Orsay - The equation of state in dense matter at finite temperature.

NUCLEAR STRUCTURE SEMINAR/NP DEPT, OXF - 1430 hrs
20 Feb: Dr J Asher/Oxf - Nuclear precessions observed in single - and multi-electron hyperfine fields - some recent results.

THEORY GROUP SEMINAR/DARESBURY LABORATORY - 1400 hrs
20 Feb: Dr J Lilley/DL - Inelastic $\propto$ nucleus scattering and coulomb nuclear interference.

HEP SEMINAR/BIRMINGHAM - 1615 hrs
17 Feb: V Stenger/Hawaii & RL - Prospects for the detection of ultra-high energy extraterrestrial neutrinos.

THEOR PHYS SEMINARS/NIELS BOHR C R, MANCHESTER - 1420 hrs
22 Feb: Prof J E Enderby/Bristol - Ionic liquids: recent progress in understanding their structure.

HEP SEMINARS/ROOM B, CAVENDISH LAB, CAMBRIDGE - 1100 hrs
15 Feb: J Ellis/DAMPT - New-onium
22 Feb: M J Perry/DAMPT - Quantum black holes

HEP SEMINARS/ROOM A, DAMPT, CAMBRIDGE - 1500 hrs
16 Feb: Dr M Tepor/RL - A parton approach at small transverse momenta.
23 Feb: Prof K Barnes/Soton - New symmetrics for elementary particle physics.

NUCLEAR PHYSICS SEMINARS/SURREY UNIV - 1400 hrs
15 Feb: Medical physics seminar.
22 Feb: N D Birrell/Kings - 3 nuclear calculations using separable expansion of realistic potentials

THEORETICAL PHYSICS SEMINARS/QMC - 1615 hrs
13 Feb: Prof B Widom/Cornell & Oxf - to be announced.
20 Feb: Prof R Streater/Bedford Coll - Bose-Fermi correspondence in two dimensions.

NUCL PHYS DIV COLLOQUIUM/CONF RM, H8, AERE 1 1515 hrs
16 Feb: Prof J M Reid/Glasgow - Nuclear structure program associated with the Kelvin Laboratory electron linear accelerators.

THEOR PHYS SEMINAR/CONF RM, BLDG 8.9 AERE - 1400 hrs
21 Feb: Dr M J Gillan/TPD - The Soret effects in solids.

Calling All Cricketers

All past and present cricketers, the young and not so young, are invited to a meeting on Thursday, 16 February in the R20 Conference Room, 1230 hours at which it is hoped to re-form the Laboratory Cricket Club within the Recreational Society.

NEW SPORTS DAY The (now) traditional SRC Sports Day will be held on Tuesday 18 July 1978 and an announcement about this will be given in a later issue of the Bulletin.

This year, for the first time, an 'Indoor Sports Day' is to be held at the Norton Recreation Centre, Runcorn New Town (near Daresbury) on Friday, 31 March commencing 1400 hours. There will be an optional 'disco', with supper afterwards at £1 per head.

Members of the Laboratory can obtain special leave to attend one or other of these functions but will have to take one day's leave if they wish to attend both.

The following sports will be held; all those wishing to take part must give their names to the representative indicated below, by 9 March 1978. As usual, spectators are welcome.

Swimming	Richard Hilken	R26
Darts	Ian Forster	R6
Mixed Volleyball	Ann Roberts	R27
Table Tennis	Eric Thomas	R27
Badminton	Lorna Claringbold	R27
Squash	John Price	R51
Chess)		
Dominoes)	Peter Craske	R2
Bridge)		
Spectators	Peter Craske	R2

REC SOC DANCE The next dance will be held in the R22 Restaurant on Friday 10 March. Dancing to 'Mel and His Music'. Tickets (from Val Goodwin, Dave Evans and Peter Craske) are limited so please obtain yours as soon as possible.

CHESS NEWS With only three rounds to be played in the annual Chess Tournament, Peter Craske with 6 points from 6 rounds, has established a 1 point lead over his nearest rival. Peter Hemmings with 5 points has now moved ahead of Roy Culliford who has only collected 1 point from his last two games. Barring a complete loss of form Peter Craske seems to be heading for his third successive title, however, with 3 rounds to go, there is plenty of time left for an upset.

CHRISTIAN FELLOWSHIP Friday 17 February: Meyrick Wyard will chair the meeting on the subject, 'Parents and Children'. What difference does the Christian faith make in marriage and does it help or hinder in the bringing up of children? Why not come along and share in this time and join in our open discussion in the R2 Conference Room at 1230 hours?

Friday 24 February: We move to the Lecture Theatre for this meeting which starts at 1230. The soundtrack of the film, Gospel Road featuring Johny Cash will be played and all are welcome to come along. The firt two parts describe the baptism of Jesus, His early miracles and the Serman on the Mount. This easy to listen to record includes various songs by Cash and Scripture readings with added comments.

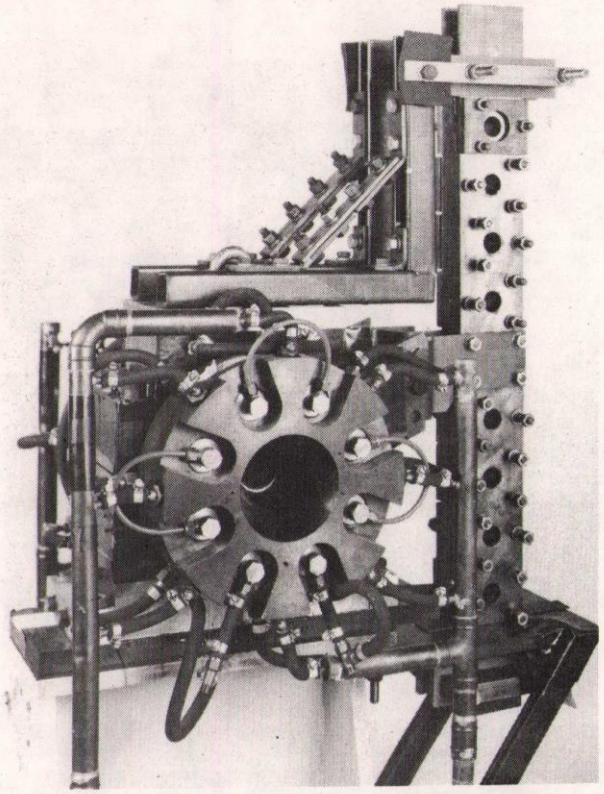


Photo: View of the 30-40 tesla solenoid used in the investigation of the CP violating decay $K_L^o \to \pi^+\pi^-$ (beamline N5)

π13

The Rutherford Multiparticle Spectrometer (RMS) has been assembled and commissioned over the past two years by the Edinburgh University - Rutherford - Westfield College (London) Collaboration. The RMS is currently taking data in the reaction $\pi^+p \to K^+\Sigma^+$ to provide improved information on the spectrum of Δ resonances and possibly reveal new "exotic" resonance states.

The spectrometer consists of the old 1.5 m bubble chamber magnet containing a liquid hydrogen target surrounded by cylindrical wire spark chambers, a large multiwire proportional chamber and time-of-flight counters. A large high-pressure Cerenkov counter is used to identify the K^+ and proton from the Σ^+ decay.

The offline analysis is progressing satisfactorily and a first look at the physics results indicates that the $K^+\Sigma^+$ events are present at the levels expected and, as a by-product, a strong signal is seen of the backward π^+p elastic scattering which will comprise the world's largest sample of this reaction.

A run before Christmas yielded about 40% of the required amount of data, and the group is looking forward to completing the data-collection early this year.

K20

The Queen Mary College (London) - Rutherford Collaboration has been commissioning equipment for the past two years for an experiment to measure the polarisation parameter in the reactions $K^+n \to K^+n$ and $K^+n \to K^op$ where the target neutrons are polarised, and hence require the use of a polarised deuteron target.

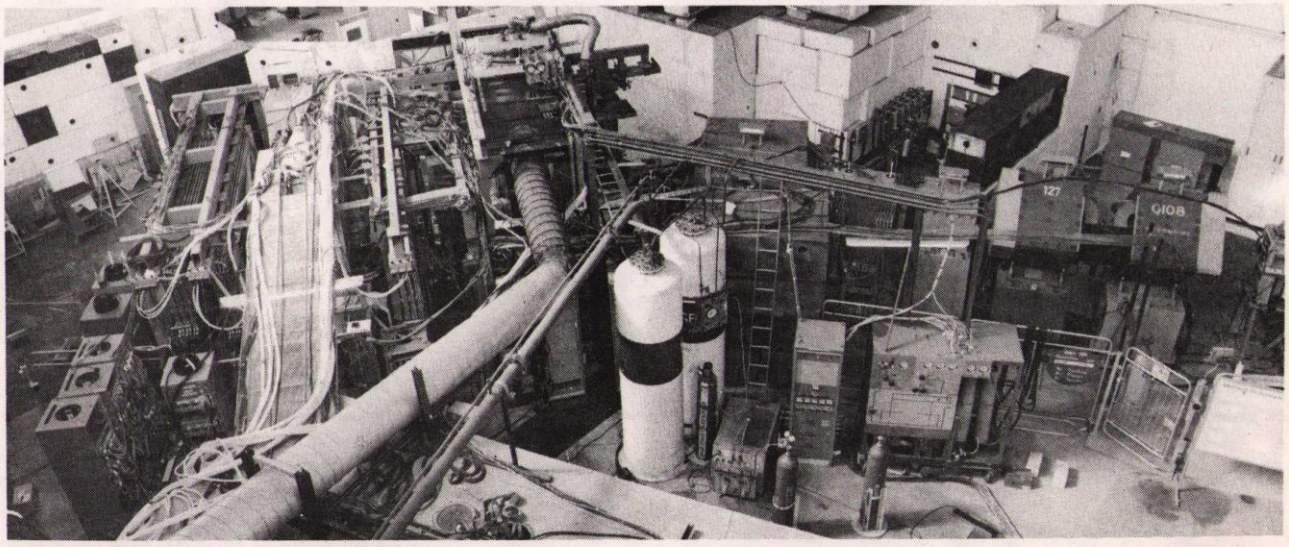
The data will be used to improve the partial-wave analysis of the K^+N interactions and, ultimately, to prove or disprove the existence of the Z_o^* resonance. The incidence kaons are identified using time-of-flight techniques at lower momenta (0.7 to 1.0 GeV/c) and a DISC Cerenkov counter at higher values. Deuteron polarisations of over 30% are obtained using a deuterated propanediol target. The downstream detector arrangement consists of low-mass spark chambers and a large array of scintillation counters to identify the neutrons.

Data have been recorded simultaneously on the two reactions at an incident kaon momentum of 0.975 GeV/c - which is appropriate for the excitation of the Z_o^* at around 1780 MeV. Before Nimrod closes, data will be taken at one more momentum setting (at least) in the interesting energy region.

K15

The Bristol University-Southampton University-Rutherford Collaboration has in the past made extensive measurements of K^+p and $\pi^\pm p$ elastic differential cross-sections with high statistical accuracy and good normalisation.

The experiment started data-taking in May 1976 and has completed 23 momenta each with more than 500,000 triggers in the momentum range 1.0 to 2.0 GeV/c. In the final months of Nimrod running, the team hopes to extend the K^-p momentum range and complete a study of the detailed structure observed in the earlier $\pi^\pm p$ data.



A view of the spectrometer in the K15 beamline used for precision measurements of elastic $\pi^\pm p$ and $K^\pm p$ cross-sections.

A Collaboration from Bristol University, Cambridge University and Rutherford has worked on a series of experiments to study resonance decays to $\Lambda^o K^o$ and $\Sigma^o K^o$. The channel $\Lambda^o K^o$ has several attractions for the study of baryon resonance decays. The Λ^o decay into $p\pi^-$ acts as a polarisation analyser for the particle spin, and the $\Lambda^o K^o$ state allows a clean study of isotopic spin $\frac{1}{2}$ states. Two earlier experiments by this group studied the angular distribution and polarisation from a liquid hydrogen target.

The experiment which is presently data-taking, has a polarised-proton propanediol target in which the proton spins are aligned along the incident beam particle direction. This target allows the spin rotation parameters of the Λ^o to be measured for the first time.

For several years, a collaboration of physicists from the Universities of Birmingham and Surrey and from Rutherford Laboratory, together with several visitors from the USA, have been using the K17 beamline to study X-rays from exotic atoms formed when pions or kaons stop in a variety of targets; this work has been very fruitful.

The present experiment is to look at the X-rays produced when kaons stop in hydrogen. Technically the experiment is difficult as the X-rays have a very low energy, and are thus easily absorbed; also, the number produced is expected to be very small. The apparatus consists of a specially constructed liquid hydrogen target with the X-ray detector incorporated as an integral part of the assembly to maximise the detection efficiency. The equipment is commissioned, and data-taking with hydrogen is just underway.

The π11 beam line has been used since 1971 to investigate the potential of negative pions for radiotherapy, by studying the effects on biological samples and measuring the physical nature of the radiation.

Biological samples studied so far have included the inhibitation of bean roots, the ability of cancer cells to form clones, the aberration of chromosomes in human white blood cells, and the effect on several sensitive organs of mice. At present, detailed depth-versus-response curves are being obtained by irradiating cancer cells in a gelatin matrix; also white blood cells are being studied to understand the effect of reducing the amount of oxygen present (as occurs in tumours with poor blood supply).

The investigations of the physical nature of the pion beam have involved several types of detectors. Ionisation chambers have been used for macroscopic dose measurements. Lyoluminescent detectors (ie those which emit light on dissolving irradiated solids) are under study since they may be constructed from tissue-like substances. Proportional chambers and nuclear emulsions have been used to provide data at the level of the size of a biological cell. Further properties of the beam are revealed using counter telescope and neutron activation techniques. In the closing months it is hoped to repeat some studies of the primary pion flux and its contaminants using counter techniques.

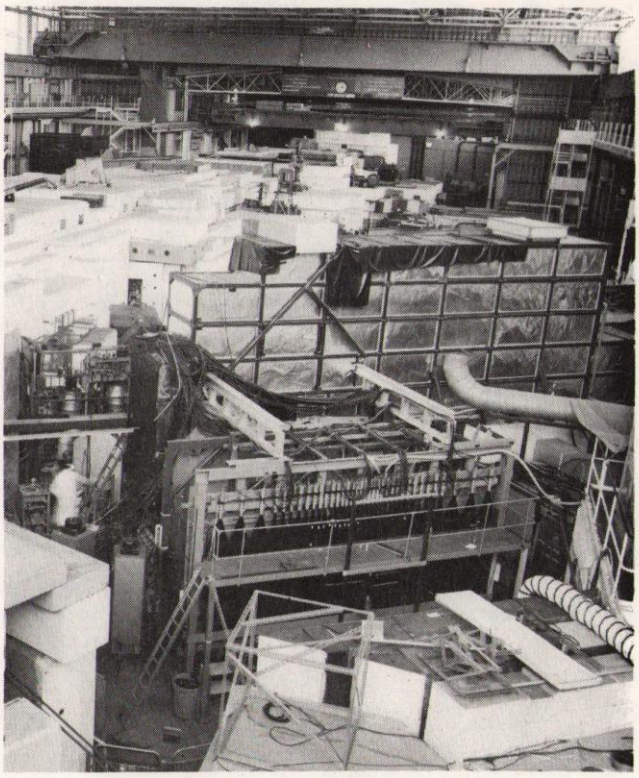


Photo: View of the apparatus on the π12 beamline used to measure the spin rotation parameter of the Λ^o.

The Changing Scene

It is always sad to lose a friend, and when Nimrod is closed it will be greatly missed as a Mighty Hunter - since most of its work has been concerned with detailed experiments producing accurate results and making discoveries of new and subtle effects. It will also be missed as a training ground for young high-energy physicists, and its departure will be a sad blow to the many user groups.

After the summer, the UK particle physics experimental activities will be centred at the CERN Laboratory in Geneva and the DESY Laboratory in Hamburg; and some experiments will continue to be performed in North America. High-energy physics will be extra-demanding in that many more physicists and technicians will need to travel abroad to collect their results.

Meanwhile, back at the Rutherford Laboratory, this summer will herald the start-up of activities concerned with converting the Nimrod complex into the new Spallation Neutron Source. This new machine, due to be ready for experiments in 1982, is already attracting international interest and will serve the needs of university scientists studying the liquid and solid states of physics, chemistry, biology and material science.

As Disraeli said in 1867, "Change is inevitable. In a progressive country change is constant". The Rutherford Laboratory has witnessed many changes over the 21 years of its history, but is unlikely ever to experience so great a change as will be happening this summer.

RUTHERFORD LABORATORY BULLETIN *Published by the Scientific Administration Group*

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