

Director's Christmas Message

The difficult financial climate our country is facing has unavoidably been reflected in short term problems in the Laboratory but nevertheless as 1976 draws to a close the future shape of our research activities is beginning to emerge satisfactorily.

In the summer, Council approved a second IBM 360/195 computer which will provide computing facilities for scientific research unsurpassed anywhere else in the United Kingdom. Council has also approved a programme of work for the Engineering Board and agreed in November to set up a unit for the support of universities scientists and engineers working in the important field of energy research.

Another important project is in the pipeline and receiving favourable consideration and I hope to tell you more about that early in 1977.

All these changes have necessarily resulted in some upheaval and I thank the many people who have been affected for their co-operation and understanding.

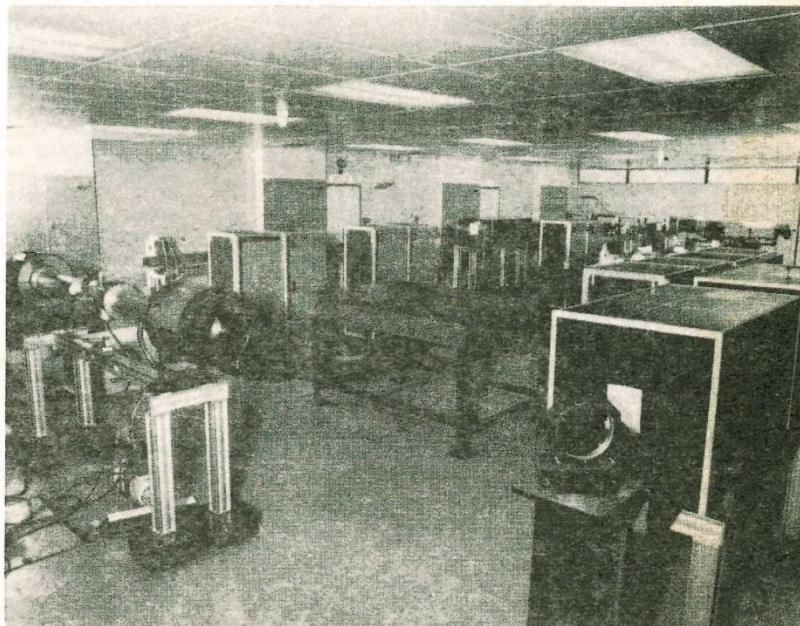
My best wishes to everyone for a successful 1977. May you and your families have a very happy and enjoyable Christmas.

Laser On Target

A new era in the Scientific life of the Rutherford Laboratory started on Friday 3 December when the first experimental results were obtained with the Laser Division's 100 Giga-watt Neodymium glass laser. Spectra of the emission of a highly ionised plasma, formed by the laser pulse focused on a metal target, were recorded in the vacuum ultra violet region by Dr Brian Fawcett of the Astrophysics Research Division of the Appleton Laboratory.

The 100 Gw laser is the 'front end' of the two beam system which will be completed early next year. It was supplied by Quantel SA, a French company, who delivered the first components in early October (see Bulletin 17).

Commissioning was completed on 2 December, the day the Division took over the laser from the suppliers. Setting up of the experiment had already been done and the first shots 'on target' were made within hours of the Laser Division staff getting their hands on the controls. For this first experiment the laser was operated at about half power; 5 joules in a 100ps pulse.



The inside of the special laser clean room in R1. The initial pulse generator is in the bottom left-hand corner of the room as seen here. The beam then passes through several stages of amplifying equipment (along the left-hand wall) before being turned into a vacuum spatial filter (left foreground). A turning mirror (right foreground) directs the beam into a series of optical components (housed in the box-like covers) before being sent on to the target area in the next room.

EVENTS

HEP SEMINAR

Tuesday 21 December
11.00
R61 Conference Room

Electron Production in 4 GeV/ π^+ p Interactions
in a Track Sensitive Target Experiment

John Guy/RL

HEP SEMINAR

Wednesday 5 January
11.00
R61 Conference Room

Production of Charged Mesons with $0.45 < x < 0.95$
at the CERN ISR.

J Singh/CERN

THEOR PHYS SEMINAR AT AERE

Friday 7 January
1415
Conf Rm Bldg 8.9, Harwell

Thermonuclear Reactions in the Early Stages of the
Universe

Dr D W Sciama/Oxford

New Unit Approved

As a result of suggestions by university workers that the Laboratory could provide technical support for their energy research, the Science Research Council has agreed to set up an Energy Research Support Unit at the Rutherford Laboratory.

The activities of the unit will take two general forms. Firstly there will be 'base support' with an annual total of about six person-years covering the 'pump-priming' activities needed to enable proposals for energy projects to be presented by university groups. Also 'link-men' will be provided to maintain close contact with groups and industries interested in a particular topic. Specialist conferences and 'workshops' will be organised with the aim of initiating research proposals.

Secondly, there is provision for an additional 12 person-years for specific projects as they are approved by the Council's Energy Proposals Committee. At the moment there are several projects at various stages of consideration. A collaboration involving four universities is preparing a proposal for a system involving a high speed turbine running off heavy vapour (rather than steam) and driving a high-speed generator with solid state converters to produce 50 Hz electrical output. Possible applications are as stand-alone generators, combined heat-and-power sources and production of electricity from waste heat. The equipment would be brought together at the Laboratory for the test programme.

Another consortium involving five universities is interested in energy research with Stirling engines. The aim would be to exploit the potential of the Stirling engine as being quiet, with low emission of noxious gases on account of its external combustion, and likelihood of reliability and long life.

The expertise of the Laboratory in instrumentation and data-reduction is being sought by several groups carrying

out energy research in buildings. One suggestion is that RL should instrument and provide the data retrieval system for research on about 40 new houses to be built in South Wales. Half the houses would be 'super-insulated' and the energy utilisation and management in these would be compared with the other half which would have a normal standard of insulation.

No energy group would be complete without its windmill! RL has been asked to do the detailed design and arrange for the manufacture of a windmill for the Cambridge Autonomous House project. The design has evolved from work at Reading University already being supported by the SRC. The windmill will be tested initially at Chilton.

The Unit will be in Instrumentation Division with Norman Lipman responsible to David Gray for the work of the Unit. There will be a small core of full-time staff in the Unit, who will be able to call on the appropriate expertise of the Laboratory as a whole for both the base support and for work on projects.

Laboratory staff already provide the secretariat for the energy committees of the SRC. Brian Jones is the Secretary of the Energy Round Table which advises the Council on its research programme in energy topics, and of the Energy Proposals Committee. The EPC, which has up to now approved grants for theoretical studies on energy systems, has recently had its role expanded to include the support of multidisciplinary projects and the overseeing of the Energy Unit programme.

The topics which have been described above are just a sample of the suggestions. Even if only a portion of the proposals lead to real projects there will be plenty of scope for the Laboratory to show that it can make big contributions to the research of yet another university community.

FULL BEAM INTENSITY ON 70 MeV INJECTOR

Last June it was reported that the accelerator had operated at its full energy of 70 MeV,

and that it remained to achieve the design output beam of 75 mA with a 500 microsecond pulse length.

Runs with output beams of over 70 mA at pulse lengths up to 500 microseconds have been made recently, the highest recorded beam to date averaging 77 mA. Some characteristics of the accelerator remain to be investigated, particularly in connection with its hoped for future as the H⁻ injector for the proposed Spallation Neutron Source.

TRAVELLING FELLOWSHIPS

Details of the Civil Service (Nuffield and Leverhulme) Travelling Fellowships are now available from Training Section, R20.

WELCOME TO RUTHERFORD

Now available is an eight-page colour leaflet called 'Welcome to Rutherford Laboratory'. Designed to help new employees and visitors find their way around and to indicate the range of services available on-site, the leaflet is available from Personnel Group, the Library and DAO's.

FILM BADGE NOTICE

It is now Period 13. Colour Strip - PURPLE for $\beta\gamma$ films and neutron packs.

PLEASE NOTE - the films for Period 1, 1977 will be put out on the boards on 24 December, and the neutron packs will be sent in the post as usual.

TLD change for people with surnames commencing A, B, C and D.

From The Editor

Nineteen-seventy-six has been a year of change, as forecast by the Director in his Christmas message, twelve months ago. Diversification is well under way and a glance through some 70,000 words of Bulletin copy show a number of innovations and many notable achievements during the past year.

Early in the year we reported on two developments, both spin-offs from the high energy physics programme. The technique, first used in HEP for stretching thin aluminised Melinex film to make light mirrors and spark chamber electrodes has been applied with great success to other areas by the Neutron Beam Research Unit and the Department of Engineering Science. The RL 'film wire' technique, selected by the Department of Trade and Industry for display at the Leipzig Spring Fair was expected to have important applications in both the aerospace and communications industries.

A month later and the Lab's know-how on Track Sensitive Targets was shown to have contributed to the Argonne Lab's success in becoming the second in the world to use this new technique, the first being the RL where the successful operation of a T.S.T. took place in December 1971.

The big news released in May was the proposal for a replacement for NIMROD (& NINA) by a high intensity neutron source. The Spallation Neutron Source (SNS) recently called 'Son of Nimrod' in a Sunday Times article by Bryan Silcock, has aroused considerable interest both inside and outside the Lab, as if approved (and the proposal has already cleared the first hurdle) it could turn the Lab into a centre for neutron beam research with facilities unrivalled in the world.

The variety of work which could be carried out on such a machine spans many disciplines including medical and biological work. This would ensure a continuation of the research carried out on Nimrod during the past 5 years on the value of pion radiation as an aid in the treatment of cancer, reported in a recent issue. Also reported was the recent work at RL which suggested that Multi-Wire Proportional Counter techniques could have important application in biomedical studies; another spin-off from HEP.

At least this line of research appears attractive to the press as does laser research. This week we carry a short story and picture on the start of operations in the new Laser Division.

High energy physicists continue to probe the mysteries of nature and thanks to the recent efforts of Chris Damerell and Frank Close (they will be repeating their lecture in the New Year) a lot of us ordinary mortals at the RL now have some insight into the fascinating world of particle physics and perhaps a little understanding of the enthusiasm of the people who work in this field.

The Lab has moved into a number of new and exciting fields and future prospects look distinctly promising. Elsewhere in this issue we report on the Energy Research Unit recently approved by Council.

Computers and computing have been in the news a number of times: in April the first & very successful International Conference on the Computation of Magnetical Fields (COMPUMAG 76), organised by the RL was held in Oxford; the 'Finite Elements' film produced in conjunc-

tion with the Royal College of Art proved a winner and copies sold like hot cakes; 'Cashing in on Computers', the Bubble Chamber Groups development of a computer simulation technique to produce 'events', 'Network Unit Starts Work', 'Chinese Checkers', and the imminent Secretariat of the DoI's National Committee on Computer Networks - these reports all point to the Labs widening interest and expertise. Before long we hope to be reporting on the reorganisation (and regrouping) of the main computing facility in the Atlas building. With two IBM 360/195 computers plus all the 'bits', the RL computing complex will form one of the most powerful in the UK if not in Europe.

For the second time St. Catherine's College Oxford played host to an RL organised international conference. The Topical Conference on Baryon Resonances attracted delegates from many countries; nearly 40 papers were presented and the amount of water consumed during the sub-tropical heat of those July days was more than equalled by the consumption of British beer during the evenings.

The Advisory Board for the Research Councils, accompanied by DES personnel and Engineering Board members, toured the RL at the end of February and were shown exhibits covering a wide range of the Laboratory's work. In addition the Lab was host to many other important visitors through the year, from the world of learning, industry and government departments. The year has also been unusual in that many familiar figures have left mainly through the premature retirement scheme. A total of 44 retirement stories have been published that have either pleased, bored or been ignored by readers.

During the year we were delighted to record the election of Dr Gerry Pickavance as a Fellow of the Royal Society, and later the award of the CBE to the Lab's Director, Dr Godfrey Stafford.

Although not strictly a Bulletin matter, readers may note with interest that news of the RL's achievements and activities have appeared in 9 of the 11 issues of the CERN Courier for 1976; this includes the December issue still to be published. (The Courier is available to anyone on request).

To end this 'Bulletin Year in Retrospect' I thank all those who have contributed to the pages - even those who have difficulty in reading the deadline dates.

In this, the last issue for 1976, it is my privilege and pleasure to thank all those who have been concerned with the production of the Bulletin during the past year - to the Messengers who deliver the copies to your in-trays; Jean, Bill & Gordon who make the plates and roll off 1200 copies per issue; Mike and Reg for their photographic contributions and to the members of the typing centre, in particular Rosemary Whitehorn. As first in the firing line Rosemary has maintained her good humour in spite of the inevitable difficulties and last minute changes. The personal interest she has shown in 'getting things right' (even the occasional error) has been invaluable.

May I conclude by wishing readers everywhere a Merry Xmas and a Happy New Year. I should particularly like to extend these wishes to old friends and colleagues who have retired during the year.

SUGGESTIONS AWARDS

At the meeting of the Local Suggestions Awards Committee held on 2 November 1976 the following awards were approved:-

Mr P Angell	Admin	R55	£5
Mr P Angell	Admin	R55	£10
Mr D J Hylton	Admin	R59	£10
Mrs K A Knight	Admin	R1	£5
Mr J O Talbot	Admin	R40	£40
Mr L J Townsend	Admin	R59	£5
Mr L Wright	Admin	R40	£10

Mr D K Fleet	Engineering	R9	£5
Mr D K Fleet	Engineering	R9	£20
Mr H J Pettit	Engineering	R18	£5
Mr D E Targett	Engineering	R18	£10
Mr D D Abbley	Nimrod	R2	£5
Mr S J Ling	Nimrod	R51	£5
Mr S J Ling	Nimrod	R51	£5
Mr B J Smith	Nimrod	R2	£15
Mr E G Starr	Nimrod	R3	£10
Mr K Waller	Nimrod	R2	£5
Mr J Flynn	Technology	R25	£20

RCVD Gets Moving

Seen here looking like a cross between a conventional bubble-chamber picture and a lunar landscape is one of the first operational pictures to be taken with the RL's new Rapid Cycling Vertex Detector (RCVD). This equipment is designed to be track sensitive at the rate of about 60 cycles per second instead of the usual one or two, and could well lead to a significant breakthrough in bubble chamber research techniques.

After a few initial teething troubles in the summer, the RCVD is now able to produce interesting pictures. 'We are now emerging from the purely technological phase of setting up the equipment and entering the realm of real physics,' says project leader Colin Fisher.

The first experiment at Nimrod in which the RCVD will be used is a collaboration between British, French and Italian physicists and is designed to study high strangeness baryon states. These states are difficult to spot using conventional bubble chamber methods because of their complexity. They involve several strange particle decays, each with a lifetime of about 10^{-10} seconds and which have small cross-sections - typically about one in every 500 K^- interactions.

The RCVD enables physicists to greatly increase the rate at which they are able to accumulate data while still keeping a detailed account of particle formation and decay. In the RCVD system, the central bubble chamber is surrounded by a concentric array of spark chambers which act as a trigger to select just those events of real interest.

In the initial Nimrod experiment, the RCVD will work with a 2.8 GeV/c K^- beam, and picture taking in the bubble chamber will be triggered by the condition that five or more outgoing particles are detected by the spark chambers in coincidence with an incoming K^- . This ensures that events are selected which include several strange particle decays and gives a sample enriched with high-strangeness baryon states.

