



Rutherford
Laboratory

R(12), NDT(60,3), ISW(3500), ANGLE(60), YINT(60), DUMMY(84),
(6,3), NACHT(48), XCEN(12), (12), (12), (12), (12), (12), (12), (12), (12),
MMDN/CFID/MFX(20,3), MFY(20,3), NFDX(10,3), NFX(3), NFD(3), I
B(2,20,3), NX(100,4), NY(100,4), XN(2), YN(8), IB(100,3), X
DY(100,2), JDX(4), JDY(4), IHS(4), IOV(2), IUN(2), IDE(2), IDE
CF(16), IFS, NFS, FX, FY, JK, PIC, KPIC, NCOUNT, NBIN, MA, M, UN
AXN, CTA, CTB, MX, MY, JA, JB, JC, JD, JE, JF, XF(20,3), YF
MMDN/CJACK/NSY(20,30), NMS(20), NDR(20), XA(5), YA
(20), BX(20), NST1(20), NST2(20), INER(20), NSX(20,30), AWT(60)

6-13 DECEMBER 1971

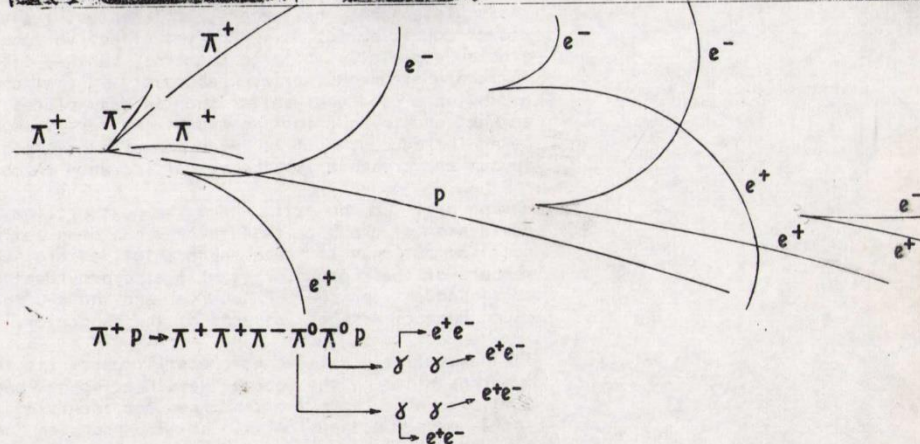
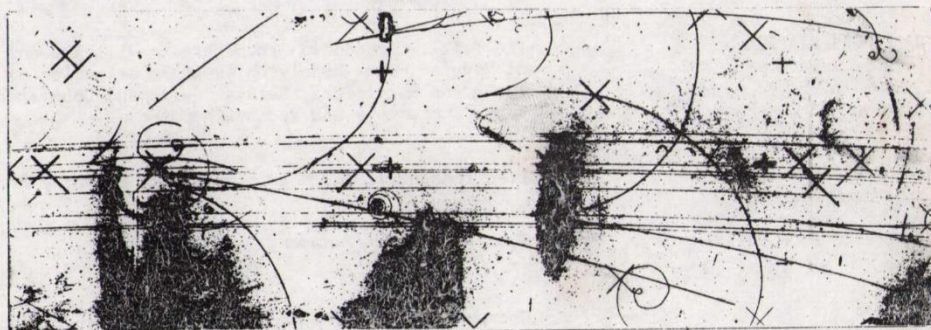
bulletin 43

UNIQUE TRACK SENSITIVE TARGET

THE PICTURE REPRODUCED HERE
SHOWS THE POTENTIAL OF THE
SYSTEM FOR EXPERIMENTS
INVOLVING THE PRODUCTION OF
GAMMA RAYS

After a long period of development, last week saw the successful operation of the track Sensitive Target facility in the Laboratory's 1.5m Cryogenic Bubble Chamber. This facility combines the advantages of the hydrogen bubble chamber with those of the heavy liquid chamber. Beam particle interactions occur in a region of pure hydrogen so that the advantages of interaction with a free proton and simple production kinematics are preserved. The hydrogen is contained between plexiglas walls within the main chamber which is filled with a heavy liquid mixture of neon and hydrogen. This heavy liquid is efficient for the detection of gamma rays arising from the decay of π^0 , η^0 and Σ^0 particles produced in the target.

With this success, the Rutherford Laboratory becomes the first High Energy Physics Laboratory in the world to make this powerful new technique available to Bubble Chamber Physicists.



The beam used in this experiment is of 4 GeV/c π^+ mesons and in the interaction shown 4 charged particles ($p\pi^+\pi^+\pi^-$) and two uncharged particles (π^0 mesons) are produced. Each π^0 meson decays immediately to 2 γ rays each of which is converted in the heavy mixture to an electron-positron pair. The gap in the charged particle tracks close to the interaction vertex occur when they pass through the plexiglas walls of the target.

The idea of using a simultaneously sensitive hydrogen target inside a bubble chamber filled with a mixture of neon and hydrogen was suggested by Dr H Leutz and preliminary tests at DESY in 1967 showed the possibility of this scheme. In collaboration with Dr Leutz and his team at CERN, members of the Experimental Facilities Group in Nimrod Division and designers from Engineering Division made modifications to the 1.5m bubble chamber that would allow this new technique to be implemented at the Rutherford Laboratory.

Technical runs at the end of 1970 were undertaken to solve the problems of filling the chamber with homogeneous Neon/Hydrogen mixtures. Great care is needed to successfully operate this potentially unstable mixture but satisfactory operation was achieved.

Continued on Page 4

INTERNAL EVENTS

NIMROD USERS MEETING
Monday 6 December
14.15
Lecture Theatre

- 1 Report on Latest Selection Panel Meeting
- 2 Long Term Schedule
- 3 A New Nimrod Injector

G Manning
T G Walker
D A Gray

SRC INDUCTION COURSES
Tuesday-Friday 7-10 December
Lecture Theatre

During these four days two SRC Induction Courses will be run in the Lecture Theatre. Some changes in the Record Society concert and Film Shows have had to be made - see details under appropriate heading.

HEP DISCUSSION GROUP
Wednesday 8 December
11.00
Conference Room Building R1

Inclusive Reactions in the Veneziano Model

Dr P Hoyer/Oxford

FILM SHOW
Wednesday 8 December
12.50
Thursday 9 December
12.40
Lecture Theatre

Aurum - The Element Au, a 29 minute colour film

Gold has always been recognised and prized as unique. Magnificent examples of gold-smithing from the world over trace this constant acceptance of the metal by successive civilisations as the ultimate adornment and an irreplaceable basis for trade and exchange. This is the first comprehensive and up-to-date report on a most controversial commodity.

TRADE PRESENTATION
Thursday 9 December
10.00 - 16.00
Building R25 Car Park

The I.T.T. Components Group caravan will present their new MQ and existing range of Modular Power Supply Units and a selection of Power Electronic Components including Rectifiers, Relays, Switches, Counters, Motors, Blowers, Speakers, Wound Components and Vacuum Components.

NIMROD LECTURE SERIES
Thursday 9 December
11.30
Conference Room Building R1

Electromagnetic and Weak Interaction Symmetry Breaking

Prof L Radicati/Pisa and Oxford

* * * * *

EDITORIAL

Communication - very much the 'in' word today, conjures up such link words as TV, radio, telephones, newspapers, conferences, lectures, reports, memos, etc etc. and of course bulletins. And yet effective communication is still a growing problem especially in large concerns, be they laboratories or factories. We are fortunate at the Rutherford Laboratory in that communication is at least equal to and often a good deal better than in many places. However it is still far from perfect and in an effort to improve matters this new and enlarged bulletin is being introduced. It is twice the size of its predecessor but with the improved layout and presentation the actual increase in copy area is only 50%.

Having provided the extra space the next problem is to fill it. To this end a new system of group representatives has been set up which should improve the position but only if these representatives are supplied with information by members of their group. It will also provide the Editor, as Laboratory correspondent for the CERN Courier and the SRC Journal, Quest, with the necessary close contact with all aspects of the Laboratory's work and activities.

The new bulletin will as before still carry its information under separate headings although the General News heading has been dropped for obvious reasons. A major change is in the deadlines for receiving information. For general and social news the deadline will be 1600 hours on Tuesdays and for events and schedules 1200 hours on Wednesdays. This does not necessarily mean that late items will not be included if urgent but advance warning that an item is coming should, if at all possible, be given. Production problems with this new format necessitates this change which should in practice make little difference to contributions. Too often the information is available but not sent in until the last minute. These deadlines will be given each week on page 3 and outside contributors are in particular asked to note the correct address.

Finally, the success or failure of the new bulletin depends entirely on the contributors. It would indeed be almost a pleasure for the Editor to apologise for not including certain items due to lack of space, a situation that has occurred all too infrequently.

So, dear readers - communicate!

EXTERNAL EVENTS

THEORETICAL PHYSICS SEMINAR

Monday 6 December
16.15
Queen Mary College London

Generalisations of the Formalism of Quantum Mechanics, with Applications to Disordered Systems

Prof S F Edwards/Manchester

PHYSICS & GEOPHYSICS COLLOQUIUM

Monday 6 December
17.00
University of Bristol

Advanced Materials for Nuclear Reactors, Boats and Radomes

Dr K H G Ashbee/University of Bristol

BRITISH COMPUTER SOCIETY - READING BRANCH MEETING

Tuesday 7 December
20.00
University of Reading

Why PL/I? - its origins, aims, definition, growth and acceptance etc.

Mr M P Saward/PL/I Manager, IBM Hursley

DEPARTMENT OF PHYSICS LECTURE

Wednesday 8 December
14.30
University of Reading

Jahn-Teller Effects in Paramagnetic Resonance Studies of Cu^{2+} and other 2E ions. Third and final lecture in this series.

Dr F S Ham/General Electric Laboratory USA

THEORETICAL PHYSICS SEMINAR

Wednesday 8 December
14.30
University of Manchester

Electronic Structure of Solids Related to the Local Atomic Environment

Dr V Heine/Cambridge

EVENT AT AERE

THEORETICAL PHYSICS SEMINAR

Tuesday 7 December
14.00
Conference Room Building 8.9

Anharmonicity Contribution to Dislocation Drag

Dr A D Brailsford/AERE Harwell

STOP PRESS, MISSING EQUIPMENT

The following items of equipment have been reported missing:-

0-1000 amp, 0-4 volt Variac Transformer Unit - borrowed from the R18 Electrical Workshop. Will present user please contact E T Gourley Building R18, Ext 573.

Rack Mounted Tektronix Storage Oscilloscope, Type 564, Ser No 568. This unit is missing from Lab 4, Building R1 and anyone with information on its present whereabouts is asked to contact T A Broome Room 1.8, Building R1 Ext 6263.

RUTHERFORD LABORATORY BULLETIN

Published by the Scientific Administration Group

Editor: H F NORRIS

Deadline
for
Insertions

GENERAL & SOCIAL NEWS
Tuesday 1600

INTERNAL & EXTERNAL EVENTS
Wednesday 1200

Room 42 Building R20
Rutherford Laboratory
Chilton Didcot Berks
Abingdon 1900 Ext 484

The present target, in which to date 60,000 pictures have been taken, is a composite structure. Two windows of 6mm thick plexiglas sheet are sealed to a stainless steel frame. Because of the large difference in thermal contraction between plexiglas and stainless steel the seal is only 'made' at the operating temperature of 290K by inflating flexible tubes with liquid hydrogen at 1000 psi to push the plexiglas sheets against indium gaskets in the frame.

Pressure variations in the chamber are transmitted to the hydrogen in the target through flexing of the plexiglas walls. By choosing suitable operating condition, good quality tracks are obtained in the liquid hydrogen within the target and the neon/hydrogen mixture in the bubble chamber.

The present target has a volume of 25 litres and the bubble chamber contains 480 litres of Neon/Hydrogen mixture at a concentration of 45 molecular % Neon. This mixture has a density of 0.36 gms/cc and a radiation length of 73 cms. By the appropriate choice of Neon concentration the radiation in the mixture can be varied between 30 cms (90 mole % Neon) to that of pure hydrogen.

VISITORS

Thirty members of the Leicester Physical Society will visit the Laboratory on Saturday 4 December.

Students attending two SRC Central Induction Courses which are being held at the Rutherford Laboratory will tour the Establishment on Tuesday and Thursday 7 and 9 December.

MYSTERIOUS METALLURGICAL MISSIVE

A letter has been received from an Italian engineer, V G Coppola, on the subject of fatigue strength of steel. He refers to an earlier letter dated 9 November. Anyone possessing or having knowledge of this earlier letter is asked to contact A P Banford Building R20 Ext 241.

UNDELIVERED MAIL

A letter has been received addressed to Martin Symons c/o Rutherford Laboratory. Will he please contact the Editor.

MISSING EQUIPMENT

The following item of equipment has been reported missing from II 11 local control room:-

4 : 1 TV Zoom lens - Arigenieux Type L2.

Will anyone with information on the present whereabouts of this item please contact D R Perry Radiation Protection Group Building R20 Ext 597/6366.

FILM BADGE NOTICE

It is Period 13. Colour Strip - PURPLE for 8y films. Please note that all fast neutron packs are to be returned when NIMROD shuts down on 6 December.

OVERSEAS VISITS

Mr P Wilde, to Belgium 6 - 8 December to attend CAMAC Software Working Group meeting in Brussels.

Dr R J N Phillips to Orsay France 7 - 8 December where he will give a lecture and have discussions.

SOCIAL NEWS

CHESS TOURNAMENT 1971-72

This popular annual event, a 9 round Swiss Tournament, is now approaching the half way mark. After 4 rounds Bill Turner the defending champion is in the lead with 4 points, closely followed by Peter Hemmings and Peter Craske on 3½ points. Jim Padley, Keith Le-Page, Alan Gilby and Bill Glasgow are within striking distance with 3 points each.

There are 28 entries this year and the big question is can anyone stop Bill Turner from making it 5 championships in a row.

SIX-A-SIDE FOOTBALL

News Flash - The Nimrod six-a-side team have won the lunch time league, more details next week.

BADMINGTON

Good Luck to the Lab badminton team who are taking part in the Civil Service Championships on Saturday.

Team - Anne Bishop, Pam Coutland, Tom McMahon, Roger Wolfenden, Frank Gold and Peter Litchfield. (Captain).

RECORD SOCIETY

The next concert will be on Monday 6 December at 12.40 p.m. in the Lecture Theatre. Tchaikovsky - Symphony No 4 in F Minor, Constantin Silvestri conducting the Philharmonia Orchestra.

Music which is very compelling and above all music for those who enjoy rich and dramatic expression.

The Record Society concerts are open to everyone, the Society itself is only a small group of people who meet to choose the programmes and take turns in presenting the records played.

CHRISTIAN FELLOWSHIP

All welcome to the next meeting at 12.30 p.m. Friday 10 December R12 Conference Room.



Rutherford
Laboratory

13-20 December 1971
bulletin 44

R(12), NDT(60,3), ISW(3500), ANGLE(60), YINT(60), DUMMY(84),
(6,3), NACHT(48), XCEN(12), CHA(12), CHA(12), CHA(12), AR,
MMDN/CFID/MFX(20,3), MFY(20,3), NFDX(10,3), NFX(3), NFD(3), I,
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DY(100,2), JDX(4), JDY(4), IHS(4), IOV(2), IUN(2), IDE(2), IDE,
CF(16), IFS, NFS, FX, FY, JK, PIC, KPIC, NCOUNT, NBIN, M, V, XUN
AXN, CTA, CTB, MX, MY, JA, JB, JC, JD, JE, JF, XF(20,3), Y, Z, Z,
MMDN/CJACK/NSY(20,30), NMS(20), NDR(20), XA(160), YA
(20), BX(20), NST1(20), NST2(20), INER(20), NSX(20,30), AWT(60)

PROGRESS REPORT AND FUTURE DEVELOPMENTS ON THE NEW COMPUTER

With three full weeks of successful operation of the new computer completed it is with pleasure that we are able to give the following progress report on this period and future developments in the computing service.

The Rutherford Laboratory will extend its computing service to all authorised users of the 360/195 computer on 1 January 1972. Amongst the first of the new Users will be the Film Analysis Groups from Birmingham, Glasgow, Durham, Oxford and theoreticians from most of the University HEP Groups. Atlas users have not yet been identified but are likely to come mostly from Chemistry, Plasma-Physics and Astro-Physics.

The new computer took a mere fifteen days to install and passed its acceptance tests without incident on 15 November 1971. The normal work of the Laboratory was immediately transferred from the 360/75 to the 195 and indeed, as if to fully justify IBM's claim of upward compatibility of 360 systems, HPD went on to measure 1000 Bubble Chamber events that same night. During the past three weeks there has been no serious incident and it can now be stated with confidence that we have a very reliable machine to serve us.

It is rather too early yet to draw conclusions about usage but our impressions is that the 195 is on average about six times as fast as the 75. Based on this figure, it is salutary to note that during the week beginning 20 November, the Laboratory used three times as much CPU (Central Processing Unit) time (effective) as was used in a typical week on the 360/75.

A particular feature of the Rutherford Laboratory computing system is the heavy investment in on-line equipment. A new departure is the introduction of remote terminals at Oxford, Birmingham and the Institute of Computer Science, London. A link to the Atlas Laboratory will be introduced in January. These first links were authorised by the Advisory Committee to provide the Central Group with experience in this field. It will probably be about twelve months before this type of service is generally available.

FUNDAMENTAL PARTICLES - A SERIES OF LECTURES FOR NON-SPECIALISTS

During December, Dr P J Duke of the HEP Division, will be giving a series of six lectures on fundamental particles. These lectures are intended quite definitely for non-specialists in high energy physics, but the course will be directed towards those who already have some knowledge of physics. Concepts used in particle physics will be introduced, via a simple model of the hydrogen atom and these concepts will then be applied to fundamental particles. Mathematics will be kept to a minimum. A write up is being prepared to go with the course. The first lecture is at 9 am on Monday 13 December in the Lecture Theatre and the full programme is shown in the Internal Events section of this Bulletin.

FILM BADGE NOTICE

It is Period 13. Colour Strip - PURPLE for 8y films. Please note that all fast neutron packs should be returned as soon as possible.

VISITORS

Ten pupils and members of staff from the Harriet Costello School for girls, Basingstoke will visit the Laboratory on Tuesday 14 December.

EXTERNAL CONFERENCES

The Ninth European Cyclotron Progress Meeting will be held in the Institute for Nuclear Physics of Kernforschungsanlage Julich on 10 and 11 April 1972.

The European Organization for Nuclear Research (CERN) in collaboration with the International Centre for Theoretical Physics, Trieste will organise the 1972 CERN School of Physics which will be held at Grado, Italy from 15 - 31 May 1972. The school is intended for young experimental physicists and in addition to the basic lecture courses, lectures on special subjects will be given by Professors A M Baldin, M Gell-Mann, W Jentschke and Abdus Salam. Further information from Dr W O Lock, Personnel Division, CERN, CH-1211 Geneva 23 Switzerland.

OVERSEAS VISITS

Dr L C W Hobbs to Paris 13-14 December to attend discussions on HFBR.

INTERNAL EVENTS

LECTURES ON FUNDAMENTAL PARTICLES FOR NON-SPECIALISTS

Monday 13 December 09.00
Tuesday 14 December 09.00
Thursday 16 December 09.00
Friday 17 December 09.00
Lecture Theatre

A series of six lectures to be given by *Dr P J Duke*. See page 1 for full details.

Details of the final two lectures will be given in the next bulletin.

NIMROD LECTURE SERIES

Monday 13 December
11.00
Lecture Theatre

Recent Results on ΛB - Decay

Dr J Fetkovitch/RHEL

PROPOSAL LECTURE

Tuesday 14 December
11.00
Lecture Theatre

Proposal No 103 - A Proposal to Measure Polarisation in $\bar{p}p \rightarrow \pi^- \pi^+$ from 1.2 to 2.4 GeV/c.

Lecture to be given by *Prof D V Bugg, Queen Mary College*

HEP DISCUSSION GROUP

Wednesday 15 December
11.00
Conference Room Building R1

Hypercharge Exchange Reactions and Regge - Regge Cuts

A Irving/Durham

FILM SHOW

Wednesday 15 December
13.15
Thursday 16 December
12.40
Lecture Theatre

The Inca Road, a 35 minute colour film

An exciting and interesting film this week to end the first half of the 1971 - 72 film show season. The Los Caminos del Inca road race was completed over 8 days in September last year, and followed the rough routes originally built over the High Andes in Peru by the Incas. The 2700 Km race was run in five stages with three rest days to enable repairs to be made to both drivers and machines. Less than half of the starters finished, the winner being Henry Bradley, a local driver who had won the race twice previously. A tremendous film of interest in it's scenery content alone apart from the excitement and thrills of the race.

SEMINAR ON COMPUTING

Friday 17 December
11.00
Conference Room Building R12

TSO - A description will be given of the Time Sharing Option (TSO) of OS 360

A Mayhook/RHEL

NIMROD LECTURE SERIES

Monday 20 December
11.30
Lecture Theatre

Single and Two Particle Inclusive Reactions

Professor S Stone/University of Rochester

EXTERNAL EVENTS

THEORETICAL PHYSICS SEMINAR
Monday 13 December
16.15
Queen Mary College London

Deep Inelastic Scattering

Professor J C Polkinghorne/Cambridge

PHYSICS AND GEOPHYSICS
COLLOQUIUM
Monday 13 December
17.00
University of Bristol

Current Research in Cloud Physics

Dr P Goldsmith/Assistant Director, Meteorological Office, Bracknell

DARESBUARY LECTURE SERIES
Tuesday 14 December
14.30
Daresbury Nuclear Physics
Laboratory

The Daresbury Synchrotron Radiation Facility

I H Munro/Manchester University

THEORY DIVISION COLLOQUIUM
Wednesday 15 December
14.00
Culham Laboratory Abingdon

Electrons in Disordered Systems

T Lukes/Cardiff

EVENT AT AERE

THEORETICAL PHYSICS SEMINAR
Tuesday 14 December
14.00
Conference Room Building 8.9

Compound States in Atoms and Molecules

Professor P G Burke/Queen's University Belfast

STOP PRESS

BULLETIN NOTICE

The next issue of the Bulletin will cover two weeks (20 December - 3 January). Copy for this issue should be sent to the Editor not later than 16.00 hours on Tuesday 21 December for General and Social news and not later than mid-day Wednesday 22 December for Events.

CHRISTIAN FELLOWSHIP - CAROL SERVICE

Correction to time shown on page 4 - the carol service will start at 12.45 p.m.

RUTHERFORD LABORATORY BULLETIN

Published by the Scientific Administration Group

Editor: H F NORRIS

Deadline
for
Insertions

GENERAL & SOCIAL NEWS

Tuesday 1600

INTERNAL & EXTERNAL EVENTS

Wednesday 1200

Room 42 Building R20
Rutherford Laboratory
Chilton Didcot Berks
Abingdon 1900 Ext 484

SOCIAL NEWS

SUCCESSFUL SUPPER DANCE

The Supper Dance held on Friday 3 December proved a great success. Billie Collins and her band provided the music for the 374 people attending.

After the dance a ladies bracelet was found. Will the owner please contact John Rice or Peter Craske, Building R2 Ext 232.

RECORD SOCIETY

Tuesday 14 December at 12.40 p.m. Lecture Theatre

"The Best of Ella" and "Such Sweet Thunder"

This week the accent is on jazz with selections from recordings made by two of the most famous names in jazz, Ella Fitzgerald and Duke Ellington. Ella Fitzgerald born in 1918, has become, in her own lifetime, an international legend. She has a quality in her voice which is hard to describe, a pitch which is almost unique and a musical feeling and ingenuity which is way above most other singers. Amongst the numbers she sings on this record are such classics as Basin Street Blues, For Sentimental Reasons and Lady be Good.

The Second great performer we feature is Duke Ellington with his Orchestra. Again it is extremely difficult to do justice to this legendary figure, without resource to superlatives. Not only is he a superb pianist, leader, and arranger but he ranks very high indeed as a composer. So if your taste is jazz, come along and listen to two of the world's greats.

ABINGDON CHRISTMAS FESTIVAL

Bring your family to the Market Place at 6.45 p.m. on Thursday 16 December to see the whole Christmas Story enacted by pupils of Fitzharry's School, and to join in your favourite carols. The singing will be led by the Abingdon Borough Band. If wet - in the Abbey Hall.

CHRISTIAN FELLOWSHIP

Friday 17 December. All welcome to a lunch-time meeting in the R12 Conference Room at 12.45 p.m.

The Rutherford Laboratory carol service will be held in the Lecture Theatre at 12.30 p.m. on Monday 20 December. The Rev. E Atkins, vicar of Harwell parish church will lead and all are most welcome to attend.

RECREATIONAL SOCIETY NEWS

The Rutherford Laboratory Chess Team have a match at Didcot on Thursday 16 December.

Badminton - we understand that the Laboratory did very well reaching the quarter finals where they were beaten by a Post Office Team which had six county players one of whom is thought to be an ex English Champion.

More news next week - the new dead line permitting!



Rutherford
Laboratory

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MMON/CJACK/NSY(20,30), NMS(20), NDR(20), NSI(20), XA(16), YA
(20), BX(20), NST1(20), NST2(20), INER(20), NSX(20,30), AWI(60)

20 December - 3 January 1972

bulletin

DIRECTOR'S CHRISTMAS MESSAGE

There have been many notable developments in the Laboratory this year.

If I have to select a few highlights, I must mention the deep involvement at CERN, progress towards the development of pulsed superconducting magnets, the successful operation of the track sensitive target in the hydrogen bubble chamber, the commissioning of the powerful IBM 360/195 computer and the creation of the Neutron Beam Research Unit.

May I take this annual opportunity to thank all of you in the Laboratory most sincerely for your endeavours and to wish you and your families a very happy Christmas and a prosperous and successful 1972.

* * * * *

FLEXIBLE COMPUTER CONTROL SYSTEM NOW OPERATING ON K9 BEAM

It is very much the fashion in the business world to blame 'the computer' for all errors, human or otherwise, that occur. While this is not entirely fair there is no doubt that until recently programming for these machines tended to be rigid and inflexible. The novel features of the new computer control system recently connected to the K9 beam line lies in the flexibility and speed with which programs can be written, corrected, and modified using an easily understood language. The system was used operationally for the first time in the recent and very successful Hydrogen Bubble Chamber run (see report in the Bulletin, No 43 6 December).

The K9 beam line is a multi-energy/multi-particle separated beam that supplies particles to the 1.5 metre Hydrogen Bubble Chamber. It contains 24 magnets, 2 electrostatic separators and 6 collimators, together with several scalars and other diagnostic equipment. A PDP-8 computer with 12k of core store, a 32k disk, and a magnetic tape unit is interfaced to the beam line largely through a 2-crate CAMAC system.

The computer system monitors all the equipment and can control separately, sequentially, or severally most of the adjustable beam elements. For example all six of the collimators can be driven simultaneously. Another task which the computer is frequently called upon to do is to set the current in a magnet or the position of a collimator to a series of specified values, accumulate data from the beam line for each value, produce a graph of the results and calculate the optimum. The computer then completes the task by automatically adjusting the current or position to its optimum value.

This flexibility is achieved by the use of a high level language based on the use of an interpreter. With most high level computer languages, for example FORTRAN, the programme has to be put through a special programme called a 'compiler', which translates the high level language that is easy for human beings to use into the machine language that the computer uses. With an interpreter however, the programme is only translated into machine code at the last moment, all storage of programmes being in their original high level form. This means that the programmer can sit down at the computer keyboard, write a programme directly into the computer, try it in parts whilst so doing, and make modification and corrections as he proceeds. Thus he can have quite a complicated programme, written, debugged and operating in a very short time indeed.

The programming language RTI-70 is a modification of FOCAL* which allows programmes to be written using disk-resident sub-programmes also written in RTI-70 or in assembly language. A suite of widely applicable sub-programmes is rapidly being built up which may be used in any sequence to do a variety of tasks. The flexibility of the system is thereby increased still further, a point of great importance for a beam such as K9 which has itself to be versatile in the provision of a wide range of particle types, momenta and intensities to fulfill the requirements of the bubble chamber physicists.

An idea of the speed with which programmes may be written is exemplified by the time taken to write a programme to perform a variety of tasks among which were:-

- 1) To give warning if any beam line element was out of tolerance or off.
- 2) To give warning if the number of particles entering the bubble chamber was outside prescribed limits.

*FOCAL is an on-line, conversational, interpretive language for the PDP-8 computer.
(D E C)

Continued on page 4

INTERNAL EVENTS

NIMROD LECTURE SERIES

Monday 20 December
11.30
Conference Room, Building R1

Single and Two Particle Inclusive Reactions

Professor S Stone/University of Rochester

HEP DISCUSSION GROUP

Wednesday 22 December
11.00
Conference Room, Building R1

Wire Resonance Dual Models

M Vaughn/RHEL

INFORMAL THEORETICAL PHYSICS MEETING

Wednesday 5 January

14.00 - 15.30

16.00 - 17.40

Thursday 6 January

9.45 - 11.15

11.45 - 13.15

14.15 - 15.45

16.15 - 17.45

Friday 7 January

9.45 - 11.15

11.45 - 13.15

14.15 - 15.45

16.15 - 17.45

The programme is as follows:-

Non-Polynomial Lagrangians, Gravity Theory & Particle Physics - A Salam/Imp Coll
Light Cone Physics - Y Frishman/Weizmann Institute

Dual Resonance Models - S Mandelstam/Imperial College
Statistical Bootstrap Model of Hadrons - S Frantschi/CERN
Recent Results at Very High Energies (CERN ISR & Serpukhov) - A N Diddens/CERN
High Energy Amplitude Analysis - R P Worden /RHEL

Electro magnetic Interactions outside the Scaling Region - G Shaw/DNPL
Deep Inelastic Scattering - J C Polkinghorne/Cambridge
Aspects of Multiparticle Production - H Satz/Bielefeld Germany
Regge Phenomenology of Inclusive Reactions - H M Chan/RHEL

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SUCCESSFUL TEST OF INDIRECTLY COOLED QUADRUPOLE MAGNET

We reported in Bulletin No 41/70 dated 16 November 1970 on the successful series of tests made of a superconducting quadrupole coil assembly. Considerable progress has been made in this field during the past year and we are now able to report that last week a new superconducting quadrupole system was successfully tested.

The essential new feature of this latest test is that the magnet is mounted horizontally in a vacuum and cooled indirectly, the cold helium liquid being some five feet remote from the magnet. The connecting system is a closed circuit capable of circulating helium at up to 14 atmospheres pressure and 25 grams per second flow. This enables the magnet to be cooled from room temperature with high density helium in about 15 hours and then maintained below 5°K with low density or two phase helium. The magnet windings were cooled to 4.4°K and the magnet quenched five times. The windings recovered their low temperature in about ten minutes each time. The highest current reached was 1190 amps, close to the expected critical current at 4.4°K.

The magnet is a d.c. quadrupole of the type required for focusing particle beams. The coils were wound from cabled filamentary conductors and impregnated with filled epoxy resin employing techniques developed in the superconducting applications research programme. The magnet had previously been tested at 4.2°K by immersion in liquid helium and allowing for the higher temperature the performance is identical under indirectly cooled conditions. Very little training was observed and the maximum field reached at 4.4°K was 34 kilogauss.

The satisfactory operation of the cooling system provides another method of cooling d.c. superconducting magnets. The cooling system was designed by the Department of Engineering Science under the supervision of Bryan Colyer. Vic Zahra and Richard Bailey schemed the major components and the latter with Graham Homer built and developed the rig to its present operational state in Lab 2. The main components were made in the Rutherford Laboratory workshops. This is therefore a rewarding culmination of many people's work.

FOUND

A ladies wrist watch has been found between the Bus Park and the Rutherford Laboratory. The owner should contact D Williams Personnel Group R20, Ext 495.

CENTRAL COMPUTER CHRISTMAS ARRANGEMENTS

Job reception will close at 12.00 hours on Friday 24 December, after which no further jobs will be accepted for processing before Christmas.

The computer will be closed down from the evening of 24 December until Friday morning 31 December as it is planned to commission the Blocked Multiplexor Channel and Fixed Head File on Wednesday and Thursday 29 and 30 December.

EXTERNAL EVENTS

DARESBUURY LECTURE SERIES
Tuesday 21 December
14.30
Daresbury Laboratory

The European 300 GeV Accelerator
E J N Wilson/CERN II

SOCIAL NEWS

CHRISTIAN FELLOWSHIP

There is no meeting on Friday 24 December. The next meeting is on Friday 31 December at 12.30 p.m. in the R12 Conference Room. All are welcome to attend. Dont forget the Carol Service on Monday 20 December 12.45 p.m. Lecture Theatre.

RUTHERFORD LABORATORY CHRISTMAS FISHING TOURNAMENT

The tournament was held at Abingdon on Saturday 11 December and assisted by good conditions proved to be very enjoyable. Len Willson (R9) and Dick Gregory (Restaurant) were joint first, Mike Greenwood (R9) came second, Tony Jeffries (R1) third and Les Proctor (R9) and Peter Craske (R2) were joint fourth.

BEST WISHES TO AND FROM HOSPITAL

Bert Aldred who has been in hospital since early December wishes to thank all his friends and colleagues for the many messages and cards he has received. We in turn wish Bert a speedy recovery and best wishes for Christmas.

* * * * *

BULLETIN NOTICE

This issue covers two weeks. Copy for the next issue dated 3 January 1972 should be sent to the Editor Room 42, R20 not later than 12 noon on Wednesday 22 Dec. Stop press items only to F Harden Ext 6114/484 by 10 a.m. on Thursday 30 December. These dates and times are necessary as pages 1 and 4 will be written typed and ready for printing before Christmas.

NIMROD WINTER SHUTDOWN

It was hoped to include details of the programme of work being carried out on Nimrod during its winter shut down period. This is being held over for a later issue.

END OF THE YEAR MESSAGE FROM THE EDITOR

This is the last Bulletin for the year 1971. It is also the third issue in the new and enlarged format. The increasing flow of information is evident by the contents of this issue. This is most encouraging, but as I wrote in the first issue, the success or failure of this enlarged Bulletin does depend to a very large extent on the contributors. I would like to express my thanks for the many favourable comments on the new format and for the constructive criticisms, and, of course, the not so constructive. The latter although small in number, were to be expected as change is often unpopular. Plans are being made to extend and improve coverage of the various activities within the Laboratory. It is also hoped to report on the Laboratory's activities at CERN.

It is my privilege and pleasure at this time of year to thank all those who have assisted in the production of the Bulletin in 1971. In particular thanks are due to the Typists, especially during the past few weeks; to Gordon and Bill of the Office Services who have again coped with my erratic arrival times and yet as far as I can recall, have still managed to print on time, and finally to the Post Ladies and Messengers who deliver the copies to your 'in' trays.

A Happy Christmas and a Prosperous New Year to all our readers.

**STOP PRESS
RECORD SOCIETY**

*Tuesday, 21 December, 12.40 p.m. Lecture Theatre
Christmas Carols from Guildford Cathedral.*

RUTHERFORD LABORATORY BULLETIN

Published by the Scientific Administration Group

Editor: H F NORRIS

Deadline
for
Insertions

GENERAL & SOCIAL NEWS

INTERNAL & EXTERNAL EVENTS

Room 42 Building R20
Rutherford Laboratory
Chilton Didcot Berks
Abingdon 1900 Ext 484

Tuesday 1600

Wednesday 1200

pmr

This programme was conceived, written, debugged, and ready for use in under three hours, meeting an urgent requirement during the first few critical hours of the expansion trials on the new target system in the 1.5m Hydrogen Bubble Chamber.

A disadvantage of RTI-70 is of course that the programmes have to be translated by the computer into its own language every time they are run, which by normal standards is slow and inefficient. However as the hardware being controlled is relatively slow to respond anyway, this has so far proved to be no handicap.

BUS DEPARTURES, CHRISTMAS EVE

There will be a combined departure and buses will leave at 15.10 hours on Friday 25 December. Details of departure bays are shown on Notice Boards in the Laboratory. Separate transport for Shift Workers will not run at 14.25 hours. Shift Workers should travel on the 15.10 hours departure.

CHRISTMAS EVE - LAST MAIL COLLECTION

The last delivery of Rutherford and Atlas mail to the Post Office will leave the Post Room, Atlas Laboratory at 11.00 hours on Friday 24 December. Mail reaching the Post Room after this time will not be taken to the Post Office until Wednesday 29 December 1971.

LOST

A blue duffle bag was lost on the ground floor of Building R1 on Friday 10 December. Will the finder please return it to Mrs C E Smith Room 2.50 in Building R1.

MISSING EQUIPMENT

The following item of equipment has been reported missing from Building R34:-

$\frac{3}{4}$ " Electric Drill, Serial Number 15952

Anyone with information on the present whereabouts of this item is asked to contact Mrs T Batchellier Building R34 Ext 297.

Tektronix Dual Trace Oscilloscope Plug-in Unit Type IAI - Serial Number 103281

This item is missing from the K12A Local Control Room. Anyone with information on the present whereabouts of this item is asked to contact M J Hotchkiss Bldg R1 Ext 6238.

FILM BADGE NOTICE

It is Period 13. Colour Strip - PURPLE for 8y films. Next film change, Wednesday 29 December. For those people on leave that week, please return your old films before Christmas.

SUGGESTION AWARDS SCHEME

At the meeting of the Suggestion Awards Committee on 8 December 1971 thirty-three suggestions were considered: the following awards were made:-

H Sangster	Nimrod	R45	£35	R Blackford	Engineering	R12	£5
R E Johnson	Engineering	R48	£7.50	P M Titterton	Nimrod	R3	£2.50
H Webb	Engineering	R9	£5	M B Davies	Nimrod	R3	£2.50
G Curry	Engineering	R9	£5	A Hickman	Nimrod	R2	£30
E Rogers	Nimrod	R2	£20 + £10	R Sargeant	H E P	R36	£2
C Worthing	Admin	R56	£3 + £2	D Wood	Nimrod	R2	£32.50
D E Targett	Engineering	R9	£2	C Grindrod	Nimrod	R2	£32.50
W G Black	Nimrod	R9	£12.50				

LETTER OF THANKS

We have received a letter from Mrs Patricia S Crews who, until she left the Laboratory on Friday 3 December worked in the R12 Admin Office. Pat wishes to thank everyone who contributed to her wonderful presents: the list is too long to publish in this cramped edition but sufficient to say that it did mention a carrycot transporter. Best wishes Pat for Christmas and 1972!

OVERSEAS VISITS

Dr C J S Damerell to CERN 19 - 23 December to work on S91 Extension (Proposal No 100)
Dr G Manning to CERN 27 - 30 December to work with ISR Experiment.

More news and social events on pages 2 and 3