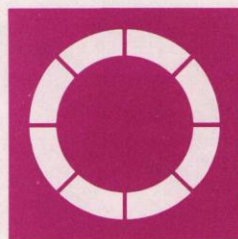


No. 9/67
6 March 67



Rutherford Laboratory

Bulletin

General News

HELIUM BUBBLE CHAMBER. The following announcement has been sent to the S.R.C. Press Office for release to the National and Local Press:-

The commissioning of the largest liquid helium Bubble Chamber in the world for use with the Science Research Council's 7 GeV particle accelerator Nimrod has just been successfully completed at the Council's Rutherford High Energy Laboratory at Chilton.

Physicists investigating elementary particle interactions make use of bubble chambers as one of the tools in their research. The liquid in a bubble chamber is used both as a means of making visible the paths of the particles and also as the source of target nuclei for the interactions being investigated. The Rutherford High Energy Laboratory has already in commission a liquid hydrogen Bubble Chamber for investigating the simplest interactions, those involving only one or two target nucleons and also a heavy liquid (freon or propane) Bubble Chamber for more complex interactions produced in nuclei consisting of many nucleons. In some cases it is impossible to identify the mode of interaction of high energy particles when they occur in a dense liquid and a simpler target nucleus is required to unravel the results of an experiment.

A helium nucleus consists of only four nucleons in a very symmetrical arrangement thus in a helium Bubble Chamber some nuclear events can be uniquely identified which cannot be identified in other chambers and some interactions can take place which are not possible with the simpler nucleus of a hydrogen atom.

The paths of high energy particles passing through the liquid in a bubble chamber are made visible by the bubbles of vapour which form on their tracks when the liquid is superheated by a sudden expansion. The events are recorded by taking stereoscopic photographs (in the helium Bubble Chamber there are four cameras) and the events reconstructed from measurements on the photographs.

By placing the chamber in a strong magnetic field the path of a particle is bent into an arc of a circle and the momentum of the particle can be determined from the radius of the arc.

The proposal to build a helium Bubble Chamber was initiated by the Oxford University Nuclear Physics Laboratory and for the last six years a joint team from Oxford and the Rutherford Laboratory have been working on it's design, construction and testing. The chamber contains 200 litres of liquid helium and as helium does not become a liquid until its temperature is less than -268°C many novel refrigeration and mechanical problems had to be solved during it's design. In addition the requirement to operate in a uniform magnetic field of 22 kilogauss imposed further difficulties.

Plans for the first series of experiments with this new equipment which will be available for British Physicists working at the Rutherford Laboratory are now well advanced.

NEW HALL THREE CEREMONY. Despite gale force winds, mud and flying debris, the ceremony was carried out on Tuesday morning last by the Director, Dr. T.G. Pickavance, driving an excavator, closely pursued by a number of press photographers. It is hoped to have photographs of the ceremony on display in the entrance hall of Bldg R.1 shortly.

NEWS FROM DARESBURY. Work has started on the extension to the Experimental Hall which will provide a further 16,000 sq. ft. of floor area for experiments. The extension will be available early in 1968.

Following the success on 2 December, when an accelerated beam was obtained from NINA, much effort has been directed towards checking that NINA conforms to theory. A major activity of the Applied Physics Group has been concerned with the beam extraction system which it is hoped will be installed in the ring in the next few weeks.

Preparations for experiments by the resident group and the University teams are at an advanced stage. Initially University teams from Liverpool, Manchester and Glasgow will be running experiments and later, a collaboration between the Universities of Manchester and Lancaster (the Manchester group) will join them.

BURSARY AND SANDWICH COURSE AWARDS 1967. A limited number of awards are available to members of staff who wish to undertake full-time or sandwich courses at Universities or Colleges of Advanced Technology. Details may be obtained from the Personnel Group, and anyone who would like to be considered for such an award should contact A.G. Taylor, Bldg R.20 Ext 495.

FINANCIAL YEAR END. All staff concerned with receipt vouchers, invoices, etc., are asked to action and return them as quickly as possible to enable payment to be made in the current financial year.

RADIATION PROTECTION NOTICE. Period 3 commenced 20 February. Colour strip - GREEN, for $\beta\gamma$ and fast neutron films. Please return all old films.

POSTPONED SEMINAR. The seminar by Dr. B.W. Allardye announced for Tuesday, 7 March at 2.30 p.m. in the Lecture Room of the Nuclear Physics Laboratory, 21 Banbury Rd, Oxford has been postponed until next term.

INTERNATIONAL SCHOOL OF PHYSICS 1967. The school will be held at Enrica (Trapani) Sicily from 1-14 July. The subject this year will be, "Advances in Particle Physics". Further information from H.F. Norris, R.20 Ext 484.

VISITORS. A party of 20 sixth form students from Langley Grammar School will visit the Laboratory on Saturday, 11 March.

EXTERNAL COURSE. The City University, St. John St. London E.C.1 is to hold a course of eight weekly lectures on "An Introduction to American Business Law" on Thursday evenings from 6.30 - 8.30 p.m. beginning 13 April. Further information from H.F. Norris, Bldg R.20 Ext 484.

OVERSEAS VISITS. Dr. G. Manning, to CERN, 6-7 March, to attend E.E.C. Meeting.

Mr. R.W. Wimblett and Mr. J.R.S. Stokoe, to CERN, Saclay and DESY 6-15 March, to investigate the latest techniques in the design and operation of Liquid Hydrogen Targets.

Dr. R.H. Thomas, to the U.S.A. 12 March for approx 1 month, to attend the "First International Symposium on Biological Effects of Particle-Accelerator-Produced Radiation" at Berkeley and for discussions on shielding experiments.

Machine Schedules

NIMROD Cycle 1 (28.2.67. - 21.3.67.)

Machine Physics: High Energy Physics (K^1 , π^+ , π^- and π^0)

Full details of Cycle 1 were given in Bulletin No. 8/67.

P.L.A.

Date

6-16 Mar.

Team

A.E.R.E.

Experiment

Proton Induced Reactions on Sn Isotopes

Internal Events

Mon, 6 Mar, 11.15 a.m.
Lecture Theatre

Nimrod Lecture
Series

Dr. R.E. Hill
(R.H.E.L.)

π^+p Elastic Scattering between 1 and 2.5 GeV/c: Phase-shift Analysis and the Argonne/Univ. of Chicago Polarised Target Experiments.

Mon, 13 Mar. 11.15 a.m.
Lecture Theatre

Nimrod Lecture
Series

Dr. H.J. Lubatti
(Orsay)

Coherent Production of Multi-Pion States from Nuclei at 16 GeV/c.

External Events

Mon, 6 Mar., 4.45 p.m.
Bristol Univ.

Colloq.

Dr. W.F. Nash
(Nottingham)

Charge Ratio of μ Mesons

Wed, 8 Mar., 7 p.m.
37 George St. Oxford

I.E.E. District
Meeting

Mr. H. Goddard
(Exeter Tech. Coll.)

Introduction to Digital Computers

Thurs, 9 Mar. 4.15 p.m.
Univ. of Birmingham

Mathematical Physics
Seminar

Dr. D.I. Olive
(Cambridge)

An S-Matrix Analysis of Physical Region Singularities

The following lectures etc., will be given at the I.E.E., Savoy Place, London during the current week:

Mon, 6 March, 5.30 p.m. : "U.H.F. Tunnel-Diode Amplifier", paper by M.K. McPhun
"Short-Hop Radio-Relay Systems Using Tunnel-Diode Repeaters", paper by Dr. D.L. Hedderly, J. Hooper and M.K. McPhun
Tues, 7 March, 5.30 p.m. : "Overall Station Control at Hunterston", paper by R.L. Carstairs and A.J. Spurgin
Thurs, 9 March, 5.30 p.m. : "The Synchronisation and Resynchronisation of Alternators", discussion opened by B.J. Cory supported by various other papers.
Fri, 10 March, 5.30 p.m. : "The Future Education of Electronic Engineers", discussion opened by Prof. G.D. Sims and B.H. Venning.
Fri, 10 March, 5.30 p.m. : "Broadband Transmission by Radio & Cable", lecture by R.W. White.

EVENT AT THE ATLAS LAB.

Tues, 7 Mar, 10.45 a.m.
Conf. Rm.

Talk

R.P. Allen
(Cambridge)

Statistics of Word Finding with Reference to Measuring Language Deficits.

EVENTS AT A.E.R.E.

Theoretical Physics Seminars during current week, in Conf. Rm. Bldg 8.9.

Mon, 6 March, 9.15 a.m. : "Optical Mixing Techniques and Ultra-High Speed Resolution Spectroscopy", by Prof. G. Benedek (M.I.T.)
Tues, 7 March, 2 p.m. : "Approximate Theory of Pair Correlation Functions in Classical Theory", by Dr. P. Hutchinson.
Fri, 10 March, 9.15 a.m. : "The Spectrum of Light Scattered from Gases: with Applications to the Initial Value Problem of the Boltzman Equation", by Prof. G. Benedek (M.I.T.).

Thurs, 9 Mar., 3.30 p.m.
Conf. Rm. H.8.

Nuclear Phys.
Div. Colloq

Dr. W. Stein
(Los Alamos)

Relative and Absolute Fission Cross-Section Measurements at Los Alamos.

Social News

RECORD SOCIETY. 12.30 p.m. Tuesday, 7 March, Lecture Theatre.

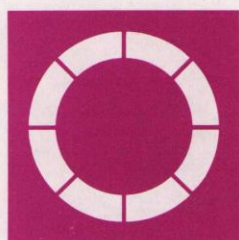
Records of "Les Swingles"

Date for your diary: 7 March - 1 April "Daily Mail Ideal Home Exhibition.

CHRISTIAN FELLOWSHIP. 12.30 - 1.00 p.m. Thurs. 9 March, R.25 Conf. Rm (1st floor). The Rev. Brian Jones of the Wantage Baptist Church will speak on "Jesus Christ's Teaching on Death and Immortality. All are welcome.

Rutherford Laboratory
3.3.67

H.F. Norris Ext 484.
Scientific Admin Group
Building R.20



General News

VISITORS Forty members of the Institution of Engineering Inspection will visit the Laboratory on Saturday afternoon, 18 March.

OVERSEAS VISITS. The Director and Dr. L.C.W. Hobbs will attend the Fifth Plenary Meeting of the European Committee for Future Accelerators (ECFA) at CERN on 20 March.

Dr. D.V. Bugg will attend the Conference on "Nucleon-Nucleon Interaction" at Gainesville, Florida, on 23-25 March.

P.L.A. NEWS During the shutdown, modifications were carried out on the P.L.A. r.f. system, increasing the beam pulse to 600 μ sec. at 25 cycles/sec., thus increasing the beam duty cycle from 1 per cent to $1\frac{1}{2}$ per cent. The 200 μ sec. beam pulse at 50 cycles/sec. is still available if required.

RADIATION PROTECTION NOTICE. Period 3 commenced 20 February. Colour strip - GREEN, for $\beta\gamma$ and fast neutron films. Please return old films. The next film badge change will be on 20 March.

LIBRARY NOTICE. Would anyone knowing the location of any copy of "Pulse Digital and Switching Waveforms" by J. Millman and H. Taub please contact the Library immediately.

FILM SHOW. See "Internal Events" for details of a Safety film to be shown this week.

Machine Schedules

NIMROD Cycle 1 (28.2.67. - 21.3.67.)

Machine Physics; High Energy Physics (K1, K4, K5, and K6)

Full details of Cycle 1 were given in Bulletin No. 8/67.

P.L.A.

Date	Team	Experiment
13-16 Mar.	A.E.R.E.	Proton Induced Reactions on Sn Isotopes.
17 Mar.	Maintenance	
18-23 Mar.	Manchester Univ.	Elastic Scattering of Protons on Li^6 and Li^7 .

Internal Events

Mon, 13 Mar. 11.15 a.m.	Nimrod Lecture Series	Dr. H.J. Lubatti (Orsay)	Coherent Production of Multi-Pion States from Nuclei at 16 GeV/c.
Wed, 15 Mar. 2 p.m.	P.L.A. Seminar	Dr. A. Zucker (ORNL and RHCL)	Some Experiments in Progress at ORIC.
Mon, 20 Mar. 11.15 a.m.	Nimrod Lecture Series	Prof. A.B. Clegg (Univ. of Lancaster)	S-Wave $\pi\pi$ Scattering

FILM SHOW. "Against the Tide". This is a Safety film of general interest. It is filmed in Technicolor, has a dramatic treatment and contains some fine action shots. It has been sponsored by the British Iron and Steel Federation and runs for 37 minutes. Performances will be given in the Lecture Theatre on Wed. 15 March (11.50 a.m.), Thurs. 16 March (12.30 p.m.) and Fri. 17 March (1.20 p.m.). A warm invitation is extended to all.

External Events

EXHIBITIONS AT EARLS COURT:

LABEX (Laboratory Apparatus and Materials), 13-17 Mar. (A few tickets are available)

MEDEA (Medical Engineering and Automation), 13-17 Mar.

Effluent and Water Treatment Exhibition, 14-17 Mar.

Mon, 13 Mar. 2 p.m.	High Energy Physics Seminar	Prof. L.M. Lederman (Columbia Univ.)	The Search for Heavy Particles (Maximons)
Burlington House, W.1			
Wed, 15 Mar. 2.30 p.m.	Particle Physics Seminar	Dr. R. Voss (DNPL)	General Review of the Status of Nina and its Experimental Programme
UCL, Gower St. WC1			
Wed, 15 Mar. 3 p.m.	Elementary Particle Physics Seminar	Dr. J.C. Polkinghorne	Schwinger Terms in the Johnson-Low Model
Silver St., Cambridge			
Thurs, 16 Mar. 4.15 p.m.	Math. Physics Dept. Seminar	Dr. C.W. Wong (Oxford Univ.)	A Perturbative Basis for the Nuclear Shell Model
Birmingham Univ.			
Thurs, 16 Mar. 6 p.m.	I. Mech.E. Discussion		Non-Linear Vibrations
1 Birdcage Walk, SW1			
Thurs, 16 Mar. 7.30 p.m.	IERE Lecture	Dr. E.A. Faulkner	The Design of Linear Amplifiers
J.J. Thomson Lab, Reading			
Fri, 17 Mar. 5.30 p.m.	IERE Lecture	Dr. R.L. Smith-Rose	Early Days in Radio Research
Savoy Place, WC2			

SYMPOSIUM A one-day Symposium on Low Temperature Devices will be held at the University of Southampton on Friday 17 March, commencing 10.30 a.m. Details are available from B.E. Kingdon.

EVENTS AT AERE

Thurs, 16 Mar. 2 p.m.	Joint Applied Maths. Group Seminar	Dr. A.L. Titter (Oxford Univ.)	A New Algorithm for the Triangularization of Matrices
Conf. Rm, Bldg 8.9.			
Thurs, 16 Mar. 3.30 p.m.	Nuclear Physics Div. Colloq.	Dr. A. Zucker (ORNL)	Elastic and Inelastic Scattering of 40 MeV Protons
Conf. Rm, Hangar 8			
Fri, 17 Mar. 9.15 a.m.	Theor. Physics Div. Lecture	Prof. G. Benedek (M.I.T.)	The Spectrum of Light Scattered from Gases
Conf. Rm, Bldg 8.9.			

(Postponed from Fri. 10 March)

Social News

RECORD SOCIETY 12.30 p.m. Tuesday 14 March, Lecture Theatre.

Tchaikovsky Ballet Music: "Sleeping Beauty" and "Swan Lake"

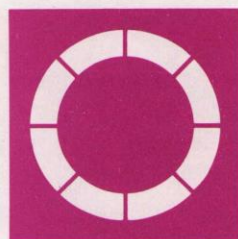
RECREATIONAL SOCIETY The Annual General Meeting will be held in the Lecture Theatre on Wednesday, 15 March at 12.40 p.m. promptly. Entry will be by Membership Card or completed Membership Application Form. Forms are being sent to all non-members. If you have not received one, please contact Mr. E.W. Clark in R.14 between 12.45 and 1.15 p.m. on Monday 13 or Tuesday 14 March.

CHRISTIAN FELLOWSHIP. 12.30 p.m. Thursday, 15 March, R.2 Conf. Rm. (Top floor): Bible Study on St. John's Gospel, Ch 16, v.8-22 will be led by John Hart of HEP-Cambridge Univ. All are welcome.

Rutherford Laboratory
10.3.67.

B.E. Kingdon
Scientific Admin.Group
Building R.20

No. 11/67
20 Mar 67



Rutherford Laboratory Bulletin

General News

VISITORS Mr. Airey Neave, M.P. for Abingdon, will be the guest of the Atlas Laboratory on Thursday, 30 March.

100 members of the British Computer Society's Study Group on Artificial Intelligence and Simulation of Behaviour will attend a one-day meeting in the Rutherford Laboratory Lecture Theatre on Wednesday, 22 March, under the auspices of the Atlas Laboratory.

25 members of the Imperial College Bubble Chamber Group will visit the Laboratory on Saturday afternoon, 1 April.

OVERSEAS VISITS Mr. R. S. Reed will visit CERN for discussions on 20 March.

Mr. R. G. Fowler and Mr. D. Mann will visit Emile Haefely and Co. Ltd., Basle, on 28 March - 1 April.

RADIATION PROTECTION NOTICE Period 4 commences on Monday, 20 March. Colour strip - RED for $\beta\gamma$ and fast neutron films. Users are requested to change their films promptly and to return all old films immediately.

BURSARY AND SANDWICH COURSE AWARDS 1967. A limited number of awards are available to members of staff who wish to undertake full-time or sandwich courses at Universities or Colleges of Advanced Technology. Details may be obtained from the Personnel Group, and anyone who would like to be considered for such an award should contact Mr. A. G. Taylor, Building R.20, Extension 495.

SCIENTIFIC ADMIN. NOTICE The present Bulletin covers a period of two weeks. Items for inclusion in Bulletin No. 12/67 for the week commencing Monday, 3 April should be received by Mr. H. F. Norris, R.20, not later than Wednesday mid-day, 29 March.

Machine Schedules

NIMROD Cycle 2 (21.3.67 - 11.4.67)

1. Machine Physios.
2. High Energy Physios.

Team	Beam	Experiment	
Birmingham/Glasgow/ Imperial College	K1	K ⁺ d interactions in the Saclay Bubble Chamber	Data
A.E.R.E./QMC/R.H.E.L.	π^+ 4	A study of Σ^0 decay	Setting up
Bristol	π^+ 5	π^+ -p differential cross-section measurements	Setting up
Westfield Coll./R.H.E.L.	π^+ 6	Measurement of the Σ^+ decay parameters	Setting up

P.L.A.

Date	Team	Experiment
20-23 Mar.	Manchester Univ.	Elastic Scattering of Protons on Li ⁶ and Li ⁷ .
24-27 Mar.	Oxford Univ.	(p,t) and (p,He ³) Studies.
28 Mar.	R.H.E.L. Nuclear Chemistry	Isomer Ratio Experiment.
29 Mar. - 1 Apr.	Birmingham Univ.	Cross-Section Measurements.

Internal Events

Mon, 20 Mar. 11.15 a.m. Lecture Theatre	Nimrod Lecture Series	Prof. A. B. Clegg (Univ. of Lancaster)	S-Wave $\pi\pi$ Scattering
Wed, 22 Mar. 11 a.m. Conf. Room, R.1	H.E.P. discussion Group	Dr. S. Y. Lo (R.H.E.L.)	Path Approximation in Strong Interactions at High Energy.
Mon, 3 Apr. 11.15 a.m. Lecture Theatre	Nimrod Lecture Series	Prof. F. Farley (R.M.C.S. Shrivernham and C.E.R.N.)	New Results on the Muon Anomalous Precession.

External Events

External Events			
Mon, 20 March, 2.30 p.m. Savoy Place, W.C.2.	IEE Electronics Division Discussion	Automated Cartography: Scientific Needs and Technical Possibilities. (Admission by ticket, obtainable from the Secretary, IEE).	
Mon, 20 March, 7.30 p.m. Coll. of Tech., Headington.	Oxford Productivity Committee Debate	Motion: "This House regrets the tendency to build obsolescence into an increasing range of products".	
Tues, 21 March, 11.30 a.m. Imperial Coll., London.	Seminar in Automatic Control	Dr. A. G. Dewey (Centre of Computing and Automation)	Realisation of Transfer Function Matrices - Part II.
Wed, 22 March, 5.30 p.m. Savoy Place, W.C.2.	IEE Electronics Division Lecture	Dr. R. Spence (Imperial Coll.) and Mr. P. J. Baxandall (RRE, Malvern)	The Theory of Oscillators.
Thurs, 30 March, 5.30 p.m. Savoy Place, W.C.2.	IEE Power Division Lecture	Mr. E. T. Norris (Consultant to Ferranti Ltd.)	Loading of Power Transformers.
EVENT AT A.E.R.E.			
Mon, 20 March, 3.30 p.m. Conf. Room, Bldg. 393/T	Metallurgy Div. Colloquium	Dr. D. Dew-Hughes (Univ. of Lancaster)	Dislocations, Microstructure and Supercon- ductivity.

Social News

RECORD SOCIETY 12.30 p.m., Tuesday 21 March, Lecture Theatre:

Guitar Concerto by Rodrigo

played by Narciso Yepes and the National Orchestra of Spain, conducted by Ataulfo Argenta.

Also records of Les Trios Paraguayos

This record of the Guitar Concerto, which proved so popular when it was played a year ago, is repeated by special request. The distinctive and evocative music of the Paraguayan harp and guitar ensemble is well known from their many television films. A programme guaranteed to please!

(Please note that there will be no Record Programme on Tuesday, 28 March).

CHRISTIAN FELLOWSHIP There will be no meeting on Thursday, 23 March.

Thursday, 30 March at 12.35 p.m. in the Lecture Theatre:-

"Songs of Christ's Passion" sung by Jimmy Darius. (All welcome)

Advance notice: Thursday, 6 April, 12.30 p.m. in the P.L.A. Conference Room, R.12 - Meeting for Fellowship and Prayer.

DATE FOR YOUR DIARY: 30 March-2 April, International Audio Festival and Fair, Russell Hotel, London.

Rutherford Laboratory
16th March, 1967.

B. E. Kingdon
Scientific Admin. Group
Building R.20