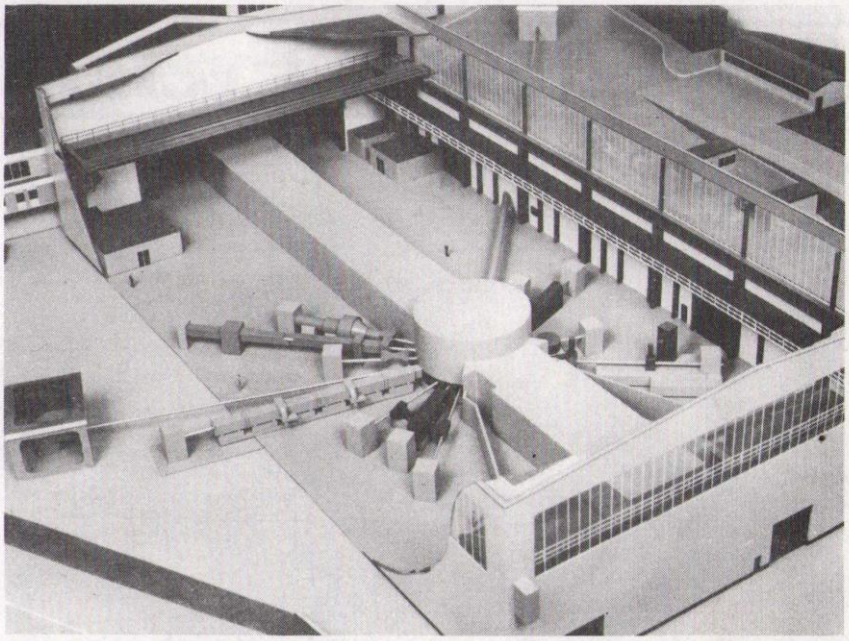
RUTHERFORD BULLETIN

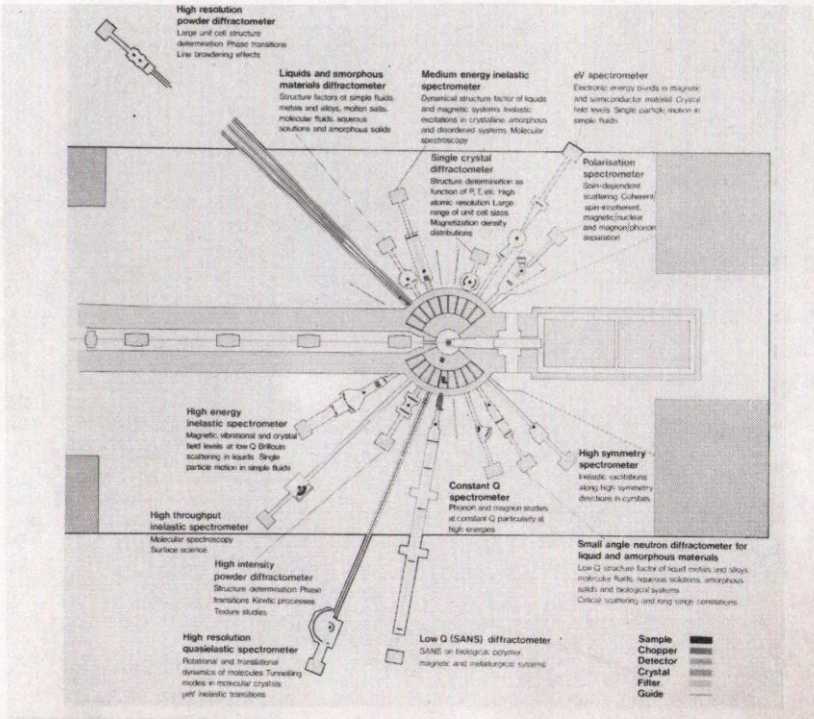
26 November 1979 No.22

First Seven for SNS

During October the Department of Education and Science approved the expenditure of £1.8M on the first batch of seven instruments for use on the Spallation Neutron Source (SNS). Although largely unheralded in the press, this event marks the culmination of an intense period of scientific and technical design work by members of the Neutron, Instrumentation and Technology Divisions in conjunction with various University groups. They are the first of the 10-12 'day-one' instruments which will be installed and commissioned for the start-up of the SNS and will enable research to be done in most areas of the scientific programme, though not fully meeting demand. Further generations, which will benefit from experience on the SNS and reflect shifts in scientific interest, will follow. Eventually the SNS will support 20-25 neutron scattering experiments.



Model of Hall 3, showing the layout of the SNS target station and neutron scattering instruments - and below, the key to it all!



Properties of Neutrons

The properties of slow neutrons mean that very different sorts of behaviour can be seen in the atoms and molecules making up different materials. Neutrons can give the position of atoms in solids and liquids; neutrons can see the motion of atoms, and neutrons can see magnetic properties at the atomic level. It is for these reasons that neutron scattering research covers such a wide range of science, including solid state physics, materials science, chemistry and biology.

Horses for Courses

To cover these different areas, the SNS instruments are each designed with particular tasks in mind. For example, the two *Powder Diffractometers* (together with a *Single Crystal Diffractometer*, to follow) will be used for finding the positions of atoms in solid materials to enable atomic structures to be determined. These range from the simplest crystalline salts to highly complex biological compounds.

A particular advantage in the latter case is that, unlike X-rays, neutrons do not damage the specimen. The high intensity of the SNS will enable a wider range of materials to be studied. The instruments take their names from the form of the sample: a crystalline powder in one case, a

(continued on p.3.)

INTERNAL Events

HEP SEMINARS
EAST WING CONF.RM4.R1 - 1100 hours

28 Nov: Prof L Castillejo/UCL
"A New Method of Finding Solutions to Classical Yang-Mills Equations in Minkovski Space"

NIMROD LECTURE SERIES
LECTURE THEATRE - 1400 hours

26 Nov: Dr S W Lovesey/RL
"The SNS Programme and its Scientific Interest"

RUTHERFORD LABORATORY LECTURE
LECTURE THEATRE - 1515hrs

13 Dec: Mr R J H Beverton, CBE, FRS.
"The Work of the Natural Environment Research Council".

EXTERNAL Events

ASTROPHYSICS SEMINARS
F5 CONF.RM.CULHAM - 1400 hours

28 Nov: Dr Philip Dufton/Queen's Belfast
"High-resolution Spectroscopy of Early-type Stars, and CNO Abundances"

12 Dec: Dr Duncan Bryant/Appleton
"Plasma Physics in the Magnetosphere: the Aurora and 'Firewheel'"

ELEM.PART.PHYS.SEMINARS
DAMTP - CAMBRIDGE - 1500 hours

23 Nov: R Kenway/Brown
"Strong Coupling Expansions in Field Theory"

30 Nov: M E Peskin/Saclay
"The Orientation of Dynamical Symmetry Breaking"

HEP SEMINARS
MANCHESTER - 1400 hours

27 Nov: Dr C Fisher/RL
"LEBC"

4 Dec: Dr G Thompson/QMC
"Diffractive Production of Resonances in the 3π Final State.
(ACCMOR Collaboration)"

ELEM.PART.PHYS.SEMINARS
NPD OXFORD - 1430 hours

29 Nov: Prof A Clegg/Lancaster
"Vector Mesons and Jets in the Hadronic Content of the Real Photon"

6 Dec: Dr M Bowler/Oxford
"Diffractive Production of 3π Resonances for Very High Incident Pion Momenta"

THEO. PHYS. SEMINARS
QMC - 1615hrs

3 Dec: Prof V Heine/Cambridge
"New Developments in the Magnetism of Iron".

10 Dec: Dr J S Dowker/Manchester
"Quantum Mechanics and Topology".

THEOR.PHYSICS SEMINARS
CLARENDON LAB - OXFORD - 1615 hours

29 Nov: Dr J M Irvine/Manchester
"Neutron Stars"

6 Dec: Prof F Calogero/QMC & Rome
"Spectral Transforms and Solitons"

LOW TEMP.PHYS.SEMINARS
SUSSEX - 1415 hours

4 Dec: P G Dawber/Sussex
"Some Theoretical Considerations in the Use of Cerium Magnesium Nitrate for Low Temperature Thermometry"

PART.PHYS.DIS.GP.MTGS
BIRMINGHAM - 1615 hours

30 Nov: Dr R Roberts/RL
"Confrontation of Deep Inelastic Data with QCD"

7 Dec: Dr W G Jones/Imperial
"Measurement of η^1 width and its Relevance to Quark Changes"

THEORY GROUP SEMINARS
DARESBURY LAB - 1400 hours

26 Nov: Dr A L Stewart/Queens, Belfast
"Applications of Perturbation Theory to Photoionisation"

3 Dec: Mme C Caroli/Paris VII
"Interference Effects in Auger Emission"

HEP SEMINARS
CAVENDISH LAB - CAMBRIDGE - 1500 hours

28 Nov: Dr J B Kinson/Birmingham
"Recent Results from the 8.25 GeV/c K^-p experiment (including the observation of a narrow Y* at 3170 MeV/c^2)"

ELEM.PART.PHYSICS
WESTFIELD COLL. - 1400 hours

29 Nov: D H Osborn/Cambridge
"Multi-Instanton Determinants"

PHYSICS COLLOQUIA
CLARENDON LAB - OXFORD - 1615 hours

30 Nov: Dr N J Stone/Oxford
"Nuclear Orientation in the 1980s: High Precision, Fast Cooling, and Short Half-lives"

7 Dec: Prof W Paul/Bonn
"Magnetic Bottles for Neutrons"

THEO.ELEM.PART.PHYS.SEMINARS
NPD OXFORD - 1430 hours

30 Nov: Dr R Kenway/Brown
"Strong-Coupling Expansions in Field Theory"

7 Dec: Dr M E Peskin/Saclay
"The Orientation of Dynamical Symmetry Breaking"

NPD COLLOQUIUM
AERE - 1515 hours

29 Nov: Prof R B Cundall/Salford
"**Explosives**" - lecture with demonstrations
(In Cockcroft Hall)

6 Dec: (H8) Dr J D Hughes/AERE
"Strong Carbon Fibres make the Strongest Composites"

THEO.PHYS.SEMINARS
T.P.D.CONF.RM - AERE - 1400 hours

27 Nov: Dr C Llewellyn-Smith/Oxford
"Unified Models of Strong, Weak and Electromagnetic Interactions"

4 Dec: Dr J Narayan/Oak Ridge
(Title not yet available)

SHEP SEMINARS
SOUTHAMPTON - 1430hrs

29 Nov: Dr M E Peskin/Harvard & Saclay
"The Orientation of Dynamical Symmetry Breaking".

30 Nov: Dr F L Lloyd/Imperial
"Evidence of Gluons from TASSO".

7 Dec: Dr G Shaw/Manchester
"Jets and Multiplicities in Two-dimensional QCD".

SNS Seven *(cont. from p.1.)*

single crystal in the other. The *High Resolution Powder Diffractometer* will be on the end of a 100 metre long neutron guide tube which will pass well outside Hall 3 on the south side.

The *Liquids and Amorphous Materials Diffractometer* is specially designed to study less-ordered forms of materials. In solutions of salts in water, for instance, water molecules may be firmly fixed around specific ions, but at greater distances from the ions there is much more random motion. Neutrons often provide the only method of studying these properties.

The *Small Angle Scattering Spectrometer* (this is the one which is going to use the ex-Nimrod separator tanks, *see Bulletin No 13)* is used for looking at large size - by this we mean tens or hundreds of Angstrom units - atomic structures. Examples would include, defects and imperfections in metallic alloys, the structure of plastics and the behaviour of biological materials.

Inelastic Measurements

Three of the instruments are for inelastic measurements. This means measuring the energy change of the neutron on scattering and indicates the motion of atoms and molecules in solids and liquids. *The Quasielastic Spectrometer* is capable of measuring small energy changes with high resolution, of the order of a millionth of an electron volt. This is done by measuring the incident neutron energy by time-of-flight and the scattered neutron energy by back reflection from a bank of silicon or graphite single crystals. It is used for determining the motion of atoms over very small distances, such as the hopping of a hydrogen atom from one site to another as it diffuses through a metal.

The *High Throughput Inelastic Spectrometer* works on a similar principle, except that the energy of the scattered neutrons is measured by passing them through a cooled beryllium block which acts as a broad-band filter, passing only very slow neutrons. This instrument will measure large energy changes at moderate resolution, but with high count rate thus allowing a high throughput of samples.

Chemical Spectroscopy

Finally, the *High Energy Inelastic Spectrometer* also measures large energy changes, this time with high resolution. The incident neutron energy is measured using a very fast mechanical chopper phased to the neutron bursts from SNS, the scattered energy being determined by time-of-flight. The chopper has a burst time of 1 microsecond and posed new design problems which have been solved. These last two instruments will be particularly useful for chemical spectroscopists, for the study of molecular motions in materials under varying conditions of temperature and pressure.

We are grateful to H Wroe and G Stirling for the information contained in this article.

Rutherford Laboratory Lecture

The next lecture in this series will be held on Thursday 13 December at 15.15 hours in the Lecture Theatre R22.

Mr R J H Beverton, CBE, FRS.

'The Work of the Natural Environment Research Council'.

Mr. Beverton proposes to review the origins of the Council, which was set up, along with the SRC, by the Science and Technology Act of 1965, and to trace its evolution to the present time. He will refer to the ways in which the Council has developed policy on matters such as the setting up of institutes, the provision of central facilities and university support. During the talk he will give some idea of the scope of the sciences of the natural environment and of their present and future contribution to the country's life and economy.

For your diary:- The next lecture on 24 January 1980 will be by Dr J E Midwinter. "Optical Fibre Systems - a Reality at Last".

Trade Exhibition

Hewlett Packard - Desk-Top Computers are staging an exhibition of Desktop Graphic Systems and Instrument Controllers in Conference Room 5, R20 on Thursday 6 December between 1000 and 1600 hours.

Library Notice

LIGHT READING!

The Library has just begun to collect a small collection of "general interest" books which are being discarded by the British Library. These cover a range of subjects (of course reflecting the interests of the Library Staff!), including economic history, fine art etc. These are being shelved beside the "help yourself" items in R61. If you would like a change from particle physics, the theory of condensed matter etc, please feel free to browse through these. They may be borrowed without consulting the Library Staff, and we trust you to return the books when you have finished with them. We hope to build up the collection gradually.

Safety Film Show

A film entitled "Something to do with Safety Reps" will be shown on Tuesday 27 November in the Lecture Theatre at 1230, 1315 and 1400 hours.

The Safety Representatives and Safety Committees Regulations came into effect a year ago, on the 1 October 1978. We have implemented the Regulations. We have modified our Safety Committee structure and have established agreed procedures with our Safety Representatives.

In this film, once again in an industrial environment, two Safety Representatives can be seen carrying out their functions each with a different approach.

The Safety Officer will give a brief introduction to the film before each showing.

OVERSEAS Visits

G E Kalmus and D Crenell to CERN from 25-28 Nov. to attend WA30 collaboration meeting and SPSC meeting.
C J Batty to CERN from 26 Nov.- 8 Dec. to work on proposal 210.
R J N Phillips to Paris from 28-30 Nov. to attend Workshop at College de France.
P S Maxwell to DESY from 2-4 Dec. to visit researchers using PETRA.
J Penfold to ILL from 6-19 Dec. to carry out experiments on D17.

C J S Damerell to CERN from 3-17 Dec. to work on NA11.

C M Fisher to CERN from 4-18 Dec. for setting up of experiment NA16, and test run.

P T M Clee to the USA from 5-12 Dec. to discuss design and construction of the millimetre wave telescope.

J Hoskins to DESY from 10-14 Dec. to service equipment on TASSO experiment.

Film Badge Notice

It is Period 12 Colour Strip PURPLE for beta-gamma films. Please check that you are wearing the correct film and all old ones are returned.

Next Film Badge Change
Monday, 3rd December.

Sales to Employees

Sales of scrap metal/plastics as set out in RLN 12/73 will be made on 30 November and 14 December at the scrap compound rear of R40 from 12.00-12.30 hrs.

Apprentice Awards

Two Rutherford and Appleton Laboratories apprentices received awards at the 1979 Apprentice Prizegiving Ceremony held in the Cockcroft Hall on 6 November. The prizes were presented by Sir Hugh Scanlon, Chairman of the Engineering Industries Board. Richard D Lloyd a Craft Electrical Apprentice received a Merit Award for the best apprentice of his year for practical and academic application. Graham M Toplis Draughtsman Apprentice was awarded the "John Dolphin Cup" which is awarded to a third year craft apprentice for application, attendance and tidiness.

Prize winners from Harwell Apprentice School. Richard Lloyd is fourth from left, Graham Toplis is third from right. *photo: Harwell*

Folk Club

The Christmas meeting of the club will be on Friday 7 December at 8 p.m. in the Restaurant Coffee Lounge. We have as our guests, Alan White, self-styled "humorist and idiot" and 'Wild Oats' a four piece band from a distant and unknown region of Kent. Do come along and bring your friends to this thriving club with a relaxing atmosphere. A licensed bar is also provided for your enjoyment.

Tickets are on sale at £1.40 at the door or £1.20 in advance from:-

John Ellis	Ext.6369/494
Alan Hodges	Ext.6323
George Pullinger	Ext.6661

Christian Fellowship

Weekly Fellowship meetings are held in R2 Conference Room at 12.30 pm. All are welcome.

29 Nov: We hope to have a visit from Mr & Mrs Bowker, who are medical missionaries from Tanzania, to talk about their work.

6 Dec: There will be a Prayer Meeting. If you have any special requests to make for prayer, please contact Chris Biddlecombe Ext.6167/203.

Missing

Bicycle RL47 has gone 'walk-about' from its home - R36. Its Keepers are very anxious for its well being. All sightings should be transmitted to P Hawthorne Ext 6185.

Coffee at Cosener's

Will you be Christmas shopping in Abingdon on Tuesday morning 4 December? Take a break and join us for coffee at the Cosener's House between 10.30 am and noon. All wives and children of Rutherford and Appleton Laboratory Staff are invited.

In the New Year, coffee mornings at the Cosener's House in Abingdon, will be on the following dates:-

Wednesday 9 January 1980
Thursday 7 February
Tuesday 4 March

Do join us for coffee between 10.30am and 12 noon.

Best wishes
Gillian Litt (Abingdon 26009)
Dorothy Gibson (Abingdon 25250)

Lunchtime Music

The programme for 5 December at 12.45 hrs in the Lecture Theatre will be 'LIZARD' by King Crimson. "King Crimson" are, or rather were, a progressive group who played together for about four years in the early Seventies. They were formed by Greg Lake who left two years later to form "Emerson, Lake and Palmer". Their first album "In the Court of the Crimson King" was praised by critics and established them on a par with Pink Floyd, Deep Purple, Led Zepplin etc. It was the era of experimentation both with instruments and music. Electronics (mellotrons, moogs) were being used together with many traditional instruments, as well as the usual guitars and percussion. The Group was large - perhaps too large and unwieldy to be commercially viable. "Emerson, Lake and Palmer" and smaller groups such as these were beginning to be the norm.

"King Crimson" split up after four years but who knows, groups from their era are coming back. "Led Zepplin" have got together for a new album and the "Moody Blues" are on a British tour now. There is just not space here to list the nine musicians and twenty odd instruments involved, but if music interests you, do come along if you can.

I have tried to avoid the term 'rock' as it seems to mean different things to different people. Perhaps this music should be called rock/jazz/classical/electronic fusion!

Restaurant News

SPECIAL MORNING SERVICE

As many people will already have realised the AERE Mobile Catering Service has reduced the number of calls it makes to the Chilton Site. The AERE Restaurant Management have informed the Chairman of the Restaurant Committee that they cannot justify restoring the original service.

The Restaurant Committee have asked the Catering Contractor to investigate the possibility of introducing a similar alternative service. This would mean that the Coffee Lounge in R22 would be open to sell rolls and sandwiches from 9.30 am - 10.30 am each day. To ascertain the requirements it was agreed at the last Committee meeting that potential users should inform the Restaurant Committee Secretary (extension 476) if they would be interested in purchasing bulk orders for workshops, laboratories and offices.

RUTHERFORD LABORATORY BULLETIN

Deadline for Insertions
1000hrs Monday 3 December

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