RUTHERFORD BULLETIN

18 June 1979 No. 12

Onto a Winning Streak

In the last couple of weeks three of the Rutherford Laboratory's technical projects have come to fruition. We thank Ron Roberts and Neil Cunliffe for news of the high accuracy magnet, and Steve Cox for information of the 'frozen spin' target and the high precision NMR apparatus.

High Accuracy Magnet for EMC

A system of superconducting solenoids for use with the European Muon Collaboration's (EMC) large polarised target has been successfully commissioned at the Rutherford Laboratory. The magnet, complete with cryostat and all its support instrumentation, is to be transported to CERN at the end of June, where it will be integrated with the polarised target and undergo further trials prior to assembly in the North Area muon beam line at the end of the year.

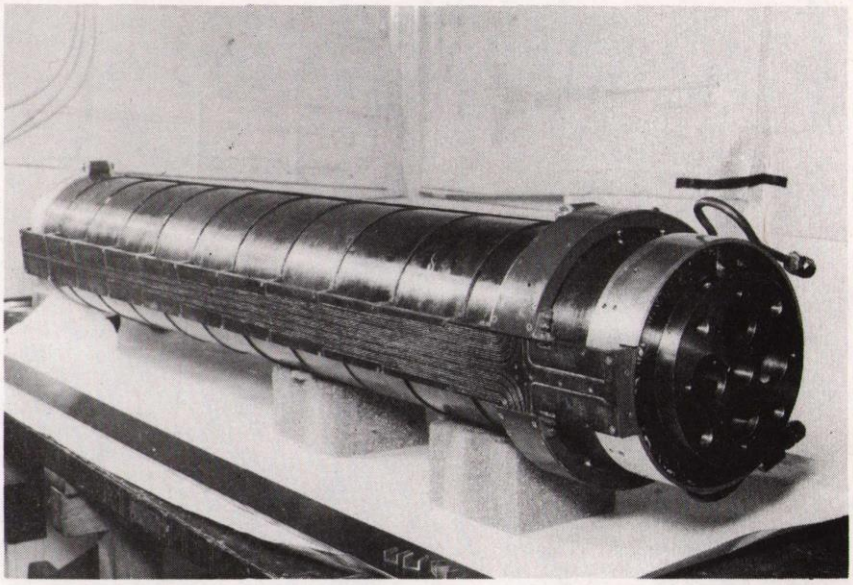
Design

The magnet consists of one large solenoid, 1.6m long with a clear bore of about 200 mm diameter, to produce the main field. Twelve independently powered trimming solenoids are arranged concentrically and evenly spaced along the main solenoid in order to achieve the required field accuracy. The magnet assembly is located in a cold bore horizontal cryostat designed at the Laboratory and manufactured by the University of Liverpool, which allows the target assembly to be fitted directly into the magnet's bore using the vacuum tank for location and support.

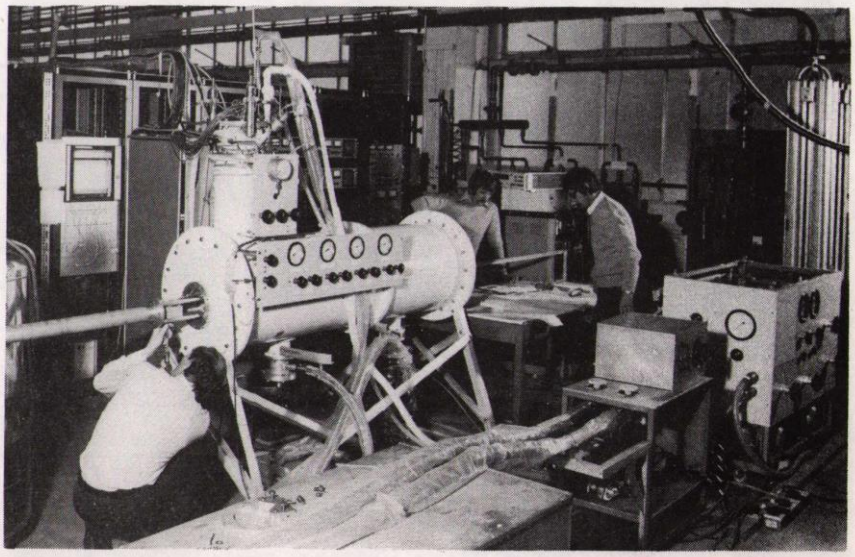
Accuracy achieved

The magnet specification requires a field of 2.6 Tesla to be accurate to within ± 1 part in 10^4 throughout a volume 1m long by 50mm diameter.

Recent tests with the magnet using a Nuclear Magnetic Resonance probe, supplied by the University of Liverpool, have shown that the field can be trimmed to the required accuracy. The total volume which meets the accuracy specified was found to be 1m long by 60mm in diameter, giving users about 45% larger target potential, should they require it. Over the proposed target volume an accuracy of ± 8 parts in 10^5 has been achieved. The field stability was satisfactory and seen to be ± 5 parts in 10^6 over a period of 5 hrs. The cryostat's performance indicates a load of 5 to 6 watts at 4.2°K when the solenoids are powered.



The superconducting magnet showing its terminations, prior to assembly in the cryostat. The winding mandrel has not been removed at this stage.



The magnet complete with cryostat, undergoing field accuracy measurements with an NMR probe.

INTERNAL Events

NIMROD LECTURE SERIES
LECTURE THEATRE - 1130 hrs

18 June: Dr R Turnbull/Glasgow
"Baryonium."

25 June: Dr D Aschman/SLAC
"Results from the CRYSTAL BALL at SPEAR."

HEP SEMINARS
R61 CONFERENCE ROOM - 1100 hrs.

20 June: M Caifaloni/Pisa
"Structure of Final States in QCD jets."

DATA HANDLING GP SEMINAR.
R61 CONFERENCE ROOM - 1430 hrs.

20 June: Dr H J Stuckenberg/DESY
"Fast Special Purpose Processors in High Energy Physics Experiments."

COMPUTING SEMINARS
R27 COLLOQUIUM - 1400 hrs.

19 June: Dr R A Rosner/RL
"SRC and University Networks - The Way Ahead."

3 July: Dr M Richards/Cambridge
"The Tripos Operating System."

EXTERNAL Events

NPD COLLOQUIUM
H8 AERE HARWELL - 1530 hrs

21 June: D Colvin/MATSU
"An Adventure in Technology in Great Britain Today."

ELEM. PART. PHYS. SEMINARS
WESTFIELD COLLEGE - 1400 hrs

20 June: Dr R J Hughes/Oxford.
"Parton Dynamics of the MIT Bag Model."

THEO. ELEM. PART. PHYS. SEMINARS
OXFORD - 1430 hrs

25 June: Dr A Mendez
"Masses of Gauge Bosons in Extended Models of Electro-weak Interactions"
venue: Theoretical Physics Dept.

29 June: Prof. J C Polkinghorne/Cambridge "Calorimetric Triggers for high p_T"
venue: Nuclear Physics Dept.

6 July: Prof. S Fubini/CERN
"Classical Solutions of Gauge Theories."

THEO. PHYS. SEMINARS
MANCHESTER - 1430 hrs

27 June: Dr D Kumar/Regensberg
"Critical Properties of Disordered Ferromagnets."

PART. PHYS. DISCUSSION GP.
BIRMINGHAM - 1615 hrs

6 July: Dr G McCauley/Birmingham
"Strings and Things."

THEP SEMINARS
SOUTHAMPTON - 1430 hrs

22 June: Dr A J MacFarlane/DAMTP
"σ-Models and their Generalisations."

NUCLEAR PHYSICS SEMINARS
NPD OXFORD - 1430 hrs

18 June: Dr M A Nagarajan/Daresbury
"Effects of Pauli Principle in Nucleus-Nucleus Collisions."

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

28 June: Dr D Aschman/SLAC
"The CRYSTAL BALL at SPEAR Finds Skeletons in the Cupboard."

Film Badge Notice

Period 7 commences Monday 18 June
Colour strip BLUE for beta-gamma films.
Please change your films promptly returning all old ones.

Please Note

Radiation Protection Group has moved from R2 to R12 (Safety Section)
Phone numbers remain the same
Film Service Ext 430
Health Physics Advice Ext 375

Astronomy Lecture

Dr D W Sciama of Oxford University will give the inaugural lecture, entitled "The Origin of the Universe" at a meeting of the Oxford and District Astronomical Society on Thursday 21 June at 7.30 p.m. The meeting will take place at Fitzharry's School Abingdon and all are cordially invited to attend.

OVERSEAS Visits

D H Saxon to DESY from
18-22 June to work on TASSO experiment.

D Morgan to Orsay from
20-23 June to attend "workshop"

P A Dewar to USA from
23 June - 8 July to attend ECD conference.

W M E Evans to CERN from
25 June - 1 July to work on ISR Jet experiment.

C J S Damerell to CERN from
29 June - 6 July to work on NA11.

Whose Book?

Will the person who ordered 'A Low Energy Strategy for the United Kingdom' by Gerald Leach please get in touch with Contracts Office, R20 Room 6 Ext 380.

Cricket

In the latest round of the Curtis Bennett Shield, played at Wargrave on 12 June, the SRC team were beaten by Grovians by three wickets. However, it was an extremely exciting game, tense until the last over.

SRC's performance was the more consistent, but D Savage with figures of 7 for 56 off 19.5 overs and P Sontag who scored 64 out of the 125 runs needed were outstanding for Grovians.

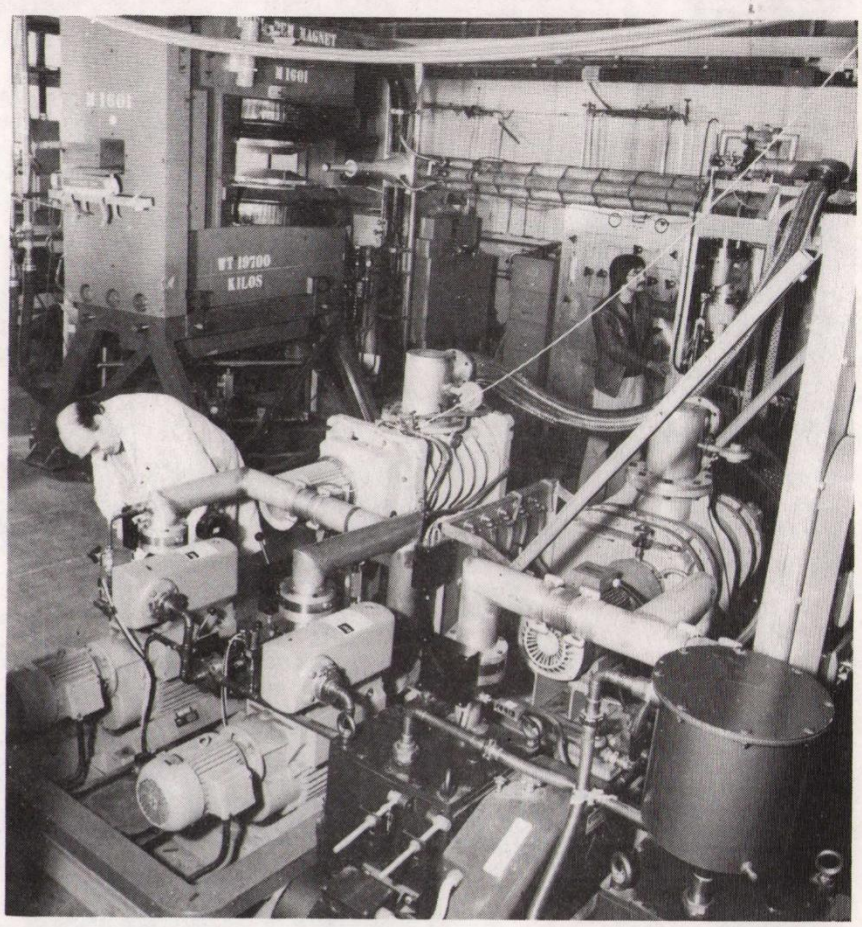
Table Tennis

John Varley would be pleased to hear from all players wishing to compete in next season's Didcot & District Table Tennis League. Please contact him on Ext 6363.

'Frozen Spin' Target for RMS

The Laboratory has just completed the construction and testing of the "frozen spin" polarised target for use in the Rutherford Multiparticle Spectrometer (RMS) experiment at CERN.

The photograph shows the target as it appeared last month during commissioning in the R25 heavy duty laboratory. The "business end" of the target is the small horizontal cryostat in the background of the photograph. Despite its size it is one of the world's most powerful helium-3/helium-4 dilution refrigerators - note the scale of the pumps in the foreground for recirculating the helium gas. The fridge keeps the target material below 0.5°K while microwave power polarises its hydrogen nuclei, that is, lines up their spins along the field of the electromagnet. Then the temperature descends even lower to 50mK (0.05° above absolute zero!) to "freeze" the polarisation during data-taking.



Recycling

The electromagnet in the photograph has been used in no less than 6 polarised targets since 1964 (π1 K7 K7' K14a and K20 at Nimrod and S124 at CERN). However this time it served only for preliminary polarisation tests. Even the huge RMS magnet was originally removed from the 1.5 metre hydrogen bubble chamber and has recently been specially adapted for polarised target use.

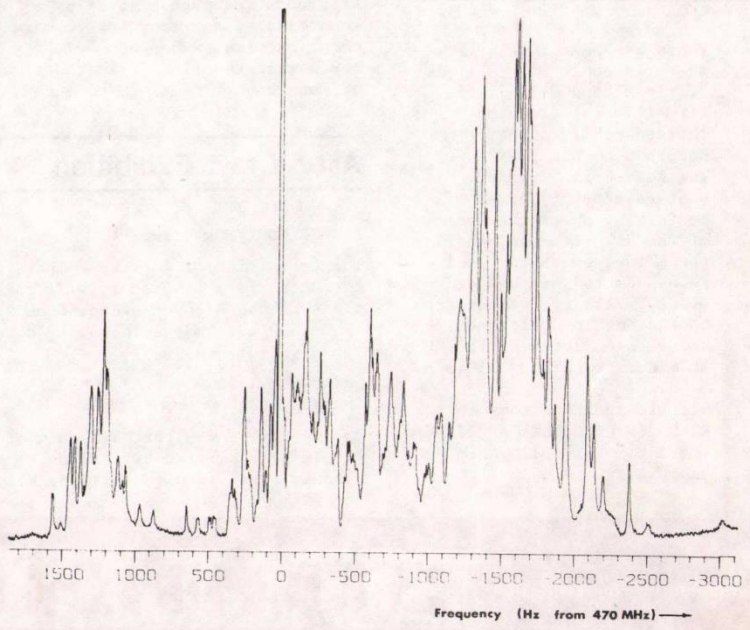
New Instrument for Biochemistry at Oxford

This fascinating spectrum is one of the latest results of the collaboration between the Biochemistry Department at Oxford University and the Rutherford Laboratory. It is the NMR or Nuclear Magnetic Resonance spectrum of the enzyme Lysozyme.

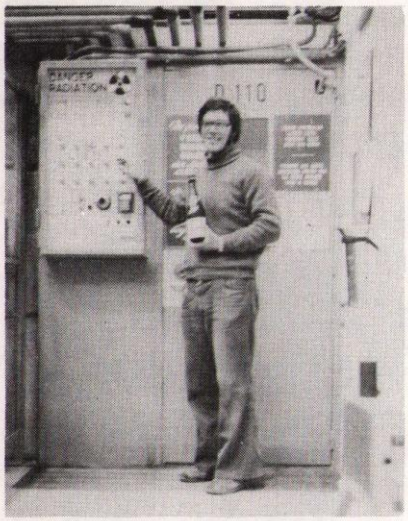
A solution of the enzyme put in an intense magnetic field absorbs radiofrequency radiation according to this particular pattern, which characterises how hydrogen atoms are arranged within the enzyme molecule. The higher the magnetic field (and therefore the higher the NMR frequency) the better for these studies - the spectral lines become better separated and more information on the molecular structure is available.

This spectrum was recorded at 470 MHz using an ingenious NMR probe and novel "front-end" radiofrequency electronics designed and built at the Laboratory. The magnetic field required was 11 Tesla, this impressive value being obtained in a niobium-tin superconducting solenoid, itself the result of an earlier collaboration (see Bulletin 14 1978). This is the highest frequency at which such a complicated molecule has been examined.

To be presented at an important NMR conference in Grenoble this month, the spectrum shows the expected increase in resolution over those from lower frequency instruments, as well as a dramatic improvement in signal-to-noise ratio. Successfully tested, the new NMR instrument will now begin routine service for the Oxford biochemists.



Good Health



Rutherford Laboratory high energy physicist, Mike Albrow achieved fame recently when he became the 40,000th person to pass through the interlock gates to enter the CERN Intersecting Storage Rings (ISR). He, and the duty officer Bernard Lambert, were each presented with a bottle of champagne, donated by the ISR Personnel Protection System team.

We learn from his colleagues, that Mike has taken the bottle home - but only to keep it in good condition until he can share it with the rest of his team.

Mike and his family are at present resident in Geneva, so that he can work full-time on the new ISR "jet" experiment.

Christian Fellowship

28 June: There has been much interest recently concerning the "Turin Shroud." Is it the actual burial cloth of Christ and if so what happened to his body? The Rev. Brian John of Wantage Baptist Church will be talking about the events of the Resurrection and if the Shroud bears any real relevance to this historic event. All are welcome to come along to Conference Rm. 2 in building R1 for this 30 minute talk at 12.30 p.m.

5 July: All are again welcome to the R2 Conference Room at 12.30pm for a time of fellowship and prayer.

1979 SRC Sports Day

Don't forget that this years Sportsday takes place at Chiswick on Thursday 28 June.

All competitors should by now have contacted the following organisers

Football (7-a-side)	R Lawes Ext. 6328
Tennis (mixed))	Mrs L Claringbold
Tennis (mens))	Ext. 6325
Bowls	P Craske Ext. 232
Netball	Mrs Goodchild Ext. 429
Cricket (6-a-side)	R E Smith Ext. 293
Hockey (mixed 3+3)	M E Claringbold Ext. 593
Angling	P Craske Ext. 232
Tug-A-War (mixed)	J Rice Ext. 6574

but information can still be obtained from them.

Would people attending as mere spectators please contact Peter Craske Ext. 232.

After the exertions of the day, for those with energy left, there will be a DISCO/SUPPER at Appleton Laboratory in the evening.

The Disco will start at 2000 hrs and go on until 2400 hrs. Tickets will have to be bought in advance and cost £1.00 (cheap at twice the price!).

Golf

A Rutherford Laboratory team was successful in a match against a team representing Brunel University played at Frilford Heath on 6 June, winning by a margin of 17½ points in a Stapleford Competition. The afternoon was much enjoyed by all the competitors, and trophies to mark the occasion were exchanged. It is hoped that the fixture is the first of many annual meetings to come.

Art & Craft Exhibition

A DATE FOR YOUR DIARY

The exhibition of work by members of the Rutherford Laboratory will take place in the R12 Conference Room from 1200-1400 hrs on the following dates:-

Tuesday 3 July
Wednesday 4 July
Thursday 5 July

May we remind you that all entry forms should be submitted by 19 June to Myra Gilbert (now in building R1).

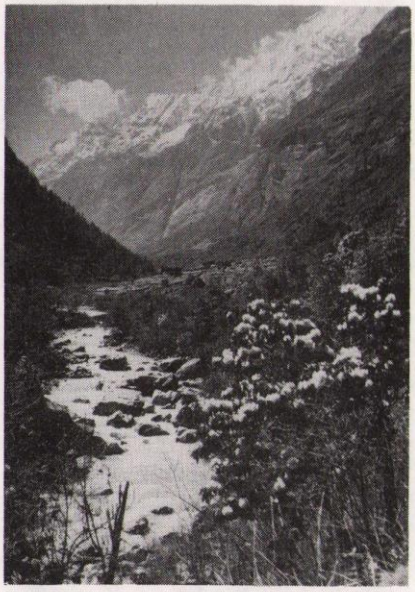
Squash

A friendly squash match between the Rutherford Lab and British Non-Ferrous Metals Ltd., played at BNF on Thursday 31st May, resulted in a 4-0 win for the Rutherford team.

Players representing Rutherford were Bob McClure, Jenny Coates, Leona Cooke and Richard Lawrence (not forgetting our faithful supporter Sylvia Talbot!)

It is hoped to play a return match in the near future and also to arrange similar friendly matches against other such teams in the locality. Anyone wishing to partake in a lighthearted social match should contact Richard Lawrence, R36 Ext. 6240.

Himalayan Trek



Susan Read joined a party on a Himalayan trek this April.

A number of people have asked if they could see the slides, so they will be shown in the Lecture Theatre next Wednesday, 20 June at 12.35. Anyone interested is welcome.

The trek started in the foothills, north of Kathmandu and finished in Langtang valley near the Tibetan border. At the beginning there are villages and cultivated fields, then at about 8000 ft rhododendron forests and many other flowers. Above 11000 ft there are alpine pastures and finally in Langtang the valley is surrounded by glaciers and peaks over 20000 ft. Some pictures are taken on an ascent of an 18000 ft peak and on the final helicopter flight back to Kathmandu.

RUTHERFORD LABORATORY **BULLETIN**

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