RUTHERFORD Bulletin 14

1 - 21 AUGUST 1978

First Time Success For

High Field NMR Magnet

An ultra high field superconducting magnet for nuclear magnetic resonance (NMR) work was ordered in 1975 from the Oxford Instrument Company by Sir Rex Richards of the Enzyme Group at the University of Oxford. The project was supported under a grant from the Biological Sciences Committee of the Science Research Council. The magnet is the first persistent NMR magnet to use niobium-tin as the superconductor. Rutherford Laboratory has assisted the project by supervising the development of the high field insert for the magnet and the persistent current joint to the niobium-tin conductor. The complete magnet has recently been tested and worked perfectly at the first attempt.

Nuclear magnetic resonance equipment is routinely used in research laboratories to determine the structure of certain compounds. The resolution of the equipment can be improved by employing higher magnetic fields and this has provided a useful application for superconducting techniques. Fields up to 8.5 tesla (being equivalent to an NMR proton frequency of 360 MHz) have been achieved using niobium-titanium superconductor. Higher fields can be reached using niobium-tin (Nb_3Sn), however it is so brittle that one cannot wind a solenoid using multifilament wire made directly from this material.

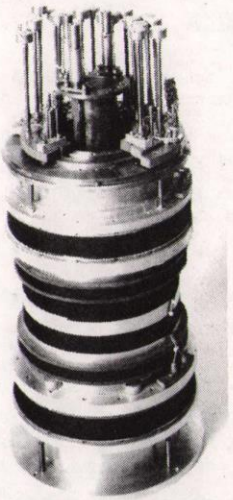
An indirect method for producing niobium-tin superconductors has been developed by a collaboration between Imperial Metal Industries, AERE Harwell and Rutherford Laboratory, supported by the Department of Industry. In this method, a malleable wire consisting of thousands of fine niobium wires in a bronze matrix is used to wind the solenoid. The finished solenoid is then heated at 700°C for several days, during which time the tin diffuses from the bronze and reacts with the niobium to form Nb_3Sn. A cross section of the conductor is shown in the photograph.

The Oxford magnet consists of two solenoids: an outer made from niobium-titanium produces a field of 8 tesla, and an insert of niobium-tin which increases the central field to 11 tesla. To achieve the stability required for high resolution NMR work these two coils have to be connected in series and therefore joints have to be made between the two types of superconductor. A considerable research effort was required by the groups at the Oxford Instrument Company and Rutherford Laboratory before the technique for producing low resistance joints (of less than 10^{-10} ohms) was perfected.

In view of the many new techniques involved, it was most exciting when the magnet, in a test cryostat, achieved the design field of 11 tesla (470 MHz) without even a single quench and was persistent (decaying less than 1 part in 10^8 per hour).

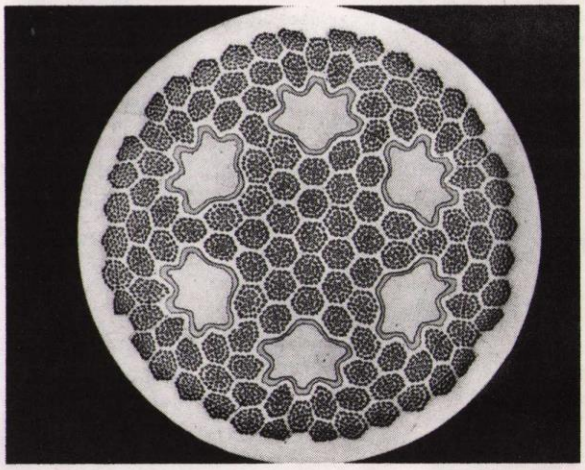
The magnet will now be placed in its final cryostat ready for use with a spectrometer specially designed by the Oxford Enzyme Group. The final cryostat is of a new type manufactured by the Oxford Instrument Company which will only need refilling with liquid helium about every 3 months. The Rutherford Laboratory is also involved in assisting in the production of electronics for the pulsed NMR system.

This combination of equipment will provide the most powerful and most convenient NMR spectrometer in the world. There has been worldwide interest and it is understood that the Oxford Instrument Company has already secured 8 export orders for this equipment. Meanwhile further research work is in progress to build magnets which can produce even higher fields!



View of the high field NMR magnet made in the form of two concentric superconducting solenoids. (Photo: Oxford Instrument Company)

Cross section of the niobium-tin composite (about 1mm diameter) made by Harwell for the insert solenoid. It contains 4477 niobium filaments in a bronze matrix. The six irregular regions contain pure copper surrounded by a diffusion barrier. (Photo: Harwell)



We thank Christopher Scott for the information contained in this report.

INTERNAL EVENTS

NIMROD LECTURE SERIES
Monday, 7 August
1130
R22 Lecture Theatre

QCD Predictions for Processes Involving Real Photons

Prof C Llewellyn-Smith (Oxford)

HEP SEMINAR
Friday 18 August
1100
R22 Lecture Theatre

Some Exact Results on Potential Models of New Particles

Dr A Martin (CERN)

OVERSEAS VISITS Mr J Jenkins, to DESY, 1-4 August, for discussions with Finance and Administration representatives.

Mr R W Morgan, to DESY, 1-4 August, to supervise return of R.Lab equipment.

Mr H Hadley, to Alpbach Austria, 1-12 August, to attend Summer School on Manned Space Activities.

Messrs N J Beadle and E W G Wallis, to CERN, 7-10 August, for discussions on equipment for expt. WA42.

Mr W M Evans, to Max Planck Institute Munich, 7-18 August, for discussions and equipment tests.

Dr M W Johnson, to Cracow Poland, 13-16 August, to participate at Conf. on Diffraction Profile Analysis and Open Meeting of the Commission on Neutron Diffraction.

Dr P L Woodworth, to DESY, 13-16 August, to attend TASSO meeting and discussions.

Dr J C Thompson, to CERN, 14-22 August, to work on expt. NA2.

Messrs D Holland, K Miles and L Phillips, to DESY, 14-25 August, to perform assembly of yoke on JADE experiment.

Dr T G Walker, to CERN, 21-23 August, to discuss instrumentation for high energy physics experiments.

Dr S F J Cox, to Tallinn USSR, 21-26 August, to attend Ampere Congress on Magnetic Resonances.

COURSES IN TECHNICAL AND SPECIALISED REPORT WRITING AND FOR OCCASIONAL SPEAKERS

Information has been received about the above courses to be run by the ARC Training Section between September 1978 and March 1979. Both courses are described in the joint SRC/ARC Training Programme booklet for 1978. Further information from Training Section, Bldg R20, Ext 266.

Sport & Social

THE PLAYHOUSE OXFORD: Tel: Oxford 47133
25 July - 12 August - Time of Life - Comedy Play - 8.00 pm
Tickets £1.25, £2.00, £2.75, £3.00.
Friday and Saturday 5 pm and 8.15 pm.
15-26 August Daughter in Law - D H Lawrence - 8.00 pm.
Tickets £1.25, £2.00, £2.75, £3.00
Friday and Saturday 5 pm and 8.15 p.m.
NEW THEATRE OXFORD: Tel Oxford 44544/5
28 Aug - 2 Sept The Young Vic present BARTHOLOMEW FAIR
Tickets £2.50 and £1.50.
12 Sept - 16 Sept - The Royal Exchange Theatre Company present THE WINTERS TALE
Tickets £2.50 and £1.50.

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TABLE TENNIS In September the evening league will begin again. However, we need to know beforehand who is interested in playing, and how many teams wish to enter.

Will all those interested please come along to a meeting on Monday 21 August at 12.45 in the R27 Conference Room, or make their intentions known to John Varley (R51) or Eric Thomas (R27).

*

FORTHCOMING EVENTS

DATE	EVENT	VENUE	CLOSING DATE
13 August	6-a-side cricket	Southampton C.S. club	7 August
20 August	Tennis	Basingstoke	4 August
23 August	Bowls (pairs)	Southampton C.S. club	4 August
24 Sept.	Hockey Mixed 7's	RAE Farnborough	11 Sept.

For further details contact P Craske Ext 232

Successful High Field NMR Magnet (Cont'd)

Members of the joint team from the Oxford University Enzyme Group, Oxford Instrument Company and Rutherford Laboratory shown grouped around an Oxford Instrument Company NMR cryostat.

CAREERING INTO SCIENCE

Early this year, a team from the BBC Horizon Series visited Rutherford Laboratory in order to investigate various possible careers in the science field. The careers were selected by six fifteen-year-old school children and included a wide range of scientific subjects, from Nuclear Reactors to Vets.

The visit to Rutherford enabled the children to interview Dr Alan Gibson and Dr George Kalmus and to extract such information as the joys and pitfalls of becoming a scientist. The children were then shown around various laboratories including that of the Laser and Particle Physics Labs and were later shown the Bubble Chamber Scanning process.

The Horizon team visited a number of establishments in accordance with each childs individual interests. They travelled to such places as Queen Mary College to see the Nuclear Reactor and to the British Gas Corporation in Solihull before travelling up to Scotland to see various other organisations, including a trip to Edinburgh Zoo to see the vet.

The Horizon programme has now been completed and will be transmitted on Friday August 25 at 9.30pm on BBC2. There will be a repeat of the programme but as yet a date has not been confirmed.

We thank Mr Martin Freeth (Producer of BBC Horizon) and the BBC for the information contained in this report.

PARTING IS SUCH SWEET SORROW

These words rang throughout the Central Laser Facility and the Hare (West Hendred) on 21 July as Lynne Bender prepared to leave the Lab after 2 years of faithful service. As Personal Secretary to Alan Gibson, Paul Williams and Mike Key, Lynne was truly the light of the Laser Division and she will be sadly missed by all her friends and colleagues.

Alan Gibson presented Lynne with a farewell gift of two suitcases at an informal gathering in the Laser Control Room. Lynne is planning to marry later in the year and will then be emigrating to the USA.

Lynne has asked us to thank everybody for her leaving present which she hopes to put to good use shortly, and she would like to say goodbye to everyone she was unable to see on her last day.

We all wish Lynne every happiness for the future.

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FILM BADGE NOTICE

It is Period 8. Colour strip BROWN for beta-gamma films. Please check that you are wearing the correct films and all old ones are returned.
Next Film Issue - Monday 14 August
Any enquiries regarding film badges please contact Mrs J A Coates, R2. Ext. 430.

FAREWELL TO SID MASKELL

Mr Sid Maskell retired from Rutherford Laboratory on 31 July after 16 years with the Electronics Group presently based in R36. Sid is taking early retirement so as to concentrate more fully on his hobbies such as gardening, building model steam engines and motor boating. His jolly smile and warm vibrations will be greatly missed by all his friends and colleagues. Sid is renowned for his Christmas parties - which we are assured will continue to be held at Chez Sid!

At an informal gathering, Sid's friends presented him with farewell gifts of a Polyspray compressed air sprayer (for his roses), a wooden tool box (for his wooden tools) and a book on Model Steam Locomotives.

Sid has asked us to thank all his friends for these presents and for the 16 years of wonderful friendship throughout his time at Rutherford.

Best wishes Sid from us all - see you at Christmas - time!

NEWS OF PAST MEMBERS OF THE LABORATORY

George Crocker (Technology Division) who left the Laboratory in February this year on reaching his retirement age, is now working part-time at the Pitt Rivers Museum in Oxford. On your next visit look out for liquid helium cooled exhibits!

Jim Pinchin who left NIMROD Division on premature retirement has obtained a technical post at Southampton College of Higher Education and is moving to Blackfield to be near his work. He sends his good wishes to all his friends at Rutherford.

*

THANKS

Gordon Hewitt would like to convey his thanks to all his friends and colleagues for his retirement gift and to wish them all the best for the future. I'm sure we all join in wishing Gordon a 'bright and sunny' retirement!

*

LOST - Has anyone seen a ladies bicycle AERE L44? It disappeared from the side of R2. Any news as to its whereabouts please contact Jenny Coates Ext. 430

SALES TO EMPLOYEES

Sale of Scrap Metal/plastics as set out in RLN 12/75 will be made on 4 and 18 August.

*

PARISH NOTE

We have received a letter from Mr James Ryan, Headmaster of St Edmund's School in Abingdon. It seems that few Catholics are aware that this Catholic Primary School exists in Abingdon. In fact, St Edmund's School was started in 1857 when children were taught in the sacristy, north aisle and the cloisters of the Parish Church. In 1858 the school moved to a building in the Vineyard (the site of the present St Helen's Garage). The Sisters of Mercy took over the teaching in 1860 and by 1873 the school moved to yet another premises next to the Catholic Church in the Oxford Road (now the Parish Hall). After 90 years in this building, the present St Edmund's School was built in the Radley Road, and has been occupied since 1963.

If anyone is interested in sending their children to St Edmund's, please contact Mr Ryan (Abingdon 21558)

SPORTS DAY 78 !

The weather for the Sports Day at Chiswick was sunny and dry, a usual report for this annual event. Approximately 100 personnel from Rutherford went to cheer on our teams (or perhaps to enjoy a day off). The results were quite pleasing this year, Rutherford winning 4 events and were runners up in another 3 games.

CRICKET (6-A-Side) - WINNERS
The cricket team regained the cup they lost to R.G.O. last year, a fine team performance despite ending the tournament with two players hobbling from leg/knee injuries.

Each match consisted of 4 x 8 ball overs.

RESULTS RUTHERFORD TEAMS
Ruth 'A' 44-2 beat Swindon 'A' 38-3
" " 52-1 beat R.G.O. 50-2
" " 35-0 beat Appleton 'B' 33-2
" " 62-3 beat Appleton 'A' 61-1 - FINAL

Ruth 'B' 41 beat Daresbury 40
" " 27 lost to Appleton 'A' 30

The final produced a very exciting climax to the tournament, Appleton in scoring 61 runs set Ruth. a very difficult task. In fact they still needed 12 runs with 4 balls left, but Bob Blowfield then decided to hit the next 3 balls for four. Eddie Smith and Bob Blowfield were the main run scorers, and the tournament will long be remembered for one mighty blow by Bob which scattered the beer drinkers INSIDE the pavilion (through a window), a shot which must have been all of 150yds
CRICKET TEAM - Ray Smith, Eddie Smith, Tudor Morgan, Brian Goodenough, Steve Hancock and Bob Blowfield.

HOCKEY (6-A-Side) - WINNERS
A new event this 4 men x 2 ladies in each team and some very good hockey was produced.
RESULTS
Rutherford 1 v Swindon 'B' 0
" 0 v Daresbury 0
" 1 v Appleton 0
" 2 v R.G.O. 0
" 1 v Swindon 'A' 0
Match was decided on a league basis.
Rutherford had 9 points, Daresbury 8 points
Also it can be seen that no goals were scored against RL.
TEAM - Lorna & Mike Claringbold, Bridget Astridge, Bob Hopgood, Paul Bryant & Brian Wyborn.

TENNIS MENS DOUBLES - WINNERS
A rare win for us in the tennis, we have only once before won this event.
BARRY WHITTAKER and COLIN WALTERS were the winners beating Harry Hurst and Gian Gopal also from Ruth. in the final.

BOWLS (PAIRS) - WINNERS
We kept up our usual form in the bowls winning at least one of the events. This year it was the Pairs.
TONY DAMERALL & JOYCE EGGLETON being our successful pair. (nice to see a lady in the winning team)
BOWLS (RINKS) - (RUNNER-UP)
Our 4 of Les Harding, Bob Maybury, Joe Roberts and Harry Stone were beaten in the final by Daresbury.

Photo: Joyce Eggleton (pairs winner) competing against Albert Knight of Daresbury in the bowls competition

FOOTBALL - (RUNNERS-UP)
Again as last year we were beaten in the final this time 2-1 by Daresbury. But a great effort from our team who on paper weren't the strongest team we could have fielded but everyone gave of their best and they were unlucky to have lost the final. A couple of great saves from the Daresbury keeper in the first half swayed the game.
TEAM - Bob McClure, John Mackerness, Phil Lewis, Mike Ryan, Pete Cutler, Steve Farr and Colin Trevis.

NETBALL - (RUNNERS-UP)
Another very hard competition and as usual the final was fought out by Daresbury and Rutherford, Daresbury being the eventual winners.
Two of our girls received injuries in the final which resulted in them having to be taken off, Pam Coulthard dislocated a finger, and Judy Herring nose injury.

FISHING - (RUNNERS-UP)
Another new event fished on the Thames at Runnymede by teams of 4. Six teams took part and the winners were DARESBURY 'A' (18 Points) with RUTHERFORD 'B' (15 Points) in second place.
A difficult event to organise but everyone enjoyed themselves. The fish didn't realise that there was a match on otherwise more of them would have turned up.
RUTHERFORD 'B' TEAM - Tony Ferrari, Dennis Day, George Render and Alan Hodges.

Thanks to all organisers, especially BRIAN PRIOR for his thankless task of refereeing the Football, and JOHN RICE making sure all those who started out returned!

We thank Mr P Craske for the above information.

RUTHERFORD LABORATORY BULLETIN Acting Editor John Litt

Please mail or phone-in contributions to:
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