

American Award for NMR Magnet

The 11 tesla niobium-tin superconducting NMR Magnet developed jointly by the Rutherford Laboratory and Oxford Instruments Ltd has gained one of the I·R 100 awards of the American magazine "Industrial Research/Development". Awards to bodies outside the USA are not numerous and to have achieved this is quite a feather in our cap. The award was presented to John Magraw, Managing Director of Oxford Instruments, at a banquet in Chicago on 20 September.

Problems Posed

Initially commissioned by Sir Rex Richards of the Enzyme Group at Oxford University, with financial support from SRC's Science Board, the development of this 11 tesla magnet presented two main problems. Firstly niobium-tin is extremely brittle and cannot be drawn into wire for coil windings. Secondly the magnet is made from several concentric solenoids all connected in series. It is operated in the persistent mode, rather than connected to a power supply, so the total resistance of the circuit must be very low (less than about 3×10^{-9} ohms). Because the inner solenoids are wound with niobium-tin and the other with niobium-titanium it follows that very low resistance joints must be made between the two kinds of superconductor.

Problems Overcome

The first difficulty was overcome by using the wind-and-react process for making niobium-tin in filamentary form which has been developed by the Rutherford Laboratory in conjunction with AERE and Imperial Metal Industries (see Bulletin 14, 1978). The basic technique was developed further by the Rutherford team (Christopher Scott, John Magraw and David Larbalestier) in conjunction with a team from Oxford Instruments to produce the very highly uniform fields required for NMR.

The second difficulty was overcome after considerable effort by the whole team (plus Graham Homer) and the magnet delivered to Oxford University has a total resistance of 6×10^{-10} ohms



John Magraw and Christopher Scott proudly display the I·R 100 Award.

(5 times better than specified). Some idea of the perfection of the system can be seen from the fact that field decays only 2 parts in 10^8 /hours, equivalent to a time constant of 5000 years.

The international importance of the work can be judged from the fact that Oxford Instruments now have about 6 similar systems delivered or on order, these representing sales approaching £1M in value.

Computer Chess Win

The British program MASTER, developed by Peter Kent from the Rutherford Laboratory and John Birmingham from AERE Harwell, has won the 2nd European Computer Chess Tournament held at the Wembley Conference Centre during the recent EURO-IFIP conference. The tournament was made possible by IBM who sponsored the competition, and Newbury Laboratories who supplied the computer terminals.

Eight programs took part, three from the UK, three from W Germany, and one each from Sweden and the Netherlands.

(Continued on page 4.)



(Photo: Harwell)

INTERNAL Events

HEP SEMINARS

CONFERENCE RM R61 - 1100 hrs

17 Oct: Lou Voyvodic/Fermilab
"Charm Decays in Emulsions"

24 Oct: Dr Anne Davis/Imperial
"CPN-1 Model : a Toy Model
for QCD???"

NIMROD LECTURES

LECTURE THEATRE - 1430 hrs

16 Oct: Dr S Wojcicki/SLAC
"Recent Results from DELCO
on Semileptonic Decays of
D-mesons"

SPECIAL LECTURE

R12 CONFERENCE ROOM - 1515 hrs

18 Oct: Don Machen/LAMPF
"The Control System for the
Fusion Materials Irradiation
Test (FMIT) Facility.
This is a general talk
intended primarily for
members of SNS, but all are
welcome."

SAFETY FILM SHOW

LECTURE THEATRE - 1230, 1315 & 1400 hrs

23 Oct: "One Last Shock"
This is a film on electrical
safety. It is set in an
industrial environment but
the message is clear.

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

EXTERNAL Events

NPD COLLOQUIUM

H8 CONF. RM. AERE - 1515 hrs

18 Oct: Dr C A Uttley & Dr M T Swinhoe/
AERE
"Tritium Breeding in Fusion
Reactor Blankets"

25 Oct: Dr J D Silver/Oxford
"Beam-foil Spectroscopy -
Atomic Physics on an
Accelerator"

ELEM. PART. PHYS. SEMINARS

WESTFIELD COLLEGE - 1400 hrs

18 Oct: Dr B R Webber/Cambridge
"Observability of QCD
Effects in Jets"

25 Oct: Dr G Thompson/QMC
"Diffractively Produced
Resonance at High Energies
in the Final State
($\pi^- \pi^+ \pi^0$)"

THEO. PHYS. SEMINARS

TPD CONF. RM. AERE - 1400 hrs

16 Oct: Prof R A Smith FRS/
Heriot-Watt
"Laser Light"

25 Oct: Prof T Brooke-Benjamin/
Oxford
"Exacting Qualitative Methods
for Non-Linear Problems"

30 Oct: Mr G A M Webb/NRPB
"General Aspects of
Radiological Protection"

NMR Magnet in Routine Use

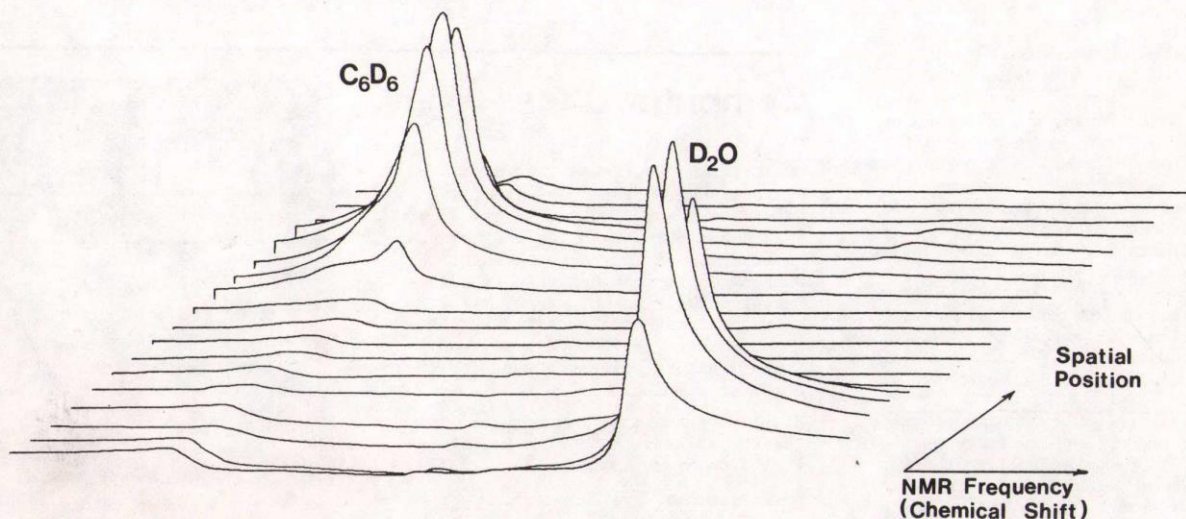
Biochemical Imaging

The new magnet has been in routine use this year for identifying and studying biochemicals using their Nuclear Magnetic Resonance spectra. It has also been used to test a completely new NMR technique which makes it possible to see how different chemicals are distributed within a sample. The 2-D spectrum in the figure is the first example of this simultaneous chemical and spatial

resolution. Each line is the high resolution spectrum from just a thin slice through the sample (obtained by a trick using a gradient RF field); stacked together they demonstrate that two chemicals were present, but located in distinct regions.

The hope is that the new technique - proposed by Steve Cox and presented last month at the Nottingham

conference "Biological Applications of NMR" - will allow the distribution of metabolites in an intact biological system to be mapped out. Perhaps it will be possible for the NMR machine to zoom in on a particular organ of the body such as the heart or a kidney to study its metabolism - or its defects - without any disturbance or damage by surgery.



Young HEP Experimenters

The annual Summer School for Young Experimenters in High Energy Physics was held at the Laboratory from 10-27 September. This year's, the eighth in the series, was directed by Dr Brian Duff of University College London. Twenty-six postgraduate students from British universities and one from Copenhagen attended the concentrated course of lectures and tutorials on the latest advances in elementary particle physics.

The Course Lecturers included Drs Ken Bowler, Derek Imrie, Bob Johnson, Peter Landshoff and Prof Gordon Moorhouse. Drs Anne Davis, Hans Reinders, David Robson and David Webber were the Course Tutors. Extra evening seminars were held on topics such as neutron stars, the mechanics of the cochlea and biophysics of the heart's pacemaker.

Following the School Dinner, Dr Duff praised the Lecturers and Tutors for their strenuous devotions and the Students for their most enthusiastic response. He thanked Dr Godfrey Stafford and his staff for their encouragement and support of the School and presented bouquets to Mrs Hunt for the care lavished on the School by the Cosener's House staff and to Mrs Sherwen for her excellent organisation.



Sir Harrie Massey delivered the after-dinner talk in which he retraced some of the early experiences following his arrival in England exactly 50 years ago. There was great confusion in physics at that time - no wave mechanics existed and there was much excitement over Rutherford's discovery of the anomalous scattering

of α -particles. Sir Harrie reminisced over his encounters with many famous men of that period, particularly those working at the Cavendish. The growth of science was so fast that he was amazed by the fantastic discoveries. However, he assured the audience that there still remains much to be discovered.

OVERSEAS Visits

W M Evans to CERN from 15-21 October to work on proposal 194.
W S Howells to Grenoble from 15-19 October to attend ILL workshop on amorphous metals.
A L Lintern to CERN from 15-19 October to work on proposal 202.
L Phillips to CERN from 15-19 October to work on experiment Nall.
A Astbury to CERN from 16-19 October to attend meeting on UAL/Prop 204.
F R A Hoggood to Budapest from 20-23 October to attend meeting.
N H Lipman to Washington from 20 October-7 November to attend Wind Energy Workshop and visit research centres.
T R M Edward, P Gottfeldt, D Jones, R P Mannix, D R Quarrie, S P H Quinton and C J Reason to Berlin from 21-26 October to attend "Real-time Data '79" conference.
M J Newman to Bologna from 24-28 October to attend "Eurographics '79" conference.
D C Sutcliffe to Italy from 21-28 October to attend "Eurographics '79" conference.
N M King to USA from 27 October-10 November to attend study group on accelerators for heavy ion fusion.

Missing

IME Calculator type 865
Serial No 51412021
Label No R006402
Please contact Reg Sidlow, Blg R2, Ext 430.

Training

MEETINGS

UNIVERSITY OF READING
PHYSICS DEPT - 5pm

- 15 Oct: "Phonons in Liquid Helium"
- 22 "The Aggregation of Nitrogen in Diamond"
- 29 "Quarks in Quanta"
- 5 Nov: "Advances in Laser Spectroscopy"
- 12 "Semiconductor Opto-electronic Devices in Fibre Communications"
- 19 "Oscillator Strengths for Highly Ionised Atoms"
- 26 "Two Dimensional Electron Localisation in Semiconductor Devices"
- 3 Dec: "Partial Coherence: Measurement and Computation"
- 10 "Phase Conjugation and Laser Technology"

COURSES

UNIVERSITY of TECHNOLOGY
LOUGHBOROUGH

- 5-9 Nov: "Introduction to Micro-processors"

UNIVERSITY of SHEFFIELD

- 22 Oct-2 Nov: "Instrumentation for Engineering Research & Testing"
- 12-16 Nov: "Matrix Methods in Engineering Mechanics"
- 10-14 Dec: "Random Vibration"
- 21-25 Jan: "Practical Spectral Analysis"

CONFERENCES

IEE

29 Oct-2 Nov: "Automotive Electronics"

THE CHEMICAL SOCIETY (Faraday Division)

12-17 Dec: "Chromatography, Equilibrium and Kinetics"

26-28 Mar: "Phase Transitions in Molecular Solids"

AWARDS

THE CHEMICAL SOCIETY. (Faraday Division)
"The Marlow Medal" closing date for applications 1.1.80.

"WINSTON CHURCHILL TRAVELLING FELLOWSHIPS"

Study projects up to 3 months in certain fields of activity - closing date 1.11.79.

Further information on items listed above can be obtained from the Training Section R20, Ext 6285/266.

Sales to Employees

Sales of scrap metal/plastics as set out in RLN 12/73 will be made on 19 October at the scrap compound rear of R40 from 1200-1230 hours.

Film Badge Notice

It is period 11. Colour Strip YELLOW for beta-gamma films. Please check that you are wearing the correct film and all previous ones are returned.

Chess Win (Continued from page 1.)

MASTER, winner of the first European tournament held three years ago in Amsterdam, retained its title with 3 wins from 3 games. The Runner up was a Swedish program DARK HORSE with 2 wins. MASTER was run on the IBM 3033 at AERE and DARK HORSE on a UNIVAC 1110/83 in Stockholm.

The most interesting game of the tournament was in the final round between MASTER and ELSA from the Technical University of Munich. ELSA was running on a Telefunken TR 440 and at that time lying in 2nd place.

Winning Game

	MASTER	ELSA
1.	N-KB3	N-KB3
2.	P-KN3	P-KN3
3.	B-N2	B-N2
4.	N-QB3	P-Q3
5.	P-Q4	O-O
6.	O-O	B-N5
7.	N-N5	P-B3
8.	P-KR3	B-B4
9.	P-K4	B-Q2
10.	P-K5	PxP
11.	PxP	N-R4 ?
12.	P-KN4	BxKP
13.	PxN	BxN
14.	PxP!	RPxP!
15.	PxB	P-B3
16.	Q-Q3!	PxN
17.	QxP+	K-R1
18.	B-K4	R-B2
19.	QxR	Q-N1
20.	Q-R5+	K-N2
21.	BxNP	Q-K3
22.	Q-R7+	K-B1
23.	B-B5!	QxB
24.	B-R6+	K-K1
25.	Q-N8+	Q-B1
26.	QxQ++	

Angling

RUTHERFORD ANGLING CHAMPIONSHIP

This event was fished on Saturday, 29 September, at Clifton Hampden. Fourteen anglers took part in an eventful match during which one angler was seen to have his umbrella blown across the river, causing a few panic stations, until it was recovered by a passing boat. Another angler was seen to enter the water! We are not sure whether this was deliberate or not, but the rumour was that he was trying to get some under-water photo's for the *Bulletin*.

The result of the fishing was a comfortable win for PETER CRASKE with 31lb 14oz of Roach and Bream, second was DARRYL TAYLOR with 11lb 2½oz, and third, FRANK SMITH with 15oz. A very enjoyable morning!

Surprise for

'Workshop'

Overseas visitors to the Polarised Target Workshop at The Cosener's House were surprised and delighted on Wednesday evening to find themselves being entertained by the Abingdon Traditional Morris Dancers.

In the historic setting of The Cosener's House on the island in the middle of the mill stream, by the light of car headlamps, the Team soon had everyone tapping their feet and clapping to the music played by (amongst others) Steve Cox, ace fiddler of the Rutherford Laboratory. All that was missing from the romantic scene was the warm moonlight night - it rained, but everybody was so enthralled it didn't seem to matter.



The Abingdon Traditional Morris Dancers have a long history which can be traced back to 1554, and a rich tradition, which includes the ceremony of electing the Mayor of Ock Street (the leader of the side) which survives only in Abingdon.

In 1978 the side was awarded the Europa Prize for Folk-art by the FVS Foundation of Hamburg in recognition of its outstanding contribution to British and European folk culture.

Folk Club

The club opened the new season on Friday, 5 October, with a resounding success. The folk music performed varied from traditional American 'Hot Vultures' to contemporary and humorous 'Magenta'.

For those who have never been to the Rutherford Folk Club I will attempt to give some details of how the evening is run. We meet in the restaurant coffee lounge listening to and watching people perform anything connected with folk music and song. The songs vary from solo ballads to rousing chorus's where everyone can join in with an attempt at raising the roof. The evening starts at 8pm prompt and a licensed bar is available.

The next meeting of the club will be on Friday, 2 November. The main guest will be Fred Wedlock from Bristol, who is extremely humorous with his tales and songs, and without doubt will ensure an unforgettable evening's entertainment. Also appearing will be a very talented duo 'The Navvies', a local group from Newbury.

Tickets are on sale at £1.50 in advance from:

John Ellis R2, Ext 494 or 6369
Alan Hodges R12, Ext 6323

With this popular performer, the tickets are expected to be sold quickly so to avoid disappointment please buy your tickets in good time.

Thanks

Jim Knight would like to thank all who contributed towards the Quartz Clock with which he was presented, on his retirement, and apologises to friends he did not manage to contact before leaving.

He also wishes to thank the Director General for his letter.

Christian Fellowship

The Fellowship welcomes everyone to its meetings, which are held at 1230 hrs in R2 Conference Room. The next meetings will be held on Thursday 18 October, and Thursday 25 October.



Deadline for Insertions

BULLETIN

1000hrs Monday 22 October

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Published by the Scientific Administration Group