

4-18 November 1974

CONFERENCE REPORT

The Editor is grateful to Chris Scott for the following report on the Chicago Conference on Applied Superconductivity and to Colin Walters for his interesting and amusing

contribution on Session J.

It is interesting to note that the only filamentary niobium-tin magnet mentioned at the Conference was the 12T solenoid (reported in RL Bulletin No. 19) which was produced at this Lab as a result of an RL/AERE collaboration.

The 1974 Applied Superconductivity Conference was held at Oakbrook, Illinois from 30 September to 2 October. It was a fairly large conference attended by about 650 people. One hundred and sixty four papers were presented which is about twice as many as at the previous conference in this series (1972 ASC, Annapolis Maryland). This reflects a swing towards applied superconductivity in response to the energy crisis and renewed efforts on the development of thermonuclear fusion reactors.

The first day was largely taken up by plenary and tutorial sessions (A and B) in which many speakers emphasized the connections between applied superconductivity and the energy crisis. Firstly that superconducting technology can be applied to devices such as magnets to reduce the electrical power consumption and secondly that since the long term solution of the energy crisis might be thermonuclear fusion reactors there is an urgent need to develop the superconducting magnets necessary to confine the plasma.

The rest of the conference can be divided into four groups: superconducting materials (sessions F, K P and T), magnets (D, G and Q), large scale industrial uses (J, L and N) and superconducting electronics. Since there were 21 sessions altogether and at any moment four sessions were running in parallel this report only covers a selection of sessions from the first three groups.

The most interesting sessions were those in the first group on conductors. The extra effort on the fusion programme has stimulated a great deal of work on high field superconductors such as niobium-tin. As well as many papers on superconducting materials in a very early stage of development (niobium-germanium and niobium-aluminium) there were three papers from American manufacturers describing multifilamentary niobium—tin composites similar to the materials produced in the U.K. as a result of a Rutherford-AERE collaboration. All three manufacturers have produced trial quantities for the Lawrence Livermore Laboratory but at this early stage it was not easy to sort out the exact position of all the competitors in the race

to produce material commercially.

The group of sessions (D, G and Q) concerned with magnets was very well attended reflecting the large number of superconducting magnets either in use or under construction. Three HEP laboratories presented plans for the extensive use of bending magnets: LBL described the present situation on the magnets for their 4 GeV superconducting synchrotron, ESCAR, ANL

and Fermi Lab presented details of the magnets intended for the ZGS stretcher and the Energy Doubler respectively. From all these magnet papers it is clear that the problem of 'training' is still unsolved. The Rutherford contribution describing some experiments designed to clarify the situation was well received. These sessions also contained several papers on large toroidal magnets for fusion experiments.

In spite of the recent North American effort on

multifilamentary niobium-tin superconductors there were no reports of magnets made from Airco, Supercon or Intermagnetic General material and the 12 Tesla solenoid made from material produced as a result of the Rutherford-AERE collaboration was the only magnet of this type mentioned.

The remaining group of sessions covered magnetic levitation (J), energy storage (L), and power trans-

mission (N).

Session J included seven papers on magnetic levitation, it was disappointing that only one reported on a real train and it was clear that we have a long wait to experience the joys of a super smooth super fast ride in a panavision cabin. The highlight was a film shown by T Ohtsuka (Japan) of the demonstration run in 1972 over 400m of track of two test vehicles propelled by linear synchronous motors. A 7 km test track is be completed by 1975 and it appears that good progress is being made towards a 500 km/hr link between Tokio

and Osaka in the 80's.

Efforts in North America are limited to theoretical studies or to experiments designed to examine particular problems. The most ambitious of the latter is a project by Ford Motor Co. in which a vehicle will be rocket propelled at 480 km/hr over a l km track at China Lake California to produce data on suspension and guidance systems.

Session L was entirely devoted to the use of large superconducting magnets for storing energy. the three large devices discussed, the University of Wisconsin (R W Boom) proposal for a solenoid (diameter 100 m) built in a tunnel excavated from bedrock seemed most detailed. In this design the bedrock provides most of the mechanical support for the magnetic forces and so reduces the capital cost sufficiently to make energy storage in 1000 or 10,000 MWhr units attractive to the electricity supply industry. A rival proposal from Los Alamos Scientific Laboratory seemed to be very similar in principle. Finally F E Mills (Fermi Lab) talked about a proposed energy storage magnet to be used as a buffer between the accelerator and the electricity supply grid so that the fluctuating demand during the accelerator cycle is not seen by the grid. Although the scale of this device (I MWhr) is much more modest than that required by the power industry, Fermi Lab feel that it would be a useful intermediate step on the way to full scale devices like the

Wisconsin proposal.

What then is the 'state of the art'? It is clear that superconductivity is spreading from specialist laboratory applications and finding uses in many fields, in particular, large scale industrial use.

CERN COURIER Some readers may receive a letter from the Editor of the CERN Courier stating that following the readership survey initiated in the May issue there has been difficulty in identifying some

The readers receiving such a letter are asked readers. The readers receiving such a letter are asked to fill in the survey (at least question I). As before these may be returned via the Bulletin Editor, Room 42,

INTERNAL EVENTS.

NIMROD LECTURE SERIES Monday 4 November II.30 Lecture Theatre

 $SU(6)_W$ is Alive and Well Dr A J G Hey/Southampton

PROPOSAL TALK & PROGRESS REPORT Monday 4 November 14.30 approximately Conference Room, Building Rt2

The Proposal Talk and Progress Report will follow the Nimrod Ops II Meeting at approximately 14.30

Proposal No 159: "A Proposal to Study K p Interactions Between 450 & 900 MeV/c", Rutherford Laboratory/Imperial College, talk by Dr R T Ross/R.L.

Progress Report on Proposal No 112: "A Proposal to Investigate Spin Dependent

Effects in High Energy Proton-Proton Interactions at Rutherford
Laboratory and CERN", Oxford University/CERN/ORSAY, talk by

Dr N E Booth/Oxford University

HEP SEMINAR
Wednesday 6 November
II.00
Lecture Theatre

Particle Exchange in Exotic Channels at Low Energies

W N Cottingham/Bristol

RUTHERFORD LABORATORY LECTURE Thursday 7 November 15.15 Lecture Theatre

R & D in High Speed Bulk Forming

Professor S A Tobias/Birmingham University (see 'News Section' for details)

SEMINAR IN COMPUTING
Thursday 7 November
11.00
Conference Room, Building RI2

General Meeting

Progress Reports will be given on various aspects of C & A Division's work

NIMROD LECTURE SERIES Monday || November ||,30 |Lecture Theatre s-channel Structure of Reggeon Diagrams

Dr C de Tar/CERN and MIT

TRADE DEMONSTRATION
Tuesday 12 November
10,00 - 16.30
Conference Room, Building RI2

SINTROM Electronics Limited will be showing a wide range of computer peripherals including - Versatec printer and plotter, a silent matrix unit with line printing speeds up to 1200 lines/min and plotting speeds up to 3" per sec on 8½", II" and 20" wide paper; System Industries disc systems with storage capacities from 2.5 - 67.6 Meg Bytes, using DRI or Diablo drives, for connection to various mini computers; Kennedy range of buffered and phase encoded Tape Transports with recording densities up to 1600 BPI in IBM compatible format; Perifile 6000, a single or dual 3M cartridge tape transport system with a storage capacity of up to 2.5 Meg Bytes/cartridge. Also on show - Dicom Cassette Tape Systems; Periflex 6500 Floppy disc systems; SAC GP3 Sonic digitizer; Carmel range of VDUs and a CAI mini computer.

HEP SEMINAR Wednesday 13 November 11.00 Lecture Theatre

Anti-proton Interactions

Dr H Muirhead/Liverpool

NRPB SEMINAR Thursday 14 November 14.00 Lecture Theatre The National Radiological Protection Board have received permission to hold their External Scientific Seminars in the Rutherford Laboratory Lecture Theatre. Attendance at these Seminars is by invitation only. The first in the series, on "Development in Bone Dosimetry" is to be given by Prof F W Spiers. Staff at the R.L. concerned will have received individual invitations.

NIMROD LECTURE SERIES Monday 18 November 11.30 Lecture Theatre

Results on Electroproduction in Exclusive Channels

Dr G Wolf/DESY

RUTHERFORD LABORATORY BULLETIN

Published by the Scientific Administration Group

ditor: H F NORRIS

Deadline for Insertions GENERAL & SOCIAL NEWS

INTERNAL & EXTERNAL EVENTS

Room 42 Building R20 Rutherford Laboratory Chilton Didcot Berks

Tuesday 1600

Wednesday 1200

Abingdon 1900 Ext 484

EXTERNAL EVENTS

UCLEAR STRUCTURE SEMINARS, NP LAB, OXFORD - 14.30 hrs
11 Nov: Dr B L Roberts/RL - Exotic Atoms - a Tool to
Study Nuclear and Particle Properties.
18 Nov: Dr D J Millener/Oxford - β Decay of 14B.

ELEMT PART PHYS SEMINARS, NP DEPT, OXFORD - 14.30 hrs 7 Nov: Dr R G Roberts/RL - Inelastic Diffraction

Scattering at High Energies - the Present Situation

14 Nov: Dr H Muirhead/Liverpool - Annihilation Process for pp, ee, KK, etc.

COLLOQUIA AT CLARENDON LAB OXFORD - 16.15 hrs

8 Nov: Dr E R Pike/RRE - Photon Statistics & Photon

Correlation

15 Nov: Dr J W White/Oxf - While Neutrons Spin,

Molecules Relax...

THEORETICAL PHYSICS SEMINARS, CLARENDON LAB - 16.15 hrs 14 Nov: Dr N Robinson/Clarendon - Electromagnets Stress &

Momentum in Refracting Media

PHYSICS DEPT COLLOQUIA, READING UNIV. - 17.00 hrs

II Nov: Dr D Totterdell/Reading - Irradiation Damage in

Silicon 18 Nov: Prof O S Heavens/York - Surface Physics

NUCLEAR PHYSICS SEMINARS, UCL - 14.00 hrs

6 Nov: Dr P E Hodgson/Oxf - Alpha Particles on the

Nuclear Surface

13 Nov: Dr J M Irvine/Manchester - Nuclear Physics of

Neutron Stars

THEORETICAL PHYSICS SEMINARS, DARESBURY - 14.00 hrs II Nov: D Scott/RL - Correspondence at Large Angle

DARESBURY COMPUTER SYSTEMS & ELECTRONICS DIV SEMINARS -14.30 hrs

6 Nov: Prof F H Sumner/Manchester - The Architecture of the MU5

13 Nov: T Daniels - DOCAL (how to use this language)

THEORETICAL PHYSICS SEMINARS, MANCHESTER - 14.30 hrs 6 Nov: Prof J M Ziman/Bristol - Electron Localisation & Percolation

13 Nov: Dr R S McIntosh/Oxford - Proton Scattering & the Effect of Strongly Coupled Deuteron Channels.

THEORETICAL & HEP SEMINARS, SOUTHAMPTON - 14.30 hrs 8 Nov: Prof D V Bugg/QMC - Collision Broadening of

Resonances (& Particles)

15 Nov: Dr D H Nanopoulos/CERN - The Question of Non-Leptonic Interactions of Leptons

NP DIV SEMINAR IN CONF RM H8 AERE - 15.30 hrs

7 Nov: Dr D Sharma/Oxford - The Origin of the Light Elements

14 Nov: Dr J C Riviere/MDD - Intercomparison of Modern Methods of Surface Analysis

SCHEDULE NIMROD

CYCLE 10 22.10.74 - 12.11.74

MACHINE PHYSICS

HIGH ENERGY PHYSICS

Team	Beam	Experiment	State
CERN/ORSAY/OXFORD	P81	Hadron-Proton Spin	Data
RUTHERFORD LABORATORY	πΙΙ	Beam Measurements	Tests
IMPERIAL COLLEGE/RL	π8Α	Experiments on Narrow Bosons X ^O (958) S* and Cross-Section Measurements	Data
BEAM DETECTOR GROUP	KI5A	Parasitic Running	Tests
COUNTER GROUP B/ CAMBRIDGE UNIVERSITY	π12	$\pi^- p + K^0 \Lambda^0$ in the Range I.4 - 2.0 GeV/c	Data
RUTHERFORD LABORATORY	π9	Polarisation in the $\pi^{-}p \rightarrow \pi^{0}n$, nn	Data
BIRMINGHAM/SURREY/RL	K17	Study of X-rays from K p Atoms	Setting up
	P17	Beam line being dismantled	

RUTHERFORD LABORATORY LECTURE

The second lecture in the 1974/75 season of this series

Is to be given by Professor S A Tobias, Head of the Department of Mechanical Engineering at the University of Birmingham. He was educated in Budapest and Edinburgh and amongst his past appointments was Assistant Director of Research, Dept of Engineering, Cambridge University. His professional interests, are in the field of mechanical engineering design, research and development with a special interest in vibration and machine tools and Who!s Who gives his recreational interests as colour

photography, music and cactus plants.

The title of lecture, to be given at 15.15 on
Thursday 7 November in the Lecture Theatre is "R & D in High Speed Bulk Forming" and Professor Tobias has kindly provided the following abstract -

In the 1950's a number of processes were developed, mainly in the USA, known under the generic name of "High Energy Rate Forming". The characteristic feature

of these processes is that they involve the discharge of some form of energy at a very high rate, its conversion into kinetic energy and the utilization of this for forming purposes.

H.E.R.F. processes can be divided into two categories: (1) explosive, electro hydraulic, magnetic etc used in the forming of sheets and tubes, (2) high energy rate bulk forming.

The lecture will discuss H.E.R.F of bulk materials, carried out in high speed hammers which are generally actuated by compressed gas.

A survey of high speed hammers will be given, with particular reference to Petro-Forge, designed and developed in the speaker's Department. The advantages of H.E.R.F machines will be discussed and the effect of high forming speeds on a variety of processes such as hot, cold forming, cropping blanking, compaction of powder and powder forging will be considered.

The lecture will be illustrated with slides and

The Director, to CERN, 4-7 Nov, to OVERSEAS VISITS attend meetings of CERN Scientific Policy Committee and CERN Committee of Council. Dr C M Fisher & Dr R Sekulin, to Rome, 5-II Nov, to discuss multiplicity trigger for RCVD proposal II9. Dr R J N Phillips, to CERN & Prague, 10-20 Nov, for consultations with TH & NP Divisions & to give lecture

Mr G H Rees, to the USSR, 17-25 Nov, to attend Russian National Accelerator Conference in Moscow & to visit

Novosibirsk.

NUMBER PLEASE The opening of the new automatic telephone exchange at Abingdon has been delayed yet again. This has been caused by faults in equipment and as operators on the manual boards are not being replaced as they leave the remaining operators are working under great pressure. This information will not ease the problems experience by members of staff when using the external telephone, but it may help in understanding the operators problems. FILM BADGE NOTICE Period 12 commences Monday 4 November. Colour Strip - A for βγ films and neutron packs. Please change your

dosimeters promptly and return all old ones. (Neutron packs to be sent to Film Service, R2).

Six monthly TLD change for people with surnames commencing S, T, U and V.

Any queries regarding dosimeters to Mrs J A Coates, Building R2, Ext 430.

The following items of equipment have been reported missing -MISSING EQUIPMENT 0-25 m/m micrometer, engraved R9/M8. 0-150 m/m depth micrometer, engraved R9/M43. Both items should be returned to R9 Tool Store a.s.a.p. Muirhead Voltage Divider ref LPI5, missing from R36. Information please to R Downs, Building R36, ext 6656.

REMINDER Will the person who removed the guillotine from the Xerox Room on the top floor of Building RI please return it.

SOCIAL NEWS

RUTHERFORD CUP Showing greater appetite for posses-FINAL REPLAY sion and certainly much more workmenlike in their performance, C & A won this Rutherford Cup replay against R25 by three goals to

one.

R25, who put up an extremely fine show when the sides met just over a fortnight ago, failed to find the continuity which served them so well on that occasion. Often C & A had the control of the midfield for long spells to which R25 could find no answer. It was rather ragic that Dave Matthews who has scored in every game he has played in with the exception of one, should be reduced to being virtually a passenger when with less than five minutes of the first half remaining he received a knee injury when he went for a 50-50 ball with goal-keeper Malcolm Edwards. It's only fair to say that C & A were two up at that stage, but even so Dave kept up his record by putting the finishing touch to a move which brought R25 a consulation goal.

The game was only 3 minutes old when C & A forged their way into the lead, the goal, one of the best your reporter has seen in the competition, came from, in my view, the outstanding player not only in this final but throughout the whole of the series - Jeff Bizzell whose reading of the game is a delight to watch. Now back to the instance when Bizzell himself in possession, something like 30 yards out unleashed a shot which had goal written on it from the moment it left his lethal

right foot.

All credit to R25 who quickly put in a counter Phil Lewis & John Mackerness combined to give the latter a chance to test Edwards with a crisp ground Later, Matthews did find the target but his shot had lost much of its power as it struck a defender on

its way to goal.

It was from a long ball up-field from Bizzell that started the move in which Ron Lawes combined with Jim Taylor to finally push the ball out to him on the left and although Steve Farr got his hands to the shot he failed to stop it from slowly trickling over the line. Shortly afterwards came the incident in which Matthews after treatment on the field had to be taken off. Half-time, 2-0.

Just 4 minutes after the break Brian Whittaker lobbed one into the goal mouth and to his surprise found the back of the net. For a spell it looked as if R25 were going to make a fight of it; Lewis who really tried to pull out all the stops in an effort to get his side back in the game, worked the ball through only to see his on-target shot strike a defender, rebound to Matthews who from close in, stroked the ball over the line to pull one back.

Back came C & A and only a timely interception by goal-keeper Farr, whipped the ball away from the head of Lawes as the C & A striker was posed to steer the ball home. Later the same player, with only the keeper to beat, saw his angled shot strike the far post and rebound clear.

The cup, statuettes and medals were presented to the winners and runners up by Mr Les Patton of the RI8 Electrical Workshop.

In addition to their main programme FILM SOC 11 the AERE Film Society organises three other types of show one of which is film Soc II. This was set up to look at 'Cinema' as an art form in more detail. This season Science Fiction is under the microscope and there will be four shows, on Tuesday evenings at 7.45 pm in the Rutherford Laboratory Lecture Theatre. Subscription £1 for the four shows.

The first, on 12 November is entitled "The Man with the X-Ray Eyes" (Roger Corman) in which Ray Milland experiments on himself to extend the effective range of his eyesight - with uncontrollable results. A neat idea with some amusing tricks and an extraordinary -not to say - horrific - final sequence. Corman indulges his particular fondness for the exuberant use of colour. The film is concise, confident and not one ounce overweight.

Meetings as usual on 8 and CHRISTIAN FELLOWSHIP 15 November at 12.30 in the Conference Room, RI2. All are welcome.