Rutherford Laboratory

28 April - 12 May 1975

bulletin 9

'ENERGY SAVER' PAYS OFF

Two hundred pounds, even in these days of rising inflation is still a healthy sum of money to take home.

Last Friday, 18 April, the Director, Dr G H Stafford presented a cheque for this amount to Mr C R Brown, a Craftsman of the Nimrod Electrical Engineering and Auxiliary Plant Group. This, the largest award yet made to an individual under the SRC Suggestions Awards Scheme, was for a suggestion on energy conservation, a subject of particular importance these days.

Chris Brown, following the publication early in 1974 of a Laboratory Notice on energy conservation, noted the lighting requirements in different areas of the experimental halls, then operating under half normal lighting for reasons of economy. On bright days the level was adequate but on dull days supplementary lighting became necessary. The basic idea put forward by Chris was to leave switched on a percentage of the lighting and control the rest by photo-cell with overriding control from the Main Control Room. The suggestion was investigated by a Nimrod Ops Group working party and by Electrical Services Group who recommended certain refinements. The estimated annual saving amounts to many hundreds of pounds. The Director spoke of the simplicity of this very effective suggestion and, mentioning that Chris had already received an award of £10 for a previous suggestion, speculated on the future if he continued to produce increasingly successful suggestions!

Chris in thanking the Director said that he would now be able to pay his large electricity bill.

In adding our congratulations, we should like to emphasise the importance for everyone to consider the value of energy conservation to the Laboratory.

Any advance on £200?

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REPORTS ON THE NATIONAL ACCELERATOR CONFERENCE AND US LABORATORIES VISITED

At the National Accelerator Conference held in Washington in March, about one in five of the participants came from overseas. Three members of the Laboratory, Bert Brooks, Alan Carne and Martin Donald attended the conference and also visited other Laboratories in the USA. Space necessarily keeps this record brief, and it is suggested that they should be contacted directly for further information.

The general overall impression was that it was not an outstanding conference. The invited papers lasted 20 minutes, but the normal 10 minute papers were perhaps too short for effective presentation and note taking. The innovation of "poster sessions" was very good, where authors pinned on boards their papers or displays to discuss informally with small numbers of people at a time.

Despite the recent hard times there was a feeling of up-turn in optimism amongst the accelerator fraternity, with a tendency to look to horizons outside high energy physics. In addition to the work of the big accelerators there was much work in progress or proposed, in the use of accelerators for irradiation and medical application (therapy and diagnostics). Also many accelerator people were becoming involved with energy schemes ranging from a large Tokamak, to be based at Princeton, to solar energy, to superconducting energy storage and transmission.

Of the "big" machines, the Fermilab accelerator held pride of place. The machine is at present available for 72% of scheduled time with peak energy of 380 GeV, and intensity 1.55×10^{13} ppp. The linac is now using a debuncher, with a resulting booster peak intensity of 1.96×10^{12}. After the April shutdown, a main ring intensity of 2×10^{13} is hoped for, and ultimately 5×10^{13} in 2 years time; they are also confident of going to 400 GeV soon. Projected magnet failure, causing machine breakdown, is expected to be one a month for a long time ahead. The superconducting energy doubler was also described, althoug h it is more popularly known as the "energy saver" since it will consume only one third of the power of the conventional machine at 400 GeV.

Many of the parallel sessions produced information of direct interest to EPIC. There were a number of papers on power supplies, including by-pass shunt arrangements to allow series connection of the various magnets in a separated function machine. Such a scheme has the advantage of less stringent requirements on power supplies since relative, rather than absolute, accuracy is more often required between magnets. Opinion on accelerator control systems was moving towards the view that commercial systems are now available for entire large machines. In the past, process control systems have been too slow for a large accelerator complex, but this is no longer true and commercial systems are available at a claimed 60% of the cost of a tailor made system. Further advantages claimed were, wide user base, good documentation, fewer problems with hardware diagnostics, integrated systems software,

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INTERNAL EVENTS

NIMROD LECTURE SERIES
Monday 28 April
11.30
Lecture Theatre

Dual String (Twistable String)

Dr H P Nielsen/Niels Bohr Institute, Denmark

TRADE EXHIBITION
Tuesday 29 April
10.00 - 16.00
Conference Room, Building R12

ITT Instrument Services are holding an exhibition of laboratory test and measuring equipment including oscilloscopes, power supplies, dmms, counters, panel meters etc

HEP SEMINAR
Wednesday 30 April
11.00
Lecture Theatre

$\pi^- p$ Charge Exchange Polarisation Between 0.67 and 2.27 GeV/c

J Davies/RL

PROPOSAL TALKS
Thursday 1 May
10.45
Lecture Theatre

Proposed No 166: "A Proposal to Measure A and R Polarisation Parameters in the Reaction $\pi^- p \rightarrow K^0\Lambda^0$ Between 1.0 and 2.1 GeV/c", Counter Group B, RL/Bristol U. Talk to be given by Dr D H Saxon/RL.

(at 11.45 approx) Proposal No 167: " A Study of Multihadron Events Involving Identified Particles in High Energy Interactions", CERN/ORSAY/OXFORD/RUTGERS/STOCKHOLM. Talk to be given by Dr W W M Allison/Oxford.

NIMROD LECTURE SERIES
Monday 5 May
11.30
Lecture Theatre

Latest ψ Results from DORIS

Professor K Berkelman/Cornell, DESY

TRADE EXHIBITION
Monday 5 May
10.00 - 16.00
Conference Room, Building R12

Advance Electronics Limited will be demonstrating a wide range of power supplies and measuring instruments including their latest Direct Off Line DC Switching Units covering 5V DC at currents 10-60 Amps and their DRM6 Digital Voltmeter indicating true RMS for sinusoidal/non sinusoidal waveforms at DC - 1 MHz.

HEP SEMINAR
Wednesday 7 May
11.00
Lecture Theatre

A Geometrical Framework for Two-body Reactions and Large P_T Phenomena.

F Elvekjaer/CERN

RUTHERFORD LABORATORY LECTURE
Thursday 8 May
15.15
Lecture Theatre

Macromolecular Architecture

Professor D C Phillips FRS/Dept of Molecular Biophysics, Oxford (See 'news' section

NIMROD LECTURE SERIES
Monday 12 May
11.30
Lecture Theatre

Resonance Production at High Energies

Professor C Michael/Liverpool

EXTERNAL EVENTS

THEORETICAL HEP SEMINARS, NP DEPT, OXFORD - 14.30 hrs
2 May: Dr M Pennington/RL - A Pot-pourri of Problems in $\pi\pi$ Physics - from Pomerons to ψs.
9 May: Dr Grewther/CERN - Renormalization Group - Eigenvalues of Mixing Matrices for Operator Product Expansions.

ELEMT. PART. PHYS. SEMINARS, NP DEPT, OXFORD - 14.30 hrs
8 May: Dr W Allison - Identification of Relativistic Charged Particles by Ionisation Loss.

COLLOQUIA, CLARENDON LAB, OXFORD - 16.15 hrs
2 May: Dr D Marsh - EPR & the Structure of Biological Membranes.
9 May: Dr H M Rosenberg - Composite Materials - Some Technology and some Physics.

THEORETICAL PHYSICS SEMINAR, CLARENDON LAB - 16.15 hrs
8 May: Prof L Mestel/Sussex - The Pulsar Magnetosphere.

THEORETICAL PHYSICS SEMINARS, QMC - 16.15 hrs
28 April: Dr H Osborn/Camb - Dynamical Symmetries for Particles
5 May : Prof J P Elliott/Sussex - A Perturbation Approach to Nuclear Structure.

NP GROUP SEMINAR, KING'S COLLEGE - 16.00 hrs
7 May: Prof R J Blin-Sloyle/Sussex - The Quenching of the Axial Vector Coupling Constant in Nuclear β- Decay.

DARESBURY LECTURE SERIES - 14.00 hrs
29 Apr: J Dowell/Birmingham - Experience with the Ω Spectrometer.
6 May: K Berkelman/Cornell, DESY - Latest ψ Results from DORIS.

NUCLEAR THEORY SEMINAR, DARESBURY LAB - 14.00 hrs
5 May: F S Levin/Surrey - A New Method in the Theory of Many-Body Scattering.

IEETE, OXFORD COLLEGE OF FURTHER EDUCATION - 19.15 hrs
30 Apr: A Attwood/Imp Coll - The Development of the Linear Induction Motor.

OPEN FORUM, COUNCIL FOR SCIENCE & SOCIETY, CONWAY HALL, RED LION SQUARE, LONDON - 10.00 - 17.00, Saturday 3 May "Neglected Research and Social Priorities".

THEORETICAL PHYSICS SEMINAR, AERE, CONF. RM, H8.9 - 14.00 hrs
29 Apr: Dr N Louat/AERE - The Theory of Grain Growth.

fixed cost and fixed delivery schedule.

The sessions on storage rings and beam dynamics were of especial interest to EPIC. A progress report on the ISR was given describing the various techniques used to improve performance; present stored beams being about 15 Amps. The DESY storage ring DORIS was described, including plans to update the injection energy and the stored beam energy from 3.5 to 4.2 GeV (RF limited) by the addition of new power supplies. Plans to do e-p physics by the end of 1975 were also given. There were several papers from the SPEAR groups at SLAC. The first described the changes in beam dynamics brought about by the new 358 MHz RF system, installed to uprate the energy from 2.5 to 4.2 GeV. The first problem encountered was of strong synchrotron-betatron coupling resonances. To obtain good operating conditions the synchrotron frequency must be held constant, so that during energy ramping or configuration changing, the RF voltage must be accurately programmed. The second problem was of a vertical instability dependent on RF voltage and intensity, with the strange property that it was possible to break through the instability at one level only to meet it later at a higher intensity. (Information since received is that by phase modulating the RF voltage, this instability has been overcome). An important paper for all storage rings described very recent measurements on the energy lost by the beam to parasitic modes. The RF cavities and "incidental cavities" caused by changes in dimensions of the vacuum vessel, can resonate at many high frequency modes. These modes can be excited by the high-peak current of the beam which consequently loses energy. The influence of bunch length in this phenomenon was discussed. It is clear that to minimise these effects great care is required in designing the geometry of the vacuum vessel, and the RF system. Other interesting papers from SPEAR were on the RF system, and the proposed new klystrons for PEP having an efficiency of 70%.

Turning briefly to other sessions, the opening remark of the first speaker on RF superconductivity that "the hopes and promises of RF superconductivity have foundered on the rocks of reality" was received with amused sympathy. Nevertheless several good results were reported, e.g. the operation of the superconducting accelerator stage of the Cornell synchrotron, and very high surface fields on electropolished lead structures for a heavy ion linac at Caltech.

The long evening session on the medical application of accelerators was very well attended and of the many schemes in operation or proposed, those of LASL and ANL will be mentioned. Respectively these are, an inexpensive 500 MeV proton linac to produce negative pions for cancer therapy, and two 200 MeV proton synchrotrons for proton diagnostics where range sensitivity leads to very detailed radiographs, with patients receiving a very low dose rate.

In the final plenary session, the plans for European accelerators were described, including a long and full description of EPIC. In the final paper of the Conference, Weisskopf asked if accelerators were really necessary. In giving the (inevitable!) positive reply, he likened the whole business to Columbus sailing across the Atlantic and discovering America: the accelerator builder built the ship to make it all posssible, the experimentalists leapt ashore to inspect the coast and mountains, while the theorists stayed at home in Madrid saying that he would reach India!

Turning to the general visit to the States, several things were remembered very clearly. It was hard to realise there is an energy crisis in the USA when the temperature in the Conference hotel was in the eighties, and modern cars with all the paraphenalia of pollution control did 6-8 miles to the gallon (U.S). Enormously impressive and exciting were the whole of SLAC and SPEAR. The SPEAR machine and experimental control were in the same room with all the benefits of communication and mutual respect - this was brilliant. The computer display where psi events were reconstructed "before your very eyes" to give the strong impression of witnessing the very forefront of physics, was equally brilliant. The general facilities at SLAC were both extensive and excellent. with the general attitude that no process or technique was too difficult to overcome.

Los Alamos was also very impressive; the Lab itself is set in probably the most spectacular setting of all the accelerator Labs, at 7300 ft, with hot desert lower down and snow capped peaks above. The LAMPF linac is at present having a long shut-down for repairs and modifications. The new pion channel for cancer therapy will be ready for patients when the machine starts up again in July. As at SLAC-SPEAR, it was interesting to see the comprehensive in-house facilities at Los Alamos. Equally notable in another way at Los Alamos and its environs was the availability of Mexican food, all hot spicy and delicious. However the hotness was counteracted by Sopiapillas (bags of batter, deep fried and filled with honey) - superb, but bad for the waistline.

Also visited for one short day only, were the Argonne and Fermilab. The Argonne, after a period under seige, is really a hothouse of exciting schemes, from fusion devices to proton diagnostics, to solar heating, apart from the full programme on the ZGS. The performance of the Fermilab accelerator has already been described, but the Lab itself is appropriately impressive as befits the highest energy machine in the business. Altogether a memorable visit to the United States (oh those sopaipillas, tacos, tamales, frijoles, chilli con carne - now there's a familiar name!! .... Ed!)

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SUMMER SCHOOL The Science Research Council's Summer School on 'Aspects of Energy Conversion' will be held at Lincoln College, Oxford from 14-25 July 1975. It is aimed, principally at post-graduate students with first degrees in a scientific or technical discipline and those in the energy field who wish to broaden their knowledge of this important field through contact with recognized experts. Application forms and details can be obtained from Dr I M Blair, Energy Technology Support Group, AERE, Harwell, Oxon, OX11 ORA. Please note - the closing date for applications, 30 May 1975.

FOUND Enquiries on the following items should be made to Mrs S Fones, Bldg R20, Ext. 495

Ladies watch	-	in the upper ground floor cloakroom, R1.
Sum of money	-	in Room 1.75, R1.
Comb and case	-	gent's cloakroom, R20.
Gents umbrella	-	East wing gent's cloakroom, R1.
Parker biro	-	R1.

SALES TO EMPLOYEES Sales of scrap metal/plastics, as set out in RLN 12/73, will be made on the following dates:- 2, 16 and 30 May 1975.

RUTHERFORD LABORATORY BULLETIN *Published by the Scientific Adminsitration Group*

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Deadline for Insertions	GENERAL & SOCIAL NEWS	INTERNAL & EXTERNAL EVENTS
	Tuesday 1600	Wednesday 1200

RUTHERFORD LABORATORY LECTURE

Professor D C Phillips, FRS is the next speaker in the Rutherford Laboratory Lecture series. In 1966 he became Professor of Molecular Biophysics at the University of Oxford a position he still holds. He is Chairman ofthe Cell Biology and Disorders Board of the MRC and a Member of the MRC Council. Other memberships include the Oxford Enzyme Group, the Scientific Council of ILL, Grenoble and the British Association. He particularly enjoys lecturing to young people. Professor Phillips has kindly supplied the following abstract of his lecture which is entitled 'Macromolecular Architecture' and will be given in the Lecture Theatre at 15.15 on Thursday 8 May.

Protein molecules are naturally occurring polymers made from twenty different kinds of α-amino acids that are joined by peptide bonds to form long polypeptide chains. Typically, an enzyme molecule may comprise 300-400 amino acid residues. X-ray analysis is revealing the three-dimensional structures of such molecules in increasing detail and is showing how they interact with one another and with other molecules.

The precise chemical formula of each protein is encoded in the genes and no other information is needed for a protein to adopt automatically its unique three-dimensional structure when placed in the appropriate environment. Progress is now being made in attempts to predict the three dimensional structures of protein molecules from their chemical formulae.

EXPLOITING BRAZING IN PRODUCTION

The Welding Institute are organising a two day seminar in London on 13 and 14 May 1975. entitled "Exploiting Brazing in Production". The seminar will be of value to all engineers, designers and metallurgists who wish to ensure that they are in a position to assess the value of brazing as an alternative method of assembly and who wish to obtain an up-to-date appraisal of modern brazing technology and practice.

Immediately following the brazing presentation, there will be a one day seminar on 'Adhesive Bonding' at the same venue. Further details from Training Section, R20, Ext. 266.

LOCAL SUGGESTIONS AWARDS

At the 13th meeting of the Local Suggestions Awards Committee held on 5 March, the following awards were approved.

Mr M A W Keep	Admin	R59	£10
Mr G Rouse	"	R2	£10
Mrs C M Bradley	ACL		£5
Mr P A Ashman	Engineering	R9	£5
Mr J B Child	"	R18	£5
Mr R P Hogan	"	R9	£5
Mr D D Abbley	Nimrod	R2	£5
Mr C R Brown	"	R6	£200 - see page 1
Mr A S Castle	"	R2	£5
Mrs J A Coates	"	R2	£5
Mr B R Phillips	"	R3	£5
Mr G Render	"	R8	£15
Mr S N Watson	"	R2	£5
Mr B E Wise	"	R2	£5

THE ROYAL SOCIETY

Information is now to hand on the programme of meetings for May and June. Full details and abstracts of the papers to be presented at the May two-day, 'meeting for discussion' on A Review of the United Kingdom Contribution to the International Biological Programme, is also available from the Editor.

FILM BADGE NOTICE

Period 5 commenced Monday, 21 April Colour Strip - RED for βγ films. Please check that you are wearing the correct dosimeter and that all old ones are returned.

Six monthly TLD change for people with surnames commencing Q, R, S and T.

OVERSEAS VISITS

Dr C J S Damerell, to CERN and Amsterdam 28 April - 2 May, to give talk and work on S120 Experiment and to attend WA3 collaboration Meeting at Amsterdam.
Mr F F Freeman, to ILL, early May for 6 days to participate in experiment using D5.

SOCIAL NEWS

CHESS MATCH

The challenge match between the combined Harwell/Culham team and the RL/Atlas team resulted in a win for the 'cheeky' ones. At the end of the normal playing time the points stood at 4½ each. The unfinished game on Board 2 between Mike Elder/Atlas and Mike Duck/Harwell was given to the latter player. This decided the match in favour of AERE.

An excellent match and a very close result, especially as the opposition team had 5 county players on the top 5 boards.

PIANO RECITAL FOR CHRISTIAN AID

Tessa Birnie, an international concert pianist from New Zealand is giving a recital on Friday 2 May at 8 pm in the Abingdon College of Further Education. Details of programme and tickets are on the Restaurant Notice Board and in the AERE News.

CHRISTIAN FELLOWSHIP

2 May: All are welcome to join in a time of prayer led by Terry Adams of Bldg R12 at 12.30 in the Conference Room, Bldg R12.

9 May: What do Muslims believe? Do they believe in life after death or the eternal damnation of non-believers? Derek Smaje of Bldg R18 will attempt to answer these and other questions at 12.30 pm in the R12 Conference Room, in the third of a series on the Mohommedan faith.

PROPOSED VISIT

A trip is being planned to the Old Time Music Hall at Bradford. If anyone would like to go (or just use the coach for a personal visit to family or friends) please let Valerie Goodwin, SRC-R1, Ext. 6256, know in plenty of time so that a coach may be booked. The cost for the coach should be about £3 per head. A half-day trip to York and the moors on the Sunday is proposed as an alternative to spending the day in Bradford. The date will be: 4th October (leaving approx. 10.0 in the morning) and returning 5th October (leaving Bradford at approx. 5.00 in the afternoon).

FOOTBALL

Recent results and forthcoming fixtures as below.

RESULTS

Nomads	1	RRD	3	459	0	RRD	6
C & A	2	Taylors	1	Transport	9	Toxic	0
Nomads	1	RHG	2	R25	1	Atlas	1
353	6	Atlas	1	RRD	6	RHG	0

FIXTURES

W/C 28 Apr.		W/C 5 May	
Tues.	Nomads v 459	Mon.	Admin v R25
Wed.	App v RRD	Tues.	Admin v Rovers
Fri.	App v RHG	Wed.	RRD v Toxic
		Thurs	C & A v Atlas
		Fri.	Trans v Nomads