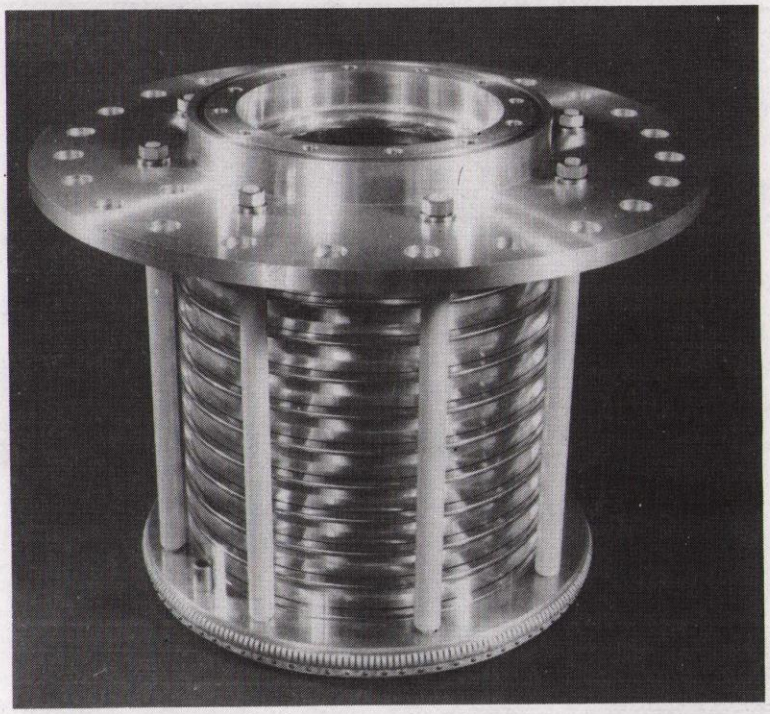
Bulletin
of the Rutherford and Appleton Laboratories 11 May 1981 No. 8.

Computer Aids Laser Design

The most complex electrical components of the New Gas Laser, 'Sprite', have been designed with the help of a computer program.

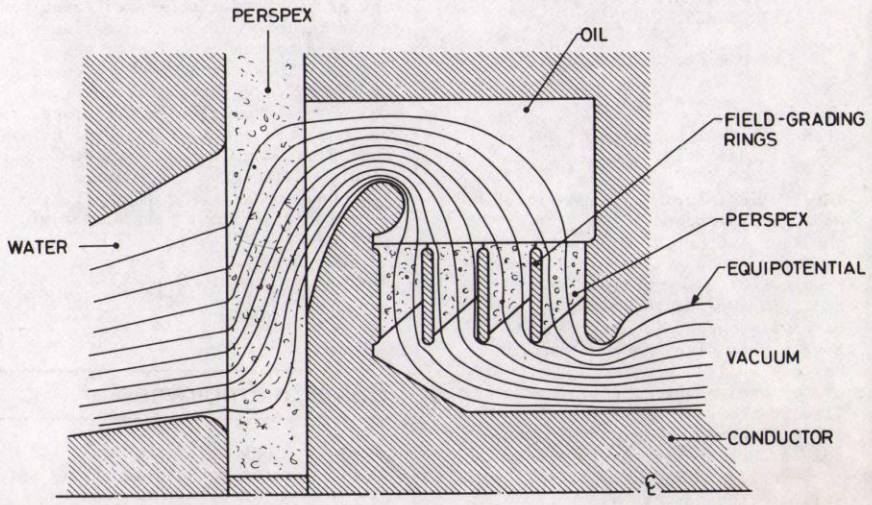
'Sprite', which is to be the subject of a future bulletin report, is a pulsed gas laser, pumped by extremely energetic electrons, and when fully operational will be one of the most powerful lasers of its type in the world. It is being built by the Gas Laser Development Group, and marks a large step forward in both gas laser and pulsed power technology. Using the computer program PE2D, in close collaboration with the Computer Application Group, it has been possible to analyse the electrical characteristics of the most complicated assemblies in Sprite where conventional methods are inadequate. This includes the output busing or insulator (see photograph), the high-voltage (1 mV) gas switches, the transmission lines, and the electron-beam diodes.



One of the four high voltage insulators. The top flange is held at earth potential and the negative voltage is applied to the bottom of the column. The assembly is evacuated, and the output is taken from a stalk which passes through the centre of the stack. 27442

The Computer Program

PE2D is one of the most recent computer programs developed by the Technology Division for the analysis and design testing of magnets, electrical machines, and electrostatic devices. Originally the work was intended for use within the Laboratories for magnet design, but more recently, electrical engineering departments in several universities along with other divisions at RAL have made use of the computing capabilities of the Computer Applications Group for the design of generators, motors, and electrostatic devices. As a further example, the diagram shows the simulation of the Electron Beam Micro-Fabricator (EBMF) lens as used by the Electron Beam Lithography Facility.



Electrostatic plot of the insulator. The effect of the metal grading rings (shaded) has been studied using the computer program.

INTERNAL Events

HEP SEMINARS
R61 CONF. ROOM - 1100 hrs.

20 May — Dr P Landshoff/Cambridge
'Nonrelatavistic Wave-functions in Relatavistic Physics'

NIMROD LECTURES
R61 CONF. ROOM - 1400 hrs.

18 May — Dr G Wolf/DESY
'Title to be announced'

EXTERNAL Events

NPD COLLOQUIUM
CONF. RM. H8 - HARWELL - 1530 hrs.

14 May — Dr L G Earwaker/Birmingham
'Materials Analysis using Nuclear Reactions on the Birmingham Radiation Centre Dynamitron Accelerator'

THEO. PHYS. SEMINARS
TPD LECTURE TH. - HARWELL - 1400 hrs.

12 May — Dr J D Speight/Post Office Research Centre.
'Title to be announced'

19 May — Dr J Sinclair/AERE
'Acoustic Emission Source Determination'

PHYSICS COLLOQUIA
CLARENDON LAB - OXFORD - 1615 hrs.

15 May — Prof. R Weinstock/Oberlin College, Ohio.
'Dismantling a Centuries-old Myth: Newton's *Principia* and Inverse-square Orbits'

22 May — Prof. B Buras/Risø National Lab, Denmark.
'The Laue White Beam Diffraction in the Eighties'

THEO.PHYS.DEPT. SEMINARS
CLARENDON LAB - OXFORD - 1615 hrs.

14 May — Prof. L J F Broer/Eindoven
'Properties of Evolution Equations, with Illustrations from the KdV Equation'

HEP GROUP SEMINARS
CAVENDISH LAB - CAMBRIDGE - 1430 hrs.

13 May — P E L Rakow/Cambridge
'Report on the Oxford Conference on Particle and Nuclear Physics'

20 May — S Wada/Cambridge
'Some Topics in Perturbative QCD'

PART.PHYS.DISC. GP MEETINGS
BIRMINGHAM - 1615 hrs.

15 May — Dr D M Scott/DAMPT
'Weak Boson and Heavy Quark Signatures'

PHYSICS COLLOQUIA
HH WILLS LAB - BRISTOL - 1700 hrs.

18 May — Prof I F Silvera/Amsterdam
'Spin Polarised Hydrogen: a New Superfluid'

RL Colours

The next lecture in the series will take place in the Lecture Theatre on Thursday 21 May at 1515 hrs.

'HOW TO BE A PHYSICIST - AND LET OTHERS ENJOY IT.

A Demonstration Lecture
by
N KURTI

Department of Engineering Science
University of Oxford

The public image of the physicist has undergone a marked change during the last two or three decades. The temporary euphoria stemming from promises of cheap nuclear energy and from some of the pleasing results of physics-based industries gradually gave way to disenchantment and it has become fashionable to lay most of the unpleasant aspects of modern life at the door of the scientists and engineers. Physicists have to some extent themselves to blame; they rarely apply their professional skill to the agreeable aspects of life. And yet there are so many ways in which physicists can enrich even purely sensual pleasures, for example the pleasures of the palate.

The lecture will give several examples, illustrated by experiments, of the applications of physics in the kitchen and will indicate how new or hitherto little-used processes can stimulate culinary invention and lead to the creation of new dishes. There is however no question of trying to dethrone the chef and to put the physicist in his place. Culinary creations will always be as they have been in the past the result of artistic imagination seasoned with a blend of empiricism and tradition - but only a dash of physics.

Sales to Employees

Sales of scrap metal/plastics as set out in RLN 12/73 will be made on 22 May.

The sales will now take place at the rear of R24, NOT as previously, the rear of R40. The times remain the same, 1200-1230 hrs.

Film Badge Notice

It is PERIOD 5 Colour Strip ORANGE.

Please check that you are wearing the correct film badge, and all old ones are returned.

NEXT FILM CHANGE
Monday 18 May.

Trade Exhibition

There will be a one-day exhibition by J J Lloyd Instruments Ltd on Monday 11 May in R12 Conference Room. All concerned with fields of electrical measurement, recording and calibration and/or materials testing are welcome to this exhibition of UK manufactured equipment. The exhibition will be open from 10.00 to 16.00 hours.

Philips Electronic Instruments will be exhibiting from their test and measurement range on Wednesday 20 May between 10.00 and 16.00hrs in R12 Conference Room. Instruments on show will be logic analysers, oscilloscopes including their recently announced digital storage oscilloscope, multi-meters, counters, generators and micro-development systems.

'Computer Aid' *(cont'd from p1.)*

PE2D was originally written in 1977 as an experimental program for investigating methods for solving magnetostatic field problems. The range of methods included in the program has enabled its development into a general purpose package for a wider class of problem. Time dependent electromagnetic fields can also be solved. As its name suggests, PE2D is limited to two dimensional problems, but rotationally symmetric cases can be treated. The program has a sophisticated data generation and result retrieval section, which uses colour graphics to enable the user to ensure that data is correct before embarking upon the more expensive analysis routines. After analysis, the graphics again help the user to obtain an immediate impression of results. The program will also display many derived quantities which the designer desires, obtained from the field solution.

Code Development

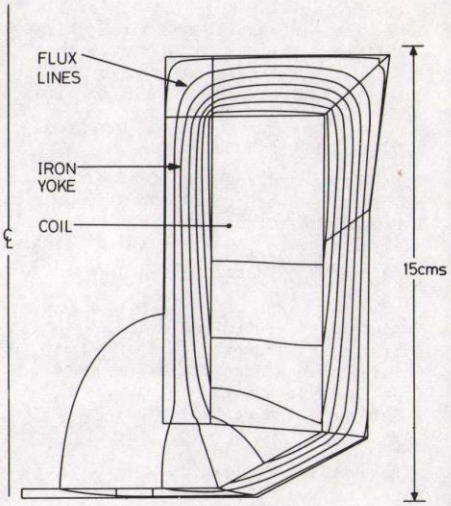
One of the main advantages of the computer approach to the field plotting problem is the possibility of optimising the electrical design of components on the computer, thus reducing expensive and time consuming development work in the laboratory; the ability to modify conductor profiles, for example, and to see immediately the effect of the changes made, was most important in the case of the insulator described above.

It was found, however, that the method of inputting the physical details of the problem to be solved was so laborious as to make interactive design work almost impossible. As a result, the code has now been modified to include a cursor input mode from graphics terminals, and this has greatly simplified the input of data.

A further development of the code arose from the need to include electrically 'floating' conductors in the simulation; an example of this is the grading rings used in the vacuum insulator, which take up a potential determined by their stray capacitance to other charged parts of the system. The code was unable to treat such cases directly, since each conductor is required to have a defined potential for data input. The solution to this problem is to replace floating conductors by insulators with extremely high dielectric constant (typically 10,000). This has the effect of excluding electric field lines, as a conductor would, and the potential of the region can be obtained directly from the equipotential which follows the boundary of the region. This technique has greatly enhanced the scope of the code for electrostatic problems, with no modifications to the actual code.

The program PE2D is available on the Interactive Computing Facility, and to industry world-wide through Compeda Ltd.

Further information can be obtained from Chris Biddlecombe (Technology Division) and Chris Edwards (Laser Division).



Magnetic field plot of the EBMF lens. Electrons enter the lens close to the axis of the lens, and are brought to the required focus by the magnetic field.

Obituaries

Mrs Leona Cooke

Many of us lost a great friend when Lee was tragically killed in a car accident on 25 April. Her brother-in-law, Lance Corporal Christopher Cooke, who was with her in the car was also killed. She was only 33 years old.

The sense of loss is all the greater because she had been so full of life. As a secretary in HEP Division, with J J Thresher and later Chris Damerell, her charm and tact kept a hundred and one people happy. However great her load of work, she would always stop to sort out the most confused and ill thought out requests for help, and her sympathy, generosity of heart, and understanding were a constant support to those who worked closely with her.

She leaves many friends also, in her social life - at Yoga, squash and as national finalist at bar billiards. Her liveliness and lightness of heart were exceptional; and she will be greatly missed.

Our deepest sympathy must go to her husband, Frank, and son, Richard, in the shock of this sudden and unexpected bereavement.

Mr H G Windless

We are also sorry to announce the death of Bert Windless who died on Tuesday 21 April after a long illness patiently and cheerfully borne.

Bert came to R2 Workshops in June 1975 and after training as a rigger was appointed chargehand within a year. When Nimrod closed down in 1978 he was in charge of one of the 'heavy gangs' which were the mainstay of the dismantling and disposal exercise. After a year off work due to his illness Bert returned to work in August 1980 and played a very large part in setting up a new lifting tackle store which has enabled SNS Division to use the hundreds of items more efficiently and economically. He will be very much missed by everyone.

We offer our sincere sympathy to his wife and family.

Mr R W Wimblett

It is with the deepest regret that we report the death of Ron Wimblett on Wednesday 22 April. Ron, who was the senior engineer with the Target Group of the SNS project, was well known and well liked through the Laboratories. He will be sadly missed by all his friends and colleagues.

We extend our deepest sympathy to his wife Mary, and to his family.

In Memoriam

So many people have wished to show their respect and love for Lee Cooke that donations in memory of her are still being received. We felt that in her son, Richard, we have our best memorial and so will use contributions for his benefit.

Please contact Kay Knight on Ext 6602/507 or Clare Philpot on Ext 248 if you wish to know more.

Indoor Sports Day 1981

This was a splendid day for the Chilton teams with a clean sweep of all nine events. Mind you, there were 160 of us taking part in the occasion, held at the Oasis Sports Centre, Swindon.

BADMINTON MIXED DOUBLES

A triumph for Kay Knight. This was her third win running, each time with a different partner. This time it was Tony Short. We await with interest to see who she turns up with next year.

BADMINTON MEN'S DOUBLES

Dave Wooton and Roger Wolfenden again proved too good for the opposition. This was their third win in 4 years. They were taken to 3 sets in the final by A Stevens and J Denly.

BRIDGE

To outsiders a puzzling event, with calls of 'No Trumps'. '3 Spades' etc echoing around, and players moving from table to table. B Martin and W Bain were the eventual winners.

CRIB

A triumph for the ladies! Barbara Powell's partner did not arrive, so Mrs Forster, who had come only to watch Ian Forster play darts, agreed to stand in - and they ended up winners, beating Jack Akhurst and John Ball.

35538

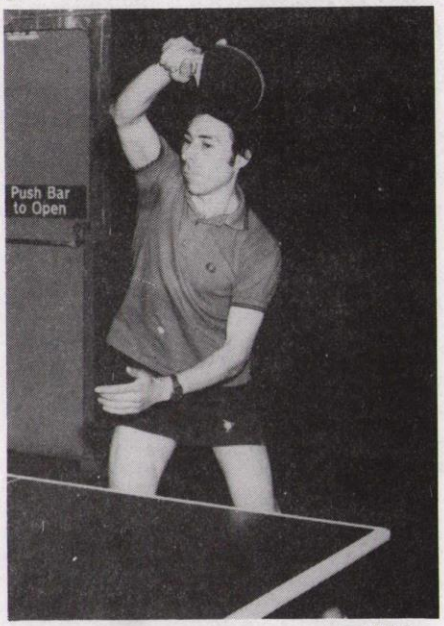
'Concentration' - Craske & Hemming

CHESS

The usual mind scrambling games at 10 minutes per game produced some exciting games with nail biting finishes. After all the clocks had stopped ticking Peter Hemmings had won, beating Asoke Nandi in the final.

DARTS

A very popular event. We fielded 8 teams (4 'Rutherford', 3 'Atlas', 1 'Appleton'). 'Rutherford B' reached the final against Central Office, a battle which A Forster, P Angel, R Mills, R Wyatt and T Morgan clinched for us in the deciding game.



'Action' - J.Spencer 35532

SQUASH

This year again it was a hard tournament for the mixed teams with the favourites 'Appleton A', Mr & Mrs T Dunwoody and R Holdaway meeting 'Rutherford A', F E Close, W Johnson and Susan Stewart in the final with 'Appleton' winning 2-1.

TABLE TENNIS

This tournament took longer than expected and the final play-off between 'Rutherford A' and 'Atlas A' could not be completed. Sportingly both teams agreed to share the cup. The Atlas Team was Eric Thomas, Tim Pett and Peter Kent, and playing for 'Rutherford A' were Arthur Chilvers, John Varley and M Howard.

VOLLEY BALL

This event was won by 'Appleton A' who were by far the best team of the day. Rutherford's two teams just hadn't had enough practice to upset Appleton's supremacy.

It was an enjoyable day for all, and the evening's disco and supper rounded off the event happily.

Sid Axford Retires

Sid Axford, the man who supervised the construction of the IRAS antennae, retired today - Thursday 30 April after 26 years on the Harwell and Chilton sites.

We're not sure if the IRAS episode was a highlight of his career, but it certainly impressed us! Quietly he will tell you, 'it was a challenge'. The structure arrived as a giant meccano set (minus instructions) plus a set of photographs. From this Sid and his stalwart band, with only experience to guide them, did the job without mishap and to schedule.

35550

Sid served his apprenticeship in Bath with W G Walters in electrical and mechanical repairs. After serving with H. M. Dockyard, Chatham during the war, he returned to Bath to rejoin his firm. In 1951 he joined the Avon Rubber Company at Melkesham. In 1955 he came to Harwell, transferring to NIRNS to work on the PLA and Nimrod before joining Engineering Division in 1968.

"I have always had a high opinion of Sid," said Roy Tolcher who was performing the farewell ceremony. "He knows his stuff and does a good job. Thank you Sid for all the good work you have done," he continued. 'On behalf of the Labs and your many friends and colleagues, I wish you and your wife a long, happy, healthy retirement. As a mark of our esteem please accept these gifts and card. You'll notice it has a few reminders on the front - by courtesy of Barry Childs."

The gifts turned out to be a slide projector and a beautiful model of the hydraulic press Sid had presided over for many years.

Sid thanked everyone for the delightful mementos and for their friendship and help. He had enjoyed his time at the Labs. He had arrived when the PLA was the only building on site - things had certainly changed. "Thank you all again" he ended "and good luck to everyone for the future."

Bulletin

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