

Bulletin

of the Rutherford Appleton Laboratory

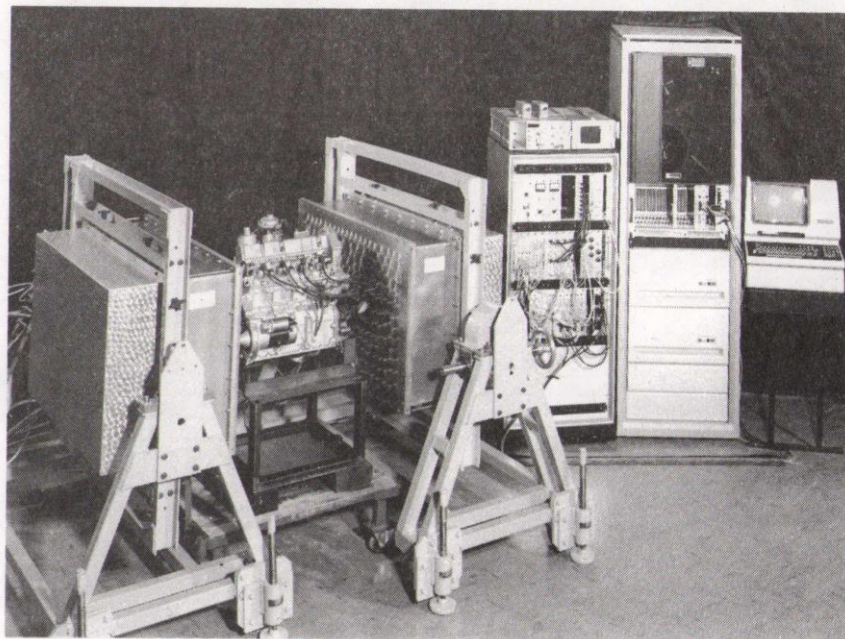
30 Mar 1987 No. 4

The RAL Positron Camera

Positron Emission Tomography (PET) is now a well established and powerful technique for the study of metabolic processes in the living human body and has already been responsible for rapid progress in the understanding of many diseases such as Parkinson's disease which are metabolic in origin. Modern conventional PET scanners use multiple rings of sodium iodide or bismuth germanate scintillation counters to detect the annihilation gamma rays from the positron emitting isotopes which label significant molecules within the tissue of the patient. The RAL positron camera works rather differently by providing two very large, position sensitive MWPC gamma ray detectors, one on either side of the patient. This has the advantage of being considerably cheaper than arrays of scintillation counters and of providing exciting 3-dimensional reconstructions. Industry Year has seen significant steps in the process of using our technology to translate PET out of pure research studies into practical applications in clinical medicine and industrial non-destructive testing (NDT).

The RAL positron camera has now been under development for some ten years, first in collaboration with the MRC Cyclotron Unit at Hammersmith Hospital and later with the Physics Department of the Royal Marsden Hospital at Sutton. Much successful work was done with the Mark I instrument (30 cm x 30 cm aperture) before the granting of a CASE award to the Physics Department of Birmingham University to study the application of PET to industrial NDT, permitted the production of the Mark II device. In addition to many detailed improvements (particularly in the electronics) this offers an active area of 60 cm x 30 cm with the same spatial resolution and about four times the sensitivity of the Mark I device. Two such systems have been commissioned, one in the hands of the Royal Marsden Hospital and the other in the hands of the Birmingham University/Rolls Royce/Burmah Castrol collaboration.

The most exciting positron isotopes for metabolic studies are cyclotron-produced and very short-lived. The cost and consequent non-availability of cyclotrons has effectively stifled



The Mark II positron camera with an internal combustion engine in position for study. In the background are the LSI 11 computer and the electronics rack.

the application of PET in routine medical practice. However, the increasing availability of positron isotope generator systems (eg $^{68}\text{Ge}/^{68}\text{Ga}$ combined with the high sensitivity and low cost of the RAL positron camera make routine clinical use a real possibility. Our colleagues at the Royal Marsden Hospital are working hard to demonstrate the viability of the system in practice and the first patients are scheduled to be scanned within a few weeks. Depending on the success of the forthcoming trials there is strong evidence of a commitment to develop a commercial product in the medium term future. At the same time Oxford Instruments is developing a "cheap" bench-top superconducting cyclotron for medical use which will require a "cheap" PET system to complement it. The RAL system could well fill this role.

The industrial NDT application of the positron camera involves the tracing of ^{68}Ga labelled lubricating oil-flows in the very hostile environment of the inside of a running internal combustion engine. The design of the Mark II device was considerably

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"ruggedised" to cope with the accompanying noise and vibration. Currently a test is in progress involving a Rolls Royce jet engine and a future test is planned to study the movement of a radio-labelled pebble in a fluidised bed furnace.

Considerable development potential still exists within the positron camera technology and work is in hand to improve the sensitivity by a further factor of five and the data rate capability by a factor of ten. Such improvements will open up the areas of potential application even further. However, the funding of a Mark III system will almost certainly depend on the perception of a commercial future arising out of the success of the test programmes of the current year.

J E Bateman

RAL Lectures

The next lecture in this series will take place at 3.15 pm on Thursday 9 April in the R22 Lecture Theatre.

"FOSTERING SERENDIPITY"

by
Dr D W Braben
The Venture Research Unit
BP International

Much of today's industry is based on remarkable and unpredictable discoveries made only a few decades ago when scientists were generally allowed full rein to their creativity. However the traditional funding organisations today tend to limit the intellectual freedom of researchers and to restrict the types of research that may readily gain support. It will be argued that this policy is flawed, and gives advantage to many of our national competitors. An alternative approach to the selection of basic exploratory research will be described, which should be of interest to all natural scientists and engineers who would like to do something new.

Missing

The following item is the subject of a loss report. Please give any relevant details to Ken Hartley Ext. 5736.

20" Pye colour teletext receiver removed from R32 in early December.

Would the person who borrowed the following books, please return them to John Gilbert, R25, Ext: 6530.

'ARRL Aerial design handbook'

'IEE Antenna design handbook'
Vols 1 and 2.

Mike Hapgood would like the return of a chemical balance and a German Field telephone, World War 2 vintage, which have disappeared from B.M3 in building R3.

These instruments are of historical interest being connected with the past of the old Appleton Lab.

Any information that would help us trace these relics, would be welcome by Mike, Ext: 6520.

Christian Fellowship

Meetings of the Fellowship are held in the R2 conference room at 12.30 pm every Thursday.

Visitors are very welcome.

APR. 2 Speaker: Bible Society
Peter Roslyk
9 Prayer Meeting Grace Brown
16 No meeting
23 Easter Thanksgiving
Frank Smith
30 Tape presentation
Trevor Lucas

Indoor Sports Day

Another event has come and gone and, as usual, it was well supported from RAL. Participants and sportsmen from the Lab (about 180 of them) had an enjoyable day at the Oasis Sports complex in Swindon and came home with six trophies, though not the same ones they went with.

RAL successfully defended the Men's Badminton, Table Tennis and Bridge, adding to these the Darts, Crib and Volleyball.

On a sadder note, it was the first time ever that we were not represented in the Squash Tournament. Let us hope that will be put right next year.

It was also the first time ever RAL won the Volleyball. As runners-up in last years competition against Central Office, it must have been doubly sweet for RAL's team to beat them in the finals this year.

In the Chess Tournament a very high standard of play resulted in an absorbing competition. The strong RAL players soon found out that Central Office had found an equally good, and, in the end, better player than all of them. And whilst the RAL players were busy beating one another, Shaun Culkin of C.O. was winning; dropping only $\frac{1}{2}$ point all day.

P Craske

CRIB

After the initial shock of finding themselves playing in a far corner of the Oasis between the Volleyballers and those playing "Badders", the four leagues of crib players soon started playing down to the semi-finalists; Stan Gavigan and Tom Hinde from Central Office, and Tony Kershaw/Collin McKewan, Jonathan Goldstone/Simon Quirk and Rob Hamblton/Vernon Jones from RAL. In the end Rob and Vernon collected the trophy - Rob (we are told) fresh from his effort in the synchronised swimming.

S Hancock.

Trade Exhibition

BICC-VERO Electronics Ltd will be exhibiting their products from 1000-1600 hrs on Monday 6 April in the lay-by outside R20.

On show will be, card frames, enclosures, desk-mounted cases, circuit boards, power supplies, VME microrack and active card connectors.

Internal Events

ASTROPHYSICS EVENTS
R61 CONF ROOM - 1400 hrs

1 April Dr J Murray/RAL
'Interstellar medium abundances'
15 April Dr C Jordan/Oxford
(Title to be announced)



Tudor Morgan accepts the Darts shield from Professor Mitchell.

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DARTS

RAL won the darts competition with the team of Tudor Morgan, Stan Buckel, Eddie Smith, Don Thomas and Bill Hall, otherwise known as RAL 'A'.

Round 1 of the competition was played in three leagues, RAL 'A' winning their league (with the help of Atlas 'A'). RAL 'B' almost beat RGO and RAL 'C' did well but lost to Daresbury.

With only three leagues, the Final was played as a round-robin. Daresbury won their game against RGO, RAL beat RGO 4-1 and finally RAL emerged victors over Daresbury by 3-0. This game was a cracker, with Tudor, Stan and Eddie throwing some very good darts, with quite a few 100 plus scores.

T Morgan.

Film Badge Notice

It is period 4 Colour strip YELLOW.

Please be sure you are wearing the correct dosimeters. The last issue should be returned to Jenny Coates promptly.

Sales to Employees

The sale of scrap materials will take place on 3 and 24 April from 1200-1230 hrs in the R24 scrap compound.



87 RC 2007



87 RC 2012



87 RC 2013.



87 RC 2014



87 RC 2006

Badminton winners Alan Stevens and Richard Lawrence receive their cup from the Chairman. (top left)

Jaap Hoek and Alan Bryden winners of the Bridge Tournament. (middle left)



87 RC 2009

SERC Chairman, Professor Bill Mitchell surrounded by RAL's volleyball team. (from 1 to r) Alex Kostic, Bill Hewit Nigel West, Paul Warke and Bob Young with Sarah Corderoy and Ann Oxley and the cup. (top right)

Tudor was also awarded the Sir Geoffrey Allen Award for outstanding work for the RecSoc during the past year. (above left)

Peter Kent receives the Table tennis trophy from Bill Mitchell watched by team mates Mike Headlund (right) and Mark Adams. (middle right)

The crib trophy being accepted by Vernon Jones and Rob Hambelton. (above right)

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Four down -----

Off to the Soudan iron mine, Minnesota, USA - four of the 5 tonne modules being built at RAL, 256 of which will make up the massive SOUDAN II proton decay experiment.

Each module is designed to detect the tracks of particles formed by proton decays occurring in the 1000 tonnes of steel from which they are made, giving scientists another clue to the origins of the Universe.
(See Bulletin 18 Feb 1985)

The modules, scheduled to come off the production line at the rate of 2 per month, will be installed in an underground cavern at the mine where they will be shielded from external events.

Soudan II is also scheduled to 'star' in an ITV programme "The Cutting Edge", to be shown at 7 pm on Monday 29 June.

Making sure they arrive in peak condition are (from top left clockwise) Tom McCullough, Martyn Belton, John Carter, Dave Cockerill, Vernon Edwards, Phil Nash and Roy Bell.



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Right on cue,

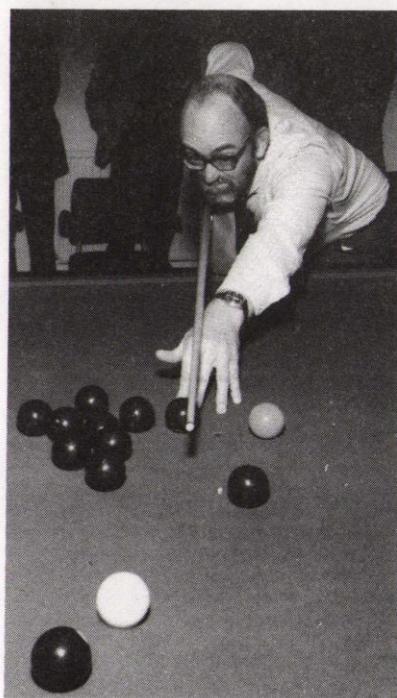
Making a break from his usual duties, RAL, acting-Director Paul Williams tests the facilities of the new RecSoc Snooker Room, where, playing against club Chairman Jack Wyatt, he showed that he hadn't entirely misspent his youth.

So delighted was he with his "Opening" game on Friday 13 March that he immediately asked to be put on the club's waiting list and suggested a Laboratory Knock-out Competition for which he would present a cup.

The Snooker Room is just part of the latest update of the RecSoc complex. The Bar lounge has been extended, and a patio should be available for summer relaxation.

Tudor Morgan, RecSoc Chairman, took the opportunity of the ceremony to thank all who had helped to provide the new facilities.

Special thanks were due to former Director Geoff Manning and to Engineering and Building Works Division, he said, "for a building we can be proud of".



87RC 2056.

Barn dance club

Due to the falling attendances, the Barn Dance club took a break during the winter.

Now we resume meetings in the RecSoc building on Tuesdays at 12.30 pm, starting on 31 March.

Dancing is aimed at novice and experienced dancers alike, is led by regular local caller Mike Courthold, and the emphasis is on FUN.

Musicians are always welcome to join the band.

For further details and/or information concerning local folk events, contact Mike Courthold Ext 6462.

Thanks

Gordon Bowles thanks all who organised and attended his retirement "send-off".

"It was really most impressive", he writes. "Please convey our thanks and appreciation for their good wishes and excellent presents, including the pot-plant."

Bulletin

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Deadline for insertions: