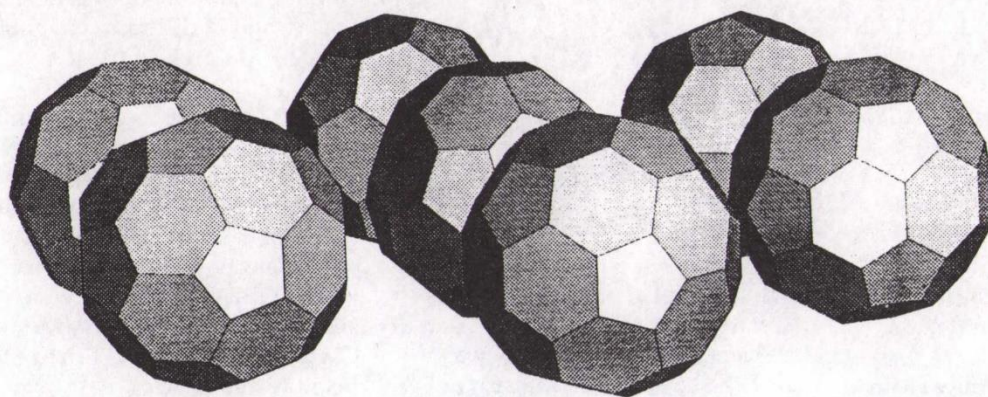


# Rutherford Appleton Laboratory Bulletin

Acting Editor Jacky Hutchinson

March 1992

## New Carbon Discovery



**We are all familiar with the two crystalline forms of carbon. Diamond is the hardest element, carbon atoms being arranged as rigid tetrahedrons. In graphite, sheets of carbon atoms slide easily over each other, making it a good lubricant.**

Now, to everyone's surprise, a completely new form of carbon has been discovered and scientists from RAL and the University of Sussex have examined its structure using ISIS instruments. Although its existence has been known for over six years, it is only recently that sufficient quantities have become available for analysis. In its most common variety the carbon atoms form spherical molecules, the atoms being arranged in hexagons and pentagons like the panels on a football. The most extensively studied molecule has 60 carbon atoms and is known as  $C_{60}$ , but

spheres containing different numbers of atoms have also been detected. They have been given the name buckminsterfullerene (or 'buckyballs' for short) after the architect Buckminster Fuller who pioneered the building of geodesic domes such as the Munich Olympic Stadium. At ISIS the versatility of the neutron has been used to probe the structure and properties of  $C_{60}$  itself and the more complex alkali metal-doped  $K_3C_{60}$  and  $Rb_3C_{60}$ .

$C_{60}$  is a fascinating material. At room temperature all the  $C_{60}$  molecules are spinning freely. The SANDALS instrument has shown that, at  $-13^\circ\text{C}$ , this random tumbling stops. Each  $C_{60}$  molecule spins about a fixed direction, though this direction is different for different molecules. (This effect was first observed from analysis of HRPD data.) Below  $-183^\circ\text{C}$  all spinning stops and the frozen configuration has a rather unexpected and beautiful symmetry resulting from a competition between graphite-

like and electrostatic bonding. The presence of electrostatic bonding means that  $C_{60}$  can never be used as a lubricant but its derivatives may be used in superconducting applications.  $Rb_3C_{60}$  superconducts at significantly higher temperatures than conventional superconductors and does not suffer from the two-dimensional nature of high-temperature superconductors. Experiments performed by the University of Sussex on the TFXA instrument have shown that  $C_{60}$ 's superconducting properties more closely resemble those of conventional superconductors.

Further experiments are planned on other doped  $C_{60}$  compounds and on the rugby ball-shaped  $C_{70}$ .

Frances Edwards has been away for several weeks. In her absence I have been acting as editor of the Bulletin.

Jacky Hutchinson



## Dr Gerry Pickavance

As recorded in the December issue of the Bulletin, Dr Thomas Gerald (Gerry) Pickavance, founder Director of this Laboratory, died peacefully on 12 November 1991 aged 76. Dr Pickavance was born in Lancashire in October 1915 and graduated with honours in physics from Liverpool University in 1937, obtaining a doctorate three years later. He stayed at Liverpool University during the war, working in the Physics Department with Nobel Laureate Sir James Chadwick. In 1946 he joined AERE, Harwell, which was then directed by another great physicist and Nobel Laureate Sir John Cockcroft, to be Head of the Cyclotron Group. Under Dr Pickavance's direction the Harwell cyclotron was constructed and established as a facility for nuclear physics studies related to the atomic energy programme. At Harwell he progressed to be the Head of Accelerator Group and Deputy Head of General Physics Division. He was also much involved in the plans to set up the new high energy physics laboratory, CERN in Geneva.

In the 1950's plans for providing world-class research facilities for the university nuclear physics community. The National Institute for Research in Nuclear Science (NIRNS) was set up in 1957. The obvious choice as Director of its first national laboratory was Dr Pickavance, so he moved over the fence from Harwell to Rutherford



High Energy Laboratory. This was the start of the most influential part of his scientific career. His task was to build and commission the proton linear accelerator (PLA) and the 7 GeV proton synchrotron NIMROD.

In his 12 years as Director Dr Pickavance realised one of Sir John Cockcroft's war-time dreams, an open laboratory devoted to the study of fundamental nuclear physics. In Rutherford Laboratory he created first-class facilities dedicated to providing a service to researchers in universities around the United Kingdom. He strove to make the Laboratory an extension of the researchers' own laboratories.

In 1969 he was appointed Director of Nuclear Physics of the Science Research Council. This allowed him to play an even more vigorous part in the UK's involvement in European nuclear physics. Sadly, his career came to an untimely end when, at the age of 57, he was taken ill with pneumonia followed by a stroke which left him partially paralysed and seriously affected his speech. However this did not impair his enthusiasm for life nor his interest in science and RAL and he continued to have a wide circle of friends.

Gerry Pickavance received many honours during his career. In 1965 he was awarded a CBE for services to science and in 1968 he was made a fellow of St Cross College, Oxford by special election. He was elected Fellow of the Royal Society in 1976 and three years later was awarded the Glazebrook Medal and Prize of the Institute of Physics.

His funeral took place on 18 November at St Nicolas' Church, Abingdon. All three subsequent Directors were present - Dr G Stafford, Dr G Manning and current Director Dr Paul Williams.

Dr Pickavance is survived by his wife, Lal, three children and 11 grandchildren.

## Good Neighbours for ISIS



On 17 December 1991 RAL's Director, Dr Paul Williams, and the Executive Director of the Australian Nuclear Science and Technology Organisation (ANSTO), Dr David Cook, signed a Letter of Intent relating to the use of ISIS for condensed matter research by Australian scientists.

*Dr Cook, Executive Director of ANSTO and Dr Williams, Director of RAL, signing the letter of intent*

It is anticipated that the Letter of Intent will be followed by a financial contribution to ISIS and Australian scientists will be able to use ISIS for a period of three years.

This is another step in the broadening international use of ISIS; through this agreement Australia will be the eighth country with a formal arrangement to use ISIS.



# New Year Honours

Congratulations to all members of staff who have recently received special recognition for the work they do at RAL. I am sure that this is not the complete list.

## New Professor

**Robin Marshall**, Particle Physics Department, has been appointed Professor of Experimental Physics at the University of Manchester. He takes up his duties in April.

Since 1978 he has led the Laboratory's research team working on the JADE and H1 experiments at DESY and now moves to head the Particle Physics Group at Manchester which is actively involved with the OPAL experiment at CERN, H1 at DESY and is preparing for the LHC project at CERN.

## Duddell Medal

Twenty years after pioneering work at RAL on superconducting filamentary materials, **Peter Smith's** work has been recognised by the Institute of Physics with the award of the Duddell medal and prize. He is honoured for the invention of the 'Rutherford Cable', comprising fine superconducting filaments embedded in a resistive matrix. Large particle accelerators such as the HERA experiment at DESY in Hamburg and CERN's LEP accelerator in Geneva depend on this cable.

Although originally conceived for fundamental research, these techniques have applications in other fields, most notably medical scanners which provide detailed diagnostic images of the interior of the body.

Peter is now developing a new experiment in fundamental physics to study the nature of unidentified 'dark matter' which permeates our Galaxy and might indicate the existence of a new type of sub-atomic particle.

## Apprentice Prizes

Two RAL apprentices were among the winners at the Harwell Apprentice and Laboratory Trainee Prizegiving ceremony recently.



*Robin Marshall*

**Damon Hogan** and **Daniel Beckett** received merit awards for first and second year electrical engineering respectively.

## Max Planck Prizes

Pioneering work at RAL on the development and exploitation of high power krypton fluoride lasers has led to an award for Professor **Mike Key** of RAL Central Laser Facility (CLF) and the Physics Department, University of Oxford and Dr **Mick Shaw** (CLF) along with Dr Keith Burnett, a fellow of St John's College, Oxford. The three have been awarded one of two prizes worth 200,000 DM from the German Max Planck Society and Alexander von Humboldt Foundation. The awards in physics are made for scientific work linking German scientists with foreign colleagues worldwide. The RAL/Oxford group was awarded the prize in recognition of past accomplishments in research and to encourage further cooperation in the study of the generation of ultra high power in ultra short pulses in the krypton fluoride laser. Their German colleague is Professor Fritz Schafer of the Max Planck Institut fur

Biophysikalische Chemie, Gottingen.

Krypton fluoride lasers are being developed as an alternative to neodymium glass lasers in the generation of the brightest laser beams in the ultraviolet spectral region because of their advantages of higher efficiency, better beam directionality (brightness) and lower cost. CLF's work on these lasers is the basis for a new machine called Titania which is under construction at RAL. When Titania becomes operational in four year's time it will be the world's most powerful krypton fluoride laser.

Two senior Professors from Glasgow and Germany have received a Max Planck Research Award in recognition of their accomplishments in research in the field of Gravitational Wave Detectors. It is recognised by the recipients that many people have played a significant part in this research, including **Roger Bennett, Ian Corbett, Justin Greenhalgh, Jim Hall** and others at RAL.

## NASA Award

Members of the ROSAT spacecraft instrument team have been awarded the NASA Group Achievement Award for their outstanding contribution to this important national project. The wide field camera on ROSAT surveys in the largely uncharted extreme ultra violet wavelength and was developed entirely within the UK by a consortium of UK universities and RAL. Sixteen of the 45 UK Awards, which took the form of framed certificates, came to RAL staff. Congratulations to **Martin Courtier, Roger Emery, David Ewart, Jock Gourlay, Alan Harris, Barry Kent, Jim Pateman, Doug Reading, Tony Richards, Martin Ricketts, Eric Sawyer, Brian Stewart, Bruce Swinyard, Darryl Taylor, John Wright** and **John Yates**.



# New Year Retirements

## Tony Lubbock

Adrian Wheldon presented Tony Lubbock with a Black and Decker Workmate (Tony's plan WAS to take things easy!) and a bottle of Christmas cheer on his retirement.

Tony started work in Chatham Dockyard as an electrical fitter apprentice and his career included a spell at the Met Office and Culham Laboratory. He joined NIRNS in 1964 and became Duty Officer for Nimrod and later helped when it was dismantled in the late '70s. He worked on ISIS for a few years before a final move to Informatics Department.



*Adrian Wheldon, Tony Lubbock and wife Joyce with gifts and flowers.*

## Other Retirements

Farewell also to the following who retired in December and January: Keith Bellinger (Science), Arthur Braham (Technology), John Chicken (RCRU), Bill Doyle (EBW), Ted Gourley (EBW), Ian Kilvington (PPD), Lyn McPherson (Admin), Anne Steer (Technology), Marion Roberts (Admin) and Bert Thompson (Technology).

We send our best wishes to all those who have left us recently and hope that they have a very happy retirement.

## Jim Hall

'Jim worked on 5 of the 6 major astronomy projects of the 20th century', commented Gordon Walker at Jim Hall's retirement presentation 'and he is respected world wide by the astronomical community.'

Jim's career, which started at Jodrell Bank, continued at Ditton Park and ended at RAL, included work on IUE, IRAS, JCMT, the Merlin Telescope and the Gravitational Wave detector.

Following an unsuccessful attempt to persuade management that he was too young to retire by shaving off his beard of 20 years, Jim now faces retirement, marriage, a house move and a new (part time) job. 'Almost all life's stresses in one go,' Jim commented. 'I have been very lucky to do work I really enjoy with colleagues I like. Thank you for the gifts, I have really enjoyed life at SERC.'



*Gordon Walker presenting Jim with his video editing console and Ray Roberts card.*

## Jean Banford



*Jean discovers the koala's secret treasure*

Conference Room 7 was packed with friends and colleagues gathering to say farewell to Jean Banford when she retired at the end of January. There were many bouquets for Jean, both verbal and floral. Bill Turner catalogued her many achievements and she received many floral tributes including one from Swindon Press.

Jean's achievements started in 1948 when she obtained six credits in eight passes on her School Certificate. She joined Scientific Administration Group at RAL in 1978 following a successful interview at the Crown and Horns over a pint! She was immediately given the task of editing and producing the Bulletin, a job she expertly carried out for ten years. In following years she took on many other tasks in the section, including exhibitions, press relations and publications. She also made a major contribution towards the production of the Laboratory Annual Reports, a point emphasised by Brian Jones who added a personal appreciation of Jean's work.

Jean thanked everyone for coming and for the gifts: a bird bath, book tokens, a framed RAL photograph and some spending money (hidden in a cuddly koala bear) for a trip to Australia to visit her sister.



# Training News

## Sponsorship

This year the Laboratory will be sponsoring a member of staff to participate in the Youth Leadership Award Programme, organised by Rotary International.

The course is to be held from 9 to 15 August at Rhos-y-Gwaliau Outdoor Education Centre, near Lake Bala. The course includes canoeing, orienteering, navigation and climbing. The training section is looking for a

suitable participant. If you are a permanent employee, aged between 18 and 23 and would like to attend, please submit a short essay explaining why you think that you would benefit from the course and why you should be chosen.

Please submit your entry by 31 March to Training, Room 2.21, R71.

## Forthcoming Events

Training Section are planning to run the following courses in March at RAL.

Presentation Skills Course  
Time Management Workshop  
Assertiveness Workshop

Details of the aims and content of each course are in the JTS Programme. If you are interested in attending any of these courses please contact Natalie Bealing (ext 6285, id NDB).

# Post-Christmas Rapping

Just to show that you can survive a management course, enjoy it and find it worthwhile, here is a 'Management Course Rap-Up'. It was written for the learning presentation of a Management I course held at The Cosener's House in July.

### MONDAY:

Well, we started off with all our hopes 'n fears  
Like the roof blowin' off or it all endin' in tears  
Then we had to draw a picture, or maybe a scrawl  
To show what we thought was the manager's role  
Yehh....

An' we had to learn how to think talk and listen  
Just to make sure there wasn't anythin' missin'  
An' don' be aggressive unless you damn well want to  
An' don' be passive 'less you...feel maybe you ought to  
Yehh!

### TUESDAY:

Tuesday brought problem-solvin' things we didn't know  
Like helicopter vision and Kepner-Trigoe  
Then there was a film on delegation of various kinds  
- The coachin' video just blew our minds  
Come on now! do it normal, do it slow  
Do it all together, then off we go!

### WEDNESDAY:

To get the time of yo' life, get yo' life on time  
Those wasted hours are just a goddamn crime  
If ya wanna be a model of efficiency  
Just gotta remember your A-B-C  
Aye!

Yo' staff are moanin' an' yo' jobs are late  
Maybe it's cos ya don't motivate  
They gotta see they work together, and they're not just fittins-an-fixtures  
You gotta tell'em how they fit, inna the big picture  
Mm-Hm

The kid looks upset so y'call him in for a chat  
Yo' ask y'open questions, an' yo' don' bowl, you bat  
That means y' reflect, an' y' help them decide  
Fo once y'ain't the driver- y' just along fo' the ride

### THURSDAY:

Thursday come, an' we had to decide  
Which animals lived, and which ones died  
Another question was, why the sheep had lambs  
Why should this be- when there ain't no rams?  
Hmhmhm.....

### FRIDAY:

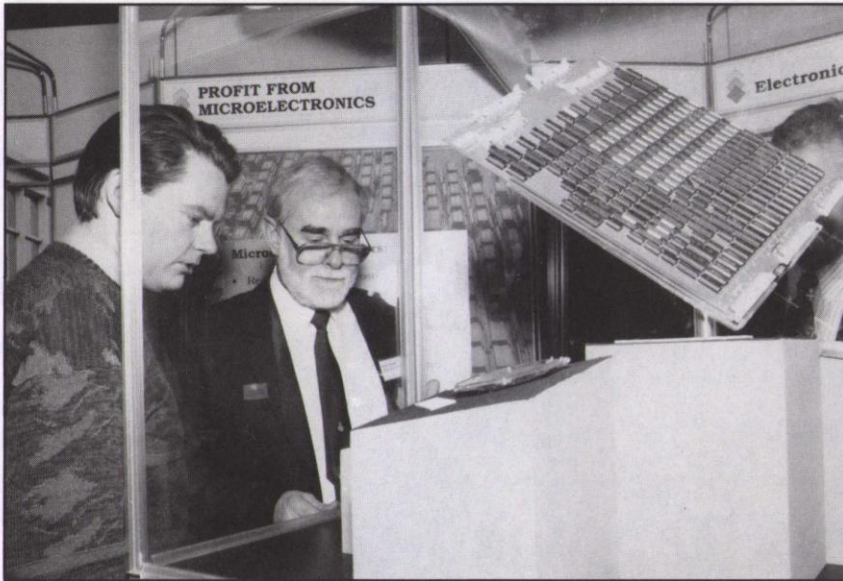
So we come to Friday and the start of the story  
With feelin's of elation, an' hopes of victory  
A sense of achievement, an' we had loadsa fun  
'Cos we weren't allowed just to sit aroun' on our bums  
We in this group feel this course has been a success  
So we wanna say thanks to JTS  
An'for keepin' it precise, but tellin' us the truth  
A bucketload of thanks to both Dave and Ruth

Now I'll be sure t' tell m' staff, not to fall into the trap  
Of thinkin' management courses put the C into rap!

Andy Napper Ian McCre  
Brian Ritchie Frank Smith



## Profit from Microelectronics



RAL Electronics Division completed a series of regional Seminars with an event held at RAL on 18 December. Funded by the Department of Trade and Industry, the seminars were aimed at convincing small companies of the benefits that using microelectronics can bring. With the theme 'Profit From Microelectronics', the seminars included keynote addresses by prominent speakers, backed up by case studies and information about sources of expertise and funding. Brian Oakley of Logica, ex-leader of the UK Alvey IT programme, was the keynote speaker at RAL. More than 150 people attended the seminars, 100 of whom were from small companies. The seminars also attracted interest from Radio 4, Fox FM, Radio Oxford, The Guardian and other national and local newspapers and magazines, all of which carried interviews or articles about the events.

RAL was chosen to perform the seminar series because of its broad background in using a wide variety of electronics and microelectronics

techniques. Andrew Kurzfeld, Head of Management Support Services in the Electronics Division, described the RAL role as one of helping companies make the right technical choice and then training them to implement that choice. Electronics at RAL also has the added benefit of independence – the exit poll conducted as part of the seminars shows that small companies really need a source of independent advice to take the first steps into new technologies. RAL has already begun to work with several small companies in the local area to see where its skills can be transferred successfully.

Electronics at RAL is the UK member of the JESSI SMI Support programme – a European project funded under EUREKA which aims to expand on a European scale the use of modern microelectronics by Small and Medium sized Industries (SMIs). With partners in six other countries and four more set to join, this project promises to be highly successful in assisting the transfer of technologies currently used at institutes such as RAL to SMIs across Europe.

## Engineering Challenge

In January seven sixth form students from Didcot joined nearly 30 engineers from RAL and Daresbury Laboratory for an engineering forum. The event took place at The Cosener's House, Abingdon and gave the young engineers the opportunity to hear talks on a variety of topics from wind energy to space engineering, and gave the sixth formers an insight into a variety of engineering careers. RAL Director Dr Paul Williams opened this annual event with a talk about innovative engineering at RAL, and Mr John Collier, FRS, Chairman and Chief Executive of Nuclear Electric, was the guest speaker.

In the afternoon participants were split into small groups and challenged to build equipment to perform a simple task using ordinary household goods such as candles, string, sand, elastic bands and water. A complete contrast to the sophisticated technology they use at work.

The winning team achieved the task of building equipment to 'hold an inflated balloon and release it after exactly 30 seconds' using sand as a timer. They were within 2 seconds of the target.

The Young Engineers Forum is organised annually by RAL to give participants the opportunity to present their work to their peers. Sixth form students from local schools who are interested in pursuing a career in engineering are invited in the hope that it will provide them with an insight into the variety of career opportunities available.





## Children in Need

A total of over £800 was pledged to by RAL to Radio Oxford for the Children in Need Appeal. Thanks to all those involved – collectors, organisers and givers.



*Contracts cake sale and raffle raised £315*



*Pudsey Bear buckets were filled with £450*



*Travel Section had a Japanese Day collection, raising £37*

## Going green at the shops

*Richard Lawrence-Wilson was one of the first to use the new recycling bins at Harwell shops which were sponsored jointly by SERC and AEA Technology. Glass bottles, drinks cans and textiles can all be given a new lease of life when deposited in the bins.*



## Rec Soc News

**SERC Indoor Sports Day** will be held on Friday 6 March 1992 at the Link Leisure Centre, Swindon.

Competitions will be held for:-

|              |          |
|--------------|----------|
| Badminton    | Bridge   |
| Volleyball   | Darts    |
| Table Tennis | Cribbage |
| Squash       | Snooker  |
| Chess        |          |

The closing date for all entries was 21 February 1992. For more details please contact T Morgan, R18 or A Napper, R9.

### RAL Football Club

In Division one of the Autotype Upper Thames Valley League, RAL 1st XI managed by Ronnie Brumfit and Norman Wallace this season, has performed well. The team is in fifth place in the table with games in hand, and has a good chance of finishing in the top three, which would be the highest ever league placement. If you wish to see a good level of football we would be pleased to have your support on Sunday mornings.

The 2nd XI, however, is struggling and occupies last place in division Three, with only two wins. We are optimistic that new manager Phil Ward will get the side enjoying football again and win more points before the season ends.

*Andy Wells*

The Football Club Christmas Draw took place on 12 December with Mr Brian Wheeler, Chairman of the Football Club, acting as Master of Ceremonies. The list of 40 prizes included large turkeys, chickens and pheasants by the brace.

The Football Club wishes to thank all the organisers and collectors for their hard work during the year and all those who bought tickets. The Club is pleased to donate £300 to a local charity, this year The Home Farm Trust.

*Brian Harrow*

**The Short Mat Bowls Club** meets in R20 (the old wages office) at Lunchtime on Tuesday and Thursday. Anyone interested should contact Mary Robertson, ext 5342, or Barry Child, ext 5563.



# Notices

## Missing

A Polaroid 670AF camera (RO40709). Last seen in the HET cabin in R55. Please contact Zoe Bowden, ext 5683, with any information.

A Shackmann 7000 oscilloscope camera, RAL 34022, Hewlett Packard 8494A attenuator, serial 151OA07472, RAL 35334 Avometer model 8, serial 46710, RAL 39186.

Items last seen in Lab 7, R1 or HEP test beam R5.2. Please contact Brian Payne, ext 6118, with any information.

Fluke Multimeter type JF75, serial number 37209218 R37903. Please contact P Clayton, ext 6690, with any information.

A green phosphor TV Monitor, type E1, R35297. Please contact Vic Cloake, ext 5480, id VCC, with any information.

IBM Selectric Typewriter Type 6705 Label Number R37896, serial number 98981. Please contact Helen Drummond, ext 6857, with any information.

## Joint Computational Mathematics and Applications Seminar

**5 March**

S W Ellacott

'The Numerical Analysis of Artificial Neural Computing Systems'  
2.15pm in Conference Room 10, Atlas Centre R31.

Enquiries to Jennifer Scott, ext 5131.

Please send all contributions for the next issue of Bulletin to Press & PR Section, ext 6482 as soon as possible.

## RAL Christian Fellowship

'The Word became flesh and dwelt among us' (John 1,14)

Thursdays at 12.30 in Conference Room 6, R2.

Enquiries to John Hogston, ext 5183

**27 February**

Tape

**5 March**

Prayer Meeting

**12 March**

Bible study- turning points (Paul)

**19 March**

Visiting Speaker

## Thanks

**Arthur Braham** would like to say 'goodbye' to many friends especially those he missed when he left the Lab on early retirement, and also to thank everyone for the presents and to wish them good luck in future years.

**Anne Steer** would like to thank all her friends and colleagues for the lovely decanter (and the bottle to fill it!) which was presented on her retirement.

**Lynne McPherson** wishes to thank all friends and colleagues for their good wishes and for the gifts she received. She is sorry she was unable to say goodbye to everyone in person.

**Eddie Fitzharris** would like to thank all friends and colleagues on the occasion of his retirement, not only for their generous gifts and good wishes, but also for their friendship and assistance during many enjoyable years spent at RAL. His wife, Catherine joins him in thanking everyone for her bouquet of flowers and in wishing good luck, health and happiness to all.

## RAL Lecture

3pm in the R22 Lecture Theatre

**26 March**

Professor Ivor Crewe (Essex)

'The Election'

## Trade Exhibitions

These are held in Conference Room 7, R12. The usual hours of opening are 10.00am to 4.00pm

**4 March**

R S Components

**12 March**

Hamamatsu

## Arts and Crafts

Don't forget that these long winter nights are ideal for working on your exhibit for the 12th Arts and Crafts Exhibition to be held 23-25 June 1992. Further details from Jenny Coates, R25, ext 6498.

## Film Badges

| Period | From     | To       | Colour Code |
|--------|----------|----------|-------------|
| 02     | 27.01.92 | 23.02.92 | Green       |
| 03     | 24.02.92 | 22.03.92 | Red         |
| 04     | 23.03.92 | 19.04.92 | Black       |

## Sobel House Raffle

Rose Wadley and all the post room staff would like to thank everyone who bought Christmas raffle tickets for Sobel House Hospice. £285.20 was raised and will be put towards refurbishment of the Hospice - replacing the roof and upgrading the wards. The three top prizewinners were:

1st H T Medhurst

2nd V Perera

3rd M H Key



*Margaret McInnery and Rose Wadley with a display of the raffle prizes*