Bulletin
of the Rutherford Appleton Laboratory 22 April 1985 No5

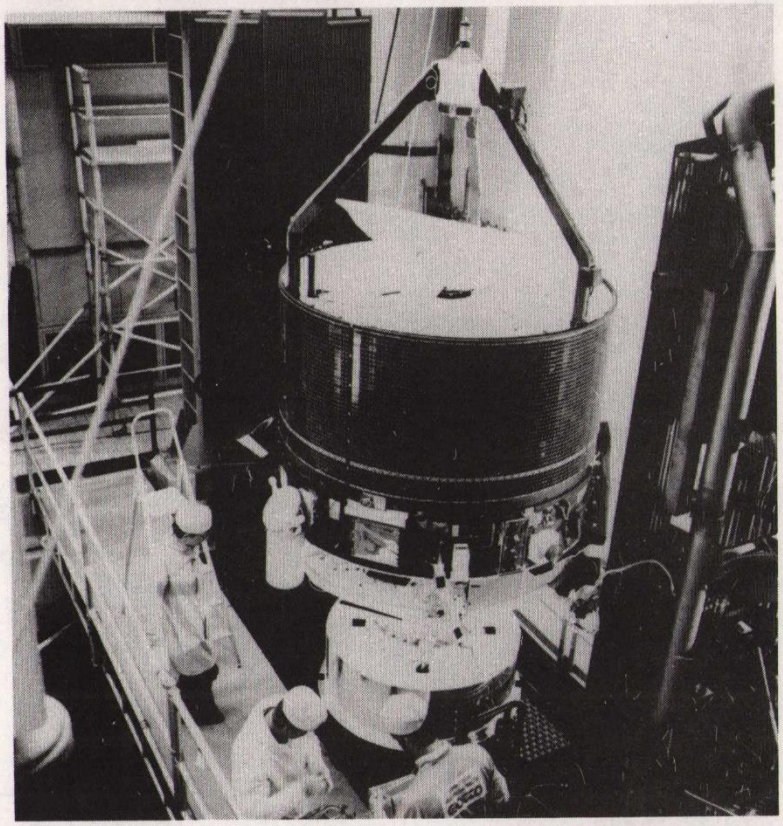
Comet Halley, Giotto and RAL

During the course of the next year comet Halley will pass around the Sun inside the orbits of Earth and Venus before departing for the outer part of the solar system beyond the orbit of Neptune on its 76 year passage, to appear again in AD 2071. This most recorded of comets, named after Edmond Halley the 18th century astronomer who first predicted the apparition of 1758, has traceable observations as far back as 87BC. Much has been attributed to comets, from omens predicting disasters to the source of life and even, recently, to being carriers of viruses. Now, however the once-in-a-lifetime return of the comet comes at a time when technology has been developed to the point where not only can sophisticated observations be made from the ground but spacecraft can sample the composition and properties of the cometary material and conduct observations of the interaction with the solar wind.

In July '85, the Giotto spacecraft which has been assembled by BAe (Filton) and tested at CNES (Toulouse) will be launched by an Ariane I rocket from Kourou in French Guiana into a parking orbit. From there the onboard engine will inject the spacecraft into its 8½ month cruise trajectory to encounter the comet on March 13th 1986.

The Rutherford Appleton Laboratory, working with two UK university research teams is providing experiments for Giotto. The first, with the Mullard Space Science Laboratory, builds upon our collaborative experience of the AMPTE project and RAL provides a special high voltage supply unit for the Plasma analyser. This experiment will measure the distribution of positive ions in the energy range 10 ev to 70 kev.

RAL is also working in collaboration with the University of Kent on the dust impact detection system. This experiment involving a multinational team of investigators, employs eight sensors mounted on the defensive shield system to measure the flux of particles encountered by the spacecraft in the range as low in size as 10^{-17} grams. For this project RAL has not only provided Project management and support of spacecraft interfaces but has directly contributed with a blend of engineering and scientific development which has led to some 50% of the flight hardware and most of the ground support equipment being built at Chilton.



The Giotto spacecraft under test at Toulouse. Ray Turner.

Why a Space Probe ?

Our knowledge of comets is currently limited to visual and spectroscopic observation. The cometary nucleus is believed to consist of methane and ammonia ice mixed with dust particles - a dirty snowball - and is perhaps less than 10 km in diameter. As it approaches within 300 million km of the Sun, surface material is evaporated and released to form a coma which can be in the order of 100 million kms long. The coma is shaped by the pressure of sunlight and by the charged solar wind to form

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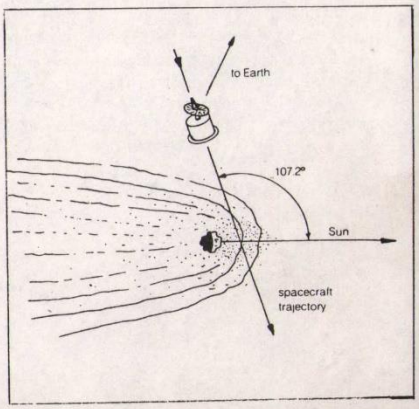

Geometry at Halley encounter. The spacecraft will be targetted to pass the comet nucleus by about 500 km on the sunward side.

Comet Halley *(cont'd from p1)*

a tail which points away from the Sun. There are in fact two tails (ion and dust) which can be distinguished by careful observation.

Comet Halley orbits the Sun in the opposite direction to the Earth and at an angle of 18^{0}, motion which helped Halley to separate previous observations from the majority of comets, which causes problems for space probes. Launch energy constraints limit spacecraft to travel in the direction of the Earth's travel, this results in an encounter relative speed of 68 km per sec or 150,000 miles an hour (or if you prefer Didcot to Paddington in one second). At this velocity a large particle of dust (0.1 g) could just penetrate an aluminium plate 8 cm thick.

Four of the five spacecraft which will encounter the comet in March '86 some 90 million miles away from Earth will avoid close penetration of the coma. Vega 1 and 2 (USSR probes which will have arrived via Venus - leaving probes there) and MS-T5 plus planet A (Japan) will aim to pass 10 thousand to 100 thousand km from the nucleus. Such is the level of international scientific cooperation that information from them (particularly the vega TV cameras) will be used to place the European Space Agency's Giotto spacecraft, arriving a few days later, on a trajectory which will pass less than 500 km from the nucleus. To protect Giotto from dust impacts a dual bumper shield is employed. Instead of an 8 cm thick, 2 metre diameter plate, a thin aluminium (1 mm) front sheet and a somewhat thicker fibreglass sandwich rear shield with a 25 cm gap between them, will be used. When a dust particle penetrates the front sheet it is vapourised - the resulting gas cloud expands so that the impact momentum is distributed over a large area of the rear shield. Even with this protection the likelihood of the spacecraft surviving encounter is very low, but the design of the instruments on board takes this into account and considerable data on dust composition and the plasma environment should be obtained during the short encounter period. This, when combined with the information from other spacecraft and ground observations, will provide a deeper insight into the nature and structure of comets.

Visual Observations

Regrettably for the 1985-86 passage the Earth is not ideally placed with respect to the Sun and the comet, for good visibility from the northern hemisphere. In good conditions the comet may be visible to the naked eye low in the Southern England sky in the early December evenings. In February 1986 perihelion (the closest point to the Sun) occurs but for us this is on the far side of the Sun. If you can manage an April holiday in the southern hemisphere this will give the best viewing conditions, just before dawn. Visibility of the now receeding comet, from Southern England, will be possible just before dawn towards the end of April '86 but the Moon may interfere. During May observations with binoculars should be possible but after this telescopes will be needed.

National Safe Driving Awards

Once again we have reached the time of year when the Royal Society for the Prevention of Accidents, National Safe Driving Awards are Announced.

We offer our congratulations to RAL drivers who have received the following awards for 1984:-

Mr M D Fitzgerald	6 year Badge
Mr J Culley	20 year Diploma and Badge
Mr D Stock	18 year Badge
Mr E Smith	22 year Badge
Mr R Brown	5 year Diploma and Badge
Mr B Turner	3 year Badge
Mr A Shoebridge	New Entrant

Library Notice

Copies of "Picked Up For You This Week," a collection of the general science information leaflets issued in 1984 by the Training and Education Service CERN, are now available from the R61 Library Desk.

Film Badge Notice

It is period 5 Colour strip BROWN.

Please be sure you are wearing the correct dosimeter and return all old ones to Jenney Coates, R12 Room E.06.

NEXT FILM ISSUE
Monday 20 May

Thanks

L.E. (Robby) Robinson says a very sincere thank you to all his friends and colleagues for their very good wishes, and their generous gifts which were presented to him on his retirement. "I will think of you all whenever I use them. I have enjoyed working with you and wish you all well in the future. Apologies to those I was unable to say 'cheerio' to before I left," he writes

RAL Lectures

The next lecture in this series will be held on Thursday 9 May 1985 at 3.15 p.m. in the R22 Lecture Theatre

BRIAN W ALDISS

"THE PALE SHADOW OF SCIENCE"

Brian Aldiss is perhaps the best known British writer of science fiction. He is, or at some time has been, President of the British Science Fiction Association, the Editor of SF Horizons and the President of World SF. His many prizes include the first James Bliss Award for SF criticism.

He writes "My talk about the Pale Shadow of Science will concern the fact that on the whole science fiction is better received by scientists than by literati. This has prompted some science fiction writers to look upon themselves as in some way mouthpieces for progress and playing the prediction game. But SF remains a literary mode, and is better advised to play what I see as its own role, as a metaphor, albeit a science-related one."

He adds that he may be unable to refrain from making a few remarks about his new novel in the Helliconia trilogy which was published on 18 April.

The Bar's Open

The RecSoc Bar will be open from 12 noon until 2 pm on Monday 22 April. For further details - see RecSoc members or go and find out.

Christian Fellowship

Meetings of the Fellowship are held in R2 Conference Room at 12.30 pm on Thursdays unless otherwise advertised. Visitors and new members are always very welcome.

PROGRAMME FOR MAY

May 2 'Count Your Blessings'
Grace Brown/Janet Richardson

May 9 Bible Study
Richard Heenan/Simon Atkin

May 16 Prayer Meeting
Denis Williams

There will be NO meeting on 23 May, but on Friday 24 May Steve Walters from Harwell will lead a "Music and Praise" meeting in the Music Room in R58 at 12.30 pm.

REMAP Award

By now many of you will have notice the "deliberate" mistake in issue No 4 of the *Bulletin*. Stan Buckel was pictured collecting an award, but not the one mentioned.

Stan, Peter Hey and Anthony Peters were awarded the Sir Geoffrey Alan Perpetual Award 1985 for their invaluable work as members of REMAP.

The Award takes the form of a Cup which was received by Stan on behalf of the three club members. We congratulate them on this much deserved recognition of their many years of service to REMAP.

REMAP (Rehabilitation Engineering Movement Advisory Panel) is part of the Royal Association for Disability and Rehabilitation, and is a voluntary movement of engineers, doctors, remedial therapists and social workers organised into small groups, called panels, throughout the country. Members engage in the design, construction and development of special "one off" items as invaluable aids for the disabled, which cannot be obtained as standard items from manufacturers. Cases of need are referred to the panels mostly by Social Services Department of Local Authorities and Area Health Authorities, but also by Societies for the disabled and by individuals.

At RAL for the last seven years, a small number of club members have maintained an output of useful items, mostly to meet the needs of rehabilitation and occupational therapy departments of local hospitals.

During the last year, the REMAP team has continued to meet once a week and has produced quite a large number of aids. Items made are mostly of wood, and include:

a) Various attachments for wheelchairs.
b) Supports for people with amputations.
c) Tray supports for people with limbs disabled by strokes. See through trays are also made.
d) Foldable supports to enable people suffering from arthritis to carry out normal activities such as gardening.
e) Games with especially large pieces for ease of use by the disabled.

One of the team. Peter Hey, who has recently retired from RAL but who still continues to attend workshop sessions, also finds time to visit the hospitals involved to see how the various pieces of equipment are being used. If modifications are needed he either does them on the spot or returns them to the workshop for further work to be done on them.

The work done by the three club members is totally voluntary and they impose no financial burden on the RecSoc of which the Club is a part.

Volunteers to help with this work are always most welcome, and Stan would be very pleased to hear from you.

Away They Go

For RAL, Friday 29 March wasn't the most happy day, ending as it did with four more gaps in the ranks. Myra Gilbert, Robbie Robinson, Derrick Moore, Maurice Dean; all celebrated their retirements on that day and left the establishment a little less rich in their going.

Myra Gilbert

85RB 1965

Myra's farewell, in a coffee lounge overflowing with friends and colleagues, was also a family affair attended by both her son and daughter and with a 'phone call from her husband Fred (working on the Millimetre Telescope in Hawaii) right on cue as was expected of him.

Dr Jim Valentine, speaking on behalf of all present summed up Myra's great value to the Laboratory over 25 years by citing the farewell lunch invitation she had sent to her friends. It was, he said, neat, precise carefully engineered and with a hint of humour, epitomising the characteristics for which she will be greatly missed.

The same strengths had also been used by Myra over the years to the good of the RecSoc and in the leading role she has played in the foundation and organisation of the RAL Art and Craft Exhibitions, events where the undoubted quality of the work on show has always been enhanced by the manner of its presentation.

In token of the esteem in which she is held, and in gratitude for all she has done, gifts of a carriage clock and crystal glasses together with a signature-laden card were presented to Myra on behalf of all her many admirers.

Thanking everyone for the gifts and Dr Valentine for his potted history of her career - "very enlightening", was how she put it - Myra expressed her gratitude to all those she had worked with for the guidance, help and advice which had made her job enjoyable. Her special thanks was to the typing centre staff with whom she had seen many changes and of whom she would be taking away many good memories.

"Thank you for the presents, for coming and for your good wishes", she ended as the 'phone rang.

Derrick Moore

85 RB 1952

Derrick Moore's presentation took place before an appreciative audience in the Lecture Theatre, and, as for the past 24 years there is hardly an HEP project in which he hasn't been involved, friends and colleagues had arrived from far and wide.

Dr Ron Newport (Division Head, Instrumentation) opened the proceedings with a glowing account of Derrick's excellent and enthusiastic service to the Laboratory, followed by Dr John Thresher's (Division Head, HEP) grateful acknowledgement of his outstanding contribution to the world of High Energy Physics.

From the building of Nimrod, through the demanding effort needed to produce over a decade of major nuclear physics experiments for CERN, to the Nobel Prize winning detectors of UA1, and current LEP involvement, Derrick's career has been one that only the best of engineers, expected to achieve the impossible could have sustained. His reputation extends far beyond the Laboratory. Internationally he is held in the highest esteem.

His outstanding contribution to HEP will always be appreciated by all those involved in the subject, said John Thresher. "We wish him a very happy retirement".

Gifts presented included a 10 page card, framed pictures of UA1, a contribution towards a computer system, plaques and momentos galore. Mrs Moore received a bouquet of flowers.

Derrick thanked everyone for the gifts, for the friendship and help received from so many people throughout what he described as, a career rich in challenge, and frustration. It had, he said, been a privilege and a pleasure to work with world wide scientists and the finest craftsmen in the world. Now he was looking forward to orienteering, map-making and playing with his computer.

"Best wishes to the Aleph team, to the workshops and to RAL" he ended.

Maurice Dean

85 RB 1970.

Saying goodbye to Maurice Dean on the same morning, Peter Clee expressed the feelings of the large crowd present when he remarked that Farewell Presentations were becoming too regular for his liking. In some respects they were of course pleasing, but it was also depressing that we were losing so many "old faithfulls".

Maurice, he said, was a very quiet, private sort of person, but still waters run deep and from his career details it became obvious that Maurice was prepared to have a go at anything; even, at one point, trying to put building and works group in order!

Maurice joined the Lab (NIRNS) in 1961, finding his niche in Engineering Division's Progress and Records section where, it is alleged, he found a hidden talent for admin and forms. Here he handled everything from inspection and progress on mechanical equipment to electrical and building liaison on Nimrod alternator repairs. In 1978 he joined PAG with Derrick Moore in the production section, where it will always be said that he is part owner of a Nobel Prize, as he organised the packing of the UA1 scintillators! He also did work for SNS, and many of the CERN experiments.

"After your terrific contribution to the Laboratory", said Peter, "we wondered what you would do in retirement, but we find you are going to lead a very busy life with your interests in photography, DIY heating, Bread and Wine making, steam locomotives etc. We are pleased to have had the privilege of working with you and we wish you a long and happy retirement".

"Thank you for your kind words," replied Maurice, "I shall get to believe them myself in time! I don't want to go. I have enjoyed my time here. Thank you also for the gifts (a commemorative plaque, multimeter and router) I wish you all well".

'Robbie' Robinson

85 RB 1959.

'Robbie' Robinson, though not having been at RAL quite as long as the others, has made his own mark too.

"It was sad that we had to lose such a cheerful, lively, friendly colleague," said Richard Lawrence-Wilson who was making the presentation. Robbie was a natural comedian, but also a very disciplined man and he would be much missed. "Thank you for all you've done and we wish you all the best for a happy retirement!

Replying Robbie thanked Richard for his kind words and everyone for attending the ceremony. It was, he said, a sad thing for him to be saying goodbye. He had enjoyed his time at RAL.

Thanks

Ron Pike would like to say thank you to all his friends for the many gifts and the wonderful send-off they gave him. It was much appreciated. He would also like to say "cheerio" to those he was unable to see in person.

"Thank you to all my friends and colleagues for the lovely send-off and presents" writes Sue Carter. "Sorry I wasn't able to get around to everyone, but 'Cheerio' to all those I didn't see."

Derrick Moore thanks all at RAL for his retirement presentation. "I can now enjoy my time between the Octagonal greenhouse and playing with my computer; he writes. "Best wishes and continued success to you all.

Crib Evening '85

This year our gathering will be held in the Recreational Association building R58 on Friday 10th May starting at 7 pm.

Singles and Doubles competitions will be held, on a league basis as usual.

Entry fee £1 per head.

Licensed bar - and food available.

Names for singles and doubles please, plus fee, to Tony Lubbock, R1, Room 2.66 by Friday 26th April.

Rutherford Shield

On 26 March the first semi-final of the Rutherford Shield was played between Students and Stores.

A year ago everybody would have predicted a win for the 'Students' but with two changes of management and additions to the squad, the 'Stores' ran out winners by 4 goals against 2.

The other finalist will emerge from the contests between 'Rovers', 'Spartans' and 'Atlas'. Rovers are from Harwell, Spartans from NRPB and Atlas the other RAL side. The final should be played when we arrive back from the Easter break - We need it!!

(Stores)
A Napper.

Coffee at Cosener's

Our next coffee morning for all RAL wives will be held on

Wednesday 8 May

at The Cosener's House Abingdon from 10.30 am until noon. As usual all pre-school children are welcome.

We always try to contact newcomers to the area, so please come along if you can. Please note the following dates in your diary and watch this space for further fixtures. Details of our gathering can be obtained from

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Zoe Patrick	Wantage 68809
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