Bulletin
of the Rutherford Appleton Laboratory 21 Oct 1985 No.13

ISIS ~ Worth Every Penny

That was the verdict of the Prime Minister, Mrs Margaret Thatcher, on the Spallation Neutron Source when on Tuesday 1 October she visited RAL to inaugurate and name the Laboratory's new pulsed neutron facility for the study of condensed matter.

Speaking to an audience of eminent scientists, government ministers and representatives from many overseas countries, Mrs Thatcher pointed out that this was the largest facility built wholly by SERC. It had taken 7 years to build, had cost 60 million pounds - and was worth every penny. The strong international interest shown in the project, she said, was direct evidence that this was a world class facility. The research it would facilitate, concerned as it was with the structure and dynamics of materials and the basic understanding of their properties, was essential to modern technology. The time-scale before a practical pay-off would be seen was short and no modern nation could afford to ignore these areas of study.

"There is already industrial interest in using the facility. This is further evidence that we have a winner - we have got it right," she said. "I wish you a marvellous time with the facility, which I name ISIS".

The Prime Minister then unvielled a plaque commemorating her visit.

Presenting Mrs Thatcher with a ceramic mug (made by the manufacturers of the ISIS ceramic vacuum chamber) as a momento of the occasion, Sir John Kingman (former SERC Chairman) thanked the Prime Minister for the honour of her presence.

The Prime Minister, accompanied by Education Secretary Sir Keith Joseph, pictured on her arrival at RAL. With her are (to her left) Dr Geoff Manning and Professor Bill Mitchell. BSRC 5057.

ISIS

ISIS was the principal goddess of ancient Egypt. She had power that transcended that of all other deities and was able to bring others back to life. She has been considered by many nations to be the symbol of renewal of life. It is an appropriate name for the new neutron source that has grown from the ashes of the earlier proton accelerator called NIMROD.

"It is a great occasion in British science", he said, "and David Gray and his team should be proud of their achievement. New ideas come not from machines but from scientists. I cannot over emphasise the importance of maintaining the flow of the best young talent in basic science. Projects like ISIS are part of our essential long term investment in our nation's future. Your presence is an encouraging sign of recognition of its status".

Earlier in the day Mrs Thatcher, accompanied by Education Secretary Sir Keith Joseph, had been conducted on an extensive tour of the ISIS facility by RAL Director, Dr Geoff Manning and Professor Bill Mitchell, the new SERC Chairman, who was enjoying his first day in office.

Both had spoken at the ceremony of their certainty that the new machine would bring about great strides forward in understanding how matter is stuck together and how it has the properties it has. "We may be dealing with solids in crystalline or glassy form, with liquids from high temperature melts to water, with a range of chemical systems including polymers, with biological membranes and so on. Neutron scattering methods tell us about the atomic arrangements of these substances. In the study of imperfections we can follow with neutron scattering the process of weakening of alloys and the atomic integrity of welds", Professor Mitchell explained.

(cont'd over)

KARMEN Inauguration

Somewhat overshadowed by the events of 1 October, but never-the-less a red letter day at RAL, was the inauguration of the massive steel blockhouse for the £4M West German neutrino experiment KARMEN.

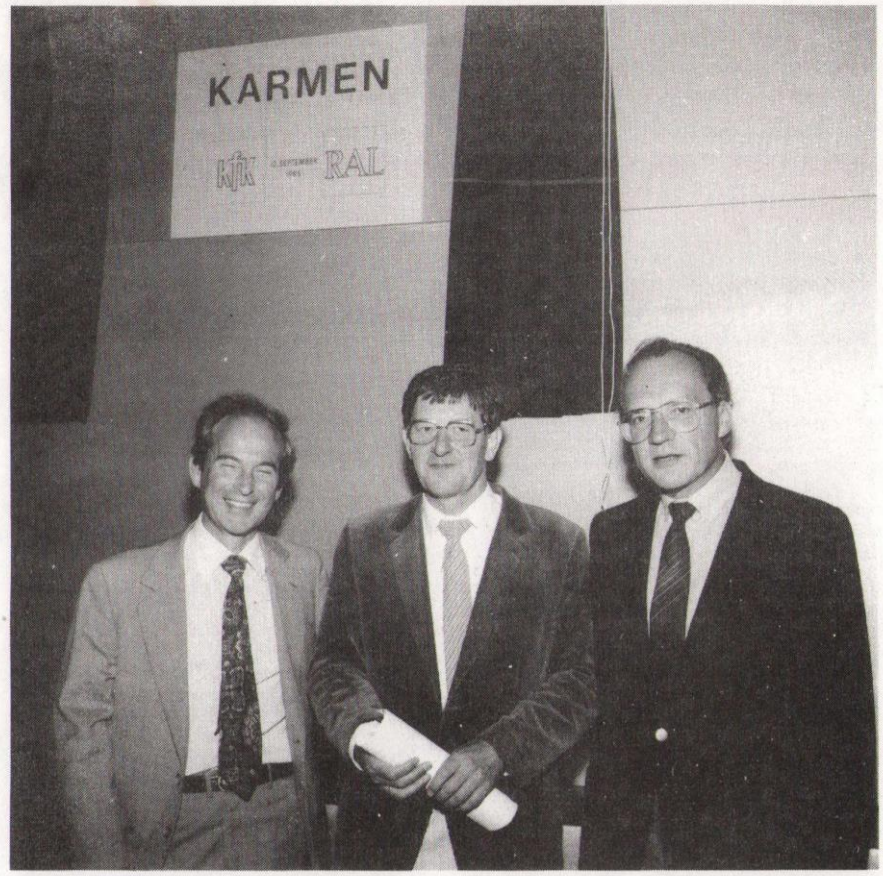
Built adjacent to the ISIS target station to house the 50 tonne liquid scintillation detector now under construction at Kernforschungszentrum (KfK) Karlsruhe, the 6000 tonne solid steel blockhouse was officially handed over by Dr Geoff Manning to Professor Klose of KfK on Friday 13 September.

Addressing an audience of distinguished guests from KfK, the University of Erlangen and the West German Embassy, Dr Manning outlined the history of the RAL/KfK collaboration, and praised the remarkable tenacity and dedication of the Karlsruhe team, headed by Professor Zeitnitz in their determination to fund this unique experiment. It had not been easy and it had been a privilege for RAL to have been able to help. He welcomed the KARMEN team to the Laboratory, "I would like to be involved myself - I wish you joy". he said.

Professor Klose, accepting the block-house on behalf of the KARMEN team, thanked Dr Manning for the friendship they had found at RAL. It had been important to find backing and acceptance in another scientific community. This was a high risk experiment which offered equally high rewards. "We have, he said, a determined crew and RAL has shown what international collaboration could do. We should like more projects of this type, please!"

Professor Zeitnitz also expressed his appreciation of the help given by his RAL colleagues. "This is an important first milestone in our collaboration and we could not have organised it without the support of people like Geoff Manning, Alan Leadbetter, Alan Carne and Roy Tolcher. It is a good example of UK-German collaboration."

KARMEN is an acronym for Karlsruhe Rutherford Medium Energy Neutrono experiment. It is a collaborative project between KfK, the University of Karlsruhe, the University of Erlangen, Oxford University, Queen Mary College, London and RAL. Its location at RAL is due to the fact that ISIS is at present the only source in the world for pulsed neutrinos.



Dr Manning (left) Professor Zeitnitz (centre) and Professor Klose after the unveilling ceremony. 85RC 4619.

The blockhouse, built under the supervision of RAL is constructed with 486 iron slabs of 180 mm thickness. It's total weight is 5,700 tonnes. With internal dimensions of 100m x 4m x 7m. It has 2m thick walls and a roof thickness of almost 3m. The sliding front-wall-door weighs 511 tonnes.

Built entirely of blocks of steel weighing 10-20 tonnes each, the construction is such that no join between blocks is in line with any other join in any direction, each having its own distinct position. A massive exercise in logistics had to be undertaken to ship the right piece from Germany to arrive at the correct time for incorporation into the block-house at RAL.

In the next issue of the Bulletin, the physics of this extremely interesting project, will be reviewed.

ISIS Inauguration *(cont'd from p1)*

The potential for development beyond the current specifications for ISIS were great added Dr Manning. At present there are ten neutron scattering instruments currently planned and 25 could be supported. The rudimentary muon facility being constructed upstream of the main target station can be enhanced. Replacement of the present target by an enriched target or the building of a second target station optimised for cold neutron work was feasible as was the enhancing of ISIS by an increase of proton intensity.

For the present and immediate future though, plans are to bring the facility to full design specification and pursue the international collaborative interest that already exists.

Council had already established links with West Germany for neutrino work on the 4 million pound project "Karmen" being built adjacent to the ISIS target area. India has provided a novel detector for one of the instruments, IRIS, already installed on ISIS. A collaboration with Italy for a new type of spectrometer is being discussed, as are possibilities of using muon beams to study condensed matter, with the EEC, France and West Germany. Outside Europe, Australia and Japan have also shown interest in joint ventures. A rosy future for ISIS looks certain.

Deeds for Three

RAL electronics apprentices Steven Cox, Chris Spencer and Stevan Heads received their Deeds of Apprenticeship on Thursday 29 August, having successfully completed their four year training period at the Laboratory.

The Deeds were presented to the three new craftsmen by Dr Geoff Manning (Director RAL) at a special ceremony held to mark their success.

I am pleased to perform these presentations for a number of reasons, Geoff Manning said. This is the second intake of apprentices under the RAL Electronic Apprentice Scheme which has completed the training satisfactorily. In fact the scheme has a 100% success record, all apprentices having completed their training and passed their examinations.

Apprenticeships throughout the country had decreased by half over the past few years, but SERC had increased its provision of places and was maintaining its numbers, and this he found most encouraging.

Congratulating the three young men on their achievement, Dr Manning said that he was very pleased that they had accepted permanent employment as craftsmen with RAL and he wished them well with their future careers.

Flanking RAL Director Geoff Manning who presented them with their deeds, Steven Cox (left) Chris Spencer (right) and Stevan Heads (far right).

85RC 4419.

RAL Summer School '85

The annual summer school for graduate students in high energy physics took place at RAL for two weeks in September. Twenty-five students from all groups in UK universities active in particle physics attended lecture courses at RAL and, with the help of tutors, lecturers and director (!) tackled numerous problems in tutorial sessions at Cosener's House. Visiting speakers gave seminars on experimental topics and students presented short talks on their work in the evenings.

Appropriately for a summer school but unusually for the summer of 1985, the sun shone for much of the two weeks. The combination of such fine weather, the hospitality of Cosener's House and the excellent facilities at RAL together with the enthusiasm of all involved seems to have ensured that the 1985 school has been as great a success as all its predecessors.

85FC 4624.

Christmas Lunch '85

The 'Lunch' will be served this year on 19, 20, and 23 December. Table reservation will be taken when the menu has been circulated - in early December.

Film Badge Notice

It is Period 10. Colour strip RED

Please be sure you are wearing the correct dosimeter and all old ones are returned to Jenny Coates, R12.

Thanks

Roy Brabham wishes to thank everyone for their good wishes and for the very handsome gift presented to him on the occasion of his retirement. "Thanks to all for making my long time at the Laboratory so enjoyable", he writes.

A Model Weekend

Once again the RAL model railway club had been invited to attend the model railway exhibition at Didcot which had been arranged by the local club. We set off bright and early for Didcot (play centre of the western world) on Saturday morning. The morning itself was promising to be a fine sunny day, the first in living memory, well any way in 1985 at least.

Arriving at the Civic Hall, an imposing building said by some to be Didcot's answer to the palace of Versaille, the day had begun. The now familiar sight of pre-exhibition chaos greeted us. Vans, cars, people, layouts, trade stands, small kids and the occasional dog all arriving at the same time and all trying to enter the same small back door at the back of the hall. This is not peculiar to the Didcot show but seems to happen at every model railway show in the land, between September and May.

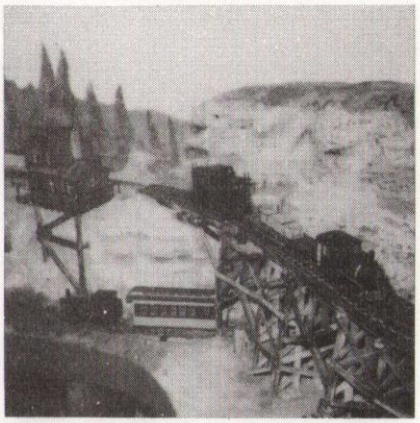
The exhibition manager was about his business thrashing about the hall at the speed of light and trying to keep his cool, solving problems faster than any computer of the day. Didcot's exhibition manager a fine fellow called big Phill, a cross between a buccaneer of the Spanish main and a Japanese Sumo wrestler soon had things under control - the lull before the storm had begun. Some lull. The often heard cries of "it wont .....? work echoed about the hall and soldering irons were seen in action. We had seen this all before. It's par for the course at most exhibitions.

At last the appointed hour arrived and Mr and Mrs Public came in to witness the smiling and confident faces of the operators who a few minutes before had been nail biting, jibbering idiots. From now the day passed by well with RAL's layout running like a well oiled clock, with trains running like the flow of water, that is to say, very fast down hill.

We had taken to Didcot a piece of West Virginia in the form of the Cambellsvile Squawcreek and Western Rail Road, which seemed to amaze some folk especially the little ones with sticky toffee flavoured fingers. Our layout not being of the usual British practice, not even G.W.R. but one of little locos, box cars, flat cars, cabooses and trestle bridge also narrow gauge to-boot.

All too soon it was time to pack up and go home, tired but pleased to have had a great time exhibiting and meeting old friends again.

Many thanks to the Didcot model railway club for their hospitality - hope you will invite us again.



Saturday ends and Sunday arrives, its off to yet another display, wearing a different modelling hat.

Sunday morning and its off to Wroughton for the Science Museums Open Day. With other fellow members of the Abingdon branch of the I.P.M.S. the international plastic modellers society I set off at dawn for the alps to the south of Swindon, on which can be found Wroughton airfield. The airfield now almost disused is home of the Science Museums large exhibits which for one reason or other cannot be displayed in London. Each September an open day is held where many items such as aircraft, buses, tractors, jet engines etc., can be seen by all, in fact you name it, they may have it.

Arriving at first light, well it seemed like first light, we encountered no-one, not a soul to be seen. Had we come on the right day? Yes, had we come in the right month? Yes. Where was everybody? A deserted airfield in darkest Wiltshire can be a very eerie place. Press on faint hearts, fear not, someone is bound to turn up even if it's only to shout, hoy! what do you want? Along the silent perimeter track past large closed hangers, suddenly to be confronted by a large strange monster. To the better informed amongst us the large monster turned out to be a Lockheed Constellation, perhaps to some the most elegant piston engined airliner ever built and to those who can remember most graceful in flight. Standing there wallowing in nostalgia we became aware of a tapping sound which came from a man driving in tent pegs, there was life on Mars after all.

Suddenly life appeared from all sides as if by magic and soon we found our alloted place in the display hanger. Our tables, having been set up, were soon covered from end to end with highly detailed plastic models, mostly aircraft but backed up with a fine display of AFVs armoured fighting vehicles.

We shared the display hanger with the most weird and wonderful exhibits imaginable from mind and body boggling cycles to a PSA stand showing how they look after Salisbury Plain and even one on preserving cart horse's. Lurking in a dark corner of the hanger was a collection of old fashioned metal peddle cars, which small children were allowed to drive around. One little soul trying his best to beat the world's land speed record flashed by so close to our stand as to stop the hearts of ten plastic modellers instantly. If, and perish the thought, the car had hit the table of which the AFVs stood, this little lad could have destroyed more armour in one fell swoop than Rommel could have in his wildest dreams.

The day will long be remembered for such things as it being colder inside than out, a west wind blowing into a west facing hanger is not for anyone with a delicate disposition. At the end of the day the final score was little children 3 (two aircraft one tank) plastic modellers 0.

Once again a good day was had by all, ending what had been a very busy weekend.

R Roberts

Bulletin

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RAL TECHNOLOGY LECTURES

The next lecture in this series will be held on Thursday 24 October 1985 at 3.15 pm in the **Lecture Theatre Building R22. PLEASE NOTE CHANGE OF VENUE.**

THE MULTIWIRE PROPORTIONAL COUNTER IN THE SERVICE OF MEDICINE AND SCIENCE

by

DR J E BATEMAN
INSTRUMENTATION DIVISION

When Roentgen and Bequerel discovered X-rays and radioactivity about 90 years ago a high resolution, moderately efficient imaging system lay immediately to hand in the form of the silver halide photographic emulsion. This imaging medium has survived the passage of time and the march of technology remarkably well, being unchallenged for more than 50 years. However, in the early 70's the EMI scanner made it clear that using digital image processing techniques there was much more diagnostic information to be obtained than was utilised in the conventional X-ray film image. The dramatic decrease in the cost of computing power of the past decade has turned such once exotic research ideas into routine practice so generating a demand for cheap and effective electronic imaging systems which can replace film over its wide range of application in medicine, materials science (X-ray diffraction) and biochemistry (autoradiography). Fortunately the Multiwire Proportional Counter (MWPC) developed over many years for particle tracking in High Energy Physics has reached a level of performance which makes it well suited to perform the required role. Capable (in various formats) of imaging X-rays and charged particles from a few keV to around 1 MeV its structural simplicity and cheap electronic readout fit it well for general (and even commercial) exploitation. Several systems successfully developed at RAL for a variety of applications are described.

FOR YOUR DIARY: The next lecture in the series will be held on Thursday 21 November 1985 by Dr Norna A Robertson, Department of Natural Philosophy, Glasgow, and will be entitled "Experiments and Techniques towards the Detection of Gravitational Radiation".

Comet Halley GIOTTO Plasma Instrument Switched On

After several nail-biting weeks since the ~~the~~ commands were sent from the ESOC control centre on Sunday 8th September to switch on the Fast Ion Sensor. The instrument, similar to that employed on the AMPTE UKS spacecraft, was checked out successfully with high voltage generators running up to their peak level. On the following day, the Implanted Ion Sensor was turned on and checked for compatibility. Both instruments have excellent noise performance and have already measured Solar wind ions at the beginning of the "Cruise - Phase" Science programme.

These plasma instruments and their shared data processing unit were provided by a consortium from the UK, W. Germany, Italy, Sweden and USA. RAL provided high-voltage units for the Fast Ion Sensor and will play an active role in the analysis and interpretation of the data.

A detailed survey of the region of space between the earth and the comet, permeated by the high-speed (1 million miles - per - hour) stream of Solar Wind plasma, is crucial in order to gain a proper understanding of the formation of the coma and tail. These visible cometary features are the result of the interaction between the solar wind and the dust and neutral and ionised gases evaporating from the surface of the nucleus. The ion sensors will be operated in modes chosen to give good resolution of the Solar Wind properties and flow direction.

In the vicinity of the comet, during the brief encounter on March 13th next year, high resolution modes will be selected to facilitate the exploration of the complex structure of the shock front and contact surface in the turbulent region ahead of the comet's relative motion in the solar wind. Comparison with the phenomena created by the AMPTE "artificial comets" is expected to give an added insight. Preparations are being made, as with AMPTE, to display this exciting, once-in-a-lifetime event as it occurs.

For further information contact Trefor Edwards, Ext. 6516.

launch of the Giotto spacecraft 2nd July

STOP PRESS

On 9 October with the Giotto spacecraft 24 million km away from Earth the Dust Impact Detection System (DIDSY) - designed and built by RAL in collaboration with the University of Kent - was successfully turned on for the first time.

In the planned steady turn on of instruments, 9 out of 10 have been checked out. No problems have been found with either the spacecraft or experiments.

Obituary

Windsor Spinks

It is with great sadness that we announce the death of Mr Windsor (Win) Spinks on Thursday 5 September at his home in East Hanney, aged 62.

Win was a founder member of the Laboratory, joining the PLA in 1961, from which work emerged his book on Vacuum Technology; a work still in demand today.

For ten years he was involved in the development of nuclear emulsions which led to the setting up of the automatic film processing laboratory of which he was, in the early '70s, in charge. This was an extremely successful operation much appreciated by a variety of bubble chamber physicists. Then, after a number of years working in the preparation of experiments for radio-biological work on Nimrod, he joined the Energy Research Support Unit to work on energy in houses which took him back to his native Wales through the Abertridwr housing project.

Born in Cardiff, 'Win' read Mining Engineering at the University of South Wales and Monmouthshire. He volunteered for the RAF in 1942 and served until 1946 on flying duties and as an Educational and Vocational Guidance Instructor. On demobilisation he took a Social Studies Diploma (Youth and Community Service) at King's College, Durham, and youth work has been central to his life ever since. His initiation into practical service work was as a Case Worker in the Newcastle area. As a result of cuts in Community Service in the early '50s he joined AERE Harwell. From thence he joined NIRNS, later Rutherford Laboratory.

His work inside the Lab has been matched with a similar variety of outside interests. He was founder member of the 'Barn Theatre', Didcot; played an active part in youth work, been Staff Side Secretary of the RL Whitely Committee and Vice Chairman of the RL Section. Politics too has figured in his life. As a Liberal he has served in a number of offices of local branch organisation.

But most of all, he has devoted his 'spare-time' to the Royal British Legion. He joined as long ago as 1945 and at his untimely death was in his second year of office as National Chairman of the Legion. For his outstanding services, he was awarded the gold badge in 1973, was made a life member in 1974 and was presented with the national certificate of appreciation in 1975.

All his many friends and colleagues at RAL mourn his loss, and extend their deepest sympathy to his wife Bridie, and to his children.

Dave Craddock Cup

On Friday evening, 30 June, in a rare piece of British sunshine, the 'Stores' played the 'Students' in the final of the 'Dave Craddock Cup', one of RAL's prestigious cricket competitions.

Both sides reached the final by finishing first and second in the league as the table shows.

TEAM	PL	W	L	Wickets Lost	Runs Against	Pts
Stores	4	3	1	14	291	6
Students	4	3	1	16	300	6
Apprentices	4	2	2	21	285	4
Laser	4	1	3	19	336	2
Atlas	4	1	3	21	337	2

The Stores won the toss and put the Students in to bat and, after their allotted 10 8-ball overs, had reached 73 for 3. Some accurate bowling by the Stores team kept the Student batsmen quiet until the last few overs when they ran like mad to boost their score.

The Stores innings started well with double figures being scored off the first over. A wicket fell soon after

David Gray (ISIS Division Head) presenting the Dave Craddock Cup to the Captain of the Stores team, Jim Denby.

slowing things up but careful batting with an eye on the scoreboard (and the sky, for fear of rain) saw the Stores to victory at 74 for 2.

Afterwards everyone retired to R58, where David Gray kindly presented the cup and trophies to both teams.

85MC4511

I would like to take this opportunity to thank everyone who entered for making it a successful competition and for help given with the organisation. Maybe we could invite the Aussie's next year!!!

Andy Napper

Missing

The following items are the subject of loss reports. Information on their whereabouts would be welcome by the enquirers named.

Wolf 3/8" Electric drill
AERE 24215 SRC 14/5153.

Contact J N Rice, R2, Ext. 6688/6789

Typewriters

IBM Electric RAL 005142
Imperial 66 RAL 006443
Imperial 66 RAL 002977
Imperial 70 RAL 005441

Philips transcribing machine
RAL 006441

Contact: Assets & Inventories
Ext. 5570

Ken Paul enquires as to the whereabouts of BT Linesman Test Unit (Yellow one piece telephone handset). Please return to Room 57 R31.

"Bleeper" R1 2.57 No. 70 has been misplaced on site, please return to G57, R31.

Internal Events

ASTROPHYSICS SEMINARS
R68 CONF. RM - 1400 hrs

23 Oct — Dr Alan Gabriel/RAL
'Preliminary Results from CHASE'.

13 Nov — Dr Alan Penny/RAL
R61 conf.rm. 'The Age of the Universe'

2- Nov — Dr Bob Dickens/RAL
'Dark Matter in Clusters of Galaxies'

HEP SEMINARS
R61 CONF. RM - 1100 hrs

23 Oct — C Hawkes/Oxford
Electroweak Radiactive Corrections to Forward - Backward Asymmetry in $e^+e^- \rightarrow \mu^+\mu^-$

30 Oct — K Bell/RAL
'A Review of Baryon Production in e^+e^- Annihilation'