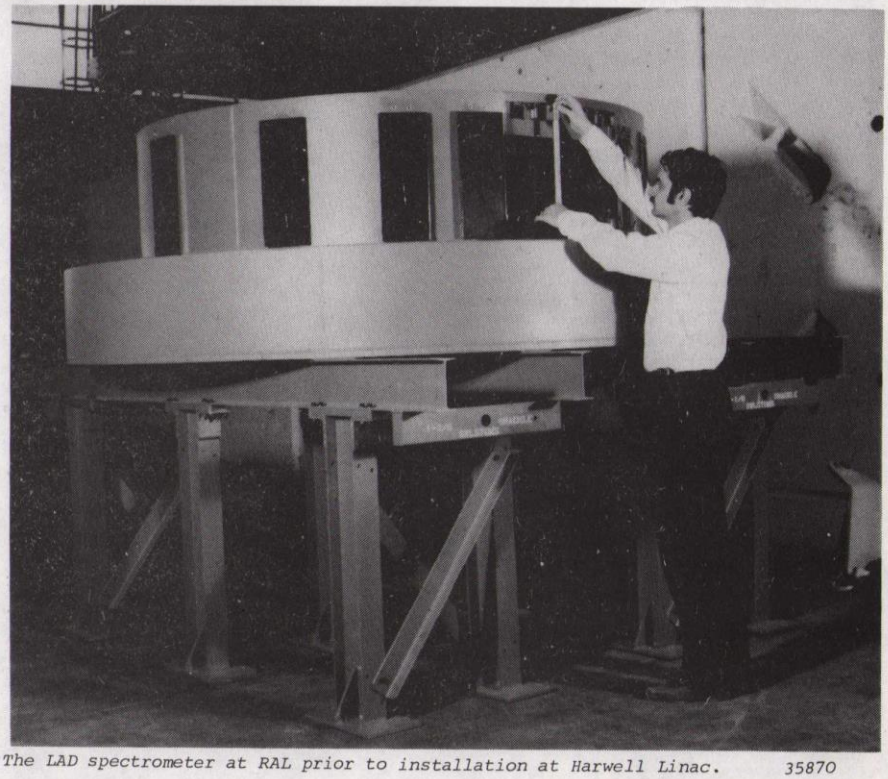
Bulletin
of the Rutherford Appleton Laboratory 19 Apr 1982 No.6

LAD on the Linac

During the past few weeks the first SNS neutron scattering instrument has started counting neutrons. The Liquids and Amorphous Materials Diffractometer (LAD) is the first of two SNS instruments to be installed on the 136 MeV Linear Accelerator HELIOS, situated just across the fence at AERE Harwell. This is a pulsed neutron source based on an electron linac, on which neutron scattering experiments are already being carried out by SERC and University scientists and which enables Neutron Division to develop instrumentation and gain experience of pulsed sources during the lead-in time to SNS operation. The current neutron scattering tests are part of the commissioning and when complete LAD will be available for use by researchers from the Universities until it is time to return for installation on the SNS in 1984.

The principle of a total scattering spectrometer such as LAD on a pulsed neutron source is simple in concept. A pulsed white beam of neutrons which has a known energy distribution is incident upon the sample. These neutrons are scattered at an angle and an energy which are subsequently measured by fixed detectors embedded in a large block of shielding and connected to a time-of-flight scalar. A knowledge of the instrumental flight paths, scattering angles and the neutron energy distribution within the incident pulse enables a measurement to be made of the sample scattering cross section.



The LAD spectrometer at RAL prior to installation at Harwell Linac. 35870

Parameters

The LAD instrument consists of a large circular detector tank filled with borated wax as shielding. The sample area at its centre is evacuated, as are the flight paths through the shielding to the detectors situated 1m from the sample. The detectors are filled with 10 atmospheres pressure of Helium -3 gas and have a diameter of 25mm and an active length 250mm. Single detectors are positioned at 6 angles between 5^{o} and 90^{o} with apertures 5mm wide cut out of boron carbide resin sheets. A bank of 8 detectors situated at 150^{o} scattering angle utilises the full width and height of all the detectors.

On the Harwell accelerator the instrument is situated at a distance of 10.5m from the neutron source. The beam line between source and instrument consists of an evacuated collimated and shielded flight tube providing a beam approximately 50mm square at the sample.

First Tests

The preliminary tests were carried out with detectors at 35^{o}, 90^{o}, and 150^{o} scattering angle and consisted of background levels and standard calibration samples such as silicon or magnesium oxide powders. Satisfactory diffraction patterns can be obtained after 24 hours counting and from the position of the Bragg peaks in the measured spectrum it is possible to calibrate the time-of-flight of the detected neutrons with its wavelength. Such a spectrum would take about 5 minutes on SNS. The measurements gave a wavelength range of 0.35Å to 3Å corresponding to a neutron energy of 700meV down to 10meV.

When commissioning has been completed the instrument will be used routinely by researchers from UK Universities using beam time funded by the Neutron Beam Research Committee of the Science Board of SERC. As its name implies, the scientific interest of LAD lies in the measurement of the structure factors of liquids and amorphous material. Typical liquids that may be studied include: simple fluids, such as argon; liquid metals and alloys; molten salts; aqueous solutions; molecular fluids, from the simpler diatomic molecules to the complicated organic compounds. In the amorphous field there are glasses, metallic glasses and thin films. Although primarily designed for liquid samples, the instrument could also carry out standard powder diffraction experiments.

(We thank Dr Spencer Howells for this encouraging news)

Wynn Evans
An Appreciation

The death of Wynn Evans and his wife Kathleen in a car accident has shocked his many friends. His research activities started with cosmic ray work in the late 1940s and over the years he has made many significant contributions to cloud chamber and bubble chamber techniques. Indeed his great strength lay in the technical aspects of particle physics and his ability to see how to construct apparatus that could be both elegant and reliable. When the P.S. started at CERN he was responsible for the construction and installation of the 1.5 metre British hydrogen bubble chamber.

It is for this work in the early 60s that he will best be remembered at the Laboratory. He made many friends during the two and a half years he was resident at Cosener's House, while in charge of this project.

For many years he has run the Film Analysis group at Liverpool and has recently been involved in the preparations for holographic systems. Wynn was also an outstanding teacher and he will be sorely missed by his colleagues both in the Department of Physics and in the University at large.

WHAT'S NEW?

PHYSICS WITH THE WORLD'S HIGHEST ENERGY ACCELERATOR
by
Alan Astbury
Lecture Theatre
Thursday 29 April
3.15 p.m.

CERN has recently operated the SPS Accelerator as an Antiproton-Proton collider, yielding the highest energy yet for man made collisions. The project, experiments and early indications of the physics will be presented. The energy regime, now open for exploration, has so far only been visible in rare cosmic ray events. The main motivation behind this project is the discovery of the W and Z bosons - the quanta of the Weak Interaction in its unification with the Electromagnetic Interaction.

Sales to Employees

The sale of scrap metal and plastics as set out in RLN 12/73 will be made on 16 April in the R40 scrap compound.

Stores also have a quantity of packing cases which may be purchased as firewood, and staff should arrange this with Mr D Taylor, R56, Ext 6663.

Lectures

HEP SEMINARS
R61 CONF. RM - 1400 hrs

22 Apr G Veneziano/CERN
"Supersymmetric Effective Lagrangians"

LECTURE THEATRE - 1100 hrs

28 Apr Dr P Dornan/IC
"Recent Results from TASSO"

WHAT'S NEW?
LECTURE THEATRE - 1515 hrs

29 Apr Dr A Astbury/RAL
"Physics with the World's Highest Energy Accelerator"

NPD COLLOQUIUM
H8 CONF. RM - HARWELL - 1530 hrs

22 Apr Dr W W M Allison/Oxford
"The Search for Charm"

29 Apr Dr C Pitt/UCL
"Integrated Optics"

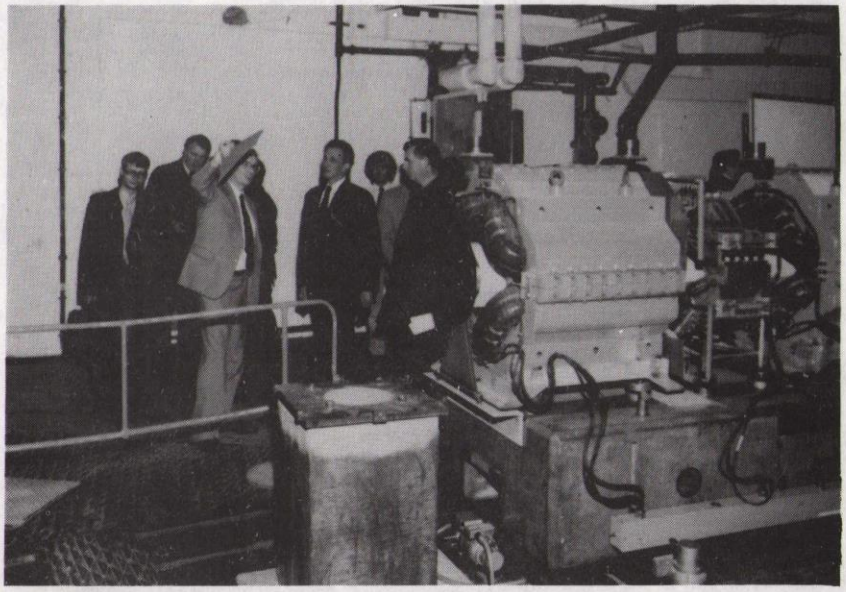
Trade Exhibition

A mobile exhibition by Edwards High Vacuum will be showing a new range of turbomolecular pumps, new Series 2000 microprocessor vacuum and process controllers, together with new coupling components and valves. This event will be on Tuesday 20 April from 1400-1600hrs and also on Wednesday 21 April from 1000-1600hrs outside R20.

On Wednesday 28 April, Wallis Electronics Ltd will be displaying its range of high voltage power supplies from 1000 to 1600 hours in the R20 Conference Room. The range extends from 24 volt DC powered modular units giving 1kV output for photomultiplier use to high power 500kV switch mode supplies for ion implantation and X-ray applications.

Sir Keith Joseph at RAL

Sir Keith Joseph (Secretary of State for Education and Science) was given a tour of the Spallation Neutron Source and an introduction to work in computing and information technology when he visited the Laboratory on Monday, 22 March.



Sir Keith is seen here being initiated into the wonders of quadrupole magnets by David Gray.

82RC 2060

A Railroad for RAL

The RAL Model Railway Club, in its new home in R58, is thriving. New members are always welcome, and new ideas are not lacking, as the following articles on their two current layouts show.

How about building a narrow gauge line in 7mm scale? OK great. Where shall we base the line? America. Why America? Why not? OK America it is, it will make a change from North Wales. Which part of America shall we model - how about California or Colorado? No, it's far too dry out there. New England would be very nice but it's just as green as Great Britain. Maybe we should settle for somewhere about a third of the way across, say Ohio or Kentucky, west of the Appalachian mountains. What does it look like over there? I don't know, perhaps we should consult an American. Good idea, maybe we can make a contact through the *Bulletin*. These and many more questions have been posed by members of the RAL Model Railway Club narrow gauge section over the last few months.

82RB 2067

The model will depict a mineral line running from its main base, up through the hills to the mine, a total track length of about 50 feet, and the mine being about 18 inches above the starting point. The course of the line will cross a creek pass through 'Ford' tunnel and over the high trestle bridge (more of which later) and on up to the mine. 'Ford' tunnel is named after General Ford, one-time chief engineer of the line who when celebrating the completion of the tunnel lit a stick of dynamite instead of his cigar and was never seen again. Strange to say, some people believe his ghost can be seen walking the corridors of R27.

What is to be mined has yet to be decided but you can be sure it will be heavily disguised polystyrene. The line will have one of those grand sounding American titles such as The Cambellsville, Squaw Creek and Western Railroad. Soon we may hear the lonesome whistle blow, while we juggle with new words like round-house, depot, switcher, tie and caboose.

The Trestle

As a balance for the large tunnel at one end of the layout the other end has been left open plan by the use of a standard American type trestle built on a curve. Built from timber these spider-legged flimsy looking bridges can carry fairly heavy trains and are very popular in Western films (usually the place where the Bad Guy is tossed into the river). They are not unique to American railways, in fact they were quite common in the West of England. They consist of many five-legged Bents or uprights 30 feet wide at the base and 15 feet wide at the top, bolted together with sway braces, spaced at 12 feet intervals.

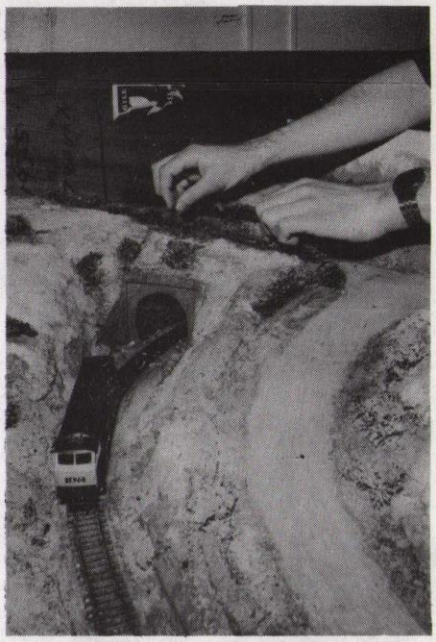
The sleepers or ties are laid directly on top and the only protection for the train was a guard timber 9 x 9 inches bolted along the edge. A crude form of fire protection was provided in small refuge platforms built every 50 feet along each with a water barrel! The only other large civil engineering job on the layout is the bridge that crosses the ravine just outside Ford Tunnel. This will be a Howe Box Truss Bridge, again a type found all over the USA.

And this is where we make our plea - if any of you good folks from the USA could help us with scenic details, rock colours etc, we would be most grateful.

Preservation Line

This layout represents part of a branchline, loosely based on "Hampton Loade" station situated on the "Severn Valley" line in Shropshire. The prototype line is now run by a preservation group and a wide variety of locomotives and rolling stock can be seen in service that would not have appeared on the line in the GWR era.

The layout plan consists of a through station with passing loop and goods yard, and a six road fiddle yard. All the baseboards are wired to a central control panel using connecting links between each base-board in order to allow the layout to be portable for exhibition use. The control panel consists of section and isolation switches and route selection studs (operating point motors), electrically fed from an ECM compspeed controller. A second control panel is to be added to enable two trains to be run simultaneously in different sections of the layout.



82RB 2073

The photographs show the result of some eighteen months work and many more months work are needed to provide realism on the layout and hence bring the layout up to exhibition standard. Over the last two months a transformation from white chunks of polystyrene to various shades of green fields, rolling hills and hedgerows has taken place. Other scenic features include a plate girder bridge spanning a slow flowing river, two cuttings incorporating tunnels and a road bridge. Station buildings have yet to be constructed and will greatly enhance the station area.

The beauty of modelling a preserved railway line is that it lends itself to running of both period and modern locomotives and rolling stock, on the layout, without upsetting the purists.

Library Notice

Please return the following books to the Library R61

"Simulation of the Monte Carlo Method" - R Y Rubinstein
"Schaun's outline of theory and problems of engineering mechanics" - W G McLean
"Orbiting the sun" - F L Whipple
"The large scale structure of the universe" - P J E Peebles
(someone from Appleton has this one)
"The ADA programming language: a guide for programmers" - I C Pyle
"Practical introduction to impedance matching" - R L Thomas
"Microwave measurements and techniques" - T S Laverghetta

The last two volumes were loaned to Appleton Laboratory prior to the merger. Their return would be appreciated.

Ron's Finale

We're going to miss Ron Jamison at RAL. During his seventeen years as a messenger, everyone has come to know him, and he knows everyone.

As David Rawlinson said at the presentation arranged by well wishers to mark Ron's retirement on Friday 19 March, "This is a farewell by friends and colleagues to an extremely popular man, who has made many friends by his cheerful, helpful attitude."

Like all Pisceans, Ron is fun loving and a lover of arts and music. They are also, by repute, good singers. So, to help him on his way in his new life of leisure, his colleagues made him a few apt presents - a set of suitcases, thought to be for a travelling music scholarship; a tape recorder - for recording his voice, to make sure he's "on song" and a large cheque.

"We wish you a long and happy retirement" concluded David. "We are sad your wife is not here to accept these flowers. We wish you both well".

Ron in reply thanked everyone for everything that they had done for him. "I'm choked" he said with emotion.

Ron says farewell to his Messenger colleagues. *82RB 2029*

Anyone for Yacht Racing?

This year's Interdepartmental Offshore Championsip is scheduled for 1 to 3 July. Ken Pavitt (RAL) is proposing to charter for the week beginning 27 June a Contessa 32, which he will enter for the Championship. Clive Sutherland (RAL) also may be able to obtain once again the Sigma 33 "Lazy S" - last year's overall winner. Both these skippers have invited the SERC Offshore Racing Association, now in its early stages of formation, to select crews for these boats.

Would anyone who is interested in participating, no matter whether expert or novice please get in touch with Ken Pavitt - Building R16, RAL Ext 6438 as soon as possible. Unfortunately, the cost of this year's event will be higher than previously as it is being staged in the high season.

If anyone has, or can obtain a yacht, for entry in the championships and would like the Offshore Racing Association to assist in finding and selecting a crew, please let Ken Pavitt know as soon as possible.

Finally, if you are interested in joining/forming the SERC Offshore Racing Association please give your name to Ken Pavitt.

Crib

A Crib Evening will take place on Friday 14 May in the R22 Coffee Lounge. Would competitors please get their names and entry fees to Tudor Morgan R18, or Tony Lubbock R2 before Friday 20 April.

The competition will feature singles and doubles, and the fee is £1 per person. This includes light refreshments.

Radio & Space at Slough

Reprints of an article entitled "Radio & Space Research at Slough, 1920 - '81" published in "The Radio & Electronic Engineer" March 1982, are now being distributed to staff who served at Ditton Park. Anyone else who would like a copy of this very interesting article on the history of the work of the Appleton Laboratory may contact one of the authors, Geoff Gardiner, Ext 6543 or Henry Rishbeth, Ext 6513.

Found

A black umbrella case has been found in the car park by the main gate of RAL. Would the owner please contact R J S Greenhalg, Ext 6376.

Lunchtime Film

"SCREENING FOR BREAST CANCER"
LECTURE THEATRE
Monday 19 April
& Tuesday 27 April
12.15pm

The film will last 20 minutes and a member of Harwell's nursing staff will be available to answer questions.

Film Badge Notice

It is Period 4, Colour Strip YELLOW. Please check that you are wearing the correct film and ALL old ones are returned.

Next Film Change - 26 April

Missing

Two extension leads are missing from the Klystron Hall (serial nos 9342, 9343). If you have these items please return them to R Wastle, R65, Ext 6452.

An Elliot chart recorder, inventory item R011081 is also missing. Would the finder please let Space and Astrophysics division administration know, on Ext 552/6174.

Bulletin

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Deadline for insertions: