

Bill Walkinshaw OBE Retires

On Wednesday, 16 August, many friends and colleagues gathered in the Lecture Theatre to wish Bill Walkinshaw a long and happy retirement. The Director, before presenting gifts, spoke of his long association with Bill lasting some 24 years, emphasising the tremendous impact he had made on the work of the Rutherford Laboratory. He had been closely involved with the design of both the PLA and Nimrod before moving on to computing. Bill had been responsible for creating one of the largest computing centres for scientific research in Europe.

Early Days

Bill Walkinshaw, born in Larbert, Stirlingshire, was educated at Broxburn High School and Edinburgh University where he read Natural Philosophy under Professor Sir Edmund Whittaker. He graduated in 1938 and was awarded the Medal for General Analysis which did, to an unusual degree, forecast a future which took him to the forefront of applied theoretical physics - a subject in which he made many valuable contributions and earned him the respect of accelerator physicists across the world. Following graduation, Bill's first job was as a maths teacher at Kirconnel. Six months later, with the outbreak of war, he was directed to join the Admiralty at Rosyth as a civilian adviser. On a cold quayside at Rosyth he was given a short course on 'degaussing' by Commander Goodeve and despatched the same afternoon in a commandeered butcher's van to Dundee to start degaussing HM submarines.

One day, in late 1940, he was instructed to catch the night train to London and report to the Admiralty, where he was interviewed by Sir Frank Brundrett. Despite a complete lack of knowledge of radio, he was Swanage-bound the same evening to join TRE (Telecommunications Research Establishment).

Radar Research

TRE was the home of radar and Bill joined the Maths Group under Dr Booker. A familiar sight around Swanage was that of four Scottish mathematicians - Dr Booker, George MacFarlane (now Sir George), Willie Robertson and Bill - very orthodox in dress (black suits) travelling in George's staid Armstrong Siddeley, locally known as the "Mathematical Hearse".

In May 1942, TRE moved to Malvern. Bill's work was concerned with aerials, radio wave propagation, waveguide theory, etc, and in particular, 10cm S-band radar. A massive effort was put into the development of radar. By the autumn of 1945, Don Fry (later to become Director of Winfrith) had formed a group which started work on electron linear accelerators. The connection of this work with the development of radar was quite strong and Bill became deeply involved in the theoretical aspects of machine design. In fact the team of Bill (theorist), Les Mullett (experimentalist) and RSR Shersby Harvey (ideas man) was the equal of any other group in the world at that time.



The unusual presentation of signatures amuses Bill

Accelerator Design

Don Fry's team at TRE was one of the early groups recruited for AERE early in 1946, before work at Harwell had commenced. The activities therefore proceeded at Malvern resulting in the world's first

continued over

Professor JT Houghton FRS



Professor John Houghton, FRS, Professor of Atmospheric Physics, Oxford University, took up his appointment as Director (Appleton) in the combined Rutherford and Appleton Laboratories on 1 September 1979. He will maintain links with the work of his University Department.

Professor Houghton was educated at Rhyl Grammar School and was a scholar at Jesus College, Oxford, where he took a double first in mathematics and physics. A research student in the Department of Meteorology, Clarendon Laboratory, he took his D.Phil in 1955. Following a Research Fellowship at the Royal Aircraft Establishment, Farnborough, he returned to Oxford in 1958 as Lecturer

in Atmospheric Physics. In 1962 he was appointed Reader and became Professor in 1976.

Well known internationally for his outstanding research in the upper atmosphere, his experiments have been carried on a number of space missions including NASA's Nimbus series and Venus Orbiter.

A member of the Astronomy, Space and Radio Board of the Council 1970 to 1973 and, since 1976, many of his experiments have received engineering and project support from the Rutherford Laboratory.

STOP PRESS

PETRA experiments reveal evidence for existence of gluons - see page 2.

Bill Walkinshaw

electron linear accelerator (0.5 MeV), followed by the 4 MeV electron linac. As a member of the General Physics Division, AERE, Bill and the team moved to Harwell in 1951.

His interest turned to proton linacs around 1948 and by 1953 (as Head of the Accelerator Theory Group) Bill was involved in the design of the 600 MeV PLA. Events however were to overtake this scheme and the machine's energy was reduced to 50 MeV. When the design work started on the Bevatron, later to be known as Nimrod, once more Bill was in the thick of the fray.

Interest in Computers

Bill's interest in computers stemmed from the early 1950s when the design of new and more sophisticated accelerators required increasingly complex calculations. When Harwell's first computer became operational in 1952, Bill put it to good use. The computer was referred to as the 'Dekatron' and contained, amongst other components, 380 Post Office type relays and 18 Dekatron tubes (cold cathode gas discharge tubes). It was an incredibly reliable machine although it could hardly be called a 'number cruncher' since it was rather slow (multiplication, for instance, took about 10 seconds!).

By 1957 he was working at NIRNS as Theory Group Leader, and in January 1960 presented to the Physics Committee the case for having an on-site computer. ORION, the first time-sharing computer was installed and working by June 1963. That

year Bill was appointed Head of Applied Physics Division, being responsible for a wide range of projects including bubble chamber and computing facilities. At the end of 1966 ORION was replaced by an IBM 360/75, which itself was replaced in 1971 by the IBM 360/195. In June 1971, the name of Mr W W Walkinshaw OBE appeared in the Queen's Birthday Honours List.

Changes in the Rutherford Laboratory's Divisional structure took place in 1969. Applied Physics was split into two separate Divisions, with Bill as Head of Computing and Automation Division. Further changes in 1976, following the merger of the Atlas Laboratory with the Rutherford Laboratory, brought the operation of all central computers including communications and operation of the FR80 under his responsibility.

As Bill said at his retirement presentation, "we thought that computer development was exploding in the 50s and 60s - it is still exploding today!" In 1977 a second 195 processor was installed, the number of workstations grew, other smaller computers appeared - and so it has continued. Computing has come a long way from that early Dekatron machine.

The secret of Bill Walkinshaw's success has been his devotion to work - which he has always regarded as a hobby (- "and I get paid for it!"). Nevertheless he has found time for many other hobbies, including music (he once played the violin), Scottish dancing and camping.

Presentations

At the retirement presentation, Dr Stafford commented that "style is what is needed - and Bill has this! He will be greatly missed as Head of C and A Division, but fortunately he will be around for some time to come". (Bill is being retained as a Consultant). Dr Stafford looked forward to many interesting discussions. After presenting parting gifts from colleagues - a bouquet of flowers for Margaret Walkinshaw, a set of headphones, a digital clock and (surprise, surprise) a calculator - the Director concluded by adding his best wishes to those of Bill's colleagues.

In reply Bill said that he had enjoyed his 40 years enormously, he had been fortunate to get into the "Maths Pool" at Swanage, and at the end of the war to be with Don Fry's group. His good fortune had continued at the Rutherford Laboratory in the 50s and 60s with Gerry Pickavance, and in the 70s with Godfrey Stafford. "It is the association of people that makes life so enjoyable."

The celebrations were by no means over as C and A Division had organised their own private party in R27 to which a few extra guests were invited. A "This Is Your Life" presentation by Harry Hurst, at which Audrey Foster's clever cartoons replaced the usual TV style, proved to be both hilarious and interesting. Further gifts were presented to conclude an enjoyable afternoon, and one that Bill will remember for a long time.

Gluons Revealed!

Evidence for a new state of matter - named the "gluon" - has been identified in four separate experiments at the new electron-positron storage rings PETRA at the DESY Laboratory in Hamburg. Two of these international experiments, code-named TASSO and JADE, have involved UK groups from Imperial College London, Lancaster University, Manchester University, Oxford University and the Rutherford Laboratory. The success of this remarkable discovery is a credit to the labours over the past few years of the many people involved in the design, engineering, purchasing, construction, shipping, installation and commissioning of the complex apparatus by the Universities and several Divisions at the Laboratory. (Recent progress reports appeared in Bulletin issues No. 21 1978 and No. 4 1979).

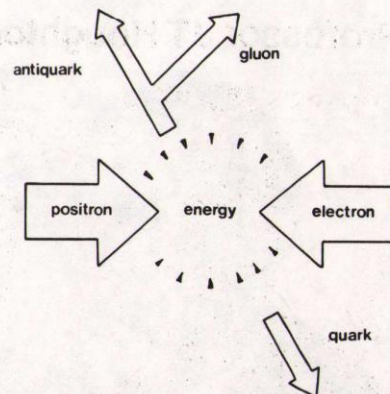
For many years the proton has been considered to be made up of 3 basic particles called "quarks" held together by quanta named "gluons". Both the quarks and gluons have a new property whimsically called "colour", and because of

this they are not expected to be directly seen. However, compelling indirect evidence for the existence of quarks has been known for many years and it has been hoped that experiments would soon be able to uncover the gluon.

At the PETRA storage rings beams of electrons and positrons are brought into head-on collisions with an energy three times larger than available at previous accelerators. Could this extra energy be sufficient to release the gluons? The experiments have been studying the spray of particles produced by these energetic collisions.

The evidence for the gluon has come from collisions producing 3 jets of particles. The simple picture that jets are due to a pair of quark particles (which works well at lower energies) is ruled out since the events clearly show that there are 3 basic particles in the final states. The outgoing quark radiates an energetic gluon at a wide angle (as shown in the figure) with the quarks and gluon fragmenting into the hadronic jets to produce a final "colourless" event. The 3-jet events

are predicted to be produced more copiously at higher energies - and it is from the high energy runs at PETRA that the presence of the gluons has been revealed. We look forward to further results from PETRA in the months ahead.



Schematic diagram of gluon production from an electron-positron collision.

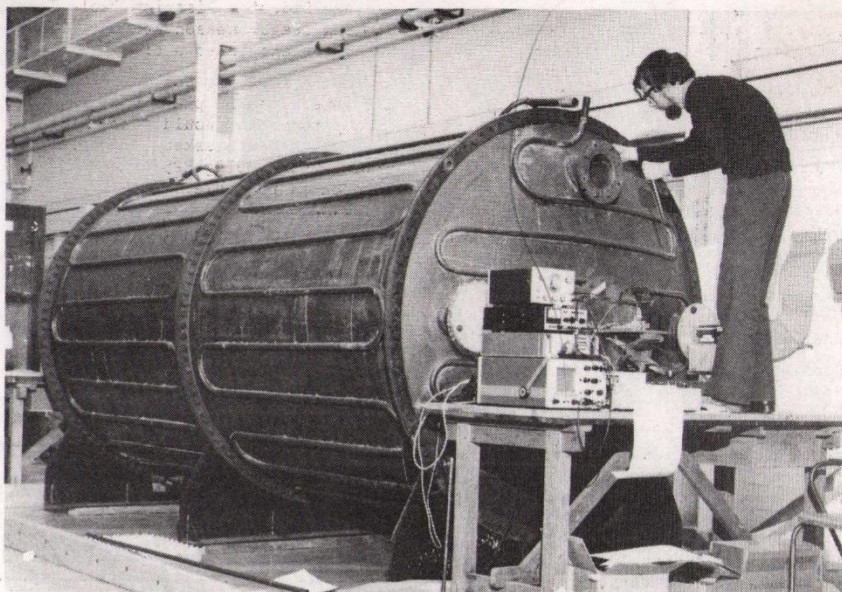
The Untuned Cavity Comes to Chilton

Just inside Building R7 can be seen a large copper tank, approximately 4m long by 2m diameter. Several theories have been advanced by interested onlookers as to what its true function is to be, and most of these theories have something to do with the large scale production of either tea or, more interestingly, whisky. Alas its true function has nothing to do with such staple beverages; it is, in fact, an untuned cavity, and a cornerstone in the Appleton Laboratory's millimetre wave research programme. The example in R7, the largest in current use, is to be used for measurements of the absorption of millimetre waves by atmospheric gases.

The cavity itself, which is a minor masterpiece of welded and spun copper fabrication (manufactured by Rycroft Ltd of Bradford) acts as a reverberation chamber for near millimetre waves. The quality of its reverberation properties are critically affected by the absorption due to the gases inside it. Thus the cavity becomes a very sensitive cell for making spectroscopic measurements of absorption by gases.

The principles of this type of measurement originated in the science of acoustics and were later applied to microwaves to a rather limited extent. In acoustics the losses in a room or an untuned cavity are sometimes described in terms of the effect upon reverberation of opening a window, hence the "open window unit" of loss which is still used in acoustics. This same method of measuring losses is used in the near millimetre wave region.

Waves in this region, which extends roughly between wavelengths .3mm and 3mm are at present used in a few specialist applications such as high definition radar at airports, where their ability to penetrate fog in spite of their short wavelengths has obvious practical advantages. It is widely anticipated that as millimetre wave technology becomes inevitably more advanced and less expensive these advantages will lead to more applications. Radio astronomy in the millimetre wave region is a flourish-



The "open window unit" is the standard unit of loss in this technique. Rodney Knight of Appleton Laboratory opens a calibration window in the wall of the Untuned Cavity.

ing and expanding field and so the propagation of millimetre waves through the atmosphere is of natural and urgent concern to astronomers.

There are several special problems associated with the propagation of these waves. The first is in handling them; the wavelengths are too short for conventional microwave plumbing and too long for the imaging and focussing techniques used in conventional optical spectroscopy. Inside the untuned cavity millimetre wave radiation is encouraged to fill the entire structure, more like a gas than a beam of radiation. This is achieved with the help of a rotating reflector within the cavity which scrambles the resonant modes, ensuring that the cavity is equally resonant at all wavelengths. However the main problem to which this work is directed, is that the atmosphere shows very variable transparency towards them, the atmospheric gases themselves do absorb these waves by amounts that are quite considerable at certain wavelengths. Therefore it is

of paramount importance that the wavelengths chosen for any particular application are not subject to unacceptably high levels of absorption by any of the gases present in the atmosphere, and this is where this untuned cavity will really come into its own. Recent tests carried out on the cavity in R7 have demonstrated that its performance is equivalent to that of a straight tube more than 400m long. With such an absorption path length and a high degree of environmental control this cavity will offer unrivalled sensitivity and versatility in this increasingly important wavelength region. The first problem to which it will be applied will be that of absorption due to atmospheric water vapour, whose anomalous temperature dependence indicates some very unusual behaviour on the part of the water molecule. This has already been the subject of collaborative work between Appleton Laboratory and Imperial College, London, and the conception of this cavity is a direct result of that work.

We are indebted to David Llewellyn Jones for this article.

OVERSEAS Visits

C J Batty and G P Gopal to Warsaw from 10-15 Sept to attend conference.
M J Shaw to Charleston USA from 10-14 Sept to attend Laser meeting.
H G V Hawthorne to CERN from 10-28 Sept to work on Nall experiment.
T Adams, R Blatchford and L Phillips to CERN from 11-21 Sept to work on MWP Chambers.
C J S Damerell to CERN from 12-17 Sept to work on Nall experiment.
J C Hart to DESY from 16-21 Sept to work on TASSO experiment.
G H Grayer to CERN from 16-19 Sept for discussions and collaboration meetings.

B Glossop to ILL from 16-22 Sept to commission cryostat.
F R Hopgood to Budapest from 20-23 Sept to attend meeting.
C D Osland, H Hurst, G A Lambert, T G Pett, A G Waters, S J Tunstall to DESY from 23-28 Sept to attend SEAS Anniversary Meeting.
R G Roberts to Goa (India) from 23 Sept to 6 October to attend Multiparticle Dynamics Symposium.
C W Trowbridge, A G A M Armstrong, D B Thomas, P Hallowell, M Holmes, R A Lawes, P Houzgo to Aachen from 24-27 Sept to attend Microcircuit Engineering Conference.

Shorthand Practice Group

Sessions are held on Tuesdays (80-100 wpm) and Thursdays (100wpm +) for people wishing to practise their shorthand with a view to taking proficiency tests.

The sessions are held at AERE Training Centre (opposite the shops) from 12.55 until 13.25 and are friendly and informal.

The next session will commence on Tuesday 4 September. If you would like to come along, please contact Sandra Kear, AERE extension 4618. We do need more recruits!

Ex Libris

Sadly, it appears that losses from the Library are on the increase - on Friday 25 August it was denuded of a further trio of its rare editions, Joan Homer, Phillipa Gamse and Jacqueline Ayres.

Joan has left us to read for a degree in Library and Information Science at Leeds Polytechnic. At a gathering of friends and colleagues, Joan was presented with a farewell gift by Frank Telling, who said that he was flattered to have been asked to do the honours for such a charming ex-colleague.

Joan had joined the Library Staff in the days when it functioned in R20, where as time went by the shelves moved closer and closer together, the cries of help from lost customers became more regular and more piteous and a large part of the Library girls duties seemed to be rescuing them from behind the cases! She had then assisted with the move to the present Library, and helped to bring it to the high standard it has achieved today. Everyone wished her success in her studies at Leeds, where they were confident she would do well, and hoped that she would always look back on her career in the Library of the 'Elizabethan Period' with affection.

In reply Joan said that after 13 years working with a group of such delightful colleagues it would be difficult to break the ties, and thanked everyone for the wonderful gift, and their kindnesses past and present.

Phillipa Gamse, our Archivist, has also left to pursue her studies. She is taking a Diploma in Archive Administration at University College London.

Elizabeth Marsh presented her with what turned out to be the definitive 'Snoopy' collection. It came with the best wishes of all, she said, she was sure Phillipa would do well at UCL, and that it had been great having her around for the past year or so. To which, Phillipa replied "Thank you very much" and uncharacteristically, could not be made to utter another word.

To end this little ceremony, Jacqueline Ayres, who worked very hard for six weeks on British Standards as her vacation job, was presented with a Scroll of Merit by 'SCABS' - the Society for the Complete Appreciation of British Standards.

Table Tennis

The new Didcot & District Table Tennis evening league season starts in September and lasts until April.

Any Rutherford Rec Soc members who are interested in playing in one of our teams and would like further information, are asked to contact Brian Wyborn, Bldg R25, Ext. 6215 as soon as possible.

Christian Fellowship

The Fellowship welcomes everyone to its meetings, which are held at 1230 hrs in R2 Conference room. The next meetings will be held on 13 and 20 September.

Film Badge Notice

Period 10 commences 10 September colour strip BROWN.

Please change your badge promptly and return all old ones.

Folk Club

The Rutherford Folk Club starts a new season of meetings on Friday 5 October 1979 at 8 p.m. with "Hot Vultures" (Ian Anderson and Maggie Holland) who sing and play Folk, Blues, Old Time, New Time, Goodtime, and Traditional songs and music. With them, on the same Bill are "Magenta" a group from Frome, Somerset who sing and play contemporary folk music.

Horticultural Society

The 1979 AERE Horticultural Society's 37th Show is to be held on Thursday 13 and Friday 14 September in the Upstairs Hall of the Social Club. It will be open to the public from 1230-1900 hrs on Thursday and 1200-1300 on Friday.

Please support this event. There are 95 classes under the following sections. Flowers, Vegetables, Fruit, Floral Art, Preserves, Cookery, Needlecraft, Handicrafts, Wine & Beer making and two special classes - "Webbs Master Gardener Competition" (first prize £3 plus a beautifully etched copper plaque) and a "Homemakers Class" (first prize £3 plus a silver cup). Why not try your luck - and help fill the benches? Schedules are available from Mrs W Dance H7.12 AERE Ext 2312.

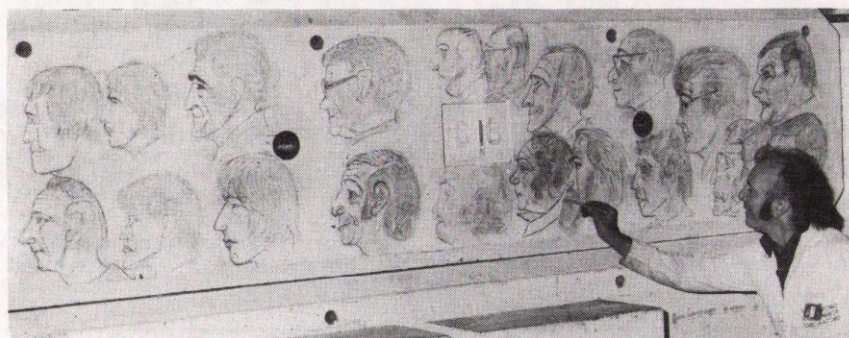
You need not be a member of the Society to compete. There will be a plant and produce stall, a raffle and on Friday at 1300 hrs, after the presentation of awards, there will be an auction of the produce donated for sale.

Angling

The 1979 Rutherford Angling Championship will be fished at Clifton Hampden on Saturday 29 September from 8 a.m. till 1 p.m. If you wish to fish, please give your name to P Craske, Ext. 232 by 25 September.

The Good the Bad and the Ugly

This mural is the work of Peter Champ, resident artist of the 'Nimdis' team. He has managed to sketch all his colleagues in the spare moments they have had in their mammoth task of dismantling Nimrod.



Top Row L to R

John Sexton, Phillip Moss, Tony Fox, George Dolman, Bert Kidd, Len Torode, Eddie Awdziejczyk, Frank Towers, Bob Hall and Wally Dormer.

Bottom Row L to R

Tom Whittle, Paul Walters, Steve Mears, Frank Lloyd, Ian Cron, Wilf Buxton, Stan Harrison, Phil Hingston, George McGee, and last but not least, John Thompson.



Deadline for Insertions

BULLETIN

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