Introducing the Harwell Heritage Project

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The very nature of the CLF's work has always been one of "what ifs…" and enquiry. Sometimes these questions come to nothing; often they lead to more questions; occasionally they take us in directions that nobody was expecting. It was in this very broad spirit of enquiry that the CLF became involved within this project, when someone innocently enquired "What's in the basement?"

What's in the basement?

A year or so ago, in response to a few enquiries that elicited responses that included the words "catacombs" and "dungeon," what used to be the Library Archives were (re)discovered in the former Nimrod Motor Alternator Hall Basement.

The basement is double-height, measures 37 x 15 m and is divided into eight secure cages of which the Library Archives is one of the largest. This cage contains seven rolling stacks holding five tons of material on 1.5 km of shelving. As can be seen in the photograph, this was nothing like a standard office environment.

The basement archives in October 2022. The first challenge was to push the gate open and clamber round an over-loaded trolley. Happily, the cage is now considerably tidier and far more accessible.

The Harwell Campus has seen a great number of technological and scientific achievements over its near 80-year history. The AERE Harwell story – with its 14 reactors leading Britain's early atomic energy development – is fairly well known. What is less well known is that Harwell also built 12 accelerators of various designs that were key not only to the formation of the Rutherford High Energy Laboratory (RHEL) next door, but also to the development of accelerators at CERN.

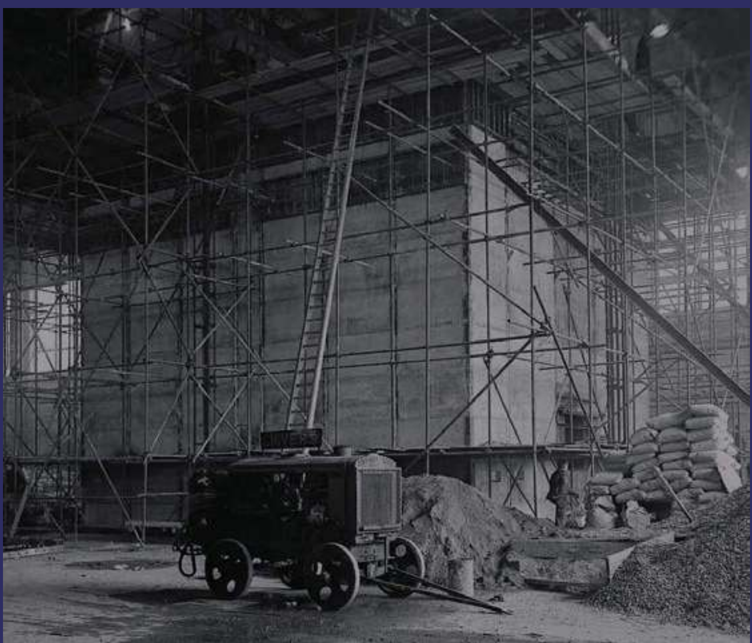
A decade younger, the early part of the Rutherford Laboratory story is a mystery to many. Information is scant and scattered; people who were there are no longer here, and we are in danger of losing our institutional memory.

Over the last year or so, the basement has revealed much original material from the early days of the Laboratory in the 1950s until the 1980s when use of the cage ceased for archival purposes. Although very much "in the raw," the material is already proving to be a remarkable record of the Laboratory as a world-leading centre of science, collaborating with the likes of NASA, CERN, and universities across the world. Much of this material is being scanned and is available in the "Rutherford Laboratory" and "AERE Harwell" sections of the Chilton Computing archive website.

The need for a national accelerator facility

In 1941, physicists at the universities of Birmingham, Liverpool, Cambridge and Oxford produced the two-part MAUD Report. Use of uranium for a bomb discussed the feasibility of an atomic bomb for the war effort which helped start the Manhattan Project, while Use of uranium as a source of power led to the start of nuclear power programmes in the UK and around the world.

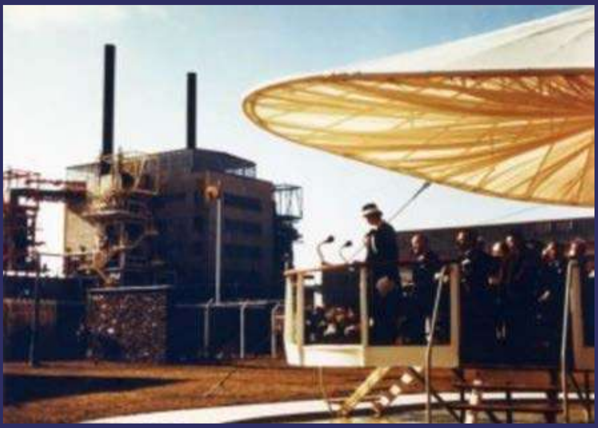
The Atomic Energy Research Establishment (AERE) Harwell was set up in 1946 to research and develop the use of nuclear energy for Britain's first commercial nuclear power station. The first reactor built at Harwell was GLEEP (Graphite Low Energy Experimental Pile), which achieved criticality on 15 August 1947 to become the first operational reactor in western Europe. (Enrico Fermi's Chicago Pile-1 achieved criticality on 2 December 1942; the Russian F-1 on 25 December 1946.)



Construction of GLEEP, a low power reactor used for investigations into reactor design and for the testing and calibration of materials.

In 1946, Harwell was supposed to be a secure, hush-hush site. Cameras were banned under threat of a 10-year prison sentence, and the very existence of BEPO was not made public until 1948. Unsurprisingly therefore there were no signs indicating “Harwell” along the (original) A34 or at the entrance to site, although the County Council did eventually relent.

By the mid-1950s, Harwell’s aims had largely been achieved. Much of the pioneering nuclear work was moving to other nuclear establishments and Calder Hall in Cumbria – the world’s first full-scale commercial nuclear power station – was opened by Her late Majesty Queen Elizabeth II on 17 October 1956.



Her late Majesty Queen Elizabeth II opens Calder Hall. (1956)

From 1947 until the 1990s Harwell built a total of 14 fission reactors and one fusion reactor (although the latter did not actually achieve fusion).

What is less well-known is that they also built twelve accelerators, the first being the 170 MeV 110-inch (nearly 3 m) synchrocyclotron “the most powerful atom-splitting machine in the country” in 1947.

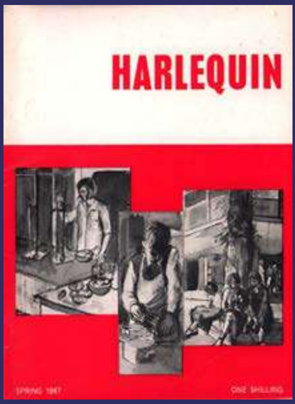
Harwell’s 110-inch synchrocyclotron accelerator.

In 1957 they built the 12 MeV Tandem Van de Graaff accelerator – a cigarette-lighter shaped building that famously resisted demolition in 2005. Harwell scientists and engineers were, arguably, becoming Britain’s experts in accelerator design and use, even more so than the electrical engineering firm Metropolitan Vickers (MetroVick) that manufactured them.

Drawing of the Tandem Van de Graaff accelerator.

By the mid-1950s universities were clamouring to teach the exciting new fields of nuclear and high-energy physics, although very few could afford to build facilities of their own. The Department for Scientific and Industrial Research (DSIR) was also beginning to baulk at the cost of funding Harwell's nuclear research programme.

Sir John Cockcroft – Nobel Prize-winner in Physics and the first Director of Harwell – was not the only person to realise that a critical situation was developing. Britain was in danger of losing its scientific reputation and scientists in a brain-drain to facilities abroad, chiefly to Berkeley and Brookhaven in the USA, but also to the new accelerator at CERN that had just been announced.

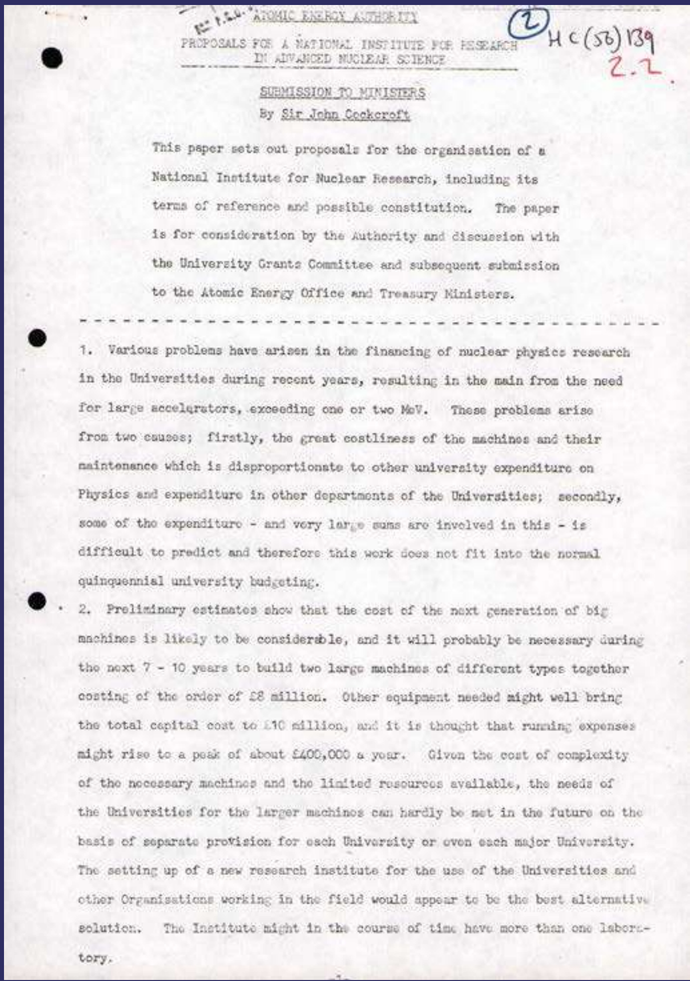


Cover and drawing of Sir John Cockcroft in the Spring 1967 issue of Harwell's journal, Harlequin. This and subsequent issues included Cockcroft's talk about the beginnings of AERE Harwell given on 27 January 1967, Harwell's 21st anniversary. Cockcroft died on 18 September later that year.

In a paper written in 1956, Cockcroft proposed a new National Institute for Nuclear Science to provide facilities [such as large accelerators and nuclear reactors] that were beyond the scope of individual institutions, and to encourage use of these facilities by scientists of universities, the Atomic Energy Authority (AEA) and industrial laboratories.

He suggested that the new institute be sited next to Harwell to take advantage of existing geological surveys and infrastructure and, crucially, to ease collaboration between scientists and engineers at the two institutes by eliminating the need for travel. It is likely he was also mindful that such an arrangement would provide very natural opportunities for AERE staff, fearful of losing their jobs if the nuclear work was scaled back.

The National Institute for Research in Nuclear Science (NIRNS) was announced in Parliament on 14th February 1957 and ratified by Royal Charter on 7th May 1958. The Chairman was Lord Bridges and the committee – representing universities and the AEA – included Cockcroft as well as Professor Rudolf Peierls, Sir William Penney and Basil Schönland (the second Director of AERE Harwell). Bridges had recently retired as Head of Treasury and although no scientist, he understood both intellectual endeavour and government procedures. He thought the name NIRNS was "horrid" however and said so in Parliament.



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ATOMIC ENERGY AUTHORITY

PROPOSALS FOR A NATIONAL INSTITUTE FOR RESEARCH IN ADVANCED NUCLEAR SCIENCE

SUBMISSION TO MINISTERS

By Sir John Cockcroft

This paper sets out proposals for the organisation of a National Institute for Nuclear Research, including its terms of reference and possible constitution. The paper is for consideration by the Authority and discussion with the University Grants Committee and subsequent submission to the Atomic Energy Office and Treasury Ministers.

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1. Various problems have arisen in the financing of nuclear physics research in the Universities during recent years, resulting in the main from the need for large accelqrators, exceeding one or two MeV. These problems arise from two causes; firstly, the great costliness of the machines and their maintenance which is disproportionate to other university expenditure on Physics and expenditure in other departments of the Universities; secondly, some of the expenditure - and very large sums are involved in this - is difficult to predict and therefore this work does not fit into the normal quinquennial university budgeting.

2. Preliminary estimates show that the cost of the next generation of big machines is likely to be considerable, and it will probably be necessary during the next 7 - 10 years to build two large machines of different types together costing of the order of £8 million. Other equipment needed might well bring the total capital cost to £10 million, and it is thought that running expenses might rise to a peak of about £400,000 a year. Given the cost of complexity of the necessary machines and the limited resources available, the needs of the Universities for the larger machines can hardly be met in the future on the basis of separate provision for each University or even each major University. The setting up of a new research institute for the use of the Universities and other Organisations working in the field would appear to be the best alternative solution. The Institute might in the course of time have more than one laboratory.

First page of Cockcroft's "Proposals for a National Institute for Research in Advanced Nuclear Science: Submission to Ministers" (1956)

NIRNS Charter and seal: Elizabeth the Second

By the Grace of God of the United Kingdom of Great Britain and Northern Ireland and of Our other Realms and territories Queen, Head of the Commonwealth, Defender of the Faith.

To all whom these presents shall come, greeting!

Rutherford High Energy Laboratory

It was envisaged that NIRNS would eventually comprise several laboratories, the first being the Rutherford High Energy Laboratory (RHEL) sited just across the runway to the south of AERE Harwell. (AERE Harwell had been the site of RAF Harwell during World War Two and so was already partially developed, if knee-deep in mud. The occasional encounter with buried cylindrical metal objects was, and remains, a site hazard to remind everyone of the site's history.)

Drawing of the Rutherford High Energy Laboratory (Architect GW Dixon). Looking north-west, the Nimrod mound is towards the left; what is now R1 is in the foreground.

The first Director of RHEL was Thomas Gerald (Gerry) Pickavance, who skilfully organised the laboratory as though it were an extension of a university research department rather than an "old-style" government department. This was much to the relief of the universities, which did not relish dependence upon the AEA in administrative matters, even if it was the AEA that was funding them.

Gerry Pickavance CBE, FRS the first Director of Rutherford High Energy Laboratory.

Godfrey Stafford CBE, FRS the second Director of Rutherford [High Energy] Laboratory.

Much thought was given to the design of the accelerator to be built at RHEL. Cockcroft convened a Symposium upon machines for high energy physics at Harwell in May 1955 to discuss this, inviting notable physicists including Professors Blackett, Frisch and Peierls, and Drs Adams, Oliphant and Salam, in addition to Harwell staff including Egon Bretscher, Brian Flowers, John Lawson, Gerry Pickavance, Basil Schönland and Godfrey Stafford.

D-Day Memorial in the south-east corner of site that was unveiled in 1955. The plaque reads: This stone marks the end of the runway from which aircraft of No.38 Group Royal Air Force took off on the night of 5 June 1944 with troops of the 6th Airborne Division who were the first British soldiers to land in Normandy in the main assault for the liberation of Europe. (Photo taken in November 2016)

No decisions were made at that meeting, but Rudy Peierls (allegedly) was inspired to write a poem which was thought to summarise it rather well:

A meeting at AERE
On how to get some GeV
With no amount of trouble you
Can do this CW.
CG has also had its fling
A Common-Garden kind of thing.
For Awful Gamble stands AG
But if it works or not we'll see.
If resonance we can't defy
The diamonds will just dot our tie.
FFAG will surely stand
For Fancy Frills are Always Grand.
Electrons I would rather leave
They lose more speed than they receive
The Linac would hardly win it.
Its house is fine but nothing in it.
Oh microgauss! Oh millithou!
Oh megaquid (if funds allow)!
I get, when I attempt to guess
The CR double EPS.

RHEL Main Gate. In the distance, Building R1 has been completed but R2 is still under construction and surrounded by scaffolding. (November 1963)

At a follow-up meeting in December, ten designs were considered in more detail, although one design was almost immediately rejected as being too difficult and costly. The main issues were the choice between an electron or a proton machine, then the required energy and intensity. They eventually decided on a 6.5 GeV synchrotron with a conventional Constant Gradient producing at least 10^{11} protons per pulse (ppp), although these requirements were raised to 5 x 10^{11} ppp at 7 GeV some years later.

In 1959, RHEL held a competition to name the synchrotron. Forty-seven entries were received from which HEPATRON was judged to be the best, but the Board preferred NIMROD – “a mighty one on the earth” (Genesis 10:8-12).

After an extensive design process at Harwell, the huge task of building Nimrod began in 1957. It took five years. First, engineers had to excavate a small hill on the western side of the Rutherford site to create a semi-underground circular building 220 feet (67 m) in diameter. Then 100,000 tons of concrete were poured to form the 30-foot (9 m) thick shielding walls and 16-foot (5 m) thick roof of the accelerator.

John Cockcroft inspects the Nimrod excavation work. (1957)

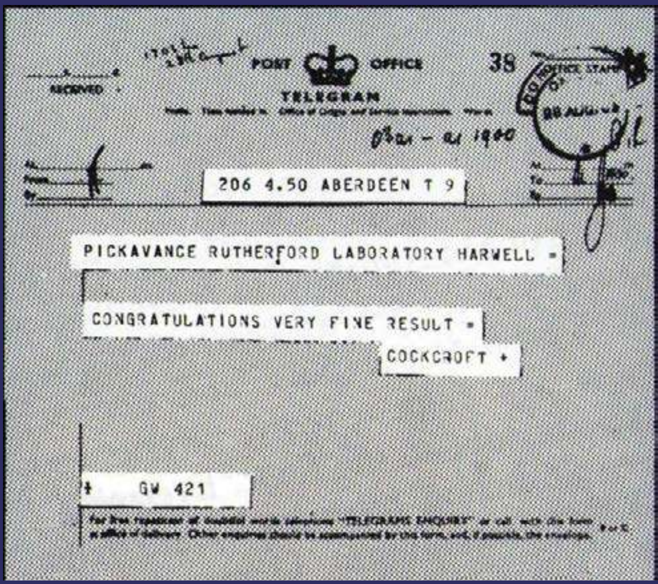
Every week for more than a year, six 20-ton sectors of magnet yoke were delivered to site – 336 of them in total, weighing nearly 7,000 tons. Each sector was carefully eased into place to form a ring-shaped magnet 150 feet (46 m) in diameter. Percy Bowles, the project engineer said it was "a demon to build," especially the vacuum chamber of epoxy resin glass fibre laminate.

Early office accommodation at RHEL: the "Chivers Desolated Ground" was named after the builders, WE Chivers & Sons. The grain-silo shape of DIDO, one of Harwell's heavy water reactors, can be seen in the distance. (1957)

View of Nimrod octant with outer vacuum vessel installed. (1966)

Nimrod first achieved design energy on Tuesday 27 August 1963 at about 7pm. In the Control Room: "Nimrod was stirring in his sleep but on the slow sweep of the oscilloscope the thick line which meant accelerated beam simply would not go far enough… Suddenly we noticed the thick bright line on successive traces was slowly but inexorably creeping out to the right… A Nimrod wizard was slowly getting the hang of the frequency programme… [Then] A click on the time-base control enabled us to pin-point the 7GeV position and watch the miracle happen."

There was a restrained but heart-felt cheer, broad smiles everywhere and a few handshakes exchanged as Nimrod graduated from being the highest energy machine in Berkshire to the highest energy machine in England.


POST OFFICE TELEGRAM
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206 4.50 ABERDEEN T 9
PICKAVANCE RUTHERFORD LABORATORY HARWELL =
CONGRATULATIONS VERY FINE RESULT =
COCKCROFT +
GW 421

Over the next few days many telegrams of congratulation were received, including "Congratulations very fine result" from John Cockcroft.

After 15 years of operation, Nimrod delivered its last particles at 17:00 on Tuesday 6 June 1978. A formal commemorative event was held a few weeks later and the master control key presented to Gerry Pickavance.

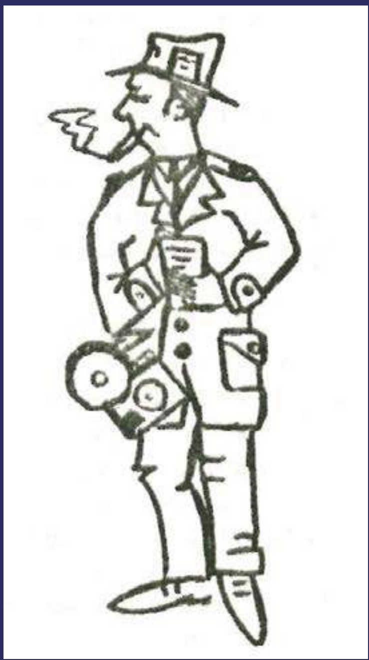

Nimrod Master Control Key

Nimrod was then dismantled to make way for a new accelerator – the Spallation Neutron Source (SNS) – opened by then Prime Minister Margaret Thatcher on 1 October 1985. The Prime Minister also announced a new name for the accelerator – ISIS – after the river in Oxford and the Egyptian goddess of resurrection. This seemed appropriate somehow, as parts of Nimrod were reused in ISIS's linear accelerator.

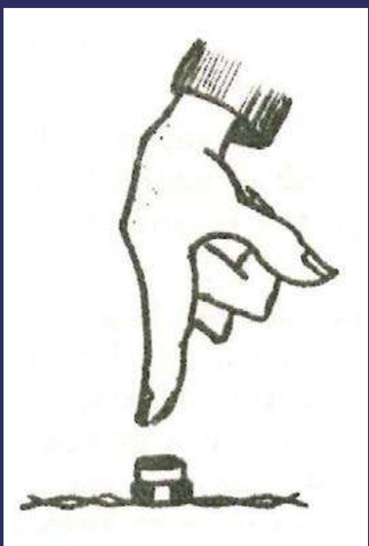
Amongst the VIP guests at the SNS Opening Ceremony were Sir Keith Joseph (Secretary of State for Education and Science), the then Prime Minister Margaret Thatcher, Geoff Manning (Director of Rutherford Appleton Laboratory) and Bill Mitchell (Chairman of SERC). This was Prof Mitchell's first day in post.

Going public

Although Harwell was initially supposed to be a secure, hush-hush site, RHEL was under no such restrictions. Part of the NIRNS charter required Rutherford Laboratory to disseminate scientific and technical knowledge in the field of nuclear or related research. Then, as now, it works with scientists and engineers across the world and engages the general public through outreach programmes and Open Days. The first of these Open Days was held in April 1964, when the Laboratory "made an exhibition of itself" and opened its doors to the Press and public. The Laboratory newsletter Orbit reported:



On Tuesday 21st April Press Photographers were let loose on the site; they loved the science fiction look of the Cockcroft-Walton accelerator and the potential of the Nimrod catacombs as the setting for a thriller. On the Wednesday nearly 100 Press Correspondents representing newspapers and the technical press came to visit. On the Thursday there was a rehearsal of the Nimrod switching-on ceremony to ensure all went well the following day.

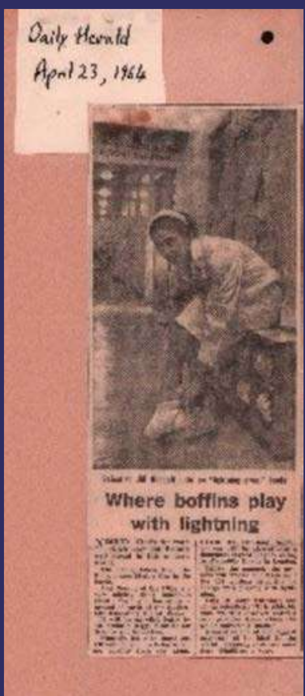


Friday 24th was the big day when, after lunch, the Right Honourable Quintin Hogg MP (the about-to-be newly appointed Minister of State for Education and Science) pressed the button to start Nimrod. The warbling note of Message 4 sounded followed by the beam electrode signal indicating that Nimrod was ON. Reports on the radio that night described the sonorous voice of Ted Eglinton as "Nimrod answering Mr Hogg."

In his speech Gerry Pickavance thanked everyone who had contributed to the construction of Nimrod and looked forward to its research programme: "There is no shortage of imaginative physicists anxious to mount experiments with which to attack the problems." Sir John Cockcroft added: "We will look forward, as Rutherford would have done, to the results."

On the Saturday there was a general Open Day for staff of the Laboratory and their families, about 5,000 visitors in all. The car parks were packed solid, 800 set teas were served in the Restaurant, and 300 cups of tea in the Coffee Lounge. Glorious sunshine set the seal on the afternoon and people actually queued to see Nimrod! All over the Laboratory people were milling about… some with awestruck faces, some glowing with pride, and some obviously muttering, “My feet are killing me.”

Looking north-east on the corner of what is now Road 1 and Road 4, the RHEL site spruced-up ready for the public to visit. The signpost indicates the Proton Linear Accelerator (PLA) R12 to the north, Nimrod R2 and the Heavy Lab R25 to the south, and the Lecture Theatre to the east. The tower of Harwell’s Tandem van de Graaff accelerator is just visible in the distance. (1964)


Daily Herald
April 23, 1964

Where boffins play with lightning

“Where boffins play with lightning” press cutting from The Daily Herald, 23 April 1964.

What's in the name?

RHEL: Rutherford High Energy Laboratory (1957)

There was much discussion about the name of the new Institute. Harwell High Energy Laboratory was politically unacceptable to the universities because it gave the impression of being too closely aligned with the AEA; Basil Schönland suggested The Rutherford Institute instead, perhaps in gratitude for the support he had been given earlier in his career. The final decision was a combination of the two: The Rutherford High Energy Laboratory.

ACL: Atlas Computer Laboratory (1963)

The Atlas Computer Laboratory was built in 1963 to house the largest and fastest of the three Ferranti Atlas 1 computers. The building was positioned between RHEL and AERE Harwell to reflect the use of its computer by the two institutes. (The computer was also used by UK universities and some institutes abroad, such as CERN.) The building itself was probably the first purpose-built computer building in the country, if not the world. Jack Howlett, the first Director of Atlas, insisted that the interior should be light and airy, and a pleasant place in which to work as opposed to the more usual Civil Service "ponderous Victorian articles."

Original main entrance of the Atlas Computer Laboratory. The branding on the car door is for NIRNS. (1968)

The computer itself was built by Ferranti Ltd and designed by Tom Kilburn in the Department of Electrical Engineering at what was then the Victoria University of Manchester. Kilburn incorporated many radical features into his design, including a multi-processing operating system that he called "The Supervisor," and used paging within virtual memory to allow users to run programs larger than the amount of physical memory available.

Ferranti/ICT engineer David Burrell at the Engineer's Console of the Atlas computer in the Atlas Computer Laboratory machine room. (1968)

Almost all computers today incorporate these ground-breaking features, but it might not have happened at all. Ferranti (acquired by International Computer and Tabulators (ICT) in 1963) were keen to develop and build the machine, but were understandably reluctant to commit the necessarily enormous amount of time and money to it unless at least one customer could be guaranteed. John Cockcroft understood their dilemma, so signed a letter of intent: if you build it, Harwell will buy it. On the strength of that letter, Ferranti felt able to go ahead.

RL: Rutherford Laboratory (1975)

The “High Energy” part of RHEL’s name was dropped in 1975, to reflect the wider scientific interests of the Laboratory and its recent merger with the Atlas Computer Laboratory upon the retirement of Jack Howlett and the decommissioning of the Atlas computer.

RRS: Radio Research Station (1924)
AL: Appleton Laboratory (1973)

In 1924, the Department of Scientific and Industrial Research (DSIR) formed the Radio Research Station (RRS) at Ditton Park, near Slough, to research radio science and to continue Edward Appleton’s ionospheric work which he began in the 1920s. Accommodations were primitive; there was one hut for the field-strength measurements, three huts for direction finding, a small tower for wave-tilt measurements, and a large workshop.

The Station was renamed the Radio and Space Research Station (RSRS) in 1965 to better reflect their wider work and facilities, which now included an 85-foot (26 m) radio telescope capable of following earth satellites, and artificial satellites, known as Topside Sounders, to explore the ionosphere from above.

RSRS was renamed by The Rt Hon Margaret Thatcher MP (then Secretary of State for Education and Science) on 7th November 1973 to Appleton Laboratory in honour of Nobel Prize-winner Edward Appleton.

RAL: Rutherford Appleton Laboratory (1979)

Appleton Laboratory was closed in 1979 and many of the staff transferred to Rutherford Laboratory, whereupon it was briefly known as The Rutherford and Appleton Laboratories until October 1981 when it became Rutherford Appleton Laboratory to signify the completion of the merger process.

John Houghton (out-going Director of AL), Godfrey Stafford (out-going Director of RL) and Geoff Manning (incoming Director of RAL). In the background is the IRAS project’s 12-metre Transportable Ground Station (aka The Dish) built on behalf of NASA in the 1960s. (September 1979)

Dr Geoff Manning, Deputy and then Director of Rutherford [Appleton] Laboratory from 1979 until 1986. (1980)

Unsurprisingly the merger was met with some dismay. Appleton staff did not relish the upheaval, and Rutherford staff wondered if there was sufficient office space for 200+ arrivals, never mind lab space. There were technical problems too: Nimrod's 220-foot (67 m) diameter ring made the entire area electromagnetically noisy, so the more sensitive radio propagation equipment and associated staff were relocated to the much quieter Chilbolton Observatory in Hampshire. Other equipment, such as the ionosondes, could be moved however, and Appleton staff eventually formed part of a new space technology and research department now known as RAL Space.

Collaboration with CERN

There has always been collaborative work between AERE Harwell, RHEL and the European Council for Nuclear Research (CERN). John Adams was the chief designer of Harwell's 110-inch synchrocyclotron before moving to CERN in 1953, and then to Culham Laboratory near Abingdon in 1961. Adams also contributed to John Cockcroft's Symposium upon Machines for High Energy Physics in 1955 to discuss the design of the machine that became Nimrod.

John Cockcroft was the UK representative on the Council of CERN and was present at the opening of the 25 GeV "atom smasher" Proton Synchrotron (PS) on 5 February 1960, together with Profs Nils Bohr and Robert Oppenheimer.

In conversation, Prof Niels Bohr, Director of the Universitets Institut for Teoretisk Fysikiin, Copenhagen, Nobel Prize-winner in Physics 1922, Member of Danish Delegation to the CERN council; Prof EM McMillan, Director of Radiation Laboratories, University of California, Berkeley; Prof CJ Bakker, Director General of CERN Council; and Prof Robert Oppenheimer, Director of the Institute for Advanced Studies, Princeton University. (5 February 1960)

At the Press Conference: Prof F Perrin, French High Commissioner for Atomic Energy; Prof E Amaldi, Head of Rome University Physics Department; Sir John Cockcroft, part-time member of UKAEA and Nobel Prize-winner in Physics 1951; and Prof CJ Bakker, Director General of CERN Council.
(5 February 1960)

This collaboration continues today. RAL's Particle Physics Department (PPD) collaborates with CERN to design and build accelerators and detectors.

Other surprises

The AERE Harwell footprint is now part of the Harwell Science and Innovation Campus. Although AERE Harwell no longer exists per se, it is well-referenced in the literature and there remains a (sadly dwindling) community of ex-employees.

Some years younger, the story of Rutherford Laboratory (now part of UKRI's Science and Technology Facilities Council (STFC)) remains a mystery to many. People are often surprised by the link between AERE Harwell's accelerators and RHEL's Nimrod, while few have heard of the Variable Energy Cyclotron (VEC) built by RHEL on behalf of Harwell.

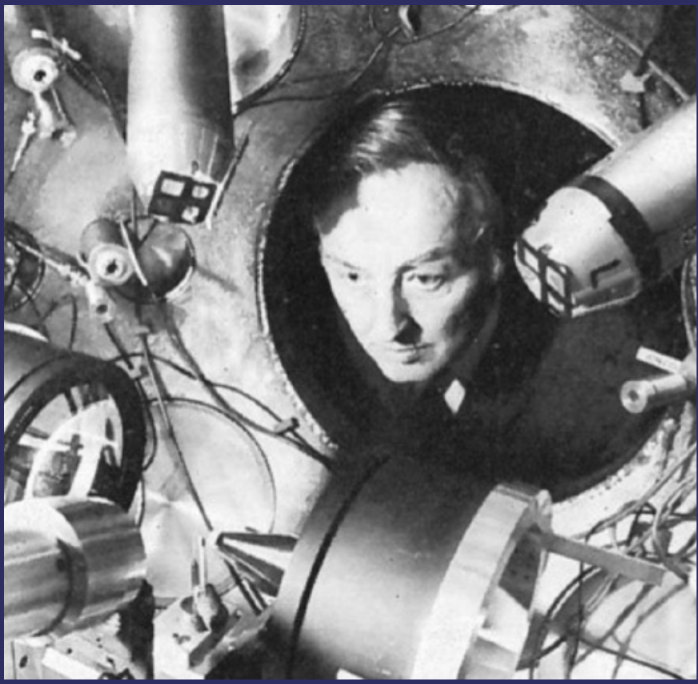
These are not the only surprises to be uncovered so far.

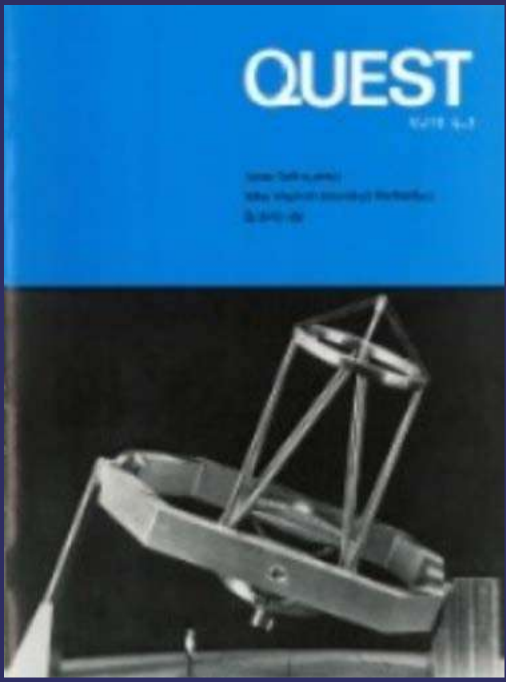
A reactor at Rutherford?

In 1966, a proposal was put forward for a nuclear High Flux Beam Reactor (HFBR) to be built by Harwell and managed by Rutherford staff who were accustomed then, as they still are, to hosting university research groups. Difficulties with funding meant that the HFBR did not go ahead.

The Joint Laser Project

In 1975, there was proposal for a Joint Laser Project between Harwell and Rutherford to build a £166k YAG (Yttrium Aluminium Garnet) laser. Again, the project did not go ahead, but in 1977 the Science Research Council (SRC) funded the Central Laser Facility (CLF) and the Neodymium Glass Laser, now known as VULCAN, which is still in operation.



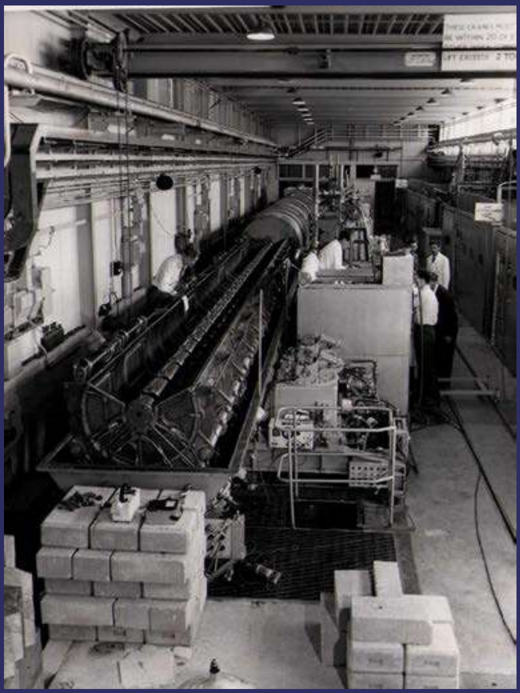


Alan Gibson, head of the Laser Facility, looks inside the laser target vessel showing the small stem supporting a micro balloon target sphere (Keystone Press) taken from Quest (the house journal of the Science Research Council), April 1977

The Proton Linear Accelerator (PLA)

In 1953, Cockcroft made a proposal to the Atomic Energy Board for the construction of a 600 MeV proton linear accelerator outside the Harwell security fence, for use primarily by university research groups.

Construction of B412 (later R12) on the south side of the runway began in the spring of 1955, before RHEL had even been named. The first 50 MeV stage of the accelerator had been built by MetroVick when results from the Liverpool synchrotron overtook them; the usefulness of such an accelerator was then called into question and the project was cancelled.



Vacuum envelope and liner lids removed from Tank 3 showing drift tubes. Tank 1 was 19 ft 3 inches (6 m) long, 5 ft (1.5 m) in diameter and weighed 4 tons. (30 July 1959)

Rather than let the accelerator sit idle, it was offered by Harwell to the newly-formed RHEL for use by university research groups as originally planned, and to give RHEL staff experience of managing an accelerator until Nimrod became operational.

The PLA was switched off for the last time at 11am on Friday 3rd October 1969. Tanks 2 and 3 lived on for use in Nimrod.

The Restaurant

The R22 Restaurant was built during the winter/spring of 1962/63, including a three-month hiatus due to 10-foot snow drifts and the worst winter in living memory. The architect, GW Dixon of the Southern Works Organisation, explained that the building's unique shape and folded roof were designed to suggest the circular movement of neutrons around Nimrod, and the floor-to-ceiling windows enabled people to enjoy the full panorama of the Berkshire Downs. Staff described it as “a circular bit with a rectangular bit joining it” and joked that it was really a sneaky new synchrotron.

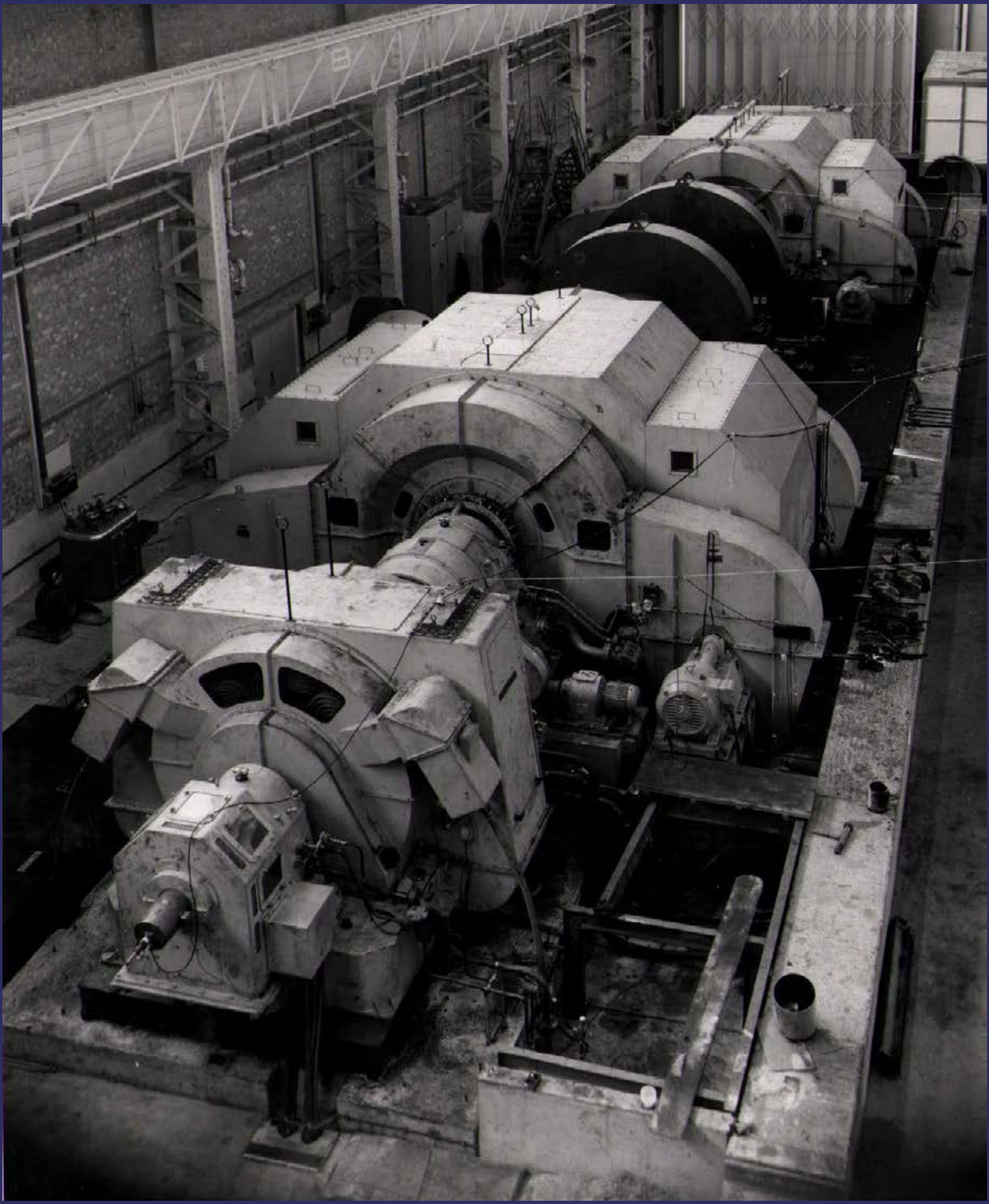
The Restaurant first opened its doors for luncheon on Tuesday 27 July 1963. It was extended outwards in 2005 to accommodate an increase in staff numbers due to the Diamond Light Source – a 3 GeV synchrotron accelerator built in the shape of a doughnut nearly 180 metres in diameter.

R22 Restaurant rotunda and servery area. (1963)

Nimrod's power supply

Nimrod’s power requirements were so considerable that it could not be connected to the National Grid or everybody’s lights would have gone out. Instead, local power storage was supplied by two massive motor alternators and two 30-ton flywheels more than 10 feet (3 m) in diameter which, at full capacity, rotated at 970 rpm. Even so, it was said that people living in Didcot knew when Nimrod was operating because their TV pictures shrank ever so slightly.

The vibrations of the flywheels were damped using 80 spring units and a counterweight of 16,000 tons of steel-reinforced concrete plunging down into the basement. These measures proved very effective and nobody in the nearby buildings complained.



Nimrod Motor Alternator Hall. From front to back: motor, alternator, two flywheels, second alternator. (November 1962)

Listening to 1955

One of the key items purported to be in Box 0666 of the archives was a set of audio tapes from the December 1955 Symposium upon Machines for High Energy Physics. But Box 0666 is missing, presumed lost in time. In December 2023, a random box file was discovered on an out-of-the-way shelf and found to contain re-recordings of the meeting on cassette, from 1982. Despite being over 40 years old, the tapes are still playable; it is possible to hear the footsteps of Cockcroft, Pickavance and others walking up and down the room (it had a wooden floor), the coughing, the teeth-jarring squeal of someone writing on a blackboard, and the jokes as they discuss the new accelerator. Spine-tingling.

The Harwell Heritage Project

Many, if not most, of Harwell Campus staff are proud of what they do and are concerned that the many technological and scientific achievements over the years are not forgotten. Although the work is generally documented in scientific literature to a greater or lesser extent, there is something truly remarkable about encountering a place or an object in its raw authentic form; there is simply no substitute for the face-to-face immediacy of contact. And if the viewing figures for television programmes such as The Repair Shop (nine series and counting, watched by 6.7 million people in March 2020), Antiques Roadshow (44 series and counting, watched by over 5 million people in August 2021) and Secrets of the museum (now into its third series) are anything to go by, people love hearing the stories that come with the objects.

There are pockets of heritage artefacts on Harwell Campus, but they are under threat from the necessary development of site, pressures on storage space, and a lack of awareness amongst staff. While there might be no place for a museum on a high-tech science R&D campus, there should be some place where past achievements (and achievements-to-come) can be documented, preserved and used to promote what is being done today. People who understand this feel there is a moral responsibility to do so as well.

Aerial view of Rutherford Laboratory looking east. In the foreground the green mound of Nimrod, the star shape of the R22 Restaurant is eastwards centre with the houses of Frome Road in the distance. (1963)

Aerial view of Rutherford Laboratory looking north. The NASA/IRAS satellite dish is in the right foreground with the R22 Restaurant further to the north. The hill covered in dried grass is Nimrod/ISIS spoil (this photo was taken in July); the accelerator mound itself is the green(ish) circle northwards. (1984)

The aim of the Harwell Heritage Project is to tell the story of the campus and the human endeavour – not just the technological side but also the cost, the time, the delays, the failures and the successes… the human experience.

Work has begun to explore the various archives on site and some of the findings have been used to illustrate this article. This is just the beginning of the process; it will take years to produce a full, detailed catalogue. The project also aims to achieve accreditation with an institute such as The National Archives and find an archive space in which to keep the heritage material.

In April 2022, STFC Executive Board agreed that RAL heritage was worth preserving, and approved the setting up of a small project team to develop the case for a heritage centre on the Harwell Campus.

The Arts and Humanities Research Council (AHRC) has since awarded a grant for a professional archivist to make an initial assessment of the campus archives and offer advice on next steps. In a separate project, a campus-wide consortium is discussing a Harwell Visitor Centre to focus on the modern-day science and technology R&D across the whole campus – with a nod to its very considerable heritage where appropriate, of course.