orbit

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Journal of the Rutherford High Energy Laboratory

News from the Proton Linear Accelerator

R C Hanna

J M Dickson

About a year has passed since an issue of ORBIT was devoted largely to the P.L.A. The annual shut-down we are having at present should, in theory, give an ideal opportunity to sit back, relax and review what's been going on over this period. But somehow shut-down periods don't seem to work out that way and life seems to get busier than ever ; but copy dates have to be met, so here goes.

Relative to the last review (ORBIT, April 1963) some things have not changed. We retain the same structure of three groups – accelerator physics, nuclear physics, and engineering. We have about the same number of people using the machine (about fifty experimenters including twenty students). There are changes in the population, although in some cases it is merely a change of status as the raw student moves up to become the polished junior member of a University's staff. As the reliability of the machine has improved, there has been an increase in the time used by each team although we are still a long way from that unthinkable state of bliss when every individual team is allocated all the time it would like to use.

Operation of P.L.A. 1963/1964

Operation is punctuated by annual shut-downs which have usually been in the Autumn. Thus the last P.L.A. year was from the 13th October 1963 to the 27th September 1964. During this time the machine has in general been operated on a two week cycle of nominally 10 days

NEWS FROM THE P.L.A. – continued

for physics and 4 days for maintenance, installation, setting up of beam lines and running-up of the machine. The experimental periods have varied in length from 4 to 18 days and the maintenance periods from 1 to 6 days (averaging about 3.2 days). A very busy year for all members of the P.L.A. Division and for our visiting staff has produced the following statistics :- time scheduled for experiments – 6,208 hours ; maintenance etc. – 1,880 hours ; proton beam available – 5,392 hours ; (i.e. 87% of scheduled time, compared with 79% for the previous year). The polarized proton beam was used for a total of 1,871¾ hours, which was 35% of the time available for experiments.

The improved reliability of the machine has been accompanied by an improvement in beam quality. Having solved most of the problems of producing a beam for thousands of hours per year, the Accelerator Physics and Engineering Groups have been able to devote more time and effort to improving the control of the machine parameters. The radio frequency accelerating voltage and its phase require to be carefully controlled and monitored in order to produce a beam of the required energy stability from pulse to pulse and within each beam pulse. A stabilizer system has now been developed and installed on two of the three tanks which can control the radio frequency voltage, to about 0.2%, against variations of the power amplifiers, the modulators and the 50 c/s power supply (including the "Nimrod Variations" on the latter – just one movement in the Enigma). Phase control is at present achieved by servo tuning at the resonant cavities and by careful setting-up and monitoring. The beam energy spread is now about 100 KeV and further improvement is expected. The energy stability, over times of the order of weeks, is better than 300 KeV and can be monitored to an accuracy of about 10 KeV. The beam energy can be varied at will by 3 MeV while still maintaining good energy resolution.

Beam currents of up to 3 μA mean have been available (unpolarized) but the full current has only been used on a few experiments, notably those using the n½ spectrometer magnet. The polarized beam intensity was 2×10^8 protons per second with a polarization of 40%, and was nearly always used at full intensity. The ability to provide polarization in any required direction (over 4π) was greatly appreciated by the experimental teams. The time of flight apparatus has been improved by the addition of facilities for producing burst spacings of up to 360 nanoseconds.

Routine planned maintenance of the whole machine has proved impracticable due to the high demand for experimental time and a scheme of 'systems checking' together with routine maintenance of rotating machinery has been successfully initiated.

The Nuclear Physics Programme

There have been substantial changes in the equipment available for the experiments. First is the provision of the third experimental area ; in case any member of a building committee wonders how Dr. Batty slipped this through without their knowledge, we hasten to explain that experimental area three is the big outdoors, where many neutron flight paths are available radiating at angles of from 0 to 90° from the target. The same clearing magnet as before is used to sweep away the protons that have not interacted with the thin target ; this magnet is surrounded by a circular shielding wall with holes to let the neutrons out along their flight paths. They look equally useful for arrows! Excellent true-background ratios have been found with the detectors in their new position, and the disaster of having to clear all other experiments from the second experimental area to accommodate multi-angle time of flight work has been avoided.

The second large piece of experimental apparatus which has come into use since the last report is the n½ magnetic spectrometer. This is probably a good opportunity to clear up the mystification which this rather abbreviated title causes in many minds. Briefly, it is a large magnet with a useful field bounded by two concentric semicircles and their common diameter. Within this region, where the field is symmetric around the axis, the field decreases with increasing radius according to the relation $\frac{dH}{H} = -n\frac{dr}{r}$. In our instrument n = ½. . . hence the name. This results in the useful property that charged particles entering the field from a target placed outside the field may be brought to a focus ; that is, they will pass through the focal plane of the spectrometer at a point which is determined by the momentum (hence energy) of the particles, but not by their direction on leaving the target. This focal plane is outside the field region and accessible. The magnet has a mean radius of 40 inches, weighs 30 tons, and can bring to a focus any charged particle from any reaction which can be produced by 50 MeV protons. The instrument combines good resolution (better than 1 in 1,000 in energy) with a fair range (particles over a 10% range of energies can be focused simultaneously) and good gathering power (2×10^{-3} steradian).

'It all started at Scarborough when 'Wilson's Law' (that scientific progress is directly related to how much you decide to spend on training scientists, plus how you treat them when you get them, plus Lord Bowden, minus the Tory Government) took its place for posterity's schoolboys beside those earlier dictums of Pythagoras, Euclid and company.'

W. Shakespeare.
'Science reorganised–at last.'
Guardian 27 August.

NEWS FROM THE P.L.A. – continued

Two types of detectors have so far been used in experiments – arrays of small solid state detectors, and a sonic spark chamber which is relatively easy to use as information is required in one dimension only. The resolution available with this instrument opens up new fields of possible experiments. Teams from A.E.R.E. and Kings College, London, have used the magnet so far ; the main interest of the first group has been in studying nuclear reactions, and of the second in studying elastic scattering from deformed nuclei. Here, low lying nuclear states are easily excited and their coupling influences the scattering.

The proton-proton interaction has been intensively studied at the P.L.A. by several teams ; the latest work to be finished is a set of measurements by a joint Queen Mary College, London and Rutherford Laboratory team on the way the spin direction of a proton changes during a collision with a proton. The initial spin direction is determined by the polarized source, while one component of the proton's spin direction after the collision can be measured by the asymmetry in scattering from helium nuclei. When polarized beams were prepared by nuclear scattering, rather than in special sources, three successive nuclear scattering events were required and this class of experiment acquired the title of "triple scattering". The name sticks, even though the first of the three scatterings has been eliminated. The measurement remains difficult and time consuming, with the full intensity of the polarized proton source (2×10^8 protons per second) yielding only one useful event per second. However, results have been achieved for five angles at 50MeV and three angles at 30MeV.

The next experiment in the programme is a more accurate measurement of the angular distribution in scattering. Only a single nuclear collision is involved, but to reach the desired accuracy will be far from easy. After this, attention will shift from the proton-proton interaction to the neutron-proton interaction. Already a Rutherford Laboratory team has an experiment under way to discover to what extent the neutrons ejected at 0° from deuterium carry the polarization of the incident proton, and hence see how useful this reaction is as a possible source of polarized neutrons.

Much of the apparatus for the proton-proton "triple scattering" experiments has been taken over by the University College team for similar experiments with proton-α particle collisions.

The analysis is somewhat simplified by the target having zero spin, but complicated by the possibility of breaking up the target nucleus, a fate which protons at the P.L.A. are spared. This work continues the programme begun with polarization and angular distribution measurements.

Keen interest continues in the Optical Model work, where teams from A.E.R.E., Birmingham University, and Kings College, London, study the differential cross sections, the total reaction cross sections and the polarization angular distributions of protons interacting with complex nuclei. A group led by Hodgson, Oxford, does much of the theoretical analysis. The long standing problem of lack of good fits to the results taken at the largest scattering angles is still with us. Additional interests are the changes observed in the theoretical parameters between 30 and 50MeV and the effects of symmetry as one moves from a nucleus fairly symmetrical in neutrons and protons (Ni^{58}) to one where the number of neutrons is considerably greater (Ni^{64}).

Detailed study of nuclear reactions at the P.L.A. is complicated by the large number of different types of event that result from bombardment by 50MeV protons ; even the elastic scattering can be difficult to isolate when it is near a minimum (variation by five orders of magnitude are observed as the scattering angle is changed). However, better techniques, especially the steady improvement of solid state detectors, is giving better identification of the lighter reaction products (deuterons, tritons, He^3 and He^4 nuclei) and Oxford University, Queens University, Belfast,and Westfield College, London, together with A.E.R.E. are all deeply involved in the field. The time is probably not far off when the polarized beam too will play its part in these investigations.

The 1964 Shut-Down

This year's annual shut-down started on the 27th September and will last for six weeks. The principal tasks to be carried out are the installation of an improved polarized source, the detailed examination and resetting of tanks 2 and 3, the completion of the installation of the radio-frequency stabilizers, the installation of an improved rectifier for the tank 3 modulator and many improvements in the control wiring of the machine.

Development of the polarized proton source has continued ever since its installation early in 1961. The present modification is more fundamental than any previously achieved. Its aim is to increase the polarization by at least a factor of two and to increase the beam intensity to over 10^9 protons

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'. . . . . the real trouble about our machinery of government is its excessive preoccupation with avoiding the small mistake. Too much time is spent worrying about saving the candle ends ; too little is spent questioning whether the candles should have been lit in the first place.'

Rudolf Klein.
"Bureaucrats and the £1,000 dogs.'
Observer 30 August.

per second. In the polarized source an atomic hydrogen beam is produced, which contains two states of the four possible states of the atoms. These can be visualised (in a classical physics way) as small bar magnets, which in a weak magnetic field, are either aligned with their north poles all pointing along the field direction or with their axes at right angles to this direction (there being equal numbers in the two states). In a strong magnetic field the second state has its north pole pointing in the opposite direction to the magnetic field.

Ionization of such a beam in a weak magnetic field of atoms produces ideally a 50% polarized proton beam (in practice 40%, due to background effects) and zero polarization in a strong field. These bar magnets oscillate about the local magnetic field in a similar manner to the oscillation of a top or gyroscope. By applying a suitable combination of a d.c. magnetic field and radio frequency magnetic field, which together sweep through resonance with this oscillation as the atom traverses the apparatus, the direction about which the oscillation occurs can be rotated through 180°. Then in a weak field the directions are such that a polarization is still available, but in a strong field both states are oriented in opposition to the magnetic field. Thus a 100% polarized proton beam is ideally possible, and in practice at least 80% polarization should be obtained.

The modification of the polarized source consists, therefore, of two new components ; a small magnet with a field which changes from 5 gauss at the input end to 15 gauss at the output end and contains a radio frequency coil producing 0.6 gauss (r.m.s.) at 15 Mc/s and secondly an ionizer working in a strong magnetic field of about 2,000 gauss.

An article like this can't hope to do more than skim over the surface ; the P.L.A.'s Annual Progress Report will be out in the near future to give the whole P.L.A. story over the last year in much finer detail.

NIRNS Executive Committee

Recent Institute General Notices announced the setting up of an Executive Committee and the appointment of Dr. Clarke. This short article explains the new arrangements.

The Institute have always firmly maintained the policy of delegating executive responsibility directly to the Director of the Rutherford Laboratory, and later also to the Director of the Daresbury Laboratory. They have deliberately avoided the establishment of a central "Headquarters" through which responsibility would pass to the Directors. There are of course decisions to be taken for the Institute as a whole. While there was only one Laboratory this led to no practical problems. The Governing Board took the major decisions at their meetings, held about every three months, and the General Purposes Committee, (G.P.C.), usually meeting midway between Board meetings, took certain other decisions, mainly on financial affairs. At other times the Director of the Rutherford Laboratory, in consultation with the Chairman and other Members as necessary, took whatever action was required. It was always possible to call a special Board meeting, as was in fact done on one or two occasions.

In the present circumstances, with two fully independent and widely separated Laboratories, with vital financial arrangements to be made, and with the present rapid developments in the field of high energy physics, it has become essential to form a strong central nucleus to take the relatively minor decisions affecting the Institute as a whole, and to think out the major matters and prepare them for full and properly informed discussion and decision on the Board. The Executive Committee has been formed to meet this need. It takes over the functions of the G.P.C. which had executive responsibilities in the field of finance, and of the Personnel Committee which also had certain executive responsibilities, but it is expected that the Executive Committee will do much more than these. As a single body meeting frequently with a powerful membership including the Chairman of the Institute and the Directors of the Rutherford and Daresbury Laboratories, the Committee may be expected to take firm charge of the Institute's affairs, subject to the general authority and policies of the Board.

The initial membership of the Committee will be :-

Lord Bridges (Chairman)	Professor B.H. Flowers
Dr. J.B. Adams	Professor A.W. Merrison
Dr. A.C.W.V. Clarke	Dr. T.G. Pickavance
Mr. A.E. Drake	Professor D.H. Wilkinson

The inclusion of the Chairman and three other Members of the Board is appropriate in view of the Committee's authority to take executive decisions. Mr. Drake's inclusion in the Committee, as previously in the General Purposes Committee, is one of the principal means whereby the U.K. Atomic Energy Authority's responsibilities for the Institute's finances are carried out.

The Committee also includes the newly-appointed Head of the Institute's Central Administration and Finance, Dr. A.C.W.V. Clarke. His organisation at present comprises Dr. Willis, Mr. Halstead, Mrs. Griffiths and Mrs. Owen, and will provide the Secretariat of the Executive Committee. The new arrangements will enable the personnel, financial and administrative functions of the Institute to be co-ordinated under the direct responsibility of a Member of the Executive Committee.

The Accelerator World

NIMROD

Nimrod accelerated 10^{12} protons per pulse for the first time on 23 September 1964. This beam intensity was the figure chosen for the accelerator performance when the project was decided upon in 1957. At the pulse repetition rate of the machine (1 per 2 seconds at full energy) this is equivalent to 5×10^{11} protons per second which is comparable with the highest intensities achieved at any other accelerator in the world.

The achievement came almost exactly a year after the design energy of 7 GeV was reached (August 1963). This was the time predicted for the improvement of the machine to accelerate 10^{12} protons. From the initial intensity of 10^{10} the various factors contributing to the performance of the machine have been progressively optimised. Beam injection studies have thrown light on the reasons for losing particles from the beam at the start of acceleration. The radio-frequency system, which provides the electric fields to accelerate the beam and the magnetic fields in the Octants which hold the beam in orbit, have been improved.

The increased intensity of Nimrod will increase its efficiency in supplying high energy particle beams for experiments. In any one experiment a large number of events, involving the particular interaction being studied, need to be recorded to assemble sufficient information to draw statistical conclusions. Therefore the more particles in the beam from the accelerator, the more interactions will be recorded at each machine pulse and the less time any one experiment will be using Nimrod. Also with more intense accelerated beams the more easily can several experiments be fed with particles at each machine pulse. Bubble chamber experiments, which will shortly be underway using the 80 centimetre hydrogen bubble chamber from Saclay, in particular, will benefit from the increase in intensity.

A small team from the DESY Laboratory, Hamburg, arrived at the Rutherford Laboratory at the beginning of October. The three members of this team, Dr. H. Hultschig, Mr. J. Koll and Mr. H. zur Horst are to make a series of calibration measurements on a Čerenkov counter built for an experiment on the 6 GeV electron synchrotron at DESY. In this experiment, electrons will be scattered from a target of polythene or liquid hydrogen and the counter will be used to detect the recoil protons. The tests at the Rutherford Laboratory are being made at the end of the P4 beam line at a series of different energies while the P4 experiment is in progress.

Dr. Jakeways from the Physics Department of Leeds University visited the Laboratory in September to test Čerenkov counters on Nimrod. These counters are to be used in the satellite Esro II to detect primary electrons with energies from 1 – 5 GeV in cosmic rays. The tests were successfully carried out on the π1 beam line.

A new experiment has been introduced into 'Period 2' experiments on Nimrod. The charge exchange experiment on the N1 beam line has been completed and the beam line, renamed N2, is to be used for the investigation of the two body decay of the neutral K meson, $K_0{}^2$. An experiment with the 33 GeV synchrotron at Brookhaven indicated that the $K_0{}^2$ decayed into two π mesons. Decay into three π mesons is well known and in accord with prevailing theories. But the two body decay, if it is proved that it does in fact occur, implies either that a new force, to be added to the known strong, electromagnetic, weak and gravitational forces, is at work in nature; or that one of the accepted conservation laws, charge-parity conservation, ruling over particle interactions, is violated.

The N1 beam line has been rapidly modified for the new experiment and by the use of sonic spark chambers, results should be assembled quickly. By the end of the year, it is hoped that the Brookhaven results will have been checked and in the new year the experiment may be carried further.

The polarised proton target successfully scattered protons, at 300 MeV, for the first time on 19 October. By comparison with previous scattering experiments carried out at 300 MeV, which did not involve a polarised target, the polarisation was estimated as considerably in excess of 60%. From 21 October the target is being used for scattering π mesons on the π1 beam line. ORBIT will carry an article on the target early in 1965.

Nuclear Photography Conference

The Vth International Conference on Nuclear Photography was held at CERN in September. The conference was divided into three main sections :

1. Properties of Photographic Emulsions

Much detailed work on the properties of photographic emulsions was presented; latent image formation, handling and processing of emulsions providing the main topics. The study of solid state detectors was discussed and there were several reports on the observation of tracks due to charged particles in single crystals and insulating materials. The outstanding feature of the work is the development of a new method of dating minerals from the observation of Uranium fission tracks. By this new method it has been possible to establish that some minerals have survived for times of the order of the estimated lifetime of the earth.

NUCLEAR PHOTOGRAPHY CONFERENCE - continued.

2. Automation of Measurements

The recent work on the automation of measurements in nuclear emulsions was reported and it emerged that many laboratories now own machines to measure quantities like ionization, track width and multiple scattering semi-automatically. It was surprising to learn that the work on digitising of co-ordinate measurements has not progressed with the same speed. Many laboratories are endeavouring to complete microscopes digitised in x, y and z directions. One important advance in the problem of fully automating microscope measurements was reported by the group from University College, London, where a microscope has been built which can follow tracks in nuclear emulsion automatically.

3. Application of the Technique

The conference concluded with a session on the applications of the nuclear emulsion technique. Here the main efforts are being made in the study of the dependence of ionization on velocity in the extreme relativistic region, magnetic moment experiments, hyperfragment studies and cosmic ray studies using balloons, sounding rockets and satellites. It was clear that the nuclear emulsion technique will be concentrated in this type of work for quite some time.

P.J.F.

CERN Anniversary

On 10 October, 1964, C E R N celebrated the tenth anniversary of the coming into force of the Convention establishing the European Organisation for Nuclear Research on 29 September, 1954. Ministers and officials from the 13 Member States attended and Great Britain was represented by the Earl of Bessborough, then Joint Parliamentary Under Secretary of State at the Department of Education and Science.

Mr. J.H. Bannier, President of the C E R N Council, welcomed the visitors. 'It is you, and your predecessors, who have had the courage and imagination to create C E R N at a time when only a handful of enlightened scientists could foresee what this new Laboratory might accomplish... You are today on a part of your own territory and everything around you belongs to the scientific potential and the spirit of your own country.'

Professor Powell, C E R N Scientific Policy Committee, spoke on the future of high energy physics. 'We are now looking forward to the 1980's and proposals for a new generation of accelerators will eventually involve an annual expenditure several times greater than that of C E R N. For the future strength and vitality of this continent and for the maintenance of its great scientific traditions, we must ensure a balanced and effective development of all science and technology. For this purpose we need to establish a well informed and imaginative attitude to the role of fundamental science, its profound significance for our whole future and the principles which should govern its proper support; and at the present time the balanced support of science must include adequate provision for one of its most vital and promising branches, high energy physics.'

Letters to the Editor

Pseudonyms are accepted provided the author's name is known to the Editor.

EDITOR : B. Southworth,
National Institute for Research in Nuclear Science,
Room 40, Building R 20,
Rutherford High Energy Laboratory,
Chilton, Didcot, Berkshire.

Sir,

The Mechanical and Electrical Engineering Section attempted to organise a dance to raise money for a Children's Christmas Party. The dance was to have been held in the Restaurant on 11th September but so few tickets were sold that the dance had to be cancelled. Less than a hundred tickets were sold and of these less than a dozen were bought by staff outside the workshops.

The Dance Committee are bitterly disappointed by the lack of support. They convey their apologies to those who purchased tickets for any inconvenience they suffered and thank them for their support.

R. HECKEN, Secretary.
(on behalf of the Dance Committee).

On the Personnel News pages the Section advertise a dance to be held on Friday 25 November. We hope that support will be much more forthcoming than last time.

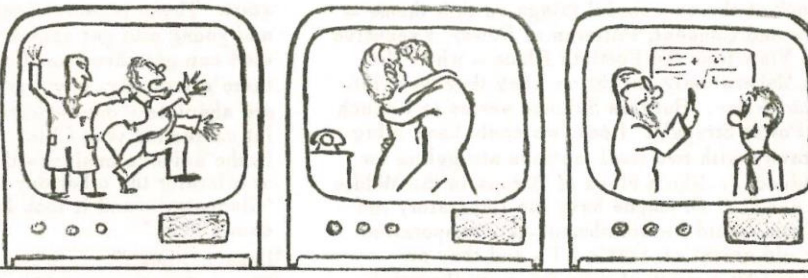
—Ed.

Sir,

This is the story of Doctor Blank,
Who found he had to be 'Quite Frank',
For so obsessed was this pitiful chap,
He even took quality from Andy Capp.
It appears that at school, just like the rest,
He would join in the Fourth Form's ribald jest.
But in manhood life became so grim,
He found he could not afford to grin.
But worse to come, for you to see,
No jokes in ORBIT he did decree.
Mirth to the bread of life is leaven.
I wonder, do they laugh in Heaven ?

LES MISERABLES.

The Science Series



SCENE : A conference room at the T V Centre. A group of script writers are sitting round a table in various states of exhaustion. The air is blue with cigarette smoke and the ash trays are overflowing. The chairman speaks :-

"Look, I don't care how overworked you are. We must have an idea for a brand new series by the end of the day. I've got to get it to the Planning Committee first thing tomorrow."

"Can I recapitulate Chief? Let's see what we *CAN'T* do : We can't have another Doctor series, or another Hospital series, or another Court Room series, or another Scotland Yard series or Policeman series, or Newspaper Man series . . . My God Chief you're crucifying us. What else is there?"

A short man with crew-cut and thick lensed spectacles suddenly leaps to his feet.

"I got it! I got it!"

"Let's have it then, Herman."

"It's just hit me Chief. We should do a Science Series ! There's this young scientist see ? He's brilliant but idealistic ; got some crazy idea of seeing justice done and all that. A crusader. Always jumping into situations with both feet. Then there's this old scientist – mature, shrewd, wise and experienced. He's sort of mothering the young guy, bringing him on, sort of, guiding his career. The series is written round the development of this young guy – see ?"

"A bit hackneyed isn't it ?"

"Hackneyed, shmackneyed ! It's a well tried formula Chief ! Look at the series that have used it – Dr. Kildare, Findley's Case Book, The Defenders, Saints and Sinners, The Naked City, – is there a winner that hasn't used it ? It's fundamental and I'll tell you why. We'd all like to have one of these old guys around to tell our troubles to. We all need sure fire advice – wish fulfilment see ?

"I don't see what the stories would be about."

"Human interest stories Chief, with a scientific background ! Scientific Kipling. Here's one right off the cuff . . . The young scientist has a friend and he suspects that another guy, the Baddie, has stolen his friend's results and got quick promotion on the strength of it . . . He also suspects that the Baddie has sabotaged his friend's equipment so that there's an accident and his friend is fired for negligence and sued for £1 million which he has to pay in instalments for the rest of his life. The young scientist thinks this is unfair. He wants to bring his suspicions out into the open and help his friend. But the old scientist says 'Hold it. We have to figure all the angles on this. For a start you can't prove anything. Secondly, stirring all this up will damage the reputation of the Laboratory just when we're putting in for a big increase in our budget. Then there's your own career, which could be brilliant. You could become a great scientist and make big contributions to our culture – have you the right to jeopardise this just for some trivial principle ? This affair isn't your concern.'

So on the day his friend leaves, the young scientist just says, 'So-long,' over the phone and avoids personal contact. . . He's learning to compromise see ? – He's maturing."

"Hmm. Not bad. But this series has to go for at least ten episodes. Is there enough in the idea for that Herman ?"

"Sure Chief ! This is a rich vein ; it's a goldmine. It'll make Perry Mason look like a flash in the pan. Here's another episode. In this one we bring out that the young scientist is a flyer – potential Nobel Prizewinner. But the old scientist realises suddenly that he himself isn't top flight – he feels he's getting old all of a sudden. Then he realises he's treating the young guy as a son and living his own life again through him. He begins to have doubts about the value of his influence over the young scientist . . . Say, we could have all this happen on the old scientist's birthday when he suddenly remembers he's thirty-nine."

"Hmm . . . No . . . I don't think so, Herman. I'd like to see something using the Power Angle."

"I'm glad you mentioned that Chief and I absolutely agree with you – the Power Struggle is very popular

THE SCIENCE SERIES - continued

just now. I don't need to tell you of course, but just look at the successful things on this theme – Advise and Consent, Patterns of Power, Executive Suite, View from the Fortieth Floor – why 'The Plane Makers' only caught on when they went into the Boardroom. But this Science series is a cinch for a Power Struggle. Look, we could have a big Laboratory with two rival factions struggling for ascendency... like a clash of Barons in the Middle Ages see ?... Or maybe have the Laboratory run by an Old Guard Establishment – contemporaries of the old scientist, that's it! – and they are pressured by a group of younger, more thrustful men – closer to the young scientist and this causes a personal conflict between the old and young scientist. And we shoot the whole thing at an Accelerator Lab. against a background of big machines, cooling towers, transformers, all symbols of power – it's sensational!"

"I'm doubtful. A good series should have a few murders in it."

"Right again Chief! And these Accelerators I just mentioned are absolutely ideal for murders. Look what the James Bond films have done with fancy hardwear. All those underground rooms, tunnels, cat walks – ideal for chase scenes. Why, this could turn out to be the modern Western."

"You're going overboard on this Herman. Our budget won't run to anything like the Bond films. What we need are good *STORIES*. We need a convincing *MOTIVE* for murder. I can't see where this comes from in science."

"You're wrong there Chief... er – I mean just let me remind you of the situation in these labs. – there's ample motive for murder! Ambition, for a start. These organisations expand rapidly at first and young men get senior positions – then nobody else can get ahead until somebody dies. Then there's jealousy, envy, greed... Why these scientists are absolutely one hundred per cent human. Just let me remind you, Chief, of the big issues involved in the science business these days. I heard of an accelerator the other day that cost more than 'Cleopatra' – and it took longer to make. That just shows you!"

"Hmm.... Sex?"

"Plenty Chief – no problem."

"Hmm.... title?"

"Now I have a suggestion for that Chief. Most of these scientists have Ph.D's and they can use the designation 'Doctor', which I think we should use in the title – it has favourable associations for women viewers. So why not something like this :-

SET AGAINST THE BACKGROUND OF A LARGE SCIENTIFIC LABORATORY, A DRAMA OF MODERN LIFE, A HIGH TENSION SERIES - "DR.. KILPATRICK""

"Mmm... Well... Hmm... I don't know... Hmm..."

"Of course we have to sell this to the Planning Committee. I wouldn't like that job, but a man of your calibre Chief..."

"Yes it will be difficult. It's a startling idea... it will take great judgement to put it over..."

"I could fill you in on all the details Chief, but of course it's the original idea that counts."

"Very well gentlemen – I'll put it up to the committee. You know me – when I think of an idea, however revolutionary, I always act decisively."

NI

A precedent seems to have been established to name National Institute Accelerators NI....**

For example we have

NIMROD National Institute Machine for Research On the Downs.

NINA National Institute Northern Accelerator.

May we offer for future projects –

NICOTINE National Institute Cyclotron On Terrain Inclined North East.

NIHILISM National Institute Heavy Ion Linac In the South Midlands.

NINCOMPOOP National Institute Novel Conception Of the Machine Physics Of Oscillating Particles.

NIRVANA National Institute Research Venture Anticipating Northern Accelerators.

'The chief doomsday scientist, Dr. Cameron, beat his little son and locked him in dark closets until the child became insane. Is this the way nuclear scientists conduct their private lives? Possibly, but the book does not make us believe it.'

Julian Moynahan.
Reviewing 'The Wapshot Scandal'.
Observer, 6 September.

Personnel News

Comings and Goings

E.R. Harrison, who has worked at the Laboratory for several years on the AERE staff and who was one of the instigators of the Laboratory journal, joins the Nimrod General Physics Group.

Mrs. J.P. Dawkins, Mrs. J.M. Phelps and Miss S.G. Hayes join Secretarial and Typing Group.

Dr. A. Hern, Dr. A.W. Hendry and H. Hurst join Theoretical Studies Group.

Mrs. M. Thomson, Miss A. Waite, Miss E.M. Rundle and Mrs. J. Mays join General Administration Group; J.A. Swain joins Finance and Accounts Group.

Dr. N.K. Ganguly joins PLA Nuclear Physics; J.H. Mason joins Nimrod Machine Physics.

J.L. Mills and B.W. Fail join Nimrod Machine Engineering; B.G. Prior and K.T. Buck join Central Engineering.

P. Gottfeldt and J. Varley join the Bubble Chamber team at CERN.

Dr. I.J. Good, Dr. I.P. Grant and Dr. A.O.L. Atkin join Atlas Mathematics Group.

Dr. P. Bryant joins Atlas Programming Group; Miss M.J. Trigwell, Miss H.E. Ralling, E.C. Whailey and Mrs. S.A.J. Graham join Atlas Operations Group.

Miss D.G. Belton joins Atlas Administration Group.

Mrs. C.A. Smith, T. Noland and P.J. Hallowell join us as college-based Dip. Tech. Students; R.A. King and P. Monaghan join as Student Apprentices.

Mrs. C.J. Hawkes, R. Brown, R.L. Evans, C.W. Haines, Mrs. E.F. Barlow and Mrs. S.E. Chapman have left us. (Eileen Barlow and Sheila Chapman, our ex-telephonists, wish to thank all those who contributed to their presentations).

The following college-based Dip. Tech. Students have also left us : K.B. Burchall, Miss A.M. Hobson, P. O'Brien, D.M. Tinsley, B.J. Sharpe and V.L. Watson.

Dr. J.D. Prentice, Dr. J.M. Charap, Dr. D.A. Smith Dr. L.J. Vick and A.G. Wilson have completed their fixed term appointments.

R. Stafford has transferred to the Daresbury Laboratory.

Congratulations to —

Pat Rossiter, ex Travel Section, and her husband David on the birth of a son, Paul Jerome, on 17 October.

Suggestion Awards

At the twentieth meeting of the Rutherford Laboratory Suggestion Awards Committee, held on Wednesday, 23rd September, 1964, the following awards were made :

£2 to G. Horton for his proposed modifications to the degreasing plant. The modification has been constructed and successfully adopted.

£2 to F. Harris and T. Burson whose multi-purpose high vacuum flanges have been successful.

£2 to C. Grinrod whose proposed modifications to co-axial Radio Frequency Power Lines is practicable and may possible be adopted in the future.

£1. 10s. 0d. to G.R. Gasgoigne who drew attention to the safety hazard present with the scrap metal wall in Building R9.

Additional awards of £1 were made to G.E.C. Fry, A.M. Jackson and C. Richardson.

B. BRISCOE, Secretary.

Record Society

Programmes will be held every Tuesday in November at 12.30p.m. in the Lecture Theatre.

3 Nov: Brahms Symphony No. 1
(The four Brahms symphonies will be played in sequence on the first Tuesday of the next four months).

10 Nov: Musical Impressions of Italy.
Elgar 'In the South'
Respighi 'Pinetrees of Rome'

12 Nov: Ella and Louis.
Jazz from Ella Fitzgerald and Louis Armstrong.

24 Nov: Music from France.
Berlioz Corsair Overture
Delibes Sylvia (Ballet Music)
Ibert Divertissements.

NIMROD VOTES LIBERAL

'TO ENSURE A REASONABLE BALANCE BETWEEN THE REGIONS, THERE SHOULD BE NEW TOWNS AND MAGNET AREAS DEVELOPED IN REGIONS OF HIGH UNEMPLOYMENT TO COUNTER THE CONGESTED AREAS.'

EXTRACT FROM A LIBERAL PRE-ELECTION PAMPHLET.

Christian Fellowship

The Rutherford Laboratory Christian Fellowship, which has now been in existence for a year, meet twice a month in the P L A Conference Room, Building R 12.

Meetings begin at 1.00 p.m. and always close by 1.30 p.m. During the present session, the First Epistle of St. John is being studied on the second Wednesday of each month, and the meetings on the fourth Wednesdays are led by invited speakers (usually local clergy).

Anyone wishing to join the meetings is assured of a warm welcome. For further details, contact B.E. Kingdon, Building R 20, Extension 6297.

First Aid Course

If there is sufficient demand, arrangements will be made to hold another 13 week First Aid Course at the Laboratory. The sessions will be held on either Thursday or Friday, beginning in January 1965.

Anyone interested should contact Mrs. M. Roberts, Admin. Office, Building R 12 forwarding a note giving their Group or Section Leader's approval.

Electrical and Mechanical Engineering Services

A DANCE

will be held in the Rutherford Laboratory Restaurant

on

FRIDAY 27 NOVEMBER 1964

Dancing to Frank Rogers and His Music

8.00 p.m. to 1.00 a.m.

Admission 6s.0d. — Dress Informal

Bar - Buffet - Coffee Lounge

Tickets from :

E. Kirby R 18, R. Hecken R 8 and all Admin. Offices

For Your Diary — A 'GRAND BALL' will be held in the Restaurant on New Year's Eve.

Solution to PERFECT SQUARES (September, Orbit)

[1] 5	7	7	[2] 6				[3] 9	2	1	6
			5		[4] 7	8	4			
[5] 4		[6] 2	5				[7] 8	[8] 1		[9] 2
8		[10] 2	3	0	4		[11] 6	4		8
[12] 4	3	5	6				[13] 4	4	8	9

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