RRS Newsletter

(For the Use of R.R.S. Staff Only)

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~ Jan '64 ~

Mr. Nicolson and the Minitrack Station

Members of the Research Station were delighted to read that Mr. Nicolson had been awarded an M.B.E. in the New Year's Honours List. In recent years he has been in charge of the Minitrack Station at Winkfield and it is reasonable to suppose that the award is intended in particular at least to mark the success of Mr. Nicolson and his team in the international service of satellite tracking and telemetry reception.

The starting of a new service of this kind was not simple. At first no one in this country knew precisely what the work would be or what staff would be needed. When the Station first came into operation the load on it was not great and a comparatively small team could operate it. Suddenly however, in mid 1962, the observational programme increased and the operating team was too small. While the numbers in it were being built up, a pool of knowledgeable workers was established at the main Research Station to be called upon to help when necessary. Now at last the staff has been increased to a reasonable size, but very recently a scheme has come forward to increase the work and complexity of the Station still further; it will require a further increase in the numbers of staff.

Mr. Nicolson, ably assisted by his senior colleagues, has been responsible for the maintenance and efficient operation of the minitrack during this period. He has had to organize its operation continuously through the 24 hours week in and week out. Shift work has involved problems of staff transport and of staff who are absent attending courses. Frequent additions of new and elaborate equipment have involved highly skilled experience.

Over the past four years, Mr. Nicolson has carried the responsibility for all these activities with unvarying cheerfulness and enthusiasm. His award is of course intended to recognise the value of his work over a longer period than this, but if it recognised only the work he has done at Winkfield, it would have been very well earned. The Station owes him and all his team a debt of gratitude for the good work they have done and are still doing.

J. A. Ratcliffe

HEINRICH RUDOLF HERTZ

Heinrich Hertz, who was born on 22nd February, 1857, died just seventy years ago. His researches into electromagnetic phenomena have ensured his high place in science, and, quite apart from his magnum opus, his work was more than sufficient to guarantee a reputation among students of the history of physics.

Hertz was born at Hamburg and, on leaving school, determined, at first, to study engineering. For this purpose he went to Munich in 1877, but rapidly became aware that his true interests lay more in the realms of physics. During the winter of 1877-78 he embarked on courses of practical work under Joly and von Bezold, at the same time improving his theoretical knowledge by studying such classics as the original works of Laplace and Lagrange.

Thus excellently if rapidly prepared, he went to Berlin in October, 1878, and had the good fortune to study under Kirchoff and von Helmholtz; at the same time he undertook research into the problem of electric inertia. The results of some of this work won a prize awarded by the philosophical faculty of the University and in 1880 appeared as a paper on 'Kinetic Energy of Electricity in Motion'. That year also saw the publication of a paper on 'Induction in Rotating Spheres', on the strength of which he was admitted to the degree of Doctor 'summa cum laude'. Shortly after this he was appointed Assistant to Helmholtz at the Berlin Institute. Hertz remained at Berlin for the next three years and during that time worked on the contact of elastic solids, evaporation, hardness and electric discharge in gases.

It was at this time that Oliver Lodge, paying a fleeting visit to Berlin, called on Helmholtz but found him just about to lecture. After a few words with the great man Lodge was handed over to 'Dr. Heinrich Hertz, with whom I speedily struck up a friendship which lasted to the end of his life. Hertz was not then a name to conjure with; I had never heard of him before, but we found we were kindred spirits and he did the honours of the place well'. This is an interesting meeting, for Lodge in 1887 was to observe certain electromagnetic wave phenomena and might have arrived independently at the same results as Hertz.

In examining superficially the background to Hertz's work it is found that speculations on the nature of the leyden jar discharge, the state of its dielectric when charged, and the germ of a field theory can be traced back at least to the mid eighteenth century. From the Gilbert's great De Magnete (1600) when even he spoke of magnetic virtue it is only a few decades to the Philossphica Magnetica of Cabeus (1629) wherein he refers to magnetic force as 'a certain quality or condition of intervening space'.

By the end of the next century Franklin and Priestly had respectively proposed that the charge affected the dielectric of a condenser and that its discharge could be oscillatory, backing both conclusions with experimental evidence. From then on, giants such as Cavendish, Ampere, Coulomb, Oersted

and Henry each made their contribution; though much of Cavendish's work remained unknown for half a century. Helmholtz and Kelvin too made strides in this field; but it was Faraday's brilliant insight which led Clerk Maxwell to more formal mathematical investigations. Maxwell added his own all-important concept of the displacement current in a dielectric, and in 1864 arrived at the theory of the propagation of energy as an electro-magnetic wave disturbance moving with the velocity of light.

In 1870, Hertz's old teacher, von Bezold, had observed what were thought to be standing wave phenomena on wires when a condenser rapidly discharged; in 1883 G. F. Fitzgerald suggested that such an action would produce the predicted electromagnetic waves. Hertz moved to Kiel in the same year and started to give serious consideration to the writings of Maxwell, and to the experimental results achieved to date. Helmholtz had drawn his attention to the problem some time earlier, but other matters had intervened.

An appointment as professor of physics at Karlsruhe Polytechnic in 1885 gave Hertz the opportunity to begin his classical series of experiments. It is said that he was put on the right track by noticing sparking in an adjacent circuit when he was discharging a leyden jar, a phenomenon seen by many before him. Edison in 1875 had noted the curious properties of these sparks due to what he called 'etheric force'. He had signalled along wire with them, and in 1879 D. E. Hughes had signalled for at least five hundred yards across free space using an imperfect contact and the telephone as a detector. Hertz, however, realised in full the implications for physics in the effect he had seen and proceeded to devise apparatus to demonstrate that the disturbance he was generating was analagous in behaviour to that of light or heat, and fullfilled the predictions of Maxwell.

These investigations occupied Hertz from about 1885 to 1889 during which time he published several papers; however it is the account of his work in Wiedemann's Annalen for July, 1888, which opened the field for many skilled investigators. Certain anomalies in his results were resolved by Sarasin and De la Rive who showed that the length of standing waves observed in space was a function of the size of the receiver, a loop with a small spark gap, rather than of the highly damped emissions from the dipole spark transmitter. Among the other workers in this field of high frequency electric phenomena were Poincaré, Lodge, Bjerknes, J. J. Thomson and, in New Zealand, the young Rutherford.

The major work of Hertz is so well known that it is not proposed to recount it in this note in any more detail. At the end of this period in his life, in 1889, he received a call to succeed Clausius as professor at Bonn University. Here he devoted his time to the study of gas discharge phenomena, an old favourite of his, investigating them in conditions which could have led to the emission and discovery of X-rays.

At the same time he turned his attention to philosophical questions involved in the fundamentals of mechanics, producing a treatise on the subject which was his last work. He died on 1st January, 1894.

Von Helmholtz, that prodigy of intellectual ability, said of Hertz, that of all his students he was the one who penetrated farthest into his own circle of scientific thought. Newton said of a promising contemporary: "Had Mr. Cotes lived, we might have known something". Mankind is fortunate that because Professor Hertz lived we have known something.

G. W. Gardiner

Some of our readers may recollect the interesting lecture given by Mr. Garrett of the Science Museum, and will recall his personal acquaintance with Frau Hertz. She died only some twenty years ago, and had lived in England with her daughters ever since the troubled days of the 'thirties had forced them to leave Germany. I believe that the daughters of Heinrich Hertz live here still; one near Cambridge and one in Buckinghamshire, not so very far from this Station.

G.W.G.

STAFF NEWS

Congratulations to:-

Mr. and Mrs. David Hannaford on the birth of their daughter, Deborah Anne, on 11th December.

Margaret Horwill and Adrian Baber on their engagement.

Mr. A. J. Rogers on his award of Diploma in Technology with Second Class Honours Division 1 in the Physics and Technology of Electronics.

Welcome to:-

Visitors

Dr. D. Ilias from the National Observatory of Athens who is visiting the station under the auspices of a NATO Scientific Committee Fellowship.

Dr. J. D. Whitehead, Reader in Physics at the University of Queensland, who is at R.R.S. for two weeks.

New Staff

Mr. S.T.C. Quek	E.O. transferred from Air Ministry

Resignations

Mr. R. Aria	T/S.A.
Mrs. E. M. Adams	T/S.A.
Tan Seng Sien	Tech Asst. (Singapore)

SPORTS AND SOCIAL CLUB

Christmas Dance

About 150 people attended the Christmas Dance, which, although it made dancing a bit more difficult, made the evening even more enjoyable for at least one bachelor on the staff, who found there was a large number of young ladies with whom to dance.

Ladies on arrival were presented with carnations which seemed very popular, even with the latecomers, who found themselves wearing pink flowers with orange frocks.

During the interval Mr. Meadows read a report and showed slides of some excavations taking place in about 2100 at a site called Ditton Park which had apparently been abandoned during the second half of the 20th Century.

The Committee wish to thank all those who helped with the food and decorations.

Dinner Dance

It is proposed to hold a Dinner Dance on 6th March at the Waterside Inn, Bray. Those interested are asked to contact Dr. Page.

M. Horwill

Smith-Rose Cup

The table-tennis and badminton sections of the Smith-Rose Cup will be played in the very near future. Will anyone interested in taking part please sign any appropriate lists that may appear and/or give their names to the following

Badminton -	Margaret Peart
Table Tennis -	Chris Lovett

Please help us to avoid the "arm-twisting" this year.

M. Williams

Bridge Club

The Christmas meeting of the Bridge Club was held on Monday, 16th December when a record number of players were present. A last-minute reduction to 19 players made the evening more hectic and hilarious than duplicate bridge usually is. The next evening is on Friday, 10th January, and the next round of the N.P.L. Inter-division League will be played on Tuesday, 14th January. I hope to arrange a match against the Road Research Laboratory in February.

Jean Scott

Camera Club

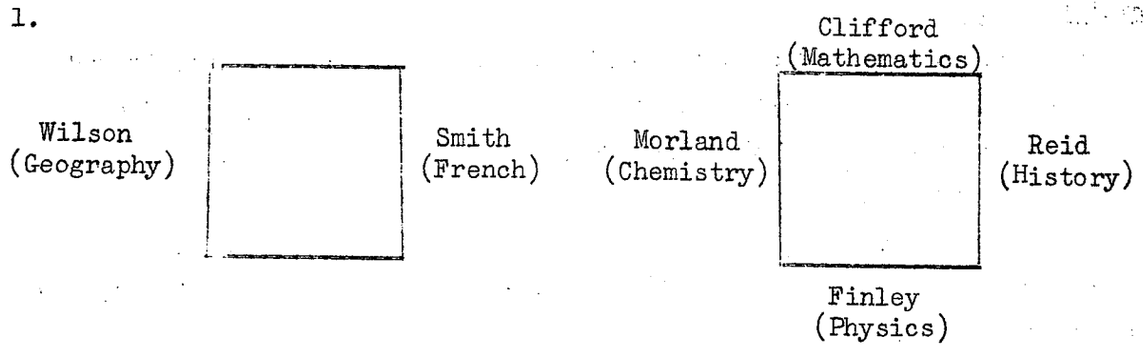
A meeting was held on 8th January. Those present decided that the early part of March would be a convenient time to hold our next print exhibition. Would members please have their work, consisting of, if possible, at least four prints each, ready for exhibition by 2nd March.

In the meantime, slide shows will be held during lunch hours in the Projection Room.

J. N. Tyler

SOLUTIONS TO CHRISTMAS PUZZLES

1.



2. Suppose there are m red cards in Portion A. Then there are 2m black cards in Portion A (26-m) red cards in Portion B and (26-2m) black cards in Portion B.

Hence $\left(\frac{26-2m}{51-3m}\right) = \frac{1}{3}$

when m = 9

So there were originally 27 cards in Portion A and 25 cards in Portion B.

3. A = 7, B = 1, C = 5, D = 3.

2 and 5 cannot both be present as then C = 0. If 5 is present it must be C for any odd multiple of 5 ends in 5. If 2 is present it must be C, for any multiple of 2 must end in an even digit, and the only available even digit is 2.

∴ C is either 2 or 5, for there are only three more choices 1, 3, 7. These must be assigned to A, B, D.

The only possible solution is 77175.

LETTER TO THE OUTSTATIONS

Dear Colleagues,

Christmas and New Year have gone; we nearly always write '64 instead of '63 and all our resolution's hues are not merely sicklied o'er; but quite faded.

Still, we had our diversions. There was The Blackout, when the main fuses failed, and we were, more than usual, people that walked in darkness. Old hands spoke of the days when the 'white' phase failed - a regular irregularity of life in the old buildings.

Matters were righted in time for the Christmas lunch enjoyed with the traditional accompaniments of wine, cigars, and fall-off in the rate of revealed scientific truth for the rest of the afternoon. In vino veritas applies to personality only, not to problems of physics.

Early in the New Year we have been visited by Dr. Pushkov from I.Z.M.I.R.A.N. (roughly our opposite number in the U.S.S.R.) and by Dr.Shapley from U.S.A. who is at present working at Aberystwyth.

Dr. Saxton, whose career and recent appointment were detailed in an earlier issue, has now left R.R.S. and Mr. Wilkins is our new Deputy Director. All our readers will surely send both these colleagues their very best wishes.

The snow is with us to some extent and rail transport has, as usual, been surprised by such a phenomenon in January. Perhaps it will go away if we don't talk about it, and make this paragraph sufficient meteorological evidence for the present from

Yours sincerely,

The Editor