Modern Views in Physics

International Conference

THE International Institute of Intellectual Cooperation is an organ of the League of Nations which at intervals arranges small conferences of experts in various subjects. In the past it has given its main attention to educational, historical and archaeological subjects, but recently it has extended into science; for example, not long ago it organized a small conference in Paris on phytohormones; another at Neuchâtel, on the molecular and atomic weights of gases, a third one in Prague, dealing with the publication of ancient scientific manuscripts. It recently embarked on a larger scheme by inviting about thirty physicists to meet in Warsaw for the purpose of discussing the philosophy of physics. The meeting took place on May 29–June 2 under the presidency of Prof. Białobrzeski; as hosts there were Profs. Rubinowicz, Szczeniowski, Weissenhof, Wertenstein and Wiśniewski, and the following guests accepted invitations: Profs. E. Bauer, Niels Bohr, L. Brillouin, L. de Broglie, C. G. Darwin, Sir Arthur Eddington, R. H. Fowler, G. Gamow, S. Goudsmit, E. Hylleraas, O. Klein, H. A. Kramers, L. de Kronig, P. Langevin, C. Moeller, J. von Neumann, F. Perrin, L. Rosenfeld, E. P. Wigner.

Reports had been prepared in advance by a number of the members to serve as bases for the discussions, and a great deal of profitable argument ensued. The detailed discussions will be printed later by the Institute, and until they appear it is not possible to give more than a very rough impression of the proceedings. The reports were furnished by Bohr on the indeterminacy of quantum mechanics, by L. de Broglie on the relations of quanta and relativity, by Brillouin on the individuality of the elementary particles, by Eddington on the relations of quanta to cosmology, by Milne on his cosmology, by Klein on field theory and by Langevin on the relation of positivism to physics. Heisenberg was also to have made a report on the limits of applicability of our present mechanics in connexion with particles of great energy, but he was unable to attend and his place was taken by Kramers, who has been in close touch with his ideas and, among other interesting things, told us what Heisenberg would have said if he had been there.

It will be seen that the subjects divide roughly into two parts, connected respectively with the foundations of physics and with the recent work on the various kinds of elementary particles. With regard to the foundations, such discussions are of

great value in helping to summarize present opinion, but when we consider what that opinion is, it is difficult not to feel rather pessimistic. The enormous triumphs of the quantum theory have all been in the branches and scarcely any in the roots. Difficulties connected with such things as radiation theory and the self-energy of the electron remain much what they have long been, and it is scarcely too much to say that if this conference had been held in 1930 the chief difference would have been that the catalogue of abortive attempts would have been shorter. Indeed the situation was summarized by Kramers in the words: The quantum theory has been very like other victories; you smile for months and then weep for years. The inexpert listener would have concluded from the discussions that the quantum theory is a poor thing and would have wondered why anyone believed in it, forgetting that on such occasions it is the points of difficulty that are considered and that no time is wasted over the very much larger field where there is a consensus of agreement.

It would not be easy to describe what was said about the fundamental difficulties, because from the nature of things the ideas of the speakers are not in clear shape, but there did seem to emerge one real divergence of opinion between what may be roughly called the mathematical minds and the physical. The mathematician tends to attack the problem of foundations by setting down a scheme for the whole universe; it has to accommodate all the necessary characters, relativity, exclusion principle and so on—making use of any technical methods, matrices, wave-functions or double quantization, that suit the author's taste—and he then tries to specialize his scheme so as to deal with the limited problems that the experimenter studies. The opposite view is taken by others, led by Bohr, who insist that nothing can be grasped by the human mind except in classical terms, so that there is always a classical basis—of fields of force, barriers, slits, etc.—underlying every problem of quantum mechanics; the quantal system moves under these controls, and though it may be possible to enlarge the system so as to include more and more particles quantally, it is never possible to go to the limit and include the whole universe. This does seem a real divergence of opinion, and, if the second view is right, the various attempts at world structure of the first type are necessarily doomed to failure.

Some of the most interesting discussions were connected with more technical matters, on which positive results may be attained. Thus Brillouin reviewed the present state of our knowledge of the elementary particles; this is nowadays quite a long list as it includes along with the older ones the photon, the neutrino and the heavy electron or 'yukon', as it has been called after Yukawa who first, and before the experimental discovery, studied some of its possibilities. The discussion was largely concerned with the relation of spin to the statistics which each particle should obey. It appeared that though this is governed by certain rules, so that half spins go with Fermi statistics and whole with Einstein, yet there is a complete lack of proof for the necessity of this connexion. Then Eddington gave an account of his theory of electrons and protons, and had to defend his position against criticism from many sides. Milne was not there, and his report was read but not discussed.

The work of the conference was not so heavy but that we had opportunities for seeing the sights of Warsaw, and several brilliant entertainments were given by our Polish hosts, including a luncheon party, where we were entertained by the President of the Republic in the Castle of Warsaw. It is noteworthy that in Poland, more than in most countries, a scientific career may lead to high political office, for until the cares of State engrossed his whole attention, the President was himself a physicist, and the Minister of Education, who entertained us at dinner, was, and in his spare time still is, a physical chemist. At the end of the conference many of the visitors paid a visit to the beautiful city of Cracow with its historic university. Altogether, from both the social and the intellectual side, the meeting was agreed by everyone to have been a great success, and the guests carried away most pleasant recollections of their visit.

C. G. DARWIN.

Obituary Notices

Mr. W. M. Mordey

MR. W. M. MORDEY, the eminent consulting engineer, died suddenly at his home in Warlingham, Surrey, on July 1, at the age of eighty-two years. He was one of the best known electricians, and besides his professional work did valuable research work. He was president of the Institution of Electrical Engineers in 1908 and was made an honorary M.I.E.E. in 1932.

Mordey was born at Donnywell, in the County of Durham, in March 1856 and was the second son of J. G. Mordey, whose father was an eminent surgeon and had been several times Mayor of Sunderland. At the early age of fourteen years he entered the P.O. Telegraph Service when it had just taken over the telegraphs from the companies. A few years later when stationed at Bradford he held classes under the South Kensington regime. In 1881 he left the P.O. service and went to the Brush Company's works at Lambeth. He was soon advanced to the responsible position of chief of the test room and became electrical designer in general. He did valuable work in developing compound winding for dynamos. He gave convincing proofs of the practicability of running alternators in parallel which then became a practical instead of merely a theoretical operation. At that time the Mordey alternator was the best parallel running alternator on the market. The 'Victoria brush' dynamo designed by Mordey was almost in general use for many years especially for ship lighting. He established against high authority that a good dynamo is also a good motor. When working on transformers he studied the magnetic ageing of the iron, and with the assistance of Messrs. Sankey succeeded in getting made the material

'stalloy' which was relatively free from many of the ordinary defects. Mordey accepted no theory until it had been practically tested and testing meant to him measuring.

One of his inventions when he was with the Brush Company was the invention of a dust-filled fuse which 'blew' safely on 2,000 volts, alternating current, and was one of the earliest of arc-extinguishing fuses.

Mordey left the Brush Company in 1895 and set up as a consulting engineer. When R. A. Dawbarn joined him the firm was called Mordey and Dawbarn. They carried out some important works in South Africa and South America. In his presidential address in 1908 he vindicated the English electrical engineering industry from the criticism that it lagged behind some other countries.

Mordey took a leading part in the committee which the Council of the Institution of Electrical Engineers appointed in 1908 to find a suitable building in which to hold its meetings. At that time the meetings were held in the lecture hall of the Institution of Civil Engineers which was kindly lent to them. The committee decided almost at once to purchase the Medical Examination Hall of the Royal Colleges of Physicians and Surgeons which was then on the market. The purchase was effected for £50,000 on a seventy-six years lease. Since then the membership of the Institution has increased nearly three times, a fact to which Mordey referred with pride a few years ago.

Mordey discovered a curious effect produced when certain finely divided minerals were placed in an alternating magnetic field. The particles repelled one another and by suitable apparatus he was able to apply the phenomenon to the separation of ores.