Quantum Mechanism in the Atom.

AT a meeting of the Royal Society of Edinburgh on May 8 Prof. E. T. Whittaker read a paper on the quantum mechanism in the atom (since published in Proc. Roy. Soc. Edin., vol. xlii. pp. 129-142).

Prof. Whittaker shows that it is possible to explain quantum phenomena satisfactorily in terms of the classical electrodynamics without postulating any structure in the atom beyond that by which it is customary to explain induced magnetisation. The author considers the effect of an approaching electron in producing a "magnetic current" in the atom; up to a certain velocity of approach the electron does not get beyond the atom but suffers an "elastic impact" which repels it without loss of energy. When, however, the velocity of approach exceeds this critical value the electron passes through the magnetic atom and gives to it energy of exactly that amount or quantum which corresponds with the critical velocity. The transformation of this energy into radiant energy can be explained by generalising the conception; thus the magnetic current becomes equivalent to a charged condenser, partaking of the nature of a Hertzian oscillator. By a simple mathematical process, combined with the assumption that the oscillators in the atoms are similar to each other in structure and differ only in scale, the equation $h\nu = U$ can be established, giving Planck's relation connecting the frequency, ν, of the emitted radiation with the amount of kinetic energy, U, absorbed from the bombarding electron. A more definite form to the quantum mechanism is given by linking a conducting circuit with the magnetic structure. Photo-electric phenomena can be interpreted on the basis of this theory, and Bohr's theory of series-spectra likewise finds an explanation.

Sir Alfred Ewing suggested that instead of following Prof. Whittaker in leaving the magnetic atomic model at a certain point there is perhaps an advantage in not dropping the model, especially as it seems to give an immediate explanation of the manner in which oscillations are set up as the electron parts with its quantum of energy. In the Ewing magnetic model the central magnetic system or wheel is controlled by an outer system or ring. When an electron passes through and escapes it gives an impulse producing relative angular displacement of inner wheel and outer ring, and the mutual magnetic forces tend to restore the original configuration. Oscillations are set up which expend their energy in emitted radiation. Conversely, in an atom in which oscillations are going on, an electron may be ejected (photo-electric effect). In being ejected it exerts an angular impulse which stops the oscillation and deprives the atom of the quantum of energy originally absorbed through resonance.

Dr. H. S. Allen directed attention to the fact that in Prof. Whittaker's "calamoids," or four-dimensional tubes of electromagnetic force, as well as in the Ewing magnetic model, magnetic forces rank on an equality with electrostatic forces. The number of magnetic tubes associated with Prof. Whittaker's magneton must be an integral number of times the unit quantum tube of magnetic induction. More satisfactory is a modified form of the quantum mechanism, in which two ring electrons are placed near together on the same axis, the electromagnetic force between them being repulsive. Such models cannot, in Dr. Allen's opinion, "reconcile" quantum dynamics with classical dynamics.

Dr. R. A. Houstoun suggested the advisability of testing Prof. Whittaker's theory by an appeal to numerical calculation, introducing, for example, definite values of the frequency and calculating the corresponding size of the molecule. The results appear to be satisfactory considering the simple nature of the assumptions made. It seems that the reciprocity which exists between electric and magnetic quantities in the electromagnetic wave must be extended to atomic structure.

Prof. Peddie remarked that the value of Prof. Whittaker's idea does not lie in its being an "only possible" one, for other possibilities exist. Its importance rests on the fact that the idea is a new one, giving for the first time an action on an electron which is not reversed in direction when the electron passes through an atom. A "perfectly elastic" collision seems to be attainable only by implicitly denying collisional radiation, which leaves part of the essential mechanism undescribed. The interactions of the atomic charges, ether and the "magnetic currents," may perhaps introduce difficulty regarding atomic subjection to the Newtonian first law of motion.

The Second Royal Society Conversazione.

THE second conversazione of the Royal Society this year was held in the rooms of the Society at Burlington House on the evening of June 20, when the president, Sir Charles Sherrington, with Lady Sherrington, and the officers of the Society, received a large number of fellows and guests. Many interesting scientific instruments and specimens were shown, several of which were exhibited at the first conversazione held on May 17, and some were briefly described in NATURE of May 27, p. 693. Below are brief descriptions of other noteworthy exhibits.

Some selections from the contents of large prehistoric cooking-places at Buckenham, Tofts Park, Norfolk, were shown by Miss Nina F. Layard. The specimens were found by Miss Layard and Miss M. F. Outram in 1921–1922, and they include hearth-stones, heating-stones, bones and teeth of animals, fragments of pottery, flint flakes and implements. Mrs. Clayton exhibited a Roman bronze measure of capacity, made under Domitian, which was found during draining works in the vicinity of the Roman Wall, three miles east of Gilsland, Northumberland.

A simple form of respiration meter was exhibited by Mr. H. F. Pierce. Two bellows are mounted on a vertical shaft, one of which measures the volume of inspired air, the other the volume of expired air. The latter is measured at a temperature of 37·2° C. to avoid error due to condensation of contained moisture. Respiration is recorded quantitatively upon a smoked drum. The moving parts are made very light and valves are operated electrically.

Mr. G. C. Robson had an exhibit showing that a highly differentiated character which appears discontinuously in the parthenogenetic gastropod, *Paludestrina jenkinsi*, does not reappear in two generations bred from parents showing this character. There is evidence that this character cannot be compared with an ordinary "fluctuating" variation. The Royal Botanic Gardens, Kew, showed a double coconut, or Coco de Mer, from the Seychelles, which