

*Réel et Déterminisme dans la Physique Quantique.* By E. Meyerson. Paris, Hermann, 1933. 49 pp.

This is number 68 of the series *Actualités Scientifiques et Industrielles*, and number 1 of the sub-series *Exposés de Philosophie des Sciences*, published under the direction of L. de Broglie. There is little contact with mathematics, the principal topic of discussion being the effect of modern physical theories (in particular the indeterminacy principle of Heisenberg) upon the reality (thing in-itself) problem of philosophy. A single quotation may serve to indicate the stimulating character of this small work of a famous philosopher: "Il est parfaitement vrai que la science ne peut nier l'existence du miracle."

F. D. MURNAGHAN

*État Actuel de la Théorie du Neutron.* (*Exposés de Physique Théorique*, III.)

By Jean-Louis Destouches. Paris, Hermann, 1933. 68 pp.

Volume 33 of *Actualités Scientifiques et Industrielles*, published under the direction of L. de Broglie, contains this very appropriate theoretical exposition of the neutron, following as it does the account by Irene Curie and F. Joliot of the experimental evidence for the neutron contained in volume 32. Too frequently the reader with an interest in physical research who wishes to follow the latest developments in some important phase of the subject must await a nearly complete settlement of the problem before he can find a summary of the facts and their implication which is understandable without special knowledge of the field concerned. Such a summary is contained in this *exposé*. It is particularly valuable at this time because of the novelty and importance of the subject, and somewhat unique in that the present status of the theory is found to be wanting in certain important respects.

The volume begins with a brief history of the neutron from the hypothesis of Rutherford in 1920 to the significant experimental evidence of Curie and Joliot, Chadwick, and others. This evidence is then briefly recounted. The possible constitution of the neutron is discussed and the main steps in the wave-mechanical treatment of this problem by Langer and Rosen are given. The wave-mechanical treatment is shown to entail serious obstacles to a satisfactory solution. Proposals with regard to the constitution of the nucleus are shown to require further detailed experimental evidence for confirmation. Bothe's hypothesis to account for the emission of neutrons is described. An instructive chapter compares the properties of photons and neutrons, and the basis upon which the existence of the neutron rests is pointed out. Brief mathematical analysis is given of the existing theory concerning the passage of neutrons through matter. The problem admits of approximate solution and the expression for the coefficient of absorption of neutrons is in reasonable agreement with the small amount of data available at present. The ionization produced by a neutron depends in its theoretical treatment upon the model assumed and upon the method of calculation.

In conclusion it is pointed out that further theoretical progress concerning the nature of the neutron must await further precise experimental work; the form which such investigation should take is suggested by the theoretical aspect of the problem.

A. T. WATERMAN