Books

Mathematical Foundations of Quantum Mechanics (Number 2 in the Series Investigations in Physics). By John von Neumann. 445 pp. Princeton University Press, Princeton, N. J., 1955. Paperbound $6.00. *Reviewed by M. E. Rose, Oak Ridge National Laboratory.*

After the rapid development of quantum mechanics in the twenties, the appearance of the original German edition of von Neumann's work was very welcome indeed. To quote the author: the purpose is to present the new quantum mechanics in a unified and mathematically rigorous representation. How well he succeeded is a familiar story to most physicists and, presumably, to a fair number of mathematicians. After almost a quarter of a century this book is still a valuable addition to any library. There are few references in which quantum statistics, including the concept of the density matrix and a discussion of the theory of measurement, is treated in as masterful a manner.

There seems to be little doubt that in this country insufficient attention has been given to a number of works of major importance which have not appeared in English. While this result of the post-war, westward shift of the center of gravity of physics is understandable, it is also regrettable. However, the most practical remedy is certainly to be found in efforts like that of the translator. He is to be congratulated on an excellent piece of work. As R. T. Beyer remarks in the translator's preface, "the manuscript has been carefully revised by the author so that the ideas expressed in this volume are his rather than those of the translator."

The Atom (Fourth Revised Edition). By Sir George Thomson. 204 pp. Oxford University Press, New York, 1955. $1.00. *Reviewed by Bernard T. Feld, Massachusetts Institute of Technology.*

In Britain (and on the Continent) people like to read and, furthermore, they are not averse to reading about esoteric or technical subjects. In response to this demand, there is available to the general public a large variety of popular tracts on all sorts of topics of "intellectual" interest. These books are, in general, well printed, well bound, pocket-sized, and cheap. What is more, many are written by outstanding authorities who not only know their subject, but also write well, and who devote great efforts to the problems of simplification and popularization of technical matters.

The book here under review is an excellent example of the genre. It was written for the Home University Library of Modern Knowledge series, first published in 1930, and has been thrice revised and extended. The author is emeritus professor of physics at the University of London and recipient, together with C. J. Davisson, of the 1937 Nobel Prize in physics for "experimental discovery of the diffraction of electrons by crystals".

The main part of the book deals, in clear, concise, and nontechnical language, with the experimental basis for the presently accepted wave-mechanical model of atomic structure. The approach is essentially historical, and the author manages to convey much of the excitement of fresh discovery through this approach. Difficult physical concepts are not glossed over, but usually explained in terms of apt analogies (e.g., the very nice discussion of the low temperature specific heat anomaly in terms of the effect of the average income of a community on the relative rates of purchase of Fords and Rolls Royces).

The parts dealing with nuclear structure and radioactivity are somewhat less satisfying, in part because the author tries too hard to be up-to-date. Also, it is clear that the author is less steeped in this subject matter. However, there is a short section on the political and social implications of nuclear energy which is a model of logical, sober, and enlightened scientific humanism.

The books ends with a brief exploration of some possible implications of modern physical theories on the old philosophical problem of "determinism *vs* free will". This attempt has the virtue over most others with which this reviewer is familiar that the problem is defined clearly and the arguments can be followed even by the nonprofessional philosopher.

This small volume is strongly recommended to interested laymen, teachers, physicists, and science writers as collateral reading for a course in atomic physics, as a source of stimulation, or just for relaxation.

Quantum Mechanics. By F. Mandl. 233 pp. (Butterworths, England) Academic Press Inc., New York, 1954. $5.80. *Reviewed by Philip M. Morse, Massachusetts Institute of Technology.*

This volume contains, in somewhat compressed form, a carefully written basis for an introductory course in quantum mechanics. It does not delve deeply into questions of fundamental philosophy or mathematical rigor nor does it discuss the calculation of specific atomic or nuclear problems and compare results with experiment. Rather it develops, carefully and logically, the main concepts and mathematical techniques of nonrelativistic quantum mechanics, from the point of view first expounded by von Neumann and Dirac.

There are nine chapters; the first on the mathematical properties of Hilbert space, and its relationship to the eigenvalue problems of physics, together with definitions of the delta function, of Fourier transforms and other