Books

Modern Probability Theory and Its Applications. By Emanuel Parzen. 464 pp. John Wiley & Sons, Inc., New York, 1960. $10.75. *Reviewed by J. Gillis, The Weizmann Institute of Science.*

THERE are three possible approaches to reading a work on probability theory. One can either read the first chapter first, ignore it altogether, or compromise by reading it last. The identification of probability with measure theory is rigorous and elegant and provides what may well be the only definition of probability with any claims to logical soundness. But when all is said and done it will never be more than an argument by which mathematicians will convince other mathematicians.

These rather banal thoughts rose to the mind on reading the book under review. It is specifically intended for students of physics, engineering, and the social sciences. One fears that this excellent group of citizens, after paying due respect to Chapter 1 of any probability textbook, will continue to work in terms of their own intuitive idea of what the concept means. Of course, this will not matter very much so long as they deal with discrete probabilities. They will be apt to get into difficulties when they encounter continuous problems, but most of them will be prepared to worry about that when it happens. It is hoped, nevertheless, that readers will really pay attention to Chapter 1 of this book. It does not even attempt a complete account of the foundations of the subject, but presents rather a glimpse of the various ideas on this question with some indication of the logical difficulties of each of them. As an introduction to more elaborate first chapters of more sophisticated books, it is almost ideal.

The rest of the book contains the standard sort of material with which one is by now rather familiar. The examples are lively and interesting and are even spiced with mild humor. One engaging little device is to end some sections with a reference to a problem in the same line as, but much more difficult than, that dealt with in the text, and a bibliographical reference to its solution. This device immediately widens the range of those who can benefit from the book.

The last two chapters are, mathematically, more advanced than the rest and discuss such topics as characteristic functions and their inversion, the law of large numbers, etc.

The book is strongly recommended for all who have to use probability ideas in application.

Nuclear Reactions II: Theory. Vol. 41, Part 1 of Handbuch der Physik. Edited by S. Flügge. 580 pp. Springer-Verlag, Berlin, Germany, 1959. DM 145.00 (subscription price DM 116.00). *Reviewed by Werner S. Emmerich, Westinghouse Research Laboratories.*

VOLUME 41, Part 1 of the *Handbuch der Physik* comprises four selected subjects in the theory of nuclear reactions. By far the largest portion of the book is devoted to the theory of resonance reactions and allied topics by Gregory Breit. This subject, as exemplified by the Wigner ℛ-matrix and the essentially equivalent Kapur-Peierls "black box", will probably be somewhat ephemeral in nature since, in principle, one can derive all results of nuclear reactions from nuclear forces and nuclear structure. In recent years, many-body theories have made a valiant attack on this problem, but since the ultimate outcome is by no means in sight, one may have to rely on the formal theory of resonances for some time to come. This theory, with which Prof. Breit has been actively associated for many years, is presented here in considerable detail and completeness.

An introductory survey establishes resonance theory in the general framework of nuclear theory. Then, the elementary form of the theory is employed to derive the famous single-channel Breit-Wigner formula for slow neutron resonances. Generalization to many channels is made in due course, and many-particle features are discussed. Next follows a development and discussion of the Wigner ℛ-matrix theory, a detailed comparison with experimental data, for instance strength functions, and resonance parameters for a large number of compound nuclei. The last section of this chapter covers phenomenological models, such as the optical model, pickup, and stripping reactions, etc.

The remaining three chapters, concerning Coulomb wave functions, polarization of nucleons scattered by nuclei, and Coulomb excitation, are under joint authorship of Prof. Breit and his colleagues, M. H. Hull, Jr., J. S. McIntosh, and R. L. Gluckstern, respectively.

The chapter on Coulomb wave functions is tailored for typical nuclear reactions, involving nonrelativistic particles having identical charge polarity. Bessel function expressions, asymptotic forms, and approximate expressions are given. Various computational methods are presented as well as a list and description of existing tables of Coulomb wave functions.

The chapter on polarization follows essentially the course taken by Wolfenstein in the *Annual Reviews of Nuclear Physics*, Volume 6. First, the necessary formalism is developed which is then applied to particles with spin $\frac{1}{2}$. Emphasis is placed on the scattering of high-energy nucleons.

The authors on Coulomb excitation refer the reader to the *Reviews of Modern Physics* article by Alder, Bohr, Huns, Mottelson, and Winther for intermediate steps in the theoretical deductions, whereas they include some supplementary aspects of the theory. Both semiclassical and quantum-mechanical first-order theo-