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# Books

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**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  $\mathcal{R}$ -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  $\mathcal{R}$ -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-

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ries are derived. Higher-order effects and limitations of the theory are also discussed.

The level of presentation throughout this volume is directed towards the diligent reader, not one who quickly wants to look up a formula. Those who wish to study and follow through the theory in detail, will find the necessary material presented here in a form worthy in every respect of the *Handbuch der Physik*.

**Electricity and Magnetism.** By Henry E. Duckworth. 424 pp. Holt, Rinehart and Winston, Inc., New York, 1960. \$8.00. Reviewed by D. Keefe, Lawrence Radiation Laboratory.

THOSE whose task it is to give lecture courses in electricity and magnetism will readily appreciate the problem of finding a suitable single textbook exactly to suit the needs of their students. Despite the many excellent texts available the objectives and scope of courses today are frequently so diverse that it is often hard to pick a book which matches the students' mathematical talents and still covers the desired material in the required detail. Professor Duckworth's book is in no sense intended as an attempt to provide a general solution to this problem but is designed to fill a particular and important gap in the elementary textbook literature. For an elementary course the inevitable millstone of poor mathematical knowledge might make this text seem to sacrifice simplicity for rigor. It is directed toward students at the intermediate level who need know nothing of electricity and magnetism but who have studied elementary physics and calculus (differential and integral) and have some knowledge of vector usage and differential equations.

For such students this is an excellent introduction to the subject and alone should serve to carry the reader from zero knowledge to the level of tackling advanced texts such as Jeans. The writing is economical but the development is as full as could be desired and the author has succeeded in keeping a high standard of rigor and logic. Many of the time-consuming and qualitative discussions of older texts—particularly on electro- and magnetostatics—have been abbreviated substantially. As is essential in a book which is to appeal to engineering as well as science students the mks system of units is given priority. The cgs and cgs-m systems of units, although given second-class status, are explained adequately in every necessary context. Incidentally, the present text begins traditionally by devoting the opening 65 pages to electric forces, fields and potential, unlike a certain recent text committed to the mks system which gave a very contracted version of electrostatics only after the definition of current had been explained rather late in the book.

Apart from the standard material including direct and alternating currents, electromagnetic induction, magnetic properties of matter, and electrical instruments, there are excellent chapters on dielectric theory and behavior, resistance (including nonohmic resistance devices), and thermoelectricity. Electrolysis, batteries,

and cells are referred to only briefly. There are frequent digressions into the field of modern physics, usually to explain the fundamental laws responsible for the macroscopic electrical or magnetic phenomena under consideration, or to refer to recent applications of certain effects.

What may be one of the most attractive features to many is the list of almost three hundred problems graded: "Hard", "Medium", "Easy", distributed among the fourteen chapters. These are well conceived and are designed to give plenty of practice in fairly straightforward mathematical manipulations.

**Plasma Physics: A Course Given by S. Chandrasekhar.** Notes Compiled by S. K. Trehan. 217 pp. The U. of Chicago Press, Chicago, Ill., 1960. Paperbound \$1.75. Reviewed by George Weiss, Institute for Fluid Dynamics and Applied Mathematics, University of Maryland.

ALTHOUGH this account of plasma physics presents the theory mainly along the lines developed by Chandrasekhar and Rosenbluth, it is nevertheless a valuable addition to the physicist's bookshelf. A rough outline of the contents includes the derivations of basic equations, the theory of charged particle orbits in an electromagnetic field, adiabatic invariants, the theory of the pinch, an introduction to stability against perturbations, dispersion formulas, and transport phenomena. These notes lack a detailed examination of nonlinear effects and present little of the molecular theory due to Bohm and Pines. Nevertheless it is as good an introduction to recent theoretical research in plasmas as can be gotten at this time.

**Physics and Electronics in Physical Medicine.** By A. Nightingale. 292 pp. The MacMillan Co., New York, 1959. \$6.00. Reviewed by R. Bruce Lindsay, Brown University.

THE modern advances in physical medicine with their reliance on more and more elaborate physical apparatus have introduced complications into medical education. By the time they finish medical school and start practice most physicians have pretty thoroughly forgotten the course in general physics taken as part of the premedical training. Those who decide to specialize in physiotherapy and physical medicine need a review and it obviously has to be of more specific nature than general physics. It is to meet this need that the present volume was written by the senior lecturer at St. Thomas's Hospital Medical School in London. It is based on a course which he has long given to post-graduate physicians preparing for the Diploma in Physical Medicine of the Royal College of Physicians and Surgeons.

The first half of the book is a brief review of elementary physics with special emphasis on those aspects of particular application to medical practice. This is well written with many well-conceived diagrams and