

young (of all ages) scientists can be summed up in this modification of Terence's dictum: "I am a man of science; consequently, I can deem nothing human as alien to me."

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The reviewer, an astrophysicist and Jesuit, is with the Vatican Observatory in Rome.

A collection of nuclear reviews

ADVANCES IN NUCLEAR PHYSICS, VOL. 1. Michel Baranger, Erich Vogt, eds. Plenum Press, New York, 1968. \$18.50

by EVANS HAYWARD

This volume is the first of a new series of books dedicated to the publication of review papers in nuclear physics. I believe that there is a real need for such a series. Students, teachers and researchers need competent review articles on all aspects of physics written by specialists.

Good review papers written by knowledgeable research workers are not generated by spontaneous combustion. They are solicited by aggressive editors who find out who can write a particular article on a specific subject and convince the prospective author of his unique abilities to do the job. No busy scientist is going to volunteer to write a review paper; it's just too much work. And anyway he's too busy filling up the pages of *The Physical Review* with the reports of truly original work. Michel Baranger and Erich Vogt, the editors of this new series, have enough good judgment, world-wide acquaintances and power of persuasion to succeed at the task they have undertaken.

In their preface the editors say that they are going to use the "stream" method for the selection of papers. They will solicit a considerable number of articles, and then when a sufficient number of papers are available the book will be published. This procedure negates the main objection to the review book as a means of publication, namely, that all too often review papers become obsolete while they await the completion of their companions. This more flexible approach is most promising.

The present volume contains a heavy dose of theoretical nuclear physics, but a greater emphasis on experimental topics is promised for the sec-

ond volume. The first paper, by Jorrit de Boer and Jörg Eichler, is a very thorough treatment of the theory of the reorientation effect and its connection with the experiments that have been performed. This article is followed by the descriptions of two different methods of describing light nuclei, "The Nuclear SU_3 Model" by Malcolm Harvey and "The Hartree-Fock Theory of Deformed Light Nuclei" by Georges Ripka. The paper by Vogt on the statistical theory is an updating of earlier reviews on the same subject with some interesting topical applications. The final paper on three-particle scattering by Ian Duck includes a discussion of the Fadeev equations and n - d scattering and points out a series of still open questions. These papers have an average length of 80 pages so that each one represents a treatment in depth.

Finally, is this book for you? If you are a nuclear theorist, it has to be available to you. Ask your librarian to get it. If you find yourself orbiting the $2s$ - $1d$ shell, it has to be on your desk: Go out and buy it.

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History of quanta

WAVE MECHANICS. By Gunther Ludwig. 230 pp. Pergamon Press, Oxford, 1968. Cloth \$5.50, paper \$4.00

by GARRISON SPOSITO

This book is not a text on quantum theory, but in fact is a contribution to the series entitled *Selected Readings in Physics*, published under the general editorship of Dirk ter Haar. The author's purpose, as he puts it, is to furnish counterpoint to those many volumes whose aim is to represent theory more or less as dogma in the context of what has been most aptly called "normal science." This is indeed a good idea; Ludwig's argument, that developmental studies of old theories can be inimical to prejudicial receptions of new ones, is the best one to support his idea.

Wave Mechanics begins with about 70 pages of what must be termed an excursion (not really a business trip, but then, not really a visit either) into

the physical, mathematical and logical aspects of quantum mechanics. Ostensibly these opening comments are meant to place the reprinted papers that follow into the milieu of current thought; but, marching as they do so rapidly through Hamilton-Jacobi theory, the notions of Hilbert space and the calculus of propositions, the comments give the impression of a thumbnail sketch for the expert rather than a critical introduction for the novice. What is more serious, perhaps, is the minute amount of attention (two pages) paid to the tantalizing philosophical heresies subscribed to by the founders of wave quantum mechanics. One would suppose that this point would command more space in a work whose objective is at odds with pure didactics.

The eight papers reprinted in the second part of the book are partial translations into English of Louis de Broglie's doctoral dissertation; three of Erwin Schrödinger's four communications on quantization as an eigenvalue problem and his paper on the connection between the Schrödinger and Heisenberg pictures; Werner Heisenberg's first paper on matrix quantum mechanics; Max Born and Pascual Jordan's more rigorous version of Heisenberg's work, and, finally, Born's paper on scattering processes wherein the probabilistic view of quantum theory is put forth. Evidently Ludwig has done the translations himself—although he does not tell us this—and presumably he had definite reasons for allowing only portions of these fundamental papers to appear. In the absence of prefatory remarks, however, one can only speculate, or, what is a little better, compare the abridged papers with the originals, in the hope of deducing the antecedent logic. If one does trouble himself to compare, he finds that, although much of what is omitted has to do with commonplace applications of quantum mechanics, some of the missing passages are notable. For example, lost from the translation of Schrödinger's first communication is his acknowledgement of de Broglie's influence upon his work. A severed final paragraph in the fourth communication describes his uneasiness over the requirement that the wave function be complex valued and does not quite live up to his expectations for a field scalar. Lastly, because the *entire* third communication has been deleted, we are deprived of Schrödinger's

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logical development of the theory of the atom. The book begins with the birth of atomic theory in the semi-classical formulation of Bohr and Sommerfeld and develops in sequence the formulations of Schrodinger, Pauli and Dirac. Each formulation is evaluated in terms of its successes and failures in explaining the experimental evidence.

ELEMENTS OF NUCLEAR PHYSICS

Walter E. Meyerhof, Stanford University. *McGraw-Hill Series in Fundamentals of Physics*. 288 pages, \$9.95 | This book introduces certain elements of nuclear physics to upper-division level physics students and graduate nuclear engineers. Scope has been limited to facilitate coverage in a one-quarter course. Gives the reader a feeling for the physical implications of a limited amount of experimental material with the aid of elementary quantum-mechanical concepts.

WAVE INTERACTIONS IN SOLID STATE PLASMAS

Martin C. Steele, RCA Laboratories, Princeton, New Jersey; and **Bayram Vural**, City College of New York. *Advanced Physics Monograph Series*. 288 pages. Available in May | A book designed to present the properties of solid state plasmas and their wave interactions from a unified point of view. The first part of the text discusses wave interactions in terms of quasiparticles and the development of a macroscopic hydrodynamic model from the more fundamental microscopic models. In the next half, the macroscopic model is used to study the interaction of electrokinetic waves with one another and with other collective excitations of the solids such as helicons, sound-waves, and spin waves.

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R. Kubo, **T. Nagamiya**, **Y. Uemura**, **J. Yamashita**, **R. Hasiguti**. Japanese Edition edited by **R. Kubo** and **T. Nagamiya**. American edition edited by **R. S. Knox**, University of Rochester. Approx. 846 pages. Available in May | A book designed to deepen the reader's understanding of the physics of solids—their structure, properties, and behavior under various conditions. Emphasis is thus placed on basic concepts rather than on applications. Composed of five loosely coupled but thoroughly complementary monographs by five eminent Japanese solid-state physicists, the text covers the subject in a unique style, and the authors present those theories which they believe will form the basis of future progress in this branch of science.

SOLID STATE BIOPHYSICS: Applications of Electron Spin Resonance, Dielectric Measurements, the Mossbauer Effect, and Lasers to Biology and Medicine
Edited by **Sidney J. Ward**, Guy's Hospital Medical School, University of London. *Advanced Physics Monograph Series*. 384 pages. \$12.00 | This graduate-level text and reference book presents important, recent research findings and explores the future potential of each investigative method. Each section is written by a contributor working actively in the field.

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er's generalization of Rayleigh's perturbation theory and, most unfortunately, the occasion of his first use of the term "wave mechanics."

It does appear that *Wave Mechanics* would have been more valuable if its reprinted papers had been left intact and if its introductory chapters had been less esoteric. As things stand undergraduates probably will not get through the advanced classical and quantum mechanics in the introduction, and the historically minded will probably reject the unexplained editing. The book might, however, serve profitably as abbreviated history for some readers.

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Math with referents in reality

PARTIAL DIFFERENTIAL EQUATIONS OF MATHEMATICAL PHYSICS, VOL. 2. By A. N. Tychonov, A. A. Samarski. Trans. by S. B. Radding. 621 pp. Holden-Day, San Francisco, 1967. \$10.75

by JOSEPH GILLIS

The second volume of this excellent textbook very properly continues from where the first volume ended. Whereas volume 1 was devoted largely to problems involving only one or two space variables, most of the work in this new volume is on three-dimensional problems.

The theoretical work presented is mainly standard and covers most of what anyone could require in a book of this type. Elliptic, parabolic and hyperbolic equations are dealt with and all of the usual methods are explained. A notable feature of the book is that problems are always shown against their specific physical backgrounds. No equation is presented out of the blue. Not only is the physical meaning of the equations always kept in the forefront, but the authors also make a point of emphasizing the intuitive physical content of the solutions. In this way the mathematics is never allowed to stray far from intuition, and, moreover, this control is never achieved at the expense of mathematical rigor. Indeed the manner in which exact and careful mathematics is combined with physical insight recalls some of the great classics of applied mathematics.

Another noteworthy feature is the selection of examples. Here again, as in the first volume, the authors have managed to illustrate the work with problems of live and actual interest.

The last section contains a reasonably broad presentation of some of the more commonly met special functions. This section contains nothing terribly new—except to those who have yet to learn of Tchebycheff-Hermite and Tchebycheff-Laguerre polynomials, Buniakowsky's Inequality, and so forth.

Taking everything together the two volumes constitute as good a textbook as one could wish of basic "mathematical methods of classical physics," and it can certainly be extremely useful to both teacher and student. Nevertheless I am mildly puzzled by an incidental problem. The entire book (both volumes) was translated into English by Robson and Basu and published in a single volume by Pergamon in 1963. The book under review now completes an almost identical translation of the same work. We have learned to accept the population explosion of scientific textbooks, but do such secondary detonations really serve any useful scientific purpose?

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Joseph Gillis is professor of applied mathematics at the Weizmann Institute of Science, Rehovoth, Israel.

Operational thermodynamics

THERMODYNAMICS: AN INTRODUCTION. By Rubin Battino, Scott E. Wood. 330 pp. Academic Press, New York, 1968. \$5.95

by JAMES B. KELLEY

Although the authors of this new text in thermodynamics disclaim any intention to relate to a particular discipline, it is obvious that their own interests quite clearly make the book of particular interest to the chemist. This is not to say that it would not be useful to the physics or mathematics student, but rather that it has special relevance to chemistry and chemical-engineering students. The book, written when both authors were at the Illinois Institute of Technology, is to be used at the "second year of physics" level.

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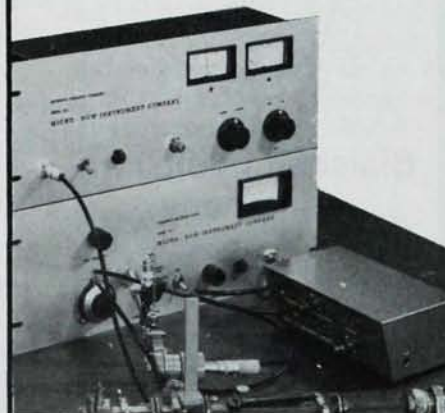
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