About a third of the booklet consists of useful numerical tables.

Although the book has a detailed table of contents, it does not have an index. It does not contain a single reference. It would have been particularly useful to include references to the many more extensive numerical tabulations of the kinematics of nuclear collisions, also available.

In the numerical examples for nonrelativistic collisions, integer mass numbers rather than the actual masses are used, an approximation which is rarely good enough for present-day experiments. In fact, for many experiments in low-energy nuclear physics non-relativistic calculations are not accurate enough, while the strictly relativistic calculation may be unnecessarily complicated. Unfortunately the book does not concern itself with this most frequently encountered intermediate situation in which one is interested in the first relativistic correction term to a nonrelativistic calculation.

Statistical Mechanics. By Kerson Huang. 470 pp. Wiley, New York, 1963. $10.75. *Reviewed by C. H. Holbrow, Haverford College.*

Statistical mechanics is a branch of physics based upon very general considerations. Consequently, it has broad and general applications. The breadth of applicability of this theory and the logical rigor with which it has been developed make it a particularly satisfying field of study. However, because this theory has a rigorous and well-defined mathematical development, textbooks treating this subject cannot differ greatly in their presentation of the fundamentals of statistical mechanics, such as kinetic theory, the Boltzmann H theorem and its analysis, a development of the ideas of microcanonical, canonical, and grand canonical ensembles, and the application of these ideas to quantum statistical mechanics, as well as classical statistical mechanics (i.e. consideration of the classical ideal gas, the ideal Fermi gas, and the ideal Bose gas). Kerson Huang treats these aspects of statistical mechanics clearly and in sufficient depth to leave the student with a good understanding of the fundamentals. However, this task is performed equally adequately by several other textbooks on statistical mechanics.

It is the careful introduction of the statistical mechanical material by a treatment of classical thermodynamics plus an interesting selection of examples of applications of the theory that make this text especially good. The book has been divided into three parts of about the same length. The first of these is concerned with thermodynamics and kinetic theory. The treatment of transport phenomena in terms of the methods of solution of the Boltzmann transport equation is excellent. The equation is solved in the zero-order approximation and the first-order approximation, and the Chapman-Enskog method for solving the equation is also described. The relationship between transport phenomena and hydrodynamics is developed. The second part is concerned with the development of statistical mechanics, and, in addition to the "hard core" material mentioned above, there is a discussion of the application of statistical mechanics to imperfect gases. The methods of pseudopotentials and cluster expansions are discussed. The final third of the book is devoted to "special topics in statistical mechanics". This is the portion which is of particular value because it discusses some of the more recent contributions to the application of statistical mechanics. For example, the Ising model, and its applications to the descriptions of ferromagnetism, binary alloys, and a lattice gas are discussed in considerable detail. The Onsager solution to the two-dimensional Ising model is developed. Also considerable attention is given to the statistical mechanics of liquid helium. The theories of Landau and Feynman which attempt to explain the two-fluid model near absolute zero are developed. The problem of the hard-sphere Bose gas is solved in order to have a simple model of an interacting system of bosons to compare with the results of Landau and Feynman.

The interest of the teacher in the more special topics outlined in the preceding paragraph will determine whether he would wish to use this book as a text. The material covered is as up to date as possible and is presented in an excellent pedagogical style. This book should serve as an effective text and should certainly be among the supplementary readings suggested in any graduate course in statistical mechanics.

Nuclear Interactions. By Sergio DeBenedetti. 635 pp. Wiley, New York, 1964. $16.00. *Reviewed by Evans Hayward, National Bureau of Standards.*

This is a book in which nuclear interactions are treated in an unusual spirit. It consists of eight chapters in each of which some topic is thoroughly developed; in each case the mathematical techniques required for the theoretical discussions are explained in detail. In this way the student need not make a research project out of the mastery of a given subject. It is all there. There is no "it is straightforward but tedious to demonstrate that . . ." nor "it is left as an exercise for the student to show that. . . ." Each step is worked through, and if the reader is already familiar with that part, he can skip it.

The first chapter begins with a discussion of conservation laws, including angular momentum, parity, time reversal, etc. These basic ideas are then used throughout the remainder of the book. A treatment of the two-body problem follows. The second chapter, on nuclear models, points out the many features of nuclei that can be associated with specific models. The transition from the harmonic oscillator picture to the Nilsson scheme is described briefly and followed by a longer treatment of the many-body problem as applied to nuclei. The third chapter is a discussion of the analysis of scattering experiments, all kinds: neutron scattering, electron scattering, nucleon scattering, and finally polarization phenomena.

The fourth and fifth chapters contrast the interactions between radiation and nucleons with other nuclear reactions, i.e., the reactions for which the basic interaction is well known, with those for which it is not. The discussion of radiation phenomena integrates its many aspects in a way that is not to be found elsewhere. And the material on nuclear reac-

tions is in many respects a modern treatment of what is already to be found in Blatt and Weisskopf.

The two final chapters are review papers on pion physics and weak interactions. These are preceded by a very complete discussion of the Dirac theory which serves as a preparation.

This is indeed a very impressive book. Every student of nuclear physics will want to have access to it, because it presents a logical development from basic principles to the point from which much of the current journal literature begins.

Studies in Statistical Mechanics, Volume 2. By J. de Boer and G. E. Uhlenbeck. 272 pp. (North-Holland, Amsterdam) Interscience, New York, 1964. $11.50.
Reviewed by Kurt E. Shuler, National Bureau of Standards.

In late 1962, when this reviewer last made a count, there were being published (at least) 137 annual series headed variously *Advances, Progress, Studies, Developments, Survey, Review, Vistas*, etc., in the fields of physical, biological, and engineering science. Unquestionably, there are more today. Arguing scientifically via the law of supply and demand, it appears evident that these volumes fill a need. I am sure that all of us, at one time or another, have made good use of these valuable compendia of knowledge and wisdom.

These *Advances in*, etc., must be judged, in the long run, by the competence of the editors and the competence of the authors whose arms have been successfully twisted by the editors. In the cases of the present volume and the preceding one in this series, the credentials of both editors and authors are beyond question. The results, i.e., the contents, are of the high quality that one would associate with the names of J. de Boer and G. E. Uhlenbeck (who play the dual role of editors and authors in this volume), K. Huang, J. M. H. Levelt and E. G. D. Cohen, and C. S. Wang Chang.

A particularly valuable feature of these *Studies in Statistical Mechanics*, as promised in the General Foreword, is the reprinting of "important older monographs, reports, or dissertations where these are not easily accessible". This program, which was started in Vol. 1 with the translation and publication of Bogoliubov's "Problems of a Dynamical Theory in Statistical Physics", is continued in this volume with the publication of the expanded and updated Amsterdam dissertation of Levelt and Cohen, "A Critical Study of Some Theories of the Liquid State including a Comparison with Experiment", and the classic, often quoted but previously rather inaccessible 1954 report of Wang Chang, Uhlenbeck, and de Boer on "The Heat Conductivity and Viscosity of Polyatomic Gases". To the latter has been added a historical foreword and some references to the recent literature. The third paper in this volume and the only one which is "new" is K. Huang's review of the quantum theory of the nonideal Bose gas, "Imperfect Bose Gas". We hope the editors will continue their policy of reprinting some of the difficult-of-access classics in addition to new and original reviews.

The book reviewers' version of the Hippocratic oath seems to require that some critical comments be offered to remain a member in good standing of the fraternity. I do not have any. I like the concept, the format, the contents, and the reasonable price of this series. I even like the innovation of the publishers in changing the color of the dust jacket from volume to volume. This not only adds color to my office but also adds suspense to the expected appearance of the next volume.

Progress in Solid Mechanics, Volume 4. I. N. Sneddon and R. Hill, eds. 198 pp. (North-Holland, Amsterdam) Interscience, New York, 1963.
Reviewed by E. H. Dill, University of Washington.

Two articles form Volume 4: "Foundations of Elastic Shell Theory" by P. M. Naghdi and "Some Extremum Principles in Irreversible Thermodynamics with Application to Continuum Mechanics" by H. Ziegler. Like the other volumes, this one is primarily of interest to the research specialist.

There are at least 3000 published articles dealing with thin elastic shells. Professor Naghdi, of the University of California, has cited fewer than 100 of these; but he has chosen well, and his derivation of the equations of the linear theory is the clearest treatment available. The explanation of the relation between the more prominent shell theories should help remove the confusion existing in some minds.

One half of the article consists of a clear and concise statement of the mathematical background, and the kinematics and statics of shells. The remainder is devoted to a derivation of the relations between stress resultants and kinematic quantities and a critique of existing theories. No attempt is made to mention methods of solution of the equations.

The second article by Professor Ziegler, of the Federal Institute of Technology, Zürich, Switzerland, has successive sections dealing with statistical foundations, classical thermodynamics, irreversible thermodynamics, and applications to continua.

The jacket summary reads as follows: "H. Ziegler presents, in elegant and definitive form, his recent fundamental work on thermodynamics of deformation in continua. Among many stimulating ideas is an extension of Gibbs' statistical mechanics to irreversible processes. Much new light is thrown on the constitutive laws of various materials, both solid and fluid."

His treatment continues in the tradition of the "Onsagerist" and may find favor among those who practice the religion of classical thermodynamics. This reviewer has never discovered any logical content to this subject since it always seems to deal with undefined quantities whose definition can be adjusted to fit the experiment.

The present work contains other statements with which the reviewer must take exception. For example, the author states (p. 147) that the principle of material indifference (see "The Classical Field Theories" by C. Truesdell and R. A. Toupin, *Encyclopedia of Physics*, III/1, Springer-Verlag, Berlin, 1960) is not valid in a continuum moving with respect to a rotating coordinate system. Furthermore, he claims (p. 94) that the entropy inequality is "less promising"