College, a MS degree from the University of Tennessee, and a PhD from Brown University. He joined the staff at ORNL in 1951 and is now a senior research physicist and group leader in the Solid State Division of the Laboratory. His research interests have been in the areas of dielectric, optical, and magnetic properties of solids, and the alteration of these properties by radiation. He has authored many papers on these topics and has contributed to several national and international symposia. In 1968 he was appointed Distinquished Visiting Professor at The American University in Cairo, Cairo, Egypt, UAR. At the present time he is a principal investigator in the Lunar Material Analysis Program sponsored by the National Aeronautics and Space Administration. Currently he is an associate editor of the Journal of Geophysical Research *and a member of the Editorial Committee of the* Journal of the American Ceramic Society. *He is in a year's leave of absence from Oak Ridge National Laboratory.*

Title Molecular Quantum Mechanics

Author P. W. Atkins

Publisher Oxford University Press

Pages 471

Price $17.75

Reviewer F. A. Matsen

Molecular Quantum Mechanics is written for advanced undergraduate students in chemistry. Dr. Atkins tries very hard and on the whole succeeds in making quantum mechanics reasonable. To this end he introduces many skillfully drawn illustrations. It compares very favorably with other books in the field and should be quite widely adopted.

The following remarks will exhibit a personal prejudice. I feel that the book is not tough enough philosophically; it tends to stress the reasonableness and pictorial aspects of quantum chemistry. This approach, it is true, delights the student. But the student may in his later years pay for his delight by the difficulty he may encounter in accepting any idea that is not reasonable or pictorial. The author's desire to be reasonable occasionally leads him into making statements that can be misleading to the student. As an example, the footnote on p. 242 concerning the Thomas Precession, and his remark on p. 257 that parallel spins tend to avoid each other.

F. A. Matsen received his PhD from Princeton University in 1940. He became a member of the faculty of the University of Texas at Austin in 1940, becoming a full professor in 1951. That year he also became a Guggenheim Fellow at the University of London and Oxford. In 1961 he was an NSF senior postdoctoral fellow at the Institut de Henri Poincaire, Paris. In 1954 he established and staffed the first computation center at the University of Texas. Since then he has served on the computation center committee and has played an important role in computer selection and financing by the National Science Foundation.

Title Thermal Neutron Diffraction

Editor B. T. M. Willis

Publisher Oxford University Press 1970

Pages xiii + 229

Price $10.40

Reviewer Hugh F. Henry

Since this volume presents papers given at an international summer school on neutron diffraction, its primary audience will be the practitioner in the field who is looking for an up-to-date summary of current activities; for him, it is most valuable as it covers remarkably well the current developments in the field. On the other hand, the beginner or a specialist in another field will probably not find this as helpful as he might wish. Although the respective articles in the book are obviously the work of several authors, its style and notation are remarkably consistent, thus indicating a very competent editing effort, and the book is as readable as might be expected. There appeared to be no obvious bias in the topics covered or in the presentation of any particular viewpoint or model. Overall, the book is heavily theoretical in treatment.

The three basic divisions of the book are identified as Experimental, Nuclear Scattering, and Magnetic Scattering. The first of these, Experimental, appears to be the weakest in the entire volume, since it is here that the non-specialist might reasonably expect to become acquainted with experimental techniques, equipment, and perhaps results. Unfortunately, this is not the case, even though someone did consider it necessary to define the units of the "barn" and the "fermi." Thus, it is particularly in this section that an individual must be knowledgeable in the field to appreciate its coverage which appears to be much more heavily theoretical than experimental. It also seems that considerably more attention is given to such perturbing effects as thermal diffuse scattering than is given to the basic phenomena which they tend to mask or even the precision with which actual results are obtainable. Perhaps this merely reflects the interests and current problems of the authors themselves as they warn other experimenters of difficulties to be expected.

Perhaps more valuable to the non-specialist are the sections on nuclear and magnetic scattering wherein there are indications of the types of problems amenable to investigation by neutron diffraction, comparisons of the respective results obtainable by neutron and x-ray diffraction, and hints of the specific results obtained in certain cases. The implications of the experimental results obtainable were indicated in many instances, such as in determining covalency parameters, structures of certain magnetic materials, charge density distribution in molecules, and the accurate location of hydrogen atoms in solid-state studies. However, such clear-cut treatment was not universally available and it was frequently difficult to distinguish between factors and quantities that had been observed experimentally, those that had been theoretically determined, and some that might wishfully be observed. For the audience to which this book is particularly directed, prior knowledge will provide the necessary evaluative distinctions.

The book should obviously be in any library connected with neutron research facilities. However, its heavy dependence upon theoretical evaluations (including perturbations therefrom) for various models, its rather fuzzy treatment of theoretical-experimental correlations, and what appears to be a rather general disdain for clearly describing experimental methods and their actual attainments appear to limit its usefulness to other than those working in fields related to its specific topic.

Hugh F. Henry, professor and head of the Department of Physics at DePauw University, graduated from Emory and Henry College and received his PhD degree in Physics from the University of Virginia. His work in nuclear energy dates back to 1949 when he became involved in the fields of criticality control and radiation protection at the Oak Ridge Gaseous Diffusion Plant. He has been with DePauw University since 1961 where he has originated courses and research involving radiation. His book, Fundamentals of Radiation Protection, *was published by Wiley-Interscience in 1969, and he spent his sabbatical leave during the school year 1968-1969 making neutron absorption studies at the NRTS at Idaho Falls, Idaho.*

Title Physics, Concepts and Consequences

Authors Raymond L. Murray and Grover C. Cobb

Publishers Prentice-Hall, Inc.

Pages 713

Price $12.95

Reviewer Thomas O. Passell

This book is intended by the authors as a text book for students in liberal arts colleges. It reads as one would expect a lecturer to speak. Interpretative paragraphs abound, answering common questions a beginning student might have about each subtopic subject. The authors have done well to use MKS units throughout, except for some notable lapses—the Section 1-5 on "Earth and the Universe" where miles become the prime unit. Frequent problems are given at the end of each chapter involving the conversion among various sets of units. These are presumably for the purpose of teaching a translation mode between the more familiar English units and the less familiar metric units. Since most of the magnitude range is not familiar to the student, this reviewer feels such persistent exercise in continual conversion of units is a non-productive use of the student's time—time which could be better spent learning fundamental principles. In the astronomical realm, a student has as difficult a time visualizing 10^8 miles as he does 1.6×10^{11} meters. I conclude that this book could be significantly and usefully shortened by deleting the numerous references to and problems involving the English system of units.

The units question is important because it is the acknowledged source of many students' feeling that physics is difficult. The authors' aim of clarifying the subject to nonspecialists is not served by teaching them to simultaneously learn two or three languages in which the subject may be expressed.

The authors have made a largely successful effort at improving the logical connectivity between various sub-branches of physics. Doubtless there are yet other ways to do it, a challenge for authors of future text books. The authors' idea of dealing in parallel with all sorts of forces and motions from the atomic to the astronomical scale is basically a sound one. It should appeal even more to advanced students who have a background of information in just one part of the size range.

The authors' stated goal is to keep the book to a compact size. Some additional features which should improve even further the compactness of the text are:

1. The use of more tables showing the analogies among various topics.

2. A more rigorous exclusion of the English system of units once the general problem of converting from one set of units to the other has been explained, as it has been in Chapter 2.

I heartily commend the book to those wishing a clear presentation on a moderately sophisticated level of the basic physics principles needed for interpretation and use of modern technology. For students of liberal arts colleges, the book will be a partial step towards convincing them that physics is something other than a frustrating maze in which 90% of the total time is spent converting from one set of units to another.

Thomas O. Passell is a senior physicist at Physics International Company, San Leandro, California. His current interests are in the field of diagnostic measurements in matter at very high energy density. He has published papers in the areas of beta-ray spectroscopy, fast-neutron-activation cross sections, upstream diffusion, elastic proton scattering, plasma calorimetry, radiative transfer, and x-ray technology. He has been active in the fields of nuclear reactor coolant technology, controlled thermonuclear fusion research, the effects of nuclear explosions, neutron dosimetry, and x-ray fluorescence. Passell received his BS degree at Oklahoma State University (formerly Oklahoma A & M) in 1951, and his PhD at the University of California, Berkeley, in 1954.

Title Nuclear Reactions

Author Daphne F. Jackson

Publisher Barnes and Noble, Inc., 1970

Pages 260

Price $10.50

Reviewer E. Linn Draper, Jr.

This book originated as a series of lectures for graduate students at the University of Surrey. Its stated aim as set forth in the Preface "is to provide an introduction to the study of nuclear reactions at a level suitable for first year research students. At the same time it is hoped that selected sections of the book could serve as suitable background reading for an advanced undergraduate course in nuclear physics." While the book has a number of admirable qualities which will be mentioned below, it is this reviewer's opinion that the level of difficulty is is too great to achieve the aim.

It is necessary that the student have a foundation in quantum mechanics at the level of the books by