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

Messiah, Gottfried, or Schiff. For instance, the introductory chapter presents the result that

$$\frac{d\sigma}{d\Omega} = |f(\Theta)|^2$$

is the differential cross section by writing the time-independent Schrödinger equation and stating the asymptotic solution. Such a cursory treatment is not likely to be meaningful to undergraduates.

A reasonably strong background in nuclear physics is also required. The results of shell model calculations are presented with little discussion and many of the equations appropriate for the collective model are given with inadequate explanation for a first time exposure. The level of difficulty is fairly uniform throughout and would be tough going for most students before their second year of graduate study.

The author is to be commended for the careful organization and logical development of concepts. For example, the first Born approximation is presented as a special case of the Born series for the scattered wave function. Such a treatment is certainly more satisfying than the somewhat contrived introductions in elementary texts, even though the formal presentation is probably inappropriate for beginners. The Coulomb potential solutions are developed in parallel to the shorter range approximations rather than as an unrelated problem.

The chapter on scattering theory is well done but, again, it is necessary to have reasonable facility with such things as Clebsch-Gordon coefficients and scattering matrices.

The chapter of greatest interest to readers of this journal is apt to be Chap. 6 entitled "The Compound Nucleus." Lucid explanations are given of the Breit-Wigner formulas for both reactions and elastic scattering. Successes and failures of the model are clearly stated.

Chapters in the book, other than those already alluded to on nuclear models, scattering theory, and the compound nucleus, include electromagnetic interactions, the optical model, direct inelastic scattering, strong absorption, transfer and knock-out reactions, and high-energy nuclear reactions.

The book has occasional misprints but these should not create too much confusion. The index is more than adequate with a number of cross references. The references to texts are too vague to be very useful, since neither chapter nor page numbers are given. References to journals, particularly in the chapter on high energy reactions, are adequate and up to date. No problems are included, which decreases the book's utility as a text.

In summary, the book's strong points are its logical organization and succinct statement. Important topics are treated in sufficient depth for more advanced students, but not in sufficient detail for the beginner. The primary audience will be medium energy physicists rather than those whose interests are neutron or low energy nuclear physics. There is probably no new material of interest to nuclear engineers.

E. L. Draper, Jr. is an assistant professor of mechanical engineering and associate director of the Nuclear Reactor Laboratory at the University of Texas at Austin. He received BA and BSChE degrees from Rice University and a PhD in nuclear science and engineering from Cornell University. His interests include neutron physics, nuclear power engineering, and applied nuclear physics.

Title Advances in Nuclear Science and Technology, Volume 5

Editors Ernest J. Henley and Jeffery Lewins

Publisher Academic Press, Inc., 1970

Pages xv - 379

Price $21.00

Reviewer Stephen J. Gage

Volume Five in the *Advances in Nuclear Science and Technology* series is a collection of six articles reviewing recent developments in the theory and practice of nuclear engineering. These articles cover various topics ranging from the academic to technological detail.

There are three excellent reviews of theoretical and calculational developments which continue the first-rate contribution of this series in these areas. "Stability Analysis of Nonlinear Space Dependent Reactor Kinetics" by W. E. Kastenberg certainly measures up to expectations and will be of interest to researchers both in and out of the nuclear field. S. Kaplan's delightful yet scholarly work, "Variational Methods in Nuclear Engineering," is his second outstanding contribution to the series, the first being "Synthesis Methods in Reactor Analysis" in Volume Three. His perspective and lucidity in developing and integrating the various approaches is to be highly commended. To be utterly picayune, the article was marred slightly by several awkward sentences but this should not diminish its appeal to students, both old and new.

"Methods and Data for Reactor Shield Calculations" by F. H. Clark is another fine contribution to the series. This article is indeed a true survey; it provides a comprehensive view; it "oversees." It does demand that one "have some acquaintance with shield calculation methods" and yet it can be very helpful to the intermediate-level graduate student or to the worker who is refreshing or expanding his knowledge of shielding methodology. I found several things with which to trifle: the treatment of discrete ordinates and multigroup calculations is much too abbreviated; topics like gamma-ray buildup factors and albedos are treated in too much detail in comparison to other equally important subjects; and there are proofreading errors. But it remains an eminently useful survey.

The fourth theoretical paper appears out of place; it is of a different genre. "A Round-Off Free Solution of the Boltzmann Transport Equation in Slab Geometry" by L. Lois and J. Certaine basically describes "a new analytic solution so formulated as to be free to round-off". There is only an exceedingly brief survey of classical analytical solutions of the Boltzmann equation, followed largely by an exposition of the round-off free solution to the Boltzmann equation for a variety of cases. While the material is presented very clearly and interestingly and while it may be of interest to a number of researchers, I felt that the work was not quite in keeping with the other reviews. This article, albeit somewhat abbreviated, would appear more at home in *Nuclear Science and Engineering*.