Finally, some criticism is in order regarding the outdated values of physical constants listed in Appendix III as most precise values. There were certainly more up-to-date compilations of physical constants available in 1966, the year of publication, than the referenced source of 1957 vintage.

In summary, this reviewer believes the book should be very valuable as a guide for laboratory-course instructors. Students, however, should be instilled with a few words of caution concerning the cited deficiencies before the book is handed to them for use.

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About the Reviewer: Hermann J. Donnert has been Associate Professor of Nuclear Engineering at Kansas State University since 1966. Following formal education in mathematics and physics at Innsbruck, Austria, he conducted postdoctoral research in theoretical physics at the universities in Köln and Freiburg. Dr. Donnert has been a member of the staff of the U. S. Army Nuclear Defense Laboratory, Edgewood Arsenal, Maryland, and concurrently, he served on the faculty at the University of Maryland. He participates actively in the CINDA program and ANS standards efforts. His research interests are in quantum field theory, low-energy nuclear physics, radiation transport and shielding, radiation effects and measurement techniques, radiation chemistry, and nuclear-weapon effects.

Nuclear Physics. By R. R. Roy and B. P. Nigam. John Wiley and Sons, Inc. New York (1967). 590 pp. $15.95.

This book was written by physicists for use in physics education. Thus it is not surprising that it is not ideal for use by nuclear engineering students. Of course, no one book could be, since nuclear engineering education encompasses nuclear physics over widely ranging levels of sophistication with primary emphasis for most being at the descriptive level. However, the advanced graduate student, specializing in reactor physics, requires a substantial quantitative appreciation of low-energy nuclear physics. In particular, he needs an understanding of the bases for the diverse interpolation and extrapolation formulas employed for the description of nuclear reaction rates. For these students, this book is as well suited as a text and/or reference work as any of which this reviewer is aware.

The presentation is nicely balanced with respect to attention paid to nuclear structure and to nuclear reactions. Of course, the physicists' viewpoint shows up here somewhat in that there is perhaps relatively more emphasis on structure and less on reactions than suits the nuclear engineer. More importantly, no attention is paid to one aspect of nuclear reactions that is of prime importance to the nuclear engineer, namely that of the effect of the environment upon neutron-nuclear reaction rates. But the latter has little to do with nuclear physics (except for its influence on the interpretation of cross-section measurements in terms of nuclear structure), and hence to look for it in a text of this kind is probably unreasonable. Neither of these mildly negative observations is to be construed as unfavorable criticism.

Much care is taken by the authors to be as quantitative as is feasible, given the uncertain state of the subject matter. Furthermore, considerable effort is devoted to the comparison of calculation with measurement. These aspects of the text make it extremely useful to the reactor physicist and the nuclear engineering student.

The first five chapters are mainly devoted to a discussion of nuclear properties and nuclear forces. The concepts of nuclear size, shape, charge distribution, and electromagnetic moments are carefully reviewed. Numerous calculations of these properties are presented in sufficient detail to be instructionally useful to the student, and are also compared with the corresponding measurements. Incorporated into the fifth chapter is a good discussion of fission.

Nuclear models are reviewed in Chapters seven, eight, and nine. The shell model, collective model, and the unified model (a marriage of the first two) are examined in considerable detail, both as to their formulation and as to their implications and predictions. Because of the successes these models have had in correlating data on nuclear ground and low-lying excited states, a working appreciation of them is of substantial importance to the applied nuclear scientist. Chapter nine is given over to a discussion of attempts to understand the many-nucleon nucleus in terms of what is known of the two-nucleon potentials. Because of the lack of concrete results here, this material is perhaps of little immediate interest to the nuclear engineer.

Chapters six, ten, and eleven describe various methods for attempting to analyze and understand nuclear reactions in quantitative terms. Of course, neutron-nuclear reaction-rate analysis (at least) is central to reactor analysis. Hence, the relevance of this material in nuclear engineering education is obvious. The presentation in these chapters is sufficiently detailed for the sophisticated student to learn from it; and, at the same time, sufficiently advanced to provide a useful reference for the working reactor physicist.

The last two chapters treat electromagnetic interactions with nuclei and with beta decay. Both of these topics are of importance to the nuclear engineer, particularly the latter. Both are dealt with quite thoroughly in the text.

In sum, I feel this is a good text on nuclear physics for use in physics education. Furthermore, until a nuclear physics text is written with the needs of the advanced nuclear engineering student specifically in mind, I feel that it is about the best available for use in nuclear engineering education as well.

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November 28, 1967

About the Reviewer: Dick Osborn is professor of nuclear engineering at the University of Michigan where he went in 1957 following six years at the Oak Ridge National Laboratory. He completed his graduate studies at Case having earned earlier degrees at Michigan State. Dr. Osborn's research and teaching interests are in nuclear physics, reactor physics, kinetic theory, and plasma dynamics.

Unitary Symmetries and Their Application to High Energy Physics. By M. Gourdin. Interscience Publishers, New York (1967). 303 pp. $12.75.

Unitary groups are widely used in modern elementary particle physics. No clear understanding of new theories is possible in this field without having a good knowledge of unitary symmetries and unitary groups. The book by Gourdin tries to introduce the reader to this important field. However, the book is typical of so many books written these days in quantum field and elementary particle theory: It is an excellent book for the specialist, a source- and handbook, but it is not a textbook for the beginner or for the physicist new in the field. The book could gain very much by re-shuffling the order of the chapters—why start immediately with physical applications when the basic mathematical concepts are explained later? Why not start with Chap. XII? A test made with two groups of students showed that reading the book should start at page 195.

The book is divided into two parts: Chaps. I to XI which give physical applications, not understandable to persons not having yet read Chaps. XII to XVII that present the mathematical background. Chapters I and II treat the unitary group SU(3) and the physical interpretation of unitary symmetry. Particle classification, strong and weak electromagnetic interactions are treated in Chaps. II to VII, respectively. In Chaps. VIII and IX, the unitary group SU(6) is discussed and Chap. X is concerned with the very important modern field of current algebra. The physical consequences of the SU(6) model are worked out in Chap. XII. Now comes the basic mathematical part: Lie groups and the Lie algebra, topological properties, like compactness, and semi-simple groups are discussed in Chaps. XIII to XV, whereas group representations and the tensor algebra of the linear group are discussed in the last two chapters.

The book is an excellent source for the specialist in the field; beginners in the field are warned to use it as a first introduction into the field of unitary groups.

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