Book Reviews

A New Exposition of Nuclear Physics

Nuclear Structure. Vol. 1, Single-Particle Motion. AAGE BOHR and BEN R. MOTTELSON. Benjamin, New York, 1969. xiv + 474 pp., illus. $25.

Bohr and Mottelson were already well into the writing of *Nuclear Structure* in 1961, when I visited Copenhagen. Now the first of the three volumes of this work has finally appeared, and it is fully as revolutionary as had been expected by those who were familiar with the lectures and publications of the authors. The set of volumes is evidently going to be the standard of reference in nuclear structure physics for many years.

Usually, the evolution of books in a particular field is gradual, with each resembling its more immediate predecessors in scope and outline but differing in detail. In nuclear physics, the progression started with the articles by Bethe and Bacher in *Reviews of Modern Physics* in 1936. From 1936 through the most recent books, the evolution is of the gradual type; undoubtedly the most enduring contribution of this period was Blatt and Weisskopf's *Theoretical Nuclear Physics*. Now we have a sudden change in the progression—*Nuclear Structure* is not much like what has gone before. The amount of really new material is impressive. Moreover, the authors exploit fully new techniques of exposition. It seems likely that they will influence not only nuclear physics texts, but texts in all branches of physics.

Each of the three volumes of *Nuclear Structure* is to have three chapters. A chapter is further subdivided; there are expository sections, each followed by illustrative examples, and at the end of the chapter there are numerous appendices. Nonnuclear theory, such as the general theory of beta decay, is discussed in the appendices. Long digressions on various aspects of quantum theory are thus avoided in the main body of the text. More novel is the use of illustrative examples to present as much as half of the material. The advantage of this procedure is that in the examples there is not the pressure for logical order that exists in the expository sections. Hence in the discussion of a particular phenomenon, such as, for example, neutron widths or particular nuclear spectra, the authors can bring to bear a full arsenal of theoretical tools and relevant experimental data, some of which may not have already been considered in the text. Each section of this type is more self-contained and therefore more useful for reference purposes than is usually possible when strict logical precedence is observed. Not only do the authors use these sections to dramatize the interconnections between the branches of nuclear physics, but they also give the reader a feeling for the sort of unraveling process that is an important part of current research.

The method of presentation makes a good background in nuclear physics a prerequisite for the reader. Truly this is nuclear structure for nuclear physicists. Thus, it is not a text for a course on nuclear physics; on the other hand it will be read and reread by all serious students and practitioners of nuclear physics.

This first volume of *Nuclear Structure* is titled *Single-Particle Motion*. It begins with a chapter on "Symmetries," a necessary preliminary to the consideration of intrinsically nuclear properties. Many readers will go directly to the second and third chapters, "Independent-particle motion" and "Single-particle configurations." Throughout, the approach is in terms of actual nuclei, rather than in terms of models. Elaborate formalism is relegated to the appendices and not allowed to interfere with the physical arguments. The essential reference formulas and expressions are carefully presented, and the notation is designed to set the standard for the future.

There remains the problem of how best to assimilate the great wealth of information presented in this volume. Probably all methods of attack are good, save only starting at the beginning and plodding through to the end. It is not an easy volume to digest by any means, but one must measure the time spent in reading it against the 40 years of experience in nuclear-structure physics that it summarizes.

The second and third volumes will be titled *Nuclear Deformations* and *Nucleonic Correlations*. The first volume alone demonstrates clearly that *Nuclear Structure* will take precedence on the bookshelves of all nuclear physicists, both theoretical and experimental.

MARK BOLSTERLI
Los Angeles Scientific Laboratory, Los Alamos, New Mexico

Kinds of Motion

Annual Review of Fluid Mechanics. Vol. 1. WILLIAM R. SEARS and MILTON VAN DYKE, Eds. Annual Reviews, Palo Alto, Calif., 1969. viii + 462 pp., illus. $8.50.

Rarely is an annual review more than a random collection of embroidered restatements of recently published work. Here is such a rarity, for this is the first such "annual" in fluid mechanics and provides a perspective of a rapidly maturing discipline. In the first article, Sydney Goldstein paints an impressionistic picture of the field to the mid-century mark. Then follow contributors to the modern art from many lands. I choose to group their topics into those of aerodynamic origin, those of biophysical origin, and those of planetary-physical origin.

Traditional aerodynamic problems of laminar separation, boundary layer transition, drag reduction, and hydrodynamic noise are reviewed by authors (S. N. Brown and K. Stewartson, I. Tani, J. L. Lumley, J. E. Ffowcs Williams) whose novel assessments of these topics are significant contributions to the literature. None of these problems are finally solved. Yet the authors' discontent with past empiricism and their search for deductive pathways bode well for future studies. One might complain that higher-order boundary layer theory (M. Van Dyke) is less relevant