to the reader who only knows Willy Ley as a renowned expert in rocketry and space science, but he will soon realize how boundlessly cultivated the author is and will not be too much surprised that he was educated as a zoologist.

Two features characterize the author's writing. The first one is the uncommon depth of information on various topics and the orderly exposition. The second feature is charm: A vivid presentation, a good deal of humor and a beautiful style add up to a delightful reading. Ley's book proves that scientists can write with elegance.

Of particular interest to physicists, and a wealth of information to teachers, are the essays that are a rebuttal of the fancy theories about the inclusion of such numbers as π in the Egyptian pyramids; a historical review of discoveries on gas theory; a precise analysis of the physical possibilities regarding the noise produced by meteors; stellar evolution, and the old riddles solved and the new ones posed by the space age.

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The reviewer has taught physics and mathematics for several years.

Collective model advocate

COLLECTIVE MODELS OF THE NUCLEUS. By J. P. Davidson. 238 pp. Academic Press, New York, 1968. $12.00

by HENRY S. VALK

To those working in the field of theoretical nuclear physics, the name of John P. Davidson, physics professor at the University of Kansas, needs little introduction. He and his students have made many original contributions to our understanding of the nucleus, particularly its collective aspects.

With this background it is not surprising that Davidson's new monograph provides a lucid summary of the phenomenological approach to the collective nuclear models. The main text covers the fundamental physics of the liquid-drop model and describes specific classes of nuclei and their transitions. The work concludes with a chapter on mu-mesic atoms and their use as a tool for exploring the collective properties of heavy nuclei. The author wisely chooses to place the relevant algebra of angular momentum and other calculation detail in a set of appendixes. This keeps the book relatively self-contained and permits the reader to concentrate on the physics unhindered by lengthy mathematical digressions.

This book, the outgrowth of a review article prepared several years ago (*Reviews of Modern Physics*, 37, 105, 1965), fills a long standing need. The shell model and its close relations have found many expositors, but heretofore the phenomenological collective model has not had any representation in the nuclear physicists' library. It has now found an advocate.

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The reviewer is a theoretical nuclear physicist and chairman of the physics department at the University of Nebraska.

A compendium of results

ELECTRON IMPACT EXCITATION OF ATOMS (NSRDS-NBS 25). By B. L. Moiseiwitsch and S. J. Smith. 116 pp. National Bureau of Standards, Washington, DC, 1968. $2.00

by BRUCE W. SHORE

This monograph provides a timely review of the computational and observational methods currently employed to determine cross sections for electron-impact excitation of atoms and ions. It also provides a valuable compendium of theoretical and experimental results, in both graphical display and in tabular form. Equally valuable is the authors' critical assessment of existing experimental results.

The authors, B. L. Moiseiwitsch of the applied mathematics department, the Queen's University of Belfast, and S. L. Smith of the Joint Institute for Laboratory Astrophysics at Boulder, Colorado, are respected for their work in atomic physics; Moiseiwitsch is perhaps best known for his application of variational methods (for example, *Variational Principles*, Interscience, 1966). This monograph was simultaneously published in *Reviews of Modern Physics*, **40**, 2, (1968).

The theoretical half summarizes the numerous approximation methods now used in computations. These range from the simple Born approximation through the elaborate close-coupling equations and include classical approaches, simplified methods for including exchange and approximations that guarantee unitarity. The major portion of the discussion concerns electron-hydrogen collisions, showing the relative simplicity of the electron-hydrogen system, with appreciable discussion of electron-helium collisions, and briefer mention of excitations of more complex atoms and positive ions.

The experimental half follows a similar pattern. The authors discuss methods for measuring excitation cross sections, results for hydrogen and helium and selected results for heavier atoms, particularly alkalis. They critically examine polarization and angular distribution effects, and take experimenters to task for paying insufficient attention to these and other sources of experimental errors. They conclude that significant improvements are now possible in the quality of published experimental results.

The coverage is thorough, the exposition lucid, and, as befits a review, it is well documented with references.

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An associate professor of physics at Kansas State University, the reviewer is coauthor, with D. H. Menzel, of Principles of Atomic Spectra *(Wiley, 1968).*

From optical pumping to arcs

METHODS IN EXPERIMENTAL PHYSICS, VOL. 7B: ATOMIC AND ELECTRON PHYSICS. Benjamin Bederson and Wade Fite, eds. 374 pp. Academic Press, New York, 1968. $17.00

by GILBERT O. BRINK

This is the second volume of a two-part series on the techniques of experimental atomic and electron physics. It is intended as a summary of atomic and electronic interactions in bulk matter, primarily in the plasma state. As with any such book it only partially meets this goal because of rapid developments in the field. However, it still provides a useful starting point for a beginner, as well as a means for experienced workers to bring themselves up to date in bordering areas of physics.

The book is divided into six independent and self-contained chapters, each devoted to a separate topic. Bibliographies, though not complete, provide suitable material for further literature work. It is possible to read