

nomenclature. The table is an excellent feature as it allows each contributor to use the usual nomenclature of his subject while preventing reader confusion. An author index is lacking, and the five-page subject index is inadequate for a reference work. Reviewers can play a game with themselves and try to find a word they consider significant that does not appear in the index. I should say that my own work has been only with gas lasers, but I was surprised that the subject index does not contain the terms gas laser, Lamb dip, He-Ne, ruby and continuous wave. There are also other terms I looked for but could not find.

I feel that the title is misleading. The book deals with measurement techniques applicable to lasers, but the stress is on the techniques rather than on lasers. A better title might be *Modern Optical Measurements*. Nevertheless, it is a useful book on optical measurements, and I will henceforth keep my copy near at hand in my own laboratory.

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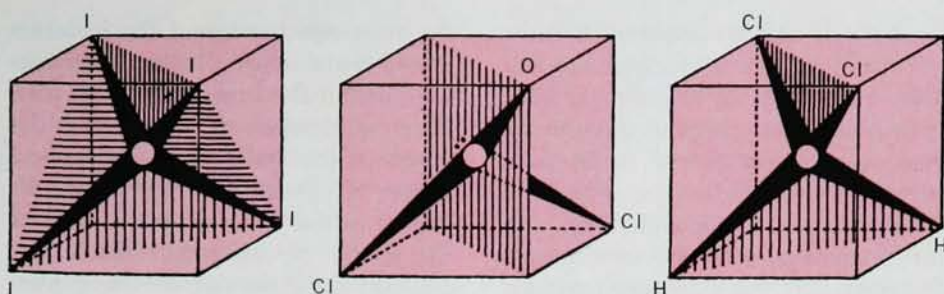
## For inorganic chemists

INORGANIC ELECTRONIC SPECTROSCOPY. By A. B. P. Lever. 420 pp. American Elsevier, New York, 1968. \$31.50

by STUART A. RICE

During the last decade, a number of books have dealt with crystal and ligand field theory and its applications to the inorganic chemistry of transition-metal complexes. Is there still need for another text? Does this text by A. B. P. Lever provide a unique point of view, method of presentation or breadth of coverage? The answers to all these questions are simultaneously no and yes.

Comparison of Lever's text with those of Leslie Orgel, of Thomas Dunn, Donald McClure and Ralph Pearson and of Carl Ballhausen is revealing. It is not as elementary as the beautiful presentation by Orgel, is



SYMMETRY PLANES of molecules. The  $\text{HgI}_2^{2-}$  molecular ion has six planes of symmetry, four of which are shown in the drawing on the left. The  $\text{SOCl}_2$  molecule (center) has one plane of symmetry and the  $\text{CH}_2\text{Cl}_2$  molecule two such planes. (From *Inorganic Electronic Spectroscopy* by A. B. P. Lever, reviewed on this page.)

more detailed and treats the theory more clearly than does Dunn, McClure and Pearson (but omits discussion of the nonspectroscopic parts of complex chemistry that they cover) and in turn is not as detailed and is less advanced than Ballhausen's text. As an intermediate level text, its principal virtue is a modest level of coverage of almost all of the relevant physical phenomena and integration of the theory with many experimental data. The text should, therefore, be very useful to students of inorganic chemistry who wish to use ligand field theory in the interpretation of experiments. It will not be very useful to the theoretical chemist.

As to details, the treatment is standard in format but clearly done. The book is illustrated with many diagrams, a number of which are quite helpful in illustrating textual material.

There are also numerous helpful tables. Occasionally advanced material is slipped in without adequate explanation (for example, Condon and Racah parameters are not really interpreted for the student). Although the student may accept such material, the text does not prepare him to understand the "whys and hows."

The book should be a very useful text for inorganic chemists and also for others who want a moderately detailed summary of ligand and crystal field theory.

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## Mechanical concepts and theories

GENERAL MECHANICS. By Henri Cabannes. Trans. from the 2nd French edition. 426 pp. Blaisdell, Waltham, Mass., 1968. \$11.50

by JACQUES E. ROMAIN

The difference between French and US general-mechanics textbooks is often that the former are more an exercise in applied mathematics and the latter are more physics in a mathematical form. By this criterion, Henri Cabannes's book would rather be classified among US texts, for it is a genuine theoretical physics book. The way new concepts are introduced is not abstractly axiomatic but discloses an earnest operational preoccupation. This careful approach clarifies, right from

the beginning, the actual purport of each concept and its limitations.

Other special features single out this book among existing textbooks on general mechanics. The first is the grouping of mathematical tools and general properties pertaining to a category of problems. Therefore the discussion of particular problems, relieved of the burden of considerations that are not relevant, becomes more compact and straightforward and the physics more apparent. A characteristic example of this approach is the exposition, at the beginning of the chapter dealing with oscillations, of the essentials of differential equations (including the classification of singu-

lar points) and consequent systems.

Related to this attitude is the author's commendable tendency to integrate related concepts and theorems in basic general statements to be later particularized. Such a presentation is enlightening in that it underlines both the relatedness of some concepts or theorems and the differences among them. For example the formulation of the fundamental law of dynamics, in which impulse is considered the primary notion from which force derives, is a particular case when the impulse is differentiable.

The last noteworthy feature of the book is its coverage. Some topics that are often found in general-mechanics textbooks, such as Hamiltonian mechanics and the mechanics of filaments, are bypassed and deferred to more specialized treatises. This makes room for chapters generally not found in a book at this level, which provide the student with a strong and updated basis for the study and application of contemporary mechanics. Important chapters are the introduction to nonlinear vibrations and to motion constraints including a control system, the treatment of stability problems by Liapunov's theorem (stated without proof), a rigorous theory of the gyroscope with an indication of some of its industrial applications, the application of the theory of rigid-body motion to some astronomical problems (such as the precession of the equinoxes and

the time equation), and the inclusion of two introductory chapters approaching modern fluid mechanics from two different viewpoints. The first is devoted to the "microscopic" statistical aspect of the kinetic theory and the second to the "macroscopic" aspect of the theory of continuous media, including the equations of shock phenomena and magnetofluid dynamics.

Developed during several years of teaching at the Faculté des Sciences of Paris, the book is definitely student oriented, and several critical discussions of basic points are likely to give the reader an adequate insight into theoretical mechanics. (The section on "the search for absolute reference systems," for example, is delightful.) The exposition is quite clear, but does not go into every elementary detail because a reasonable knowledge of geometrical and other mathematical properties is assumed. Exercises are included, some with answers, and several of them are based on everyday experience. Appendixes contain some useful tables.

That the book is a translation could hardly be guessed by reading it because the translator, S. P. Sutera, professor at Brown University, is himself an expert in the field.

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*The reviewer taught general mechanics to both undergraduate and graduate students for several years at the University of Elisabethville in the Congo.*

## A treatise on nuclear reactions

INTRODUCTION TO NUCLEAR THEORY. By I. E. McCarthy. 555 pp. Wiley, New York, 1968. \$13.95

by VITTORIO CANUTO

The book, which grew out of a course for first- and second-year graduate students, is not based on the democratic distribution of the canonical

topics normally found in a classical textbook on nuclear physics. Fundamental topics such as fission, electromagnetic interaction and beta decay are not even briefly discussed. On the other hand, such as nuclear reactions, formal-scattering theory and rearrangement collisions comprise half the book.

Chapters 8-14 offer by far the most complete and extensive treatment of the nuclear-reaction problem ever dealt with in this type of book. This reflects the author's main interest in nuclear physics, as explicitly stressed in the preface. These last chapters are really a complete treatise by themselves: very rich in details, tables, graphs and up-to-date references that are extremely useful.

Chapter 3, on nucleon-nucleon forces, does not do complete justice to the great contribution made by the Taketan group toward understanding nuclear forces. Although the phenomenological aspect of nuclear forces is quite extensively discussed, even including the most recent Tabakin potential, the extensive use of nonlocal potential by J. S. Levinger and his collaborators is not treated. It is my feeling that the deuteron problem, from the pedagogical point of view, can still offer a useful and natural starting point for the nuclear-force problem. The Bethe-Weizsacker mass formula is not discussed in depth, despite recent work relating it to the shell model.

A welcome sight because of its simplicity is the Gomes-Walecka and Weisskopf treatment of the Bethe-Brueckner equation. It appears to have been a very good idea to include it with detailed discussion of the healing properties of the wave function.

The shell model is treated as usual from the historical point of view with some useful techniques like Talmi-Moshinsky transformation, conveniently discussed at an appropriate length.

The mathematical steps are generally carried out in detail, and with the aid of appendixes 3 and 4, any student with a background in quantum mechanics should be able to read the book without difficulty.

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