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pages, once more deals with electronic spectra, but this time of ions or ion complexes subject to strong crystalline fields. The article does not include spectra involving valence electrons, which must be treated by band theory, and is thus concerned primarily with salts of the transition metals and rare earths. The theory is developed by means of symmetry group representation but remains semiempirical to account for the large amount of experimental data available. The experimental part is quite readable without complete study of the theory.

Few individuals will read this volume from cover to cover, but considering the excellence of writing, the high standard of print and illustrations, and the reasonable price this is another "best buy" in this series.

Struktur der Materie. Vol. 2 of *Lehrbuch der Theoretischen Physik* (2nd Revised Ed.). By Walter Weizel. 1793 pp. Springer-Verlag, Berlin, Germany, 1958. DM 88.00. Reviewed by Nicholas Chako, Queens College.

A BROAD field of physical phenomenon based on the microscopic theory of matter is dealt with in Prof. Weizel's second volume on theoretical physics. He treats in a comprehensive manner the mathematical analysis of a variety of topics ranging from atomic, molecular, and nuclear structure and spectra to thermal, electrical, and other properties of matter, all centered around the principles of quantum mechanics.

Broadly speaking, the treatise may be classified into four main divisions: (a) quantum mechanical analysis of atomic and molecular spectra, including Dirac's theory, (b) field theory and nuclear structure, (c) quantum chemistry and statistical mechanics, and (d) thermal, electrical, and other properties of the gaseous, liquid, and solid states of matter. There are also chapters on ion and electron optics, crystal structure, lattice theory of metals, and semiconductors.

In the first part, the author stresses the mathematical methods for the determination of atomic and molecular spectra and places less emphasis on the physical and mathematical foundations and development of quantum mechanics and the description of the results deduced from the theory. This part does not deviate very much from other texts on this subject (there are a few exceptions) where physical concepts and interpretations of the results of mathematical analysis, as well as philosophical implications, are relegated to a secondary role. This is to be regretted, since the mathematical treatment of these problems is clearly and thoroughly presented. On the other hand, the chapters devoted to field theory are well executed and constitute one of the best presentations of the subject to be found in any of the existing treatises of this kind. The sections on nuclear structure (physics) contain a good introduction for further reading. There is also an extensive treatment of molecular phenomena and chemical bonds and quantum statistics. In the fourth part, the author discusses with considerable care thermal, electrical, and optical properties of gases and solids, transport phe-

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nomena and diffusion processes, focusing properties of electromagnetic fields with applications to modern devices and instruments, and gaseous electronics, and also gives a clear and rather detailed account of crystal structure and the lattice theory of metals.

In view of the encyclopedic manner in which the author has written, it seems to the reviewer that several important topics have been omitted or barely touched upon in the text, namely, the mathematical formulation of the principles of quantum mechanics from the point of view of the modern theory of linear operators and the application of this powerful mathematical method to continuous spectra and scattering processes which are necessary for the understanding of the present development of nuclear theory. The reviewer is also somewhat perplexed by the complete absence of references to original papers and especially to current literature in connection with the chapters on field theory and nuclear structure—a somewhat anomalous phenomenon for a German book—since to the reviewer this treatise has the character of a reference work rather than a textbook.

In spite of these drawbacks, the present volume is an important contribution to the growing number of works on theoretical physics and together with the first volume, they form one of the best and most comprehensive works in classical and modern theoretical physics.

Optical Properties of Semi-conductors. By T. S. Moss. 279 pp. (Butterworths, England) Academic Press Inc., New York, 1959. \$9.00. Reviewed by Paul W. Levy, Brookhaven National Laboratory.

MOST of the present interest in the optical properties of semiconductors stems from their use in infrared sensing devices and solar energy converters. The reviewer has concluded—with full regard for the meager statistics involved—that persons interested in semiconductors for electrical applications have relatively little knowledge of optical properties, while in contrast persons interested in optical applications are completely familiar with purely electrical phenomena. Both of these groups will find *Optical Properties of Semi-conductors* of interest. Like the previous book by this author, *Photoconductivity in the Elements*, it is divided into two parts. The first part is a survey of the basic physical principles involved and the second part describes measurements on specific materials. The first part of this book is a discussion of optical phenomena in semiconductors. It begins with a discussion of electro-optical properties of solids in terms of Maxwell's equations. Then the absorption of light from both the macroscopic and microscopic viewpoint is considered. Photoelectric effects, magneto-electrical-optical effects, and the emission of radiation from semiconductors constitute the remainder of the first half. Unfortunately, a few subjects are considered with a degree of detail that should be reserved for appendixes while some subjects are described so briefly that the only thing accomplished is to point out the existence of a reference.