The book is written chiefly for specialists working in problems of stellar atmospheres. Even for them, reading is rendered unnecessarily difficult by the absence of a list of notations; instead of words, the text uses a great variety of mathematical symbols throughout, and the reader, if not of phenomenal memory, has to search for the only definition of a symbol, some 200 pages back from the passage he is just concerned with. Also, regular explanatory captions to figures and tables are completely missing, being substituted by symbols or other cryptic expressions, the meaning of which has to be found from dispersed portions of the text. This prevents an immediate access to the material; it is virtually impossible, even for a competent reader, to make direct use at inspection of the numerical data or formulae without a thorough study of the entire text, despite the straightforward nature of the data which could have been made easily accessible by a few simple captions. Confusing misprints in the very symbols often add to the difficulty.

Despite this, the monograph is an important contribution to the study of stellar atmospheres, especially from the standpoint of detailed balance in the distribution of the excited and ionized atomic states, their radiative output into discrete levels and continuum, with a non-zero source of mechanical energy which causes specific departures from local thermodynamic equilibrium without, however, departures from hydrostatic equilibrium being considered.

Advances in Catalysis and Related Subjects, Volume 12. D. D. Eley, P. W. Selwood, Paul B. Weisz, eds. 324 pp. Academic Press Inc., New York, 1960. $11.00. *Reviewed by Henry Wise, Stanford Research Institute.*

FOR twelve consecutive years, specialists in various fields of catalysis and related subjects have contributed to the *Advances*. Each volume has served both as a source book of scientific information and as a measure of scientific progress. As in the past, the editors have carefully balanced the six contributions contained in this volume. For the exploration of the physical properties of solid catalysts the reader is treated to an exposition of the application of magnetic resonance techniques (D. E. O'Reilly), and of the spectroscopy of the fine structure of x-ray absorption edges (R. A. Van Nordstrand). A more general review by D. J. C. Yates deals with the perturbations introduced into the solid surface as a result of physical adsorption, and the methods employed in the study of such phenomena. The empirical approach to an important and highly complex problem is demonstrated by Pines and Schaap in their chapter on "Base-Catalyzed Reactions of Hydrocarbons". The unique role of the carbanion intermediate is employed in the synthesis of mechanisms to explain the observed reaction products. The theoretical aspects of heterogeneous catalysis are presented in a chapter on "The Wave Mechanics of the Surface Bond in Chemisorption" by T. B. Grimley, and one on "The Electron Theory of Catalysis on Semiconductors" by Th. Wolkenstein. These two contributions differ widely in their approach. While one author attempts to apply molecular orbital theory to the problem of chemisorption on solids and points out the fundamental information yet lacking, the other erects a "building from which the scaffolding has not yet been removed". The foundation of this edifice is the concept that a chemisorbed particle may be treated as a structural defect of the semiconductor surface associated with localization of a free electron or hole. The qualitative conclusions derived from this theoretical development demonstrate the stimulating influence that the solid-state physicist has provided for a field of research which too long has been considered the province of the chemist.

An Introduction to Relativistic Quantum Field Theory. By Silvan S. Schweber. 905 pp. Row, Peterson and Co., Evanston, Ill., 1961. $13.75. *Reviewed by J. C. Polkinghorne, University of Cambridge.*

QUANTUM field theory displays a recurrent vitality which is the dismay of its obituary writers. Its birth was auspicious. Here was the formalism which synthesized waves and particles without a taint of paradox. In the late thirties, difficulties with infinities caused the subject to languish, until the postwar invention of covariant techniques of calculation and renormalization theory led to the triumphs of quantum electrodynamics. An inevitable aftermath of these triumphs was the appearance of several textbooks expounding them, among which Professor Schweber's earlier volume *Fields* has an honorable place. Since then, the discovery of the complex plane and the invention of dispersion relations have led to an even more widespread, feverish, and (so far) less completely successful activity, which continues to this day.

While the exploitation of these analytic methods is not complete and most of the problems of strong interactions theory remain unsolved, it is not inappropriate that a new crop of texts expounding these methods should begin to appear. The present volume serves two purposes: as a digest of the older ideas, and as an introduction to the new. It devotes most of its space to the former (the first 645 pages) and is understandably much more unreservedly successful in this part of its task.

Professor Schweber's treatment of field theory up to renormalization is very clear and thorough. This reviewer's only regret is that he only mentions in passing the use of counter-terms for charge renormalization. There is an excellent chapter discussing model theories such as those invented by Lee, and by Chew and Low, an important subject which has been missing from other texts. Altogether this part of the book forms a distinguished contribution to the exposition of field theory.

The account of modern developments begins with a description of the axiomatic approach and the Wightman program. Thereafter things become more breathless with a review-article style account of dispersion relations, which merely alludes to many important topics and omits others. It is inevitable. Events are moving too fast for any single author. However we shall look forward with pleasure to the possibility of Professor Schweber writing a third book, in which he will have more time and space to develop this theme in the rewarding way he has handled the earlier developments.

Neutron Detection. By W. D. Allen. 260 pp. Philosophical Library, Inc., New York, 1960. $10.00. *Reviewed by Kamal K. Seth, Duke University.*

THIS small book by W. D. Allen, who is responsible for the development, perfection, and standardization of some of the most commonly used neutron detectors, is, by the choice of its subject, of limited interest. Nevertheless, because it is written in a clear and lucid style, and because it is for the most part self-sufficient (in that it includes the necessary background material), it should provide interesting and informative reading to those who are generally familiar with nuclear physics and would like to know more about methods of neutron detection. Since the book was written in 1959 it does not include some of the latest advances in neutron-detection techniques, e.g., the development of neutron-gamma discriminator circuits and the (still embryonic) lithium sandwiched solid-state detectors.

Lumière. By P. Fleury and J.-P. Mathieu. 523 pp. Eyrolles, Paris, 1961. 71.40 NF. *Reviewed by L. Marton, National Bureau of Standards.*

APPARENTLY, *Lumière* is Volume 7 of a larger textbook entitled *Physique générale et expérimentale*. I say "apparently" for there is merely a vague indication that it may be. The preface indicates that the present volume complements Volume 4 (entitled *Images optiques*) in the same series and is really a second edition of an earlier *Images optiques*. The first edition of *Images optiques* contains nothing but the proceedings of a symposium on diffraction effects in image formation. I do not know what the content of the second edition is because I was unable to locate it. (I explored all neighboring libraries, including the Library of Congress.) The preface to the present volume states that the first volume contains geometrical optics and instrumental optics, as well as the aspects of wave optics which are important in the formation of optical images.

The present volume consists of 19 major chapters. After an introductory chapter, treating interaction between radiation and matter and the insufficiency of electromagnetic theory for its complete explanation, justification is given for quantum considerations. The next six chapters are devoted to measurements of light quantities, starting with the velocity of light, then refractive index, wavelengths, intensity of light, colorimetry, and polarization. The treatment is at a good graduate level and the two authors have done a good job in presenting the subject. The next four chapters deal with refraction and transmission of light in both isotropic and anisotropic media. Anisotropy is considered in quite a bit of detail. All this is followed by four chapters on spectroscopy. The last three chapters contain supplementary matter; Chapter 17 on light in geophysics, astrophysics, chemistry, and biology; Chapter 18 on the principle of relativity and its consequences; and last but not least (Chapter 19) certain aspects of quantum mechanics. The whole book is written in the tradition of the great French school of optical books and presents quite successfully a modernized version of the classical French book of optics. There are a certain number of omissions but in the absence of comparison with Volume 4 I don't know if I am right in complaining about them or not. Nevertheless, in the extensive chapter on photometry there is absolutely no mention of the law of Helmholtz-Lagrange. Neither do I find any mention of the Kronig-Kramers relationship, which is now assuming a more important role in current treatment of the optical constants. Another slight defect of the book is that, although it is obvious from the beginning that the authors tried to limit their units to the mks system, in the text they follow a wide variety of units. For instance, the wavelength is given on page 205 in angstroms, on page 216 in 10^{-8} meters, on page 218 in centimeters. On page 229, we are back to 10^{-8} meters. On page 234, angstroms again. Likewise in Chapters 13 and 14. Besides these units the millimicron and micron are used for wavelengths. It may be a good exercise for the graduate student to switch back and forth between units, but is it really necessary? These are very minor matters but they can sometimes be a little irritating.

The book is highly recommended to all those who would like to compare graduate treatment of optics in the United States with graduate treatment in France.

Electrolytic Dissociation. Vol. 8 of Physical Chemistry Monographs. By C. B. Monk. 320 pp. Academic Press Inc., New York, 1961. $10.00. *Reviewed by Stuart A. Rice, Institute for the Study of Metals, University of Chicago.*

BASICALLY this book is a very extended review article concerned with the methods of determining dissociation constants in electrolyte solutions, and the results of such measurements. Despite the 1022 references (no account taken of degeneracy) there are a number of surprisingly serious omissions indicative of the general principles which guided the author. In the first seven chapters the author discusses a variety of equilibrium and nonequilibrium methods applicable to the study of electrolytic dissociation. In general, the treatment of the theory is rather abbreviated and standard in form. Such theory as is given is, with one

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