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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exception, entirely phenomenological, i.e., related to the interpretation of experiment in terms of parameters rather than with the prediction of the properties of systems in terms of the presumed known properties of the constituent molecules and ions. The remaining seven chapters deal with a survey of available data. No reference is made to Fuoss' work on bolaform electrolytes, to Wall's measurements of ion association to polyelectrolytes, of Scatchard's or Klotz's studies of protein-ion interactions, etc. In keeping with the phenomenological approach adopted, no mention is made of the Kirkwood-Westheimer theory of secondary dissociation, and Gilkerson's theory of ion-pairing is glossed over with a single reference.

To sum up, the author has compiled an immense amount of data concerned with electrolyte dissociation in very simple systems, but he has not made any attempt at consistent interpretation of the data in molecular terms. For a very few specialists this text will probably have value as a reference. However, the lack of any over-all theoretical interpretation and the abbreviated nature of the phenomenological theory presented will severely limit its utility to the student.

Free-Will and Determinism. By Allan M. Munn. 218 pp. U. of Toronto Press, Toronto, 1960. $6.00. *Reviewed by R. Bruce Lindsay, Brown University.*

SOME current schools of thought hold the view that modern physics, through quantum mechanics with its indeterminacy principle, provides a bias in favor of freedom of the will of man as against rigid determinism. This is in spite of the fact that competent physicists have been unable to see any relevant connection. Professor Munn, in the present volume, takes another crack at the problem. It must straightway be confessed that his conclusion at the end of the book reduces essentially to the conviction that indeterminism in physics merely admits the possibility of free will. It is unlikely that most physicists will be impressed with this result. What the philosophers will make of it, the reviewer does not presume to predict.

In the course of his argument, the author devotes about half of the book to a review of determinism in classical and modern physics. The treatment is marred by a failure to distinguish between the concepts of causality and determinism. But a more important difficulty is that purely pedagogical one that the discussion of quantum mechanics in particular is encumbered by a mathematical analysis which is not sufficiently rigorous and detailed to be of any value to the student competent in physics and mathematics, and which, at the same time, will be more or less unintelligible to the intelligent layman for whom the book is presumably intended, but who will almost certainly get lost long before he reaches the end of the trail. The volume also contains numerous stylistic blemishes, such as, for example, *cognito* in place of *cogito* in Descartes' famous dictum, *homesostatis* in place of *homeostasis*, etc., together with many misspellings of proper names. These will unfortunately distract the attention of the careful reader who would like to understand what the author is trying to say. The use of the book for any reference purpose is rendered difficult by the absence of an index.

The Impact of Atomic Energy. By Erwin N. Hiebert. 302 pp. Faith and Life Press, Newton, Kansas, 1961. $4.00. *Reviewed by Alice K. Smith.*

WRITTEN for the Peace and Social Concerns Committee of the Mennonite Church, this book offers the thoughtful nonscientist a survey of the milestones in the military and peaceful applications of atomic energy and an account of how politicians, scientists, and church groups have responded to the practical and moral problems of control over the past fifteen years. Since no such comprehensive study has hitherto been attempted, scientists and others familiar with the field should also find this catalogue of events and points of view extremely useful, although they will need to check on the accuracy of minor points and to look elsewhere for profound and thorough analyses of scientists' reactions. Religious groups, it seems, have been scarcely less generous in making pronouncements about the dangers of atomic energy than the scientists themselves, and with about as much effect in curbing the nuclear arms race. In fact, the only case where the influence of a religious point of view upon official policy is clearly evident was when Thomas E. Murray, as a member of the Atomic Energy Commission from 1950 to 1957, explicitly used the argument of a "just" war in support of a limited nuclear arsenal to maintain the struggle against communism. Professor Hiebert himself espouses the position of nonviolence and believes that Christians should try to convince others of the validity of this stand, while encouraging scientists to work out the technical requirements of methods of control. "The Christian," he concludes, "may well believe that science without religion cannot see what needs to be done. But religion without science has not the power to do it." That this would be an alliance of men of good will, few would deny, but it still leaves unanswered the vital question of how scientists and Christians, as citizens and as policy makers, are to translate their yearning for peace into political reality.

Automat und Mensch. Über menschliche und maschinelle Intelligenz. By Karl Steinbuch. 253 pp. Springer-Verlag, Berlin, 1961. DM 28.50. *Reviewed by Walter G. Mayer, Michigan State University.*

THIS book states the personal convictions of the author concerning the relationship between the "intelligence" of programmed mechanical devices and that of the human mind. Thought processes are to be explained by ordinary physics. "I believe that we are able to analyze the functions of the mind as rationally as we can our metabolism or the motion of our muscles," is a statement found early in the book.

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