

and very clear; a number of unfortunate mistakes that crop up in the first few pages could make it confusing to newcomers (to whom, after all, it is addressed). One notes especially equation II.2 and the paragraph following II.6. The Regge continuation is developed for Yukawa potentials and a little polology is given. Van Hove has a short summary of shadow scattering that could be more readable. H. Harari of the Israel Atomic Energy Commission gives a clear sketch without proof of the principal results of unitary symmetry.

Puppi's twenty-page phenomenological survey of pionic resonances brings much new information together for the first time and is almost worth the price of the volume—or would be if it were longer.

The major contribution is that of Berman on weak interactions; the article is necessarily sketchy and goes only as far as conserved vector currents and intermediate vector bosons. Cabibbo sketches the description of leptonic decays as a symmetry-breaking of the octet model for the case where the current transforms according to a well-defined representation of SU_3 . This gives a nice explanation for the slow rate of strangeness-changing leptonic decays and for the discrepancy of the Fermi constant derived from the muon lifetime with that derived from beta decay. The book closes with several seminars on recent experimental results.

As is often a disease of summer-school proceedings, this book lacks a bit in timeliness. But it is certainly a service to have it printed at all. The reader is warned not to trust the table of contents for page numbers until a second edition appears.

Systematics of β -Decay Energies. By B. S. Dzhelepov and F. Dranitsyna. Transl. from Russian by J. B. Sykes. 63 pp. (Pergamon, Oxford) Macmillan, New York, 1963. \$3.50.

Reviewed by N. B. Gove, Oak Ridge National Laboratory.

This book deals mainly with semi-empirical mass formulas and their use in predicting beta-decay energies. Formulas due to Levy and to Cameron receive the most attention; 24 pages consist of graphs of beta-decay

energy as predicted by Levy or Cameron versus mass number. Experimental values are also shown on the graphs so that one can discern "the discrepancies between experimental and theoretical data, and the points at which extrapolation is justified and those where it is hazardous".

The prospective buyer of this book is reminded that the publisher's date, 1963, applies to the translation only. The original was apparently written in 1959; the latest reference is dated 1958. Thus no mention is made of recent mass formulas of Seeger or Kümmel and no mention is made of recent studies of beta-decay energy systematics by Everling, or Way, or Dewdney.

The last twelve pages of the 5¢-a-page book contain a list of experimental beta-decay energies, as of March, 1959, compared with the Cameron and Levy predictions. By an ironic printer's error five pages are inadvertently titled "Cases of Large Discrepancy".

Sound and Ultrasound Waves in Air, Water, and Solid Bodies. By V. A. Krasil'nikov. Transl. from Russian. 354 pp. Israel Program for Scientific Translations, Jerusalem, 1963. \$12.00.

Reviewed by Walter G. Mayer, Michigan State University.

Physical acoustics has grown steadily in the last two or three decades, and the author himself has made valuable contributions to this growth, particularly in the field of nonlinear acoustics. This book, however, differs quite markedly from his usual style and level of presentation.

The treatment is nonmathematical and descriptive and attempts to cover a wide territory, as the title indicates. There are ten chapters although one may group the topics in sections on sound in air, ultrasound in air, mechanical vibrations in liquids, elastic waves in solids, and finally one chapter each on high intensity waves and waves in the earth's crust. Rather than giving concise descriptions of what one might consider the important features of these topics, the author has selected a number of relevant samples for discussion.

Since the first edition of this book was written to overcome the inade-

quate treatment of advances in acoustics, one may wonder why the third edition does not even mention many interesting new subjects, especially those which show great promise in modern physical acoustics of solids. There are, however, some excursions into more modern areas like "aerothermoacoustics" (jet and turbulence noise), second sound in liquid helium, and high-intensity acoustic waves. The latter topic is discussed somewhat more extensively than the former two.

Some sections of the book do not really convey the feeling that progress is being made. Too much emphasis is placed on discussions of simple items like the telephone, tuning fork, and the oscilloscope. It is not apparent at all why photographs of an oscilloscope screen had to be included showing nothing more than a light spot and a vertical and horizontal line.

Unfortunately, the book contains errors, misleading and plainly wrong statements. There is no subject index and only a few complete references to books, mostly of Russian origin. There are many additional "bibliographical" footnotes, but in almost all instances only names are given while dates and sources are withheld. This unique documentation, together with the author's tendency to stress accomplishments of Russian scientists, may leave the casual reader uncertain about the chronological order of events as stated or implied in the text. The interested reader, on the other hand, should have little difficulty in filling in at least some of the missing dates, giving credit to unnamed authors for various figures, and supplying certain missing pieces of information readily available in the open literature.

Propagation of Radio Waves at Frequencies below 300 KC/S. W. T. Blackband, ed., 478 pp. (Pergamon, Oxford) Macmillan, New York, 1964. \$20.00.

Reviewed by H. J. Hagger, Albiswerk Zurich, Switzerland.

This field of radio physics is important from two points of view. First, wave propagation at these low frequencies is becoming more and more important for world-wide radio transmissions of standard frequencies, and, second, nonmanmade signals from

lightning discharges are produced in this frequency range. These two topics, united by the theory of radio-wave propagation between the earth and the ionosphere, brought together two distinct groups of experimental scientists to discuss their problems. The book is the collection of the papers presented at the seventh meeting of the AGARD ionospheric research committee in Munich in 1962.

It was a difficult task for the editor to arrange the papers, and to some extent the sequence and group classification must remain arbitrary. In the first chapter the properties of the lower ionosphere, and in the second the D-layer irregularities, are considered. The third chapter, on lower ionospheric layers and on low-frequency propagation, presents data obtained from the LOFTI satellite experiment. Oblique incidence measurements and radio noise below 300 kc/s are considered in the next two chapters. In Section 6 very-low-frequency propagation and recordings of radio transmission during the nuclear test on Johnson Island in 1962 are dealt with. The seventh chapter considers extremely low-frequency transmission (10-20 kc/s), and in the last section investigations on resonances of the earth-ionosphere cavity are presented.

In this book there is a good balance between theory and experiment, and for the first time experimental data are compared and explained by mode theory. These proceedings are an excellent reference for workers in the field or those engaged in related research. It is a reference book of the state of the art, and many valuable data are presented.

Advances in Catalysis and Related Subjects, Volume 14. D. D. Eley, Herman Pines, and Paul B. Weisz, eds. 522 pp. Academic, New York, 1963. \$16.00.
Reviewed by H. Wise, Stanford Research Institute.

To the physicist the most recent developments in research on heterogeneous catalysis should prove of interest because of the emphasis placed on the physical properties of the solid surface. No longer is the field of catalysis the happy hunting ground of the chemist who, in the past, cen-

tered his entire attention on the chemical distribution of product molecules. Four of the six contributions to this volume of *Advances in Catalysis* reflect to a major extent this shift from catalytic chemistry to catalytic physics. The chapter by G. Ehrlich on Modern Methods in Surface Kinetics represents a comprehensive review of the experimental techniques developed for the study of elementary processes occurring on solid surfaces. The availability of ultrahigh vacuum techniques, field-electron and field-ion microscopy, and flash-desorption experiments, has led to new insights on gas-solid interactions during the initial stages of surface coverage.

The chapter "Catalytic Oxidation of Hydrocarbons" by L. Ya. Margolis reviews the catalytic activity of various metals, metal-oxide semiconductors, and spinels for hydrocarbon oxidation, a most important process in the chemical industry. It is of interest that the interpretation of the catalytic properties is attempted in terms of the electronic properties of the catalyst and its modification by the presence of adsorbates. An apparent correlation is noted between chemical parameters, including rate and selectivity, and the electron work function.

Another interesting physical tool in the study of solid catalysts is to be found in optical absorption spectroscopy. In a chapter by H. P. Leftin and M. C. Hobson on Application of Spectrophotometry to the Study of Catalytic Systems some recent observations are described on the identification of chemisorbed reaction intermediates. During the last ten years these optical measurements have shed new light on some of the chemical species present on the surface of the solid and their role during catalytic reaction. It has been questioned whether the species observed in the absence of catalytic surface reaction bear any relationship to those present during catalysis. The authors of this chapter give some good evidence to demonstrate the existence of such relationships. The brief, but stimulating, chapter on Quantum Conversion in Chloroplasts by M. Calvin deals with an interpretation of photo-

physical effects of biological systems in terms of a model reminiscent of solid-state semiconductor theory. With new experimental tools for the study of solid surfaces at various stages of development, the next decade promises to be an exciting one to the scientists engaged in research on gas-solid reactions.

L'Effet Mössbauer et ses Applications à l'Etude des Champs internes. By A. Abragam. 70 pp. Gordon and Breach, New York, 1964. Cloth \$3.95; paper \$1.95.
Reviewed by G. K. Wertheim, Bell Telephone Laboratories.

The following quoted from the editors' preface to the new series *Documents on Modern Physics* is largely applicable to the present state of Mössbauer effect research.

Today the dramatic phase of a new branch of physics spans less than a decade and subsides before the definitive treatise is published. Moreover, modern physics is an extremely interconnected discipline and the busy practitioner of one of its branches must be kept aware of breakthroughs in other areas. An expository literature which is clear and timely is needed to relieve him of the burden of wading through tentative and hastily written papers scattered in many journals.

In the spirit, we are given *L'Effet Mössbauer et ses Applications à l'Etude des Champs internes*. The manuscript has been well known to scientists active in Mössbauer research since 1961 when it was first circulated by its author. Many students have found it useful and the editors and publishers are doing a service by making it generally available.

The volume under review reproduces the original version with only minor corrections. No attempt has been made to update the volume or to include references to work published since the early part of 1961. As a result, the chief value of this book is to be found in the clear and concise treatment of fundamentals. The references cited do not give an adequate picture of the scope of Mössbauer research as it bears on the study of internal fields today.

About one-third of the book is devoted to the theory of the Mössbauer effect and the rest to its application