

outline of various methods for deriving maximum information from Monte Carlo experiments, as well as a catalog of Monte Carlo methods for solving problems which might not seem amenable to probabilistic methods at first glance. Physicists with the inclination to apply Monte Carlo to their particular problems would do well to consider the use of such techniques as importance sampling, anti-thetic variates, or conditional Monte Carlo, to maximize the efficiency of their calculations. A good short introduction to these methods is to be found in the present volume. Examples of their use are taken from the fields of radiation shielding, polymer physics, and statistical mechanics.

If there is any fault to be found with the book, it is that the authors are occasionally too enthusiastic in appearing to suggest the use of Monte Carlo. For example, it is unlikely that random sampling will be more useful for the calculation of large-scale matrix products than some deterministic method. There are also occasional overhastily written sections, as on page 33, which is almost incomprehensible. Nevertheless, the book is a valuable introduction to an interesting and often quite useful mathematical technique, and can be warmly recommended.

Principles of the Theory of Solids. By J. M. Ziman. 360 pp. Cambridge University Press, London, 1964. \$8.50.

Reviewed by Lars C. Luther, University of Copenhagen.

The author of *Electrons and Phonons* offers a demanding and rewarding text for graduate students in physics. Its main purpose is to present ideas on a selection of fundamental topics. Usually it has several ideas on each subject and impresses with the mileage it can get out of a simple idea before going over to the more complicated one. It does not forget to point out where both the simple and the sophisticated ideas will fail. The author draws the line on one side by avoiding bubble diagrams and group theory, on the other by excluding tables of measured quantities and comparisons between theory and experiment. He very deliberately limits the discussion to a few topics:

periodicity, phonons, electrons, optical properties, magnetism, and superconductivity, all in perfect crystals. The last restriction is the most serious one. Impurities are only considered in two instances: impurity levels in semiconductors and electron scattering. Imperfections are not considered at all. Thus, regrettably, the text will probably not easily surmount the barrier between the physics and the chemistry departments. The author anticipated criticism on this account and with his superior presentation makes a strong case for the philosophy of preferring to explain some things well rather than mentioning almost everything.

A few words about particulars. The eleven chapters contain 174 simple and helpful diagrams, but no graphs dotted with experimental points or photographs. There are no problems or exercises, but the reader who wants to carry the mathematics along will find things to do. Symbols are consistently used, but unfortunately ν and v , when equipped with subscripts, look very much alike and mean related things. There is an exhaustive index and a list of references for supplementary reading. These references are to recent books and review articles with careful exclusion of original articles as a matter of principle (what principle?).

Physical chemists will find the prerequisites somewhat demanding: Fermi-Dirac notation, time-dependent perturbation theory, scattering (Born approximation and partial-wave analysis), normal modes of the lattice, and, as the author puts it, elementary descriptive facts about solids. Although it is quite reasonable to expect the student to be acquainted with ladder operators, it is unreasonable for the author to presuppose second quantization language, at least more unreasonable than for the reader to expect a text on the theory of solids to develop the ideas of N-representation and creation and destruction operators. This topic does not require much space, and one might save some by eliminating the résumé starting with "it is well known".

Where does the book take the reader from here? Naturally, it aims to show him the ideas behind various

experimentally established rules. Also naturally it develops the mathematics of simple, successful theories while emphasizing the vital assumptions. Its real distinction rests on three features. It has an easily appreciated structure; there is no doubt about which chapter deals with what. Secondly, though difficult theory is presented, the mathematics is kept under control and interspersed with pauses for breath while the preliminary result is examined from another angle. A good example is the calculation of electrical conductivity from the Boltzmann equation rather than from kinetic arguments. Although this is much more difficult, the development can be followed without agony and is more rewarding. Again the author's ability to convey the essence is demonstrated in a well-balanced survey of the multitude of attempts to obtain electron wave functions for solids. Thirdly, the book has the advantage of being up to date; it discusses BCS theory and the de Haas-van Alphen effect.

Perhaps one can give an idea of the range covered within the selected subjects by mentioning a few topics which are parenthetically discussed: cohesion, phonon-phonon interaction, umklapp processes in thermal and electrical conductivity, the two-dimensional Ising lattice. The discussion of magnetic properties is essentially restricted to ferro- and antiferromagnetism considered in the light of the two approaches: the Ising model and spin waves.

Strong, Electromagnetic, and Weak Interactions. Summer School Proc. (Erice, Sicily, 1963). A. Zichichi, ed. 248 pp. Benjamin, New York, 1964. Cloth \$9.00; paper \$4.95.

Reviewed by J. E. Mansfield, Harvard University.

This is a rather short set of notes from the Summer School "Ettore Majorana" of 1963. J. S. Bell of CERN provides an introduction to the elements of S-matrix and field theory, expanded and revised after the other lectures were completed; this no doubt helps, for by then it is clear what needs introducing.

Regge's twenty-page article on non-relativistic potential scattering is good

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 poleology 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