
Books

Close Binary Systems. By Zdeněk Kopal. Vol. 5 of *Internat'l Astrophysics Series*, edited by M. A. Ellison and A. C. B. Lovell. 558 pp. John Wiley & Sons, Inc., New York, 1959. \$16.75. *Reviewed by E. J. Öpik, University of Maryland.*

SPECKS of light of variable intensity hundreds of light years away: who could expect volumes to be written on such scanty information, with a heavy arsenal of mathematics, celestial mechanics, multibody problems, the theory of tidal and rotational distortion, the laws of radiation, the theory of stellar structure and evolution to be invoked for the interpretation of the observational data provided by close binary stars? Kopal's monograph provides a summary of theoretical research in this branch of astrophysics. It is mainly addressed to the specialist, only few pages descending to the level of the general reader. Much of the recent research belongs to the author himself. Descriptive and detailed bibliographical notes, with summaries and comments, transcend the usual pattern of mere lists of literature and greatly help in elucidating the subject. The more involved chapters are followed by a "Survey of Results" which chiefly serves as a guide to the labyrinth of mathematical formulas, enabling the practical researcher to use them without necessarily following up the intricacies of derivation. On the other hand, the absence of a list of notations is a serious handicap.

The book covers the dynamics of close binaries, tidal and rotational effects, being followed up to first-order terms of the distortions. The Roche model, of two revolving mass points with extended envelopes whose periods of axial rotation and revolution coincide, is considered in particular as corresponding to the close binaries; the high central concentration of mass inside stars, required by the theory of stellar structure, as well as tidal equalization of the periods justify this model. Theoretical variation of light in spherical as well as rotating distorted stars is discussed; this includes variation of projected area, mutual illumination effects, eclipses complicated by the distribution of light over the stellar disk as well as by the von Zeipel effect of surface gravity, and, finally, atmospheric eclipses or obscuration due to extended semitransparent atmospheres. Theoretical velocity changes as revealed in Doppler shifts and profiles of spectral lines are analyzed. The longest chapter is dedicated to the derivation of the elements of eclipsing binaries, taking into account the entire variety of effects and applying iterative and least-square methods. The last, most read-

able, chapter deals with the physical properties of close binaries; elements of many systems are tabulated and aspects of evolution are discussed. Particular attention is given to the escape of matter from the extended gaseous envelopes and the loss or exchange of mass between the components. In this context are of interest the results of integrations of particle trajectories in the restricted three-body problem, carried out with the aid of the electronic computers of the University of Manchester, and presented in the form of instructive tables and diagrams. These and many other features of the book will be of interest to a much wider circle of scientists than those specifically interested in close binary stars.

An Introduction to Plasticity. By William Prager. 148 pp. Addison-Wesley Publishing Co., Inc., Reading, Mass. \$9.50. *Reviewed by E. H. Dill, University of Washington.*

PROFESSOR Prager shows himself to be an outstanding teacher by presenting sophisticated concepts in a form which can be readily understood. Instead of the abstract mathematical phraseology which is usually employed, he introduces simple kinematic models to illustrate complex physical problems. At the same time, numerous references are given so that the reader may easily locate pertinent material in the advanced technical literature if he so desires.

Unfortunately only perfectly plastic materials are considered and there is very little discussion of the relation of this theory to real materials. General theorems on the behavior of structures which are constructed of perfectly plastic material are given. The load-carrying capacity of rigid perfectly plastic structures is discussed in some detail with applications to beams, plates, and shells. The applications to the finite plastic deformations occurring during extruding, drawing, or rolling of metals are indicated.

This is not a new book but is a translation of the German-language edition, *Probleme der Plastizitätstheorie* (Birkhauser Verlag, Basel, 1955). It can be highly recommended to everyone who, with a minimum of effort, wishes to become familiar with the theory of perfectly plastic bodies.

Fundamentals of Physical Science (4th Revised Ed.). By Konrad Bates Krauskopf. 653 pp. McGraw-Hill Book Co., Inc., New York, 1959. \$6.95. *Reviewed by H. A. Liebhafsky, General Electric Research Laboratory.*

THIS excellent textbook should continue to serve as well as any single book can for the training in science of students seeking a liberal education. Such students are likely to look for the kind of royal road that Euclid said did not lead to geometry. The author tries to oblige by all legitimate means. He writes entertainingly. ("Early physics was an offspring of astronomy, early chemistry an outgrowth of misguided efforts to

volume 4 Interscience Monographs and Texts in Physics and Astronomy

edited by R. E. MARSHAK

FAST NEUTRON PHYSICS

In Two Parts

*edited by J. B. MARION, University of Maryland
and J. L. FOWLER, Oak Ridge National Laboratory*

*62 specialists
provide the first
comprehensive advanced
treatment of experimental
material in the
fast neutron field*

The Contributors

R. C. ALLEN	C. H. JOHNSON
W. D. ALLEN	R. W. LAMPHERE
H. J. AMSTER	A. LANGSDORF, JR.
N. AUSTERN	N. H. LAZAR
R. BATCHELOR	E. J. LESHAN
E. BAUMGARTNER	D. A. LIND
L. C. BIEDENHARN	J. B. MARION
T. W. BONNER	D. W. MILLER
J. E. BROLLEY, JR.	J. MONAHAN
P. R. BYERLY, JR.	G. C. MORRISON
J. M. CALVERT	C. O. MUEHLHAUSE
A. G. W. CAMERON	J. H. NEILER
R. E. CARTER	G. C. NEILSON
C. F. COOK	H. W. NEWSON
J. H. COON	G. E. OWEN
W. W. EMMERICH	J. E. PERRY, JR.
A. T. G. FERGUSON	F. L. RIBE
J. M. FREEMAN	J. SAMPLE
J. L. GAMMEL	H. W. SCHMITT
J. H. GIBBONS	H. STAUB
H. GOLDSTEIN	W. E. STEPHENS
W. M. GOOD	T. R. STRAYHORN
J. GUERNSEY	C. D. SWARTZ
W. HAEBERLI	H. L. TAYLOR
W. T. HAM, JR.	M. WALT
A. O. HANSON	J. B. WARREN
R. L. HENKEL	T. A. WELTON
R. HUBER	J. A. WHEELER
C. M. HUDDLESTON	R. S. WHITE
G. S. HURST	H. B. WILLARD
A. A. JAFFE	

Fast Neutron Physics is the first and only comprehensive advanced treatment of experimental material in this field. It is meant to be a reference work. Enough detail is included to make this book useful not only to the specialist—research scientists and graduate students engaged in experimental work—but also to reactor engineers, health physicists, and to all those whose work brings them in contact with neutron physics. Although the two volumes are meant primarily for experimentalists, theorists will find collected here, in some instances for the first time, the theoretical material which pertains to the interpretation of the interaction of the neutrons with nuclei.

The first four sections, included in Part I, are concerned with experimental techniques; Section 5, which constitutes Part II, treats experimental results and their interpretation. The 62 specialists who collaborated in the preparation of this book have also provided an extensive review of the literature. As a result, many techniques contained in unpublished laboratory reports have been synthesized and are presented here for the first time.

Part I: TECHNIQUES Published (February 1960)
1007 pages 303 illustrations, 91 tables \$29.00

Part II: EXPERIMENTS AND THEORY In preparation

INTERSCIENCE PUBLISHERS, INC.

250 Fifth Avenue, New York 1, N. Y.

accomplish impossible changes in the form of matter.") He chooses interesting subject matter and arranges it with care. He has seen to it that the book contains excellent line drawings and outstanding illustrations. He has marked sections for convenient omission. Regrettably, but probably of necessity, he has soft-pedaled mathematics. Twenty-five years ago we said that students couldn't do arithmetic—now the preface mentions "a class for which mathematics is a *serious emotional block*"! (Italics supplied.)

The main theme of the book is admirable. To summarize man's knowledge of his world, the author performs a synthesis of astronomy, physics, chemistry, and geology, using the solar system as his point of departure for reasons that the ancients would have understood. Important subsidiary themes, appropriately emphasized, are science as a human adventure with a method of its own, and the relation of science to other intellectual activities. To accomplish the synthesis, the four sciences had to be dismembered and reassembled. In general, these difficult operations have been done logically and smoothly. Only in the introduction to Part 4 (there are six parts) did this reviewer find forcing and strain.

The book should teach easily. Repetition and development for pedagogical purposes are unobtrusive and effective. End-of-chapter aids are diverse and well thought out.

Only three items seem worth mentioning here on scientific grounds. The Second Law of Thermodynamics (pp. 147, 148) has been watered down too far. The importance of electrons in conduction through gases is slighted (p. 354). Isn't there a better adjective than the time-honored "uniform" for the geologist's important law of uniform change (p. 541)? "Continual"? "Experiential"? A list of minor items is being sent the author.

Appropriate revisions and additions have been made in this, the fourth edition. Topics that qualify at least for mention in the fifth would seem to be: macromolecules, semiconduction, superconductivity, research at high temperatures and pressures. Rather than imply the synthesis of an allotrope even in these times, isn't it better to speak of man-made diamonds (Fig. 15.4)?

The book is a bargain. It should prove attractive to many long out of college—to the physicist, for example, who occasionally wishes to dip into organic chemistry. An equally good companion volume on the life sciences would be most welcome.

General Circuit Theory. By Gordon Newstead. 144 pp. (Methuen, England) John Wiley & Sons, Inc., New York, 1959. \$3.00. *Reviewed by J. Gillis, The Weizmann Institute of Science.*

THE first word of the title of this excellent little monograph is clearly the operative one. The author carefully restricts himself throughout to the most general aspects of the subject and steers clear of any particular circuit problem. One might have expected

the result to be dry and cheerless, and it is a tribute to the author's grasp of the subject and his expository skill that nothing like that has happened.

The discussion includes some interesting remarks on reciprocity theorems and nonreciprocal networks. There is a fairly comprehensive account of four-terminal networks. Fourier transform theory is inevitably invoked to deal with transient phenomena; and the Bode theory, even though presented very succinctly, is actually given with most of the relevant detail.

The last chapter, on nonlinear circuits, describes some ideas which have been advanced during the past two decades. In this field no general theory exists and all that we have is, in fact, methods for handling particular problems. It was clearly difficult to fit this into the framework of the book, a fact which is reflected by the brevity of the chapter.

The Many-Body Problem: U. of Grenoble cours donnés à l'école d'été de physique théorique (Les Houches, 1958). Edited by Cécil DeWitt and P. Nozières; 15 lecturers. 675 pp. (Dunod, France) John Wiley & Sons, Inc., New York, 1959. \$15.00. *Reviewed by H. Mendlowitz, National Bureau of Standards.*

IT is now becoming usual for physicists to participate in summer institutes devoted to some special field. The Summer School for Theoretical Physics at Les Houches, France, is one of the better known of these schools. Here, the seminars and lectures are devoted to a central theme, and in 1958 this was the many-body problem. The various topics covered under this general theme included: Systems of many fermions, nuclear structure, electron gas, binary collisions and the grand partition function, collective motion, Bose systems, Bogoliubov's method, liquid He³, superconductivity (experimental and theoretical), liquid helium II, the method of pseudopotentials, and the binary collision expansion of Lee and Yang. Under these headings are numerous subtopics, each being important and interesting in its own right. Each of these was covered by experts and specialists who themselves have done original and important research in the various topics.

Instead of listing all the authors at this point, I prefer to discuss and evaluate the general features of the book. First, the publishers and authors are to be commended for bringing to completion within less than a full year the publication of the notes on the various lectures, in most cases, in a rather complete form. Unfortunately, this great speed caused a large number of casualties in the form of misprints and proofreading errors. In most cases, these errors are quite trivial, but several of these errors were quite misleading and time-consuming for the reader. In spite of this latter remark, the usefulness of the book was not impaired sufficiently to negate the value of bringing it into print with such speed.

It is probably the most complete compendium of recent work on the many-body problems to be found