

PHYSICS: FOUNDATIONS AND FRONTIERS

by **GEORGE GAMOW** and **JOHN CLEVELAND**, both of University of Colorado

Serving as an introduction to general physics and emphasizing modern physics, this text requires only high school algebra as a prerequisite.

PHYSICS: FOUNDATIONS AND FRONTIERS offers problems and questions for each chapter to promote individual thought and reasoning. The authors' ability to present modern topics at the introductory level (non-calculus) is particularly valuable.

Outstanding features:

- Clarification of the basic principles

- Material designed for a full year course—sections on modern physics adaptable for a one-semester course to supplement a year of classical physics

- Inclusion of noteworthy chapters on biophysics, astrophysics, geophysics and satellites

- Lively style designed to arouse student interest

- Every major point illustrated with line drawings, half-tones, charts, graphs and tables—more than 300.

1960 576 pp. Text price: \$7.95

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of this book by about 20 to 30 percent would have greatly enhanced its attractiveness as a text. An important asset of this text is the well-chosen list of problems and the hints for their solutions. These both complement and supplement the text.

Semiconductors. By R. A. Smith. 494 pp. Cambridge U. Press, New York, 1959. \$12.50. *Reviewed by Robert L. Sproull, Cornell University.*

SUBSTANTIAL changes have taken place in the field of semiconductor physics since the excellent books of Shockley and later of Spenke. As Shockley predicted, the discovery of minority carrier processes, the elucidation of the $p-n$ junction, and the existence of a semiconductor technology have opened whole fields of investigation to physicists. It is primarily to such physicists, rather than to transistor engineers, that Dr. Smith's book is addressed. But the advanced transistor engineer would be well advised to study it too, since its breadth may open his mind to phenomena and processes which will be important to him in the years ahead.

Breadth of coverage is the distinguishing feature of this book. It is in no way restricted to the areas of present application of semiconductors, although these are given quite adequate treatment. There are welcome chapters on imperfections, thermal effects, and optical processes not usually found in a book of this kind. There is an especially valuable and readable chapter on the methods of determining the characteristic properties of semiconductors. A long chapter on compound semiconductors is not confined to III-V compounds, nor is it distorted toward the lead salts that have been a primary interest at Dr. Smith's laboratory (Royal Radar Establishment, Malvern). Incidentally, the section on lead salts demonstrates the complete lack of bias of the author, since the work of Brebrick and Scanlon at NOL and other important contributions are accorded at least "equal time".

Many examples could be cited of the author's care in explaining the physics of semiconductors. A small section, for example, gives a comparison of the magnitudes of the various thermomagnetic effects with the Hall and Seebeck voltages of a typical semiconductor specimen under typical conditions. Such attention to the necessities of the process of explanation helps assure this book an important place in the literature of semiconductor physics.

An Introduction to Mathematical Statistics. By H. D. Brunk. 403 pp. Ginn & Co., Boston, Mass., 1960. \$7.00. *Reviewed by T. Teichmann, General Atomic.*

THE development of modern statistics, and its extensive application to varieties of problems considerably more complex and subtle than those considered in its early days, have made it highly desirable, if not mandatory, to relate intimately the underlying notions of the theory of probability and the techniques used in treating practical examples. For a time it

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Journal of the American Medical Assn.

944 pp, 195 illus, 1958—\$12.50

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seemed as though a gulf might develop between the practitioners of statistics, with their ingenious and complicated algorithms, and the mathematicians investigating the significance of the concepts basic thereto. It is therefore gratifying to observe that this presentation by Prof. Brunk, which bids to become a standard introductory textbook, combines an extensive introduction to probability theory, with the more standard exposition of statistical techniques.

The section on probability theory includes a chapter on elementary and general probability spaces and on the notion of independence, which is followed by a discussion of random variables and their combinations and concluded by a description of the algebra of independence.

The statistics portion consists of two parts. The first of these comprises an elementary course in statistics, including such topics as random sampling, law of large numbers, estimation of parameters, central limit theorem, and confidence intervals and tests of hypotheses. The remaining portion, which is interspersed with the above, deals with more advanced questions, such as statistical decision theory, regression, sampling from a normal population, experimental design and analysis of variance, distribution free methods, and others. The presentation generally recognizes that statistics is an application of probability theory, not simply a collection of increasingly elaborate algorithms.

A desirable characteristic of the book is the extensive use of examples as part of the text, generally worked out in detail and with full discussion. In addition, each chapter closes with a good selection of problems for the student.

The style is lively but puzzlingly inhomogeneous. One sentence may be formal and impersonal, the next informal, and the next discursive and addressed to the reader. Possibly this results from the extensive use of lecture notes as the basis for the book, and while it is sometimes a little irritating it does not detract in any essential way from the general readability and obvious utility of the work as a whole.

Annual Review of Nuclear Science, Volume 9. Edited by Emilio Segrè, Leonard I. Schiff, Gerhart Friedlander, Walter E. Meyerhof. 625 pp. Annual Reviews, Inc., Palo Alto, Calif., 1959. \$7.00 in US; \$7.50 elsewhere. *Reviewed by Jacques Romain, Brussels, Belgium.*

ANNUAL reviews are a most valuable reference when they are written with the two following needs in mind: to provide the specialist of the field reviewed with a consistent exposition of the recent progress and a complete survey of the literature, and to give the specialist of a neighboring field the opportunity to gain a good idea of the advances made during the year. Both of these requirements are undoubtedly satisfied by the present book. The surveys of literature are concluded at dates ranging from December 1958 to July 1959. Some of the articles are highly technical,