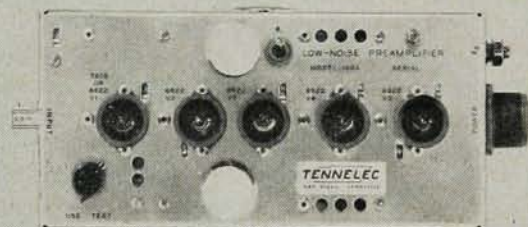




quiet!

Noise is energy, and a prime deterrent to the accurate detection and measurement of other forms of energy ■



One outstanding virtue of the charge-sensitive Model 100-A Preamplifier for semiconductor detectors is its exceptionally low noise level—lower than in any preamplifier previously available. It drives almost any main amplifier and most multichannel analyzers directly, making possible measurements previously unattainable ■

Designed by E. Fairstein, its other virtues are many and equally impressive. Mail the coupon for a comprehensive technical description ■

TENNELEC

INSTRUMENT COMPANY, INC.
P.O. BOX 964 / OAK RIDGE / TENNESSEE

TENNELEC Instrument Company, Inc.
P.O. Box 964, Oak Ridge, Tennessee

P11

Please send data and prices on the Model 100-A Preamplifier and other Tennelec products.

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

for this purpose was first made in the late nineteen-forties, but its implementation had to await the construction of reactors capable of producing the neutron fluxes required in such experiments. However, since the first successful experiments were carried out, in the middle of the last decade, a great deal of theoretical and experimental study has been devoted both to the experimental method itself and to the interpretation of the results it has provided.

The book under review is a good survey of what was achieved with the aid of this research tool in the first five years of its use. It contains fifty papers divided into seven categories: general theory; methods of neutron spectrometry; liquids and molecules (other than water); water; cold moderators; solids; neutron spectra. Most of the papers are in English, with a few in Russian and in French. Each paper is prefaced by abstracts in English, French, Russian, and Spanish, and the discussions connected with the papers presented are included. The scientific level of the papers is almost uniformly high, and a great deal of effort seems to have been devoted to presenting them in a useful and attractive setting. This is a book which will be of value not only to neutron physicists, but also to other experimentalists and theoreticians interested in the microscopic properties of solids and liquids.

Mathematical Statistics and Probability. Symp. Proc. (Berkeley, Summer 1960). Jerzy Neyman, ed. Vol. 1, Theory of Statistics, 767 pp., \$16.00; Vol. 2, Probability Theory, 633 pp., \$13.50; Vol. 3, Astronomy, Meteorology, and Physics, 335 pp., \$7.00. U. of California Press, Berkeley, 1961. Reviewed by Mark Kac, The Rockefeller Institute.

THE first three volumes of the proceedings of the Fourth Berkeley Symposium on Mathematical Statistics and Probability cover the theory of statistics, probability theory, and astronomy, meteorology, and physics. There are two more volumes, devoted to biology, econometrics, industrial research, and psychometry, but these are not under review here.

Volumes 1, 2, and 3 are collections of papers bearing little relation to each other. An exception to this is a group of papers in Volume 3 by Hammersley, D. G. Kendall, Kerr, and Lyttleton on the statistical theory of the loss of long-period comets from the solar system. The reviewer's interest was particularly aroused by these contributions.

Because the proceedings are much more like a research journal than a book, it is impossible to give them any kind of a comprehensive review. Even listing the titles of individual contributions would require more space than this journal could easily spare. And yet these proceedings represent a sample of a five-years' effort in a large and important field of science, and as such they deserve some kind of general comment and appraisal.

There are three observations (one for each volume)



ELEMENTARY QUANTUM MECHANICS

By Peter Fong, *Syracuse University*

This book offers a fresh approach to the basic concepts of quantum mechanics for one semester course. Some special features include: (1) A new method to introduce the Schrödinger equation; (2) A new method for introducing the Born second assumption; (3) Discussion of the close relationship between quantum and classical mechanics, with worked-out examples.

368 pp, 71 illus, 1962—\$9.75

THERMODYNAMICS

The Kinetic Theory of Gases and Statistical Mechanics—Second Edition

By F. W. Sears, *Dartmouth College*

This widely accepted text for a one-semester course on the intermediate level is primarily for science and engineering students. Numerous problems are designed to stimulate student thinking. "The work is characterized by the skill in organization and presentation which the users of other Sears textbooks have come to expect." (American Journal of Physics)

374 pp, 150 illus, 1953—\$9.75

MECHANICS—Second Edition

By Keith R. Symon, *University of Wisconsin*

Containing over 350 imaginative problems, this advanced undergraduate text has achieved outstanding acceptance. "This is a well-written sophisticated book that challenges the student continuously. I have used this book for a one-semester course and would highly recommend it for either a one or two-semester course." (American Journal of Physics)

557 pp, 132 illus, 1960—\$10.75

FOUNDATIONS OF ELECTROMAGNETIC THEORY

By John R. Reitz, *Case Institute of Technology*
and Frederick J. Milford, *Battelle Memorial Institute*

"This book is written as an intermediate text on electromagnetism and can be recommended for use by advanced undergraduate students in physics and electrical engineering. Aside from the usual topics . . . the book also includes chapter dealing with the microscopic theory of dielectrics and magnetism, plasma physics and electrodynamics. One is greatly impressed by the design and quality of the figures, which should greatly aid the student." (American Scientist)

387 pp, 99 illus, 1960—\$10.50

☐ To order or ask for examination copies write to:

the sign of excellence in scientific and engineering books



ADDISON - WESLEY PUBLISHING COMPANY, INC.

504 South Street • Reading, Massachusetts • Palo Alto • London

Quantum Theory of Scattering

TA-YOU WU, National Research Council, Canada, and TAKASHI OHMURA, University of Tokyo

Presents the quantum theory of scattering in both its formal aspects and in its applications to atomic and nuclear collisions.

1962 approx. 544 pp. Text price \$12.00

Group Theory and Solid State Physics

L. MARIOT, University of Dijon. Translated by Allen Nussbaum.

Presents a brief introduction to the quantum mechanics of solids and the use of group theory in simplifying energy band calculations.

1962 112 pp. Text price \$3.75

Stars and Galaxies:

Birth, Ageing and Death in the Universe

Edited by THORNTON PAGE. Wesleyan University

Features discussion by seven research astronomers regarding current discoveries concerning the outside universe. Emphasizes the joint importance of observation and theory in modern science. In the P-H SPECTRUM Series. S-ST-3 (orig.)

1962 192 pp. Paper: \$1.95, Cloth: \$4.50

The Nature of Scientific Thought

MARSHALL WALKER, University of Connecticut

Deals with the concepts and procedures common to the physical, biological, and social sciences, with particular emphasis on the types of conceptual model used in each field. In the P-H SPECTRUM Series. S-56 (orig.)

Feb. '63 approx. 256 pp. Paper: \$2.25, Cloth: \$4.50

For copies, write: BOX 903

PRENTICE-HALL, INC.

Englewood Cliffs, New Jersey

which the reviewer would like to pass on to the reader as a summary of his impressions.

(1) Information theory has now been officially subsumed under mathematical statistics. This beautiful and original theory was greeted with suspicion by fundamentalists of rigor and it is amusing to see how much belated interest has been generated in the mathematical community as soon as the ϵ 's have fallen in proper places. The creator of the theory, Claude Shannon is, by the way, one of the contributors to Volume 1.

(2) Probability Theory (Volume 2) seems like an example of "more and more about less and less". While one must admire the occasional and even frequent flight of analytic imagination and power, one would not fail to see that the volume represents a kind of "mopping-up operation". Of the three volumes under review, Volume 2 came closest in form and spirit to a specialized professional journal.

(3) Perhaps the most striking feature of Volume 3 is an almost total absence of physics. In fact, not counting a stimulating, nontechnical, and speculative article by Ulam, with a comment on it by Hammersley, there are exactly three articles dealing with probabilistic problems suggested by physics.

One is by J. A. Crawford on the motion of charged particles in a random magnetic field, the second is by W. B. Fretter on problems in the measurement of ionization in tracks in a cloud chamber, and the third is by Laurent Schwartz on the density of probability of presence of elementary particles.

The first is an interesting adaptation of the Fokker-Planck technique, the second is practical statistics with a vengeance, and the third (which the reviewer could not fully understand) ends with the following remark: "Of course the formulas and equations given here are well known in physics; only the point of view and the method of exposition are new (and eventually, the mathematical rigor!)." The subject, moreover, has little to do with probability theory.

Perhaps this is neither the right occasion nor the right place to discuss the problem of symposia, meetings, and publications in our scientific life. But at the risk of losing friends and alienating people, the reviewer will venture here the following views:

It is an admirable idea to bring together from all corners of the earth people with common scientific interests. It is particularly satisfying to note that the Berkeley Symposia have been growing progressively more and more international and that the fourth one included participants from the Soviet Union, Poland, Czechoslovakia, and Hungary, as well as from the West. The energy, dedication, and zeal of the organizers, and especially of Professor Neyman, deserve praise and admiration.

But to require every participant to present a paper and, worse yet, to bring a manuscript for inclusion in the published proceedings, is a practice which should be abandoned, if not outlawed.

Unless one can find people who are capable and will-

The Harper's Physics Series

Frederick Seitz, Consulting Editor

CHARLES SLICHTER University of Illinois

Principles of Magnetic Resonance

With Examples from Solid State Physics March '63

EDWARD P. NEY University of Minnesota

Electromagnetism and Relativity

November '62

other volumes in preparation

Also Published by Harper & Row

SYLVAN SCHWEBER Brandeis University

Introduction to Relativistic Quantum Field Theory

920 pp. \$13.75

RICHARD F. HUMPHREYS & ROBERT BERINGER

President, Cooper Union

Yale University

First Principles of Atomic Physics

390 pp. \$6.50

HARPER & ROW, Publishers, 49 E. 33d St., New York 16

OPTICAL MASERS SUPPLEMENT to be published December 1962

The *Applied Optics* Supplement on Optical Masers to be published next month will contain:

- An editorial by **Charles H. Townes**, MIT.
- A 15,000-word paper by **O. S. Heavens**, Royal Holloway College, who will discuss the basic concepts of optical masers, review the progress in this new field, summarize work on solid-state systems, and consider applications in the areas of fundamental experiments, communications, instrumentation, and surgery.
- A comprehensive 10,000-word review of gas systems by **W. R. Bennett, Jr.** Yale.
- Selected papers from *Appl. Opt.*, *J. Opt. Soc. Am.*, *Phys. Rev.*, *J. Appl. Phys.*, and *Rev. Sci. Instr.*
- Suggestions for further reading.

Authors include:

J. A. Barker	J. D. Keating	W. W. Rigrod
N. G. Basov	H. Kogelnik	F. Shimizu
W. L. Bond	O. N. Krokhn	K. Shimoda
W. S. Boyle	H. I. Mandelberg	A. E. Siegman
D. J. Brangaccio	F. J. McClung	S. Sugano
W. J. Conell	B. J. McMurtry	O. Svelto
R. W. Hellwarth	D. F. Nelson	R. C. Williams
D. R. Herriott	H. E. J. Neugebauer	D. L. Wood
A. Kastler	S. P. S. Porto	T. Yajima

**This valuable reference work
\$5.00**

-----ORDER FORM-----

Optical Society of America
1155 16th Street, N.W.
Washington 6, D. C.

Please enter my/our order for the **APPLIED OPTICS FIRST SUPPLEMENT—OPTICAL MASERS**, to be published in December 1962 at \$5.00 a copy

Name

Address

.....

.....

ing to summarize critically wide and significant areas of endeavor, we may as well dispense with symposia and operate within the ordinary framework of our professional societies and journals. Not that this framework is particularly good. Far from it. But at least papers get refereed and ten-minute contributions last ten minutes ($\pm\epsilon$).

There are now too many good, competent, and even excellent practitioners of the art of probability and statistics to allow oneself the luxury of a "free" symposium. Unless something drastic is done, symposia will become simply additional meetings and their proceedings just supplements to existing journals.

Science and Information Theory (2nd ed.). By Léon Brillouin. 351 pp. Academic Press Inc., New York, 1962. \$9.00. Reviewed by Charles M. Gottschalk, Library of Congress.

THE second edition of this outstanding primer by a distinguished physicist is a welcome addition to the rapidly growing literature on information theory. It arrives on the scene after a second printing in February 1957 followed, less than a year later, the well-received and highly commended first printing of April 1956.

The general structure of the first edition has been retained, with improvements, corrections, and explanations added to the first chapters, which provide a clear presentation of the standard results used in communication theory. Two completely new chapters, concerned with the line of research followed by the author during the last few years, some of which was first published in the journal *Information and Control*, of which the author is one of the editors, account for most of some thirty pages added to this edition. One of these chapters considers the inevitability of experimental errors and points out the impossibility of strict determinism in scientific prediction by exorcising Laplace's demon. Both the uncertainty principle and the negentropy principle of information render such demons completely unrealistic, and they prove that the smaller the experimental error, the greater the price that must be paid for the observation.

The problem of very small distances is briefly treated in the last chapter, and the author observes that their measurement requires an enormous expenditure of energy, in fact more than any big nation can afford to give. He consequently suggests that this practical limitation be introduced in the theory by means of a convenient probability coefficient that would represent the difficulty of obtaining too high amounts of energy.

All the chapters are eminently readable, even to one untrained in the terminology of the field. The assumptions and simplifications being made are explicitly stated as well as the author's viewpoint concerning the relationships among classical and modern physics and mathematics. One of the book's greater accomplishments lies in its attempt to make the reader aware of the multitude of problems yet to be investigated.