

Vital science writing

"A fine popular account of astrophysics by a major contributor to our understanding of the evolution and dynamics of stars."

—HEINZ PAGELS,
New York Times Book Review

"Authoritative information presented with sparkling wit."—
GEORGE ABELL, *University of California, Los Angeles*

100 BILLION SUNS

The Birth, Life, and Death of the Stars

Rudolph Kippenhahn

Illustrated in color, \$25.00



"An exciting story of the marvelous accomplishments of particle physics in the past decade."

—SHELDON LEE GLASHOW,
Nobel Prize in Physics, 1979

"A whole new perspective on the fascinating world of elementary particles."

—RUDOLPH MOSSBAUER,
Nobel Prize in Physics, 1961

QUARKS

The Stuff of Matter

Harald Fritzsch

Illustrated, \$19.00

At bookstores or direct from the publisher.
Toll-free (800) 638-3030

BASIC BOOKS, INC.

10 East 53rd Street, New York, NY 10022

gravitational radiation, and more. This is not, however, a special-topics book. It is a thorough exposition of the subject, weighted heavily towards theory, but with frequent comparison to observational data and brief and interesting historical sketches. The authors derive almost every major result from first principles, pursuing most topics right up to current research. Where refinements go beyond the scope of the book, up-to-date information can be found on the list of over 600 references at the end of the book. The result is a unique blend of the textbook and the research monograph, suitable for graduate students on up.

Shapiro and Teukolsky, both professors of astronomy and physics at Cornell, were just beginning their careers when the subject of compact objects caught fire. They have both made fundamental contributions to the field and have now given us a beautiful textbook and reference work. Above all, *Black Holes, White Dwarfs, and Neutron Stars* demonstrates the enormous range of physics that must be brought to bear in the study of astronomy, where phenomena are witnessed only in their complex entirety. Neutron stars cannot be digested piecemeal in the lab or office. Happily, Shapiro and Teukolsky's book can.

Electrical Transport in Solids

K. C. Kao, W. Hwang

663 pp. Pergamon, New York, 1981. \$120.00

Electronic transport in organic solids has been a prominent topic among scientists and engineers since the early 1950s. At the Symposium on Electrical Conductivity in Organic Solids held in Durham, North Carolina, in 1960—perhaps the first international symposium exclusively devoted to electrical transport in organic solids—most of the papers concerned aromatic organic molecular crystals. In the sequel conference held in Ottawa in 1962, the role of excitons in charge-carrier generation in molecular crystals and the transport in charge-transfer complex crystals were also discussed. Research on charge-transfer complex crystals blossomed early in the 1970s, partly because of the announcement of extremely high electrical conductivity in the TTF-TCNQ complex crystal. Recently, doped organic polymers have become a focus of research interest.

In view of its importance as a research area, I have long felt the need of a good advanced text or reference book on electrical transport in organic solids. The present book, by two active research scholars, satisfies the needs of those who are interested in organic semiconductors. It covers charge-car-

rier injection from different contacts, space-charge electric conduction, and, in one long chapter, filamentary charge-carrier injection, high-field effects, thermally stimulated currents, transient phenomena, time-varying fields and transport in relaxation semiconductors. A chapter on photoelectronic processes begins with a concise, readable section on the molecular-orbital theory of aromatic molecules followed by a discussion of the kinetics of excitons leading to charge-carrier generation as well as a short section on the band-band transition. The authors explain photoinjection of carriers at different electrode contacts, photoemission from organic crystals and photovoltaic effects with carefully selected figures and a table summarizing photovoltaic effect measurements. In view of the central role played by the excitons in charge-carrier generation and luminescence, the final chapter on luminescence is definitely a well-conceived and useful part of the book.

K. C. Kao and W. Hwang have done an extensive literature search (over 2600 references are included) and have succeeded in coherently presenting a subject that has been investigated by a diverse group of scientists and engineers. Well-chosen figures, tables, and enough relevant equations make the book readily accessible to graduate students and researchers. The list of principal symbols makes it easy to read a section without referring back to the earlier pages.

This book is a valuable resource to any scientist or engineer who is interested in electrical transport or luminescence of semiconductors in general, as well as to anyone engaged in organic semiconductor research.

SANG-IL CHOI

University of North Carolina

High Resolution Spectroscopy

J. M. Hollas

638 pp. Butterworths, Woburn, Mass., 1982. \$115.00

High-resolution spectroscopy has initiated most of the major advances in atomic and molecular physics. Especially over the last decade, there have been significant increases in the resolution and volume of spectroscopic data, due primarily to the development of two new tools: the laser and the synchrotron radiation source. While many of the laser spectroscopic techniques are the same as those used in traditional spectroscopy, the increased spectral brightness has extended those techniques to unexpected environments, such as low-density atomic beams and even traps for single ions. The synchrotron, in a similar fashion,

has extended short-wavelength spectroscopy well beyond the limits imposed by conventional sources of uv and soft x rays. Consequently, a single book describing the uses and techniques of high-resolution spectroscopy is a monumental task if it is to describe traditional spectroscopy and recent advances.

In this volume, J. Michael Hollas makes just such an attempt, covering the spectrum from microwaves to soft x rays. He includes information about many techniques, ranging from the obsolete Toronto mercury-arc source to the modern techniques of saturation spectroscopy. Similarly, he includes a wide variety of theoretical underpinnings: energy quantization, line-broadening mechanisms and group theory for polyatomic molecules. Unfortunately, by aiming to cover such a vast area, this book misses many important topics and only superficially touches others. For example, its treatment of molecular spectroscopy for the purpose of determining structure is much more complete than its sparse treatment of precision atomic spectroscopy. There is no mention of the measurements to detect parity violation or other fundamental effects. Similarly, there is a discussion of quantum beats spectroscopy, but no mention of separated oscillatory fields and only a brief discussion of multiphoton spectroscopies.

Hollas writes in a style that is easy to read, directed at "postgraduate students and teachers of spectroscopy," as he says in his preface. He tends to avoid acronyms and detailed references. However, the lack of references and the brevity of many of the discussions prevent this book from being a solid introduction to high-resolution spectroscopy. It does provide a significant overview, particularly of high-resolution molecular spectroscopy.

WILLIAM E. COOKE

University of Southern California

Building Scientific Apparatus

J. H. Moore, C. C. Davis, M. A. Coplan

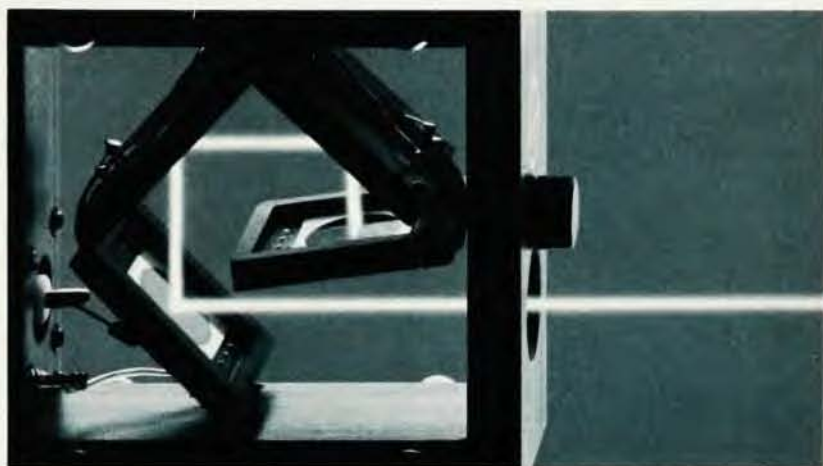
483 pp. Addison-Wesley, Reading, Mass., 1983. \$54.95

There are "how-to" books on every conceivable subject, from orchid growing to airplane construction. Yet experimental techniques are largely passed on by the apprentice system, aided by a number of specialized handbooks. That practice was fine in a simpler age, but now experimental techniques are becoming increasingly complex and individual scientists are finding they require more sophisticated cross-disciplinary skills. It is hard to imagine a single book that can encompass the full range of experimental techniques at a useful level of complex-

ity, but in 483 pages this marvelous text comes closer than any of which I am aware. I am sure that all or most of the information presented here is available elsewhere, but certainly nowhere in such an accessible fashion.

The first chapter, mechanical design, illustrates the strengths of the presentation. In less than 50 pages, the authors discuss in a clear, useful style topics ranging from the characteristics of machine tools (how round can one expect a drilled hole to be), to the

properties of materials, to mechanical drawing, to stress analysis, and even to such details as deciphering the strength code stamped on the top of bolts. This (and all other chapters) ends with a section of several pages containing not only a bibliography, but also a list of suppliers of materials (ceramics, adhesives, bearings) and equipment (welders) discussed in the chapter. The chapter on electronic design goes so far as to show 77 different manufacturers' trademarks



UDT BRINGS ABSOLUTE RADIOMETRIC STANDARDS DOWN TO EARTH AND INTO YOUR LAB.

At last, an easy-to-use radiometric reference for calibrating photodetectors and for measuring laser power in the visible light range. Use it for research and development, for calibrating production standards and for system calibrations.

The QED-100 is an absolute standard developed in coordination with the National Bureau of Standards. Its responsivity depends only on wavelength and known physical constants:

$$R = \frac{\lambda}{1239.5}$$

It gives you a simple straight-line relationship between responsivity and wavelength.

The QED-100 achieves

its absolute reference status in two innovative steps. First, a special inversion-layer silicon photodiode converts all absorbed light with essentially 100% quantum efficiency. Second, virtually all reflected light from the surface is captured by a network of photodiodes arranged in a retroreflective pattern. The result is a totally efficient standard which does not depend upon auxiliary measurements for its accuracy.

Write or call for complete information. United Detector Technology, 12525 Chadron Ave., Hawthorne, CA 90250. Telephone (213) 978-0516.



UNITED DETECTOR TECHNOLOGY

Circle number 52 on Reader Service Card