

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

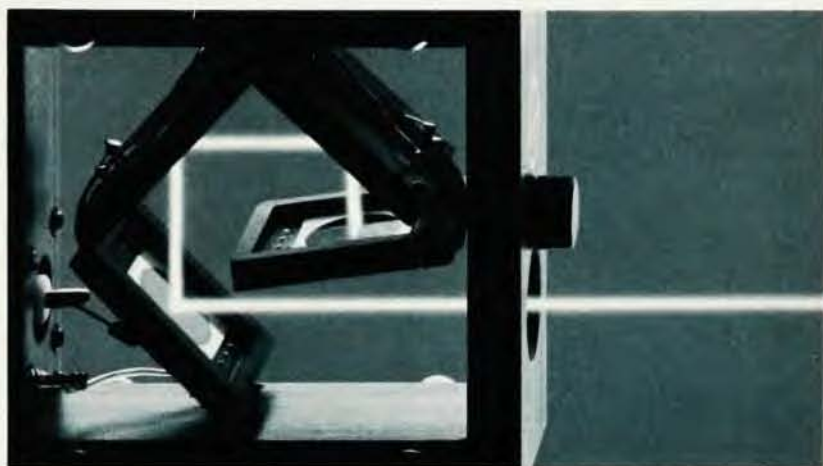
483 pp. Addison-Wesley, Reading, Mass., 1983. \$54.95

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



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290 pp. + index, illus., 1983

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408 pp., illus., 1983

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THEORY OF THE INHOMOGENEOUS ELECTRON GAS

edited by **S. Lundqvist**, *Chalmers University of Technology, Göteborg, Sweden*, and **N. H. March**, *University of Oxford*

Intended as an introduction to the theory of the inhomogeneous electron gas for students who have taken a basic course in quantum mechanics and who possess a working knowledge of statistical mechanics and an elementary background in solid state theory, this text treats both the theoretical foundation and its numerical consequences for atoms, molecules, and solids. Specific topics of interest explored include the origins of the Thomas-Fermi theory; general density-functional theory; density oscillations in nonuniform systems; applications of density-functional theory to atoms, molecules, and solids; and the density-functional approach to the electronic structure of metal surfaces and metal-adsorbate systems. A volume in *Physics of Solids and Liquids*.

410 pp., illus., 1983

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as they are printed on components and gives addresses of the suppliers. All the chapters are profusely illustrated with hand-lettered line drawings of very good quality.

The shortcomings of this book, such as they are, are the inevitable ones associated with the bias of the authors, all of whom have research interests in various spectroscopies and a strong chemistry background. Thus, the section on optics is over 270 pages long and has over 100 pages of manufacturers listings. The vacuum technology chapter, though, is only about 30 pages long and, while it has an excellent discussion of the basics, it ignores evaporation and sputtering—two of the major uses of vacuum technology. The manufacturers' list here is less than a page, not a generous representation for the wide range of equipment available. Similarly, the chapter on charged-particle optics includes sources, lenses, analyzers, and electron multipliers, but does not even mention electron microscopy. Certainly, the scanning electron microscope is beginning to become a familiar laboratory tool and should be discussed. On the other hand, the quality of the 145-page electronics section indicates that the authors had to sort this out for themselves and took care to pass this hard-won knowledge along. They even discuss grounding, shielding and pickup, topics all too often glossed over.

Anyone who has to build or buy scientific apparatus, especially in an unfamiliar field, will find this an invaluable reference.

RICHARD E. HOWARD
Bell Telephone Laboratories

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Theory of Electromagnetic Waves: A Coordinate-Free Approach. H. C. Chen. 449 pp. McGraw-Hill, New York, 1983. \$35.00. *graduate text*

Optics and Acoustics

Baelemente der Optik: Taschenbuch für Konstrukteure. H. Naumann, G. Schröder. 599 pp. Hanser Verlag, Munich, 1983. DM 98

Radiometry and the Detection of Optical Radiation. R. W. Boyd. 254 pp. Wiley, New York, 1983. \$34.95. *reference*

An Introduction to Optical Fibers. A. H. Cherin. 326 pp. McGraw-Hill, New York, 1983. \$34.95

Optical Fiber Communications. G. Keiser. 318 pp. McGraw-Hill, New York, 1983. \$35.00. *reference*

Pitch Determination of Speech Signals: Algorithms and Devices. W. Hess. 698 pp. Springer-Verlag, New York, 1983. \$37.00

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