

and then there is *The Many-Body Problem in Quantum Mechanics* by N. H. March, W. H. Young and S. Sampanthar (Cambridge U. P., 1967), and many others. In setting out to select a textbook for a course on the many-body problem or a reference book in which to look something up one certainly has many choices these days. This book has to be added to the list, of course. Perhaps advantages of Parry's book would be brevity and the fact that it is most recent in the chain. Students and researchers will be motivated to study such books in the search for still more powerful methods in view of the fact that "although success has sometimes been claimed, there is still no satisfactory theory of liquid helium that starts from the interatomic potential, and ends at the quasi-particle energy spectrum, making only well-justified approximations on the way." The book contains other useful critical insights—in discussing the equation of motion method, for example, Parry says "it is difficult to use when one wishes to make controlled approximations and to discuss the range of validity of these approximations."

JOHN L. GAMMEL
Los Alamos Scientific Laboratory
Los Alamos, New Mexico

Optical Information Processing and Holography

W. T. Cathey
398 pp. Wiley, New York,
1974. \$18.95

Since 1965, a number of books have appeared in the rapidly expanding field of optical processing and holography. For the most part these books have been dominated by the systems and communications-theory disciplines of electrical engineering. This is in sharp contrast to earlier treatments that concentrated on electromagnetic theory and classical optics. This book by W. Thomas Cathey takes its place among the better treatments of this material.

Cathey is well qualified to expound in this field, having published many papers on spatial filtering and wavefront reconstruction. His background includes both industrial experience at the Autonetics Research Center and academic experience as a professor of electrical engineering at the University of Colorado. In 1972 Cathey received the Faculty Fellowship of the University of Colorado for research in coherent imaging.

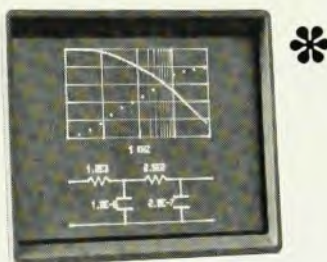
The fundamental concepts of optical processing are introduced with a particularly strong emphasis in the area of applications. A wide variety of appli-

cations are considered including the traditional areas of holography, imaging and optical data processing in addition to the results of relatively recent research on computer-generated holography, color holography, interferometry, and the use of volume recorders. An analysis, quite adequate for the particular problem being considered, is presented with each area of interest. Although many of these are somewhat heuristic, they usually succeed in making the point. This is particularly true in the chapter on coherence, where physical settings are used to define and analyze the concepts of spatial and

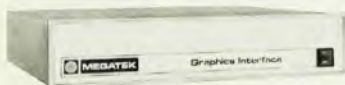
temporal coherence. This is very useful for a reader with a limited background in statistics.

Very fundamental results, such as those of scalar diffraction theory, Bragg diffraction and speckle, are often presented with minimal derivation. For example, Maxwell's equations and Green's theorem are not used in the derivation of scalar diffraction theory. However, in the applications area the chapter on classification and properties of holograms is quite exhaustive and puts a wide variety of holographic embodiments in their proper perspective. The book is certainly well suited for

See what \$1095 will do for you.



Your scope and minicomputer can be a vector graphics terminal.



Now you can get information out of your computer in a form you can easily visualize without any hardware modifications to your X-Y scope or minicomputer.

Load our easy to use software (BASIC with CALL) once. When you need graphics simply plug in the interface. Individually addressable flicker-free (50Hz) vectors provide the cleanest graphics around. And you can change the whole display in 20 milliseconds.

Megatek's self-refreshed vector graphic interfaces are available for NOVA, PDP-11, HP-2100 and Alpha-16 minicomputers. Timeshare units also available.

We've got options: a light pen for interactive displays and an inexpensive hard copy adapter that converts your X-Y recorder into a digital plotter to preserve your display. Call today and see. (714) 224-2721



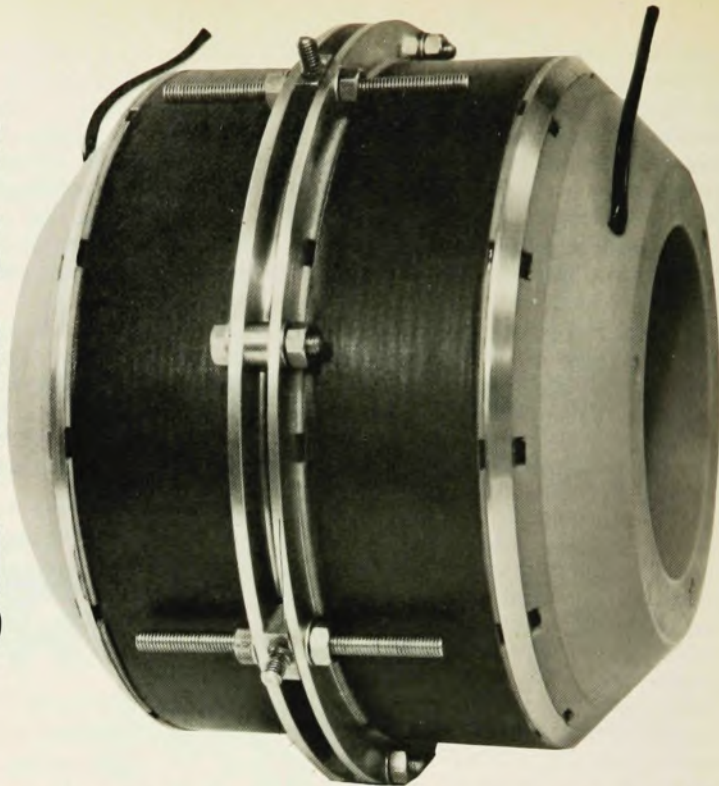
MEGATEK
BUDGET PERIPHERALS

1055 Shafter St., San Diego, CA 92106

* Actual display generated on a Textronix 604 display using a Megatek NOVA interface model BP-721.

Circle No. 28 on Reader Service Card

superconductive magnets or a complete cryomagnetic system?



OXFORD INSTRUMENTS...FOR INTEGRATED SYSTEMS MANUFACTURED BY A SINGLE COMPANY

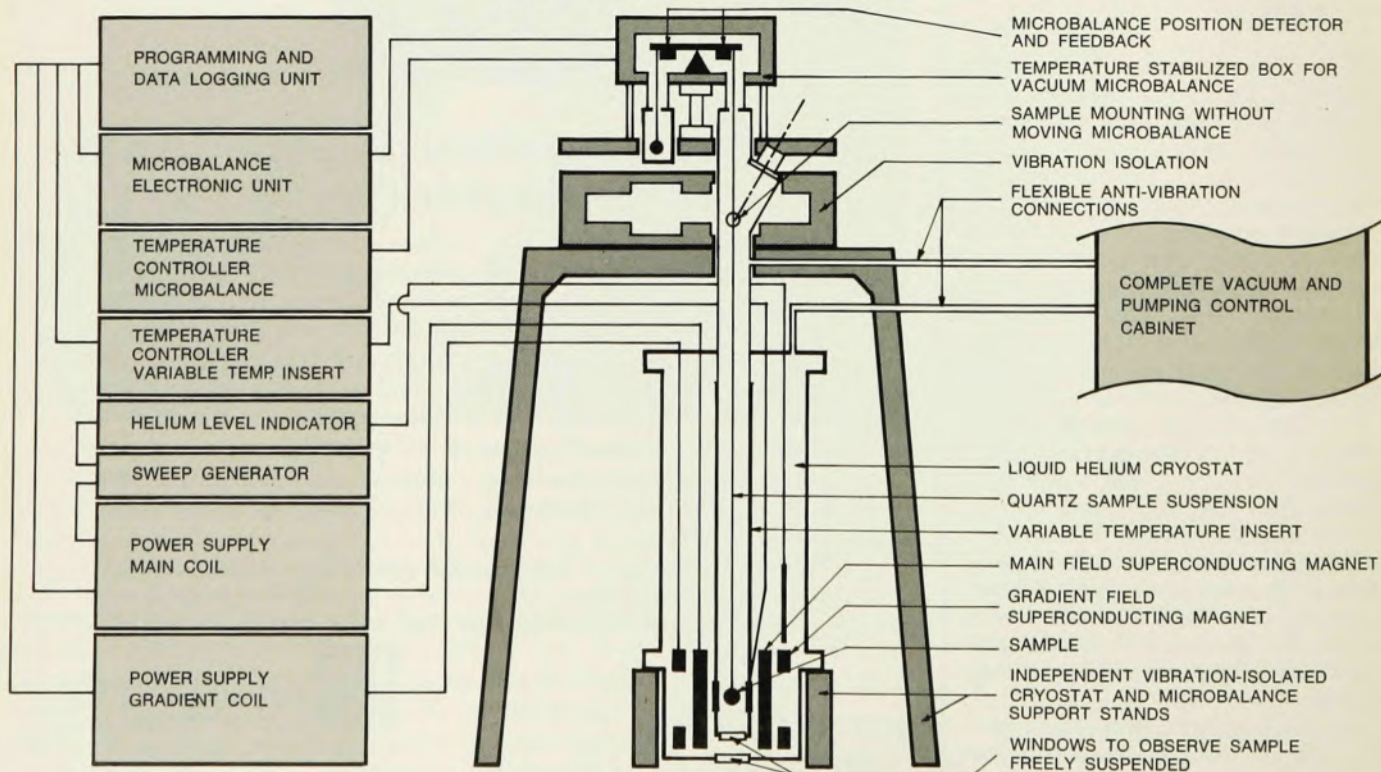
Strong magnetic fields to 11.0T and accurately controlled variable temperatures down to .3K. These are the high performance parameters you'll get from a cryomagnetic system constructed for you by Oxford Instruments. We'll help you determine the most efficient design and components for magnets, cryostats, elec-

tronics, computer interfacing and accessories to assure the most precise facility for spectroscopy, magneto optics, nuclear studies and magnetic susceptibility. Please contact us for detailed information, literature or prices. Call us today and discuss your application with a fellow scientist.

OXFORD INSTRUMENTS, INCORPORATED

48 Maryland Avenue • Annapolis, Maryland 21401 • Phone (301) 268-2350

Also in Oxford • Frankfurt • Sydney



Typical magnetic susceptibility system supplied by Oxford Instruments

Circle No. 29 on Reader Service Card

students at the senior undergraduate and first-year graduate level in addition to practicing engineers and physicists in the optical-processing field.

Organization is often a matter of personal preference; however, a number of weaknesses appear to exist. Examples of Fraunhofer and Fresnel diffraction would appear to belong in chapter one on scalar diffraction, where this material is treated, rather than in chapter two on Fourier transforms. Perhaps the order of these two chapters needs to be interchanged to provide the desired mathematical background material for scalar diffraction. On a more detailed level, Cathey often states mathematical expressions as parts of a sentence that are not in equation form. This appears to detract from the clarity.

The book is well illustrated both with figures and pictorial material, which provide a great deal of clarity and perspective. Two of the figures, however, I found to be misleading. In figure 7-22, in an effort to illustrate the use of a real-time transparency for optical data processing, the transparency is tilted so that it fails to satisfy the spatial Fourier transform relationships. It would have been preferable to use partially silvered mirrors to separate the sources and provide the correct optical processing geometry. In addition, figure 8-14, the incoherent transfer function of a rectangular lens, illustrates a pyramid with straight edges. These should be curved since they represent the product of two linear functions.

The reference lists are quite complete and should thus enable the reader to pursue any of the topics covered in greater detail. In general this book skillfully explores the many application areas of optical information processing and holography while providing an adequate mathematical background for each case.

ALBERT MACOVSKI
Stanford Electronics Laboratories
Stanford, California

Electron Spin Resonance

N. M. Atherton
438 pp. Halsted, New York
1973. \$35.00

Electron spin resonance has developed in the last twenty years from an esoteric technique used by few into one of the routine experimental techniques of solid-state physics, spectroscopy, inorganic and organic chemistry. N. M. Atherton, in the introduction to his *Electron Spin Resonance*, indicates that he has "envisioned an audience of postgraduate chemists... who wish to

use or are already using electron spin resonance spectroscopy as a research technique." As recently as ten years ago there were essentially no books on the subject addressed to this audience; there are now half-a-dozen or more. One might then inquire whether another has anything to add. My feeling is that in the present instance it does.

This book is more comprehensive in its choice of subject matter than any of the others with which I am familiar, and it develops most topics from elementary considerations to a fairly advanced treatment. It reflects Atherton's extensive knowledge of the field and familiarity with its lore. It will be valuable to the experimental practitioner. On the other hand, more advanced or theoretically oriented scientists will find much objectionable.

The first two chapters present a survey and low-level treatment of what is to follow. Later chapters treat at greater length nearly all aspects of electron spin resonance: hyperfine splittings, g-factors and zero-field splittings (both isotropic and anisotropic) in organic radicals and triplets; similar topics for transition metal complexes; relaxation, line widths and exchange effects; multiple resonance; and gas-phase electron magnetic resonance. The gas phase is treated quite briefly, but Atherton deals with all other topics more fully and at about the same level. Such uniformity is commendable in a book of this length. The practitioner will find most of what he needs to know.

Unfortunately, there are also less desirable features. Frequently in the introductory chapters and several times thereafter, topics are dealt with in ways that the author indicates are significantly incomplete or even incorrect. The motivation is to provide a treatment accessible to those with limited mathematical and quantum-mechanical training. While I agree that the results should be available to all workers in the field, I do not believe that a misleading or incorrect derivation is better than none at all. Experience suggests that despite disclaimers at the time of presentation most theories will be used far beyond their range of applicability and expected accuracy.

In the discussion of spin densities, for example, would it not be better if the statement "it is perhaps best to regard Q_{CH}^H as a parameter and be content to acknowledge the remarkable success which the McConnell formula enjoys" came before rather than after an extensive discussion of this quantity? The sentiment expressed after a discussion of hyperconjugation *versus* spin polarization concerning "the potential danger of giving names to basically simple-minded and crude descriptions of electronic effects and ad-

ARE YOU DOING NMR?



THEN YOU SHOULD BE USING THE QUIET SOURCE.

With the best signal-to-phase noise ratio available and a spurious content of better than -83dB, the new Fluke Model 6160B Frequency Synthesizer offers you a very pure signal source for NMR and microwave spectroscopy studies. At a price of only \$4995, it's easily the outstanding buy on the market today.

Other standard features include

- Range of 1 to 160 MHz with 1 Hz resolution
- BCD programmable frequency control
- Switching speeds less than a millisecond
- Modular construction so that we can tailor your instrument to your exact needs for very little extra
- Sales and fast turnaround service throughout the world

ASK FOR A DEMONSTRATION. WRITE OR CALL FOR DATA.



P.O. Box 7428, Seattle, WA 98133

For data out today, dial our toll-free hotline 800-426-0361. For immediate application help, dial (collect) 206-774-2491 and you'll get the on-duty frequency and time engineer.

Circle No. 30 on Reader Service Card