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.

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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-

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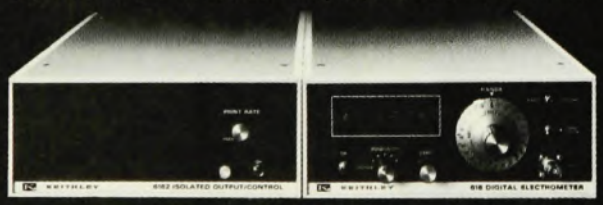

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