using acoustic waves. The book is an "introduction" to the use of acoustics in holography, not to holography itself. The book edited by Camatini ranges over a wide variety of subjects. The acoustical part of it was prepared by one of the authors of the monograph, Brenden, and its entire subject matter is also contained in the monograph. Thus my comments on acoustical holography relate primarily to the monograph and I will limit remarks about Camatini's book to the optical portion.

Acoustical holography is interesting, not only because the interaction of acoustic waves with matter is different from that of light, but also because the wavelengths that can be used are much longer. While this reduces the theoretically allowed resolution, the longer wavelengths provide so many advantages that one feels that the ultimate versatility of holography can be achieved only with acoustic waves. For one thing, simultaneous amplitudes and phase detection are possible, and the holographic reference beam can thus be introduced electronically and tailored to optimize the type of imaging that is desired. Furthermore, to generate the hologram one must often resort to scanning with point detectors. This would appear on the first thought to be a disadvantage, but Hildebrand and Brenden show that, by using circular scans, the multiple-order imaging that limits the field of view of conventional holograms can be largely eliminated.

The monograph starts with an introduction to optical holography which, while required for a consistent mathematical exposition, is probably too abbreviated for a beginner in the field. The chapter on acoustic wave propagation, on the other hand, is quite basic and adequately prepares the reader for the following discussions on scanning and liquid-surface holography. There is a highly mathematical chapter on sampling theory as it applies to acoustical holography, much of which is applicable to optical holography as well. Liquid-surface holography refers to the use of the surface to convert acoustic wave pressure to phase variations in an optical wave, so that the hologram can be reconstructed visually in real time. Chapters on other detection methods and on applications in medicine, geology, and industrial testing, among others, round out the book.

The monograph is well illustrated by photographs of holographic effects, all of which were produced acoustically. Unfortunately, the long wavelengths of acoustical holography result in a gross "laser speckle" which is painfully evident in the photographs. It is to be hoped that acoustic analogs of methods used in optical holography to reduce speckle will be available in the future.

Camatini's book contains, besides the chapters on acoustic holography, one on microwave holography by E. N. Leith that is a reprint of an earlier journal paper. Among the papers on optical holography, those that I found most interesting were the highly readable introduction by Gabor, papers on interferometric techniques by Ennos, Abramson, and Kersch, and a paper on information storage by Kiemle. There are also papers on materials and techniques, and several on image sharpening by holography. For the latter application, holography must compete with digital computation techniques that, in my opinion, are inherently more versatile.

For the person interested primarily in acoustical holography, the monograph by Hildebrand and Brenden is definitely the better choice, not only because of a more complete and detailed exposition, but also because it has the benefit of professional editing and preparation sadly lacking in the symposium proceedings.

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Cosmological Theory

L'Univers Relativiste. STAMATIA MAVRIDÈS. Masson, Paris, 1973. xx, 384 pp., illus. Paper, 198 F.

To quote out of context can be a cardinal sin when important and serious questions are under consideration. Let us nevertheless invoke a remark in G. C. McVittie's introduction to *L'Univers Relativiste*: "Fashion plays as great a role in science as it does in dressmaking." In science, unlike dressmaking, fashionable trends are based on data accumulated over decades of painstaking endeavor. In science, unlike dressmaking, the expenditure of concentrated effort by a group of talented researchers often produces a dramatic increase in our understanding of a given problem; and fashion deserves also to be commended for its catalytic role in providing such a stimulus.

There is, however, a tendency for recent books to highlight the more dramatic discoveries, often at the expense of somewhat less exotic achievements. Fashion, of course, is largely irrelevant to the quality of research accomplishments, and one should be grateful to Stamatia Mavridès in *L'Univers Relativiste* for reminding us of this basic scientific fact of life by avoiding the trend to science à la mode. Here is an exposition of general relativity and cosmology theory that is decidedly unfashionable in its selection of contents. The five chapters on cosmology constitute an admirably lucid discussion of the observational and theoretical foundations of this subject. There is even a chapter devoted to various unconventional cosmological theories, and indeed throughout the book the current orthodoxy is largely deemphasized. The author's objectivity is noteworthy, to the extent, for example, that four pages are devoted to cosmic blackbody radiation and its ramifications, whereas equal space is given to steady state theory and twice as much is spent expounding the tired light theories of Bogorodski, Finlay-Freundlich, Zwicky, *et al.*

Mavridès is a member of the mathematically oriented relativity group at the Institut Henri Poincaré, and the success of this book is a tribute to her facility in handling complex mathematical topics in a straightforward and precise manner. The first two chapters include a discussion of the observations of stars, galaxies, and radio sources that remains intelligible to the nonastronomer and yet is not devoid of detail. There follows a clear, concise introduction to the fundamentals of general relativity, and the observable predictions of Einstein's theory are discussed in detail. The book closes with a straightforward account of the equilibrium and collapse of self-gravitating systems.

This sober and solid book will appeal to the reader who enjoys his relativity free of vivid or passionate writing and unencumbered by the distracting stimulus of a heavy dosage of recent discoveries. The book's strength lies in the fair and unbiased discussion of various cosmological theories, which are developed in a compact and self-consistent manner. If one were to cite a weakness, it would lie in the brevity of the attention paid to such "fashionable" topics as the cosmic blackbody radiation and its cosmological progenitor, the primordial fireball. A more extensive discussion of this subject would enhance the diversity of the presentation of cosmological theory. I

would recommend *L'Univers Relativiste* for the physicist who requires a sound and thorough introduction to cosmology and is not afraid to tackle the mathematical basis of the theory, which is expounded concisely and clearly in this book.

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