

(quasar luminosity functions), while others are barely covered (quasar absorption lines; these are treated more thoroughly in Peterson's *An Introduction*). Kembhavi and Narlikar claim to give a neutral overview, but their specialties receive the most complete treatment.

To write a book on a rapidly evolving field is a challenge, and it is understandable that no textbook can follow the very latest developments. However, given the amazing technological leaps in high-energy astrophysics in the 1990s, the field deserves better treatment than it gets in this book. It is easy to be critical of what one knows best, so I preface the following by admitting that I may be expecting too much.

The discussions of observational results on AGN are outdated, with much of the information not carried beyond what was known in the early 1990s. There is little discussion of recent observational evidence for accretion disks or reliable black-hole mass measurements. In particular, important results such as the masing disk in NGC 4258 and the relativistically broadened iron K fluorescence lines in AGN are overlooked. For the last seven years, ASCA has been instrumental in changing x-ray spectroscopy, making a sudden leap from data with almost featureless continua to real spectral diagnostics; however, most discussions are based on missions that have long since ended (Ginga, Einstein, Exosat). This section leaves one with the impression that little progress has been made in the field of high-energy astrophysics, when exactly the opposite is true.

I also found the writing style and presentation to be uneven. While some chapters succeed, others include lots of facts but no logical framework within which the facts can be understood. The book would have benefited from a clear comparison of the various results rather than a somewhat disjointed discussion. There are also some conceptual errors that do not seem purely typographical, such as incorrect references to x-ray-telescope instrumental capabilities. In particular, the spatial resolution of the Rosat high-resolution imager is given as 1.7 arcmin, when it should be 5 arcseconds.

This book serves well as an introductory text for the advanced undergraduate or beginning graduate student who wishes general knowledge of the field of AGN research. It contains a nice overview of AGN theory, a comprehensive account of quasars, and a valuable historical review, but with a

train of thought that unfortunately stops in the early 1990s. The book therefore doesn't meet one of its goals: to be an up-to-date review of the field.

KIMBERLY A. WEAVER
Goddard Space Flight Center
Greenbelt, Maryland

Fiber Bragg Gratings: Fundamentals and Applications in Telecommunications and Sensing

▶ Andreas Othonos
and Kyriacos Kalli
Artech House, Norwood, Mass.,
1999. 440 pp. \$89.00 hc
ISBN 0-89006-344-3

Ken Hill and colleagues at the Canadian Communication Research Center discovered photosensitivity in optical fibers approximately twenty years ago. (Upon exposure to intense ultraviolet light, there is an induced change as large as 10^{-2} in the refractive index of doped silica optical fibers. This refractive index change is associated with defect transformations in the glass.) In 1989, researchers at United Technologies developed the side-writing of gratings into optical fibers, allowing grating properties to be easily varied. This led to increased activity in the fields of both photosensitivity and fiber gratings, as research groups attempted to understand the fundamental mechanisms as well as to fabricate practical devices for both telecommunications and sensing applications.

Fiber Bragg Gratings: Fundamentals and Applications in Telecommunications and Sensing, by Andreas Othonos and Kyriacos Kalli, reviews the work to date from the multiple perspectives of fundamentals of photosensitivity, devices for telecommunications, and applications in sensing. It follows closely another book devoted exclusively to the subject: Raman Kashyap's *Fiber Bragg Gratings* (Academic, 1999). Whereas Kashyap's book is almost entirely devoted to gratings for telecommunications with little discussion of photosensitivity, the book by Othonos and Kalli broadly details research in all areas of fiber gratings. With the authors' background primarily in the area of grating sensors, it is not surprising that sensing is covered in the most detail.

The authors state in the preface that the intended audience includes

researchers and academics in optoelectronics. Since fiber gratings and photosensitivity remain very active areas of research, it is not possible to provide a textbook type of introduction to the field while simultaneously providing a thorough review. The authors have emphasized completeness, making the book a challenging read for those with little previous familiarity with the subject matter.

Given the continued debate on the origins of photosensitivity in glass, the authors chose to summarize all the research to date, resulting in over 200 references for one chapter alone. This extended review-article format is used for many of the chapters, including those on applications of gratings in telecommunications and on grating sensors. While this amount of information may be overwhelming or confusing to readers new to the field, it provides a valuable reference—a single point of departure for what in the past few years has become a vast quantity of literature. This is particularly true for the chapter on photosensitivity, which covers the relevant work and organizes it in a logical manner.

The book provides an amount of mathematical detail and figures appropriate to the text. The various grating architectures employed in both telecommunications and sensing applications are particularly well illustrated. In an attempt to have each section relatively independent, the authors occasionally repeat some information or treat different aspects of the same topic in different portions of the book. For example, different types of photosensitivity (i.e., Type I, Type II, etc.) are treated in both the chapters on photosensitivity and on grating properties. This is a consequence of the extended review-article format that the book utilizes. The thorough index largely overcomes this drawback.

One notable omission is the relative lack of information on grating apodization, both in terms of theory and fabrication. This is a critical aspect of gratings for most telecommunications applications and deserved a more thorough treatment. The placement of the grating-theory chapter after the sections on grating properties and fabrication is unusual. The chapter on grating theory is also quite brief and not sufficient for a reader without some prior familiarity with the subject. As the title suggests, the book concentrates on gratings in optical fibers and does not include many references to the vast literature on planar gratings, except when presenting grating theory.

As with any book on an area of research that is still evolving rapidly, the book represents a snapshot at a single point in time. Progress continues, particularly in the areas of photosensitivity and tunable grating devices. I believe that researchers in the field will find the book to be a valuable addition to their bookshelves. The authors have provided a comprehensive overview of the field of fiber gratings.

GLENN E. KOHNKE
Corning Incorporated
Corning, New York

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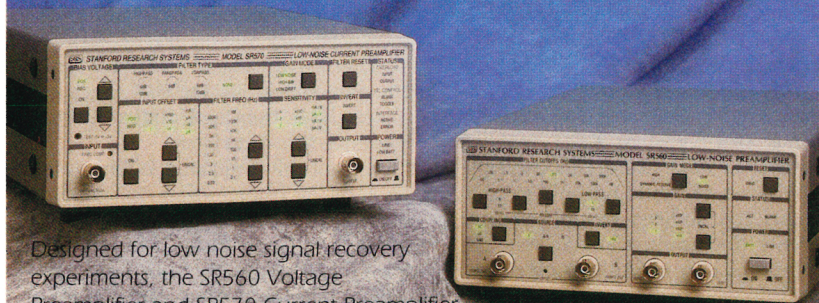
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