

some related processes) by treating sub-areas of the surface as quantum detectors having both threshold and saturation properties. Among numerous statistical properties of these receptors introduced are randomness of location, both in a given plane and in three dimensions, and a variety of grain threshold and saturation levels.

From these assumptions, the film transfer characteristics are derived as well as the noise characteristics generated both by the random distribution of the arrival of quanta in position and time, and by the distribution of parameters describing the sensor arrays. An important quantity, the detection quan-

tum efficiency, is defined; it is essentially the ratio of signal to noise at the output to signal to noise ratio at the input.

In addition to the material devoted to deriving the signal transfer function response and noise response, the book employs Fourier transform theory and the modulation transfer function to describe the effects of film characteristics on the spatial frequency content of signals.

The noise and signal analysis makes use of many of the concepts introduced by Norbert Wiener and Claude Shannon and applies them to pertinent aspects of the photographic process.

The book should be of interest to

workers in holography and in coherent and noncoherent optical signal processing. It is also of interest to those for whom photographic material is a potential storage medium.

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Galactic and Extra-Galactic Radio Astronomy

G. L. Verschuur, K. I. Kellermann, eds.
402 pp. Springer-Verlag, New York, 1974.
\$37.50

Although it is a relatively young field, radioastronomy is old enough to have a reasonable spectrum of textbooks. Until the advent of this book, however, radioastronomy texts have either been relatively elementary or have tended to stress equipment and observations. Such a book as *Galactic and Extra-Galactic Radio Astronomy* has been needed for some time by students who have completed more typical texts but might not be ready to begin reading journal articles.

The book consists of chapters on various research subjects written by people currently active in the particular areas included: The authors—all members of the staff of the National Radio Astronomy Observatory—emphasize in general scientific interpretation and results rather than equipment and techniques. Nine of the thirteen chapters deal with galactic research, including the non-thermal background emission, interstellar hydrogen and molecules, the galactic magnetic field, supernova remnants, pulsars and radio stars. Three chapters on extragalactic subjects deal with neutral hydrogen in external galaxies, radio galaxies and quasars, and cosmology. A chapter dealing with the techniques of interferometer measurements completes the collection.

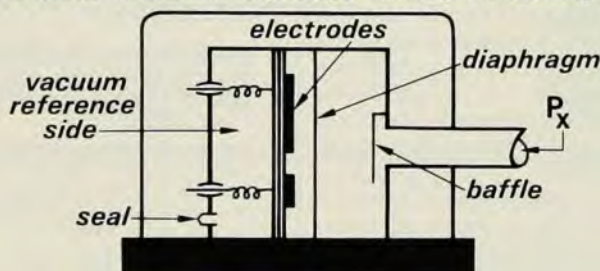
The chapters are for the most part adequately written and a few of them are particularly lucid, giving the reader a good feel for the subject. A good many of the chapters do suffer from lack of careful attention to detail, a defect that might lead a careful but inexperienced reader to become bogged down. More extensive chapter bibliographies would have made the book more useful, as would an attempt by the authors to have made their chapters more representative of the field rather than only of their own research interests.

Two perhaps closely related questions come to mind: why are the chapter authors limited to the staff of the National Radio Astronomy Observato-

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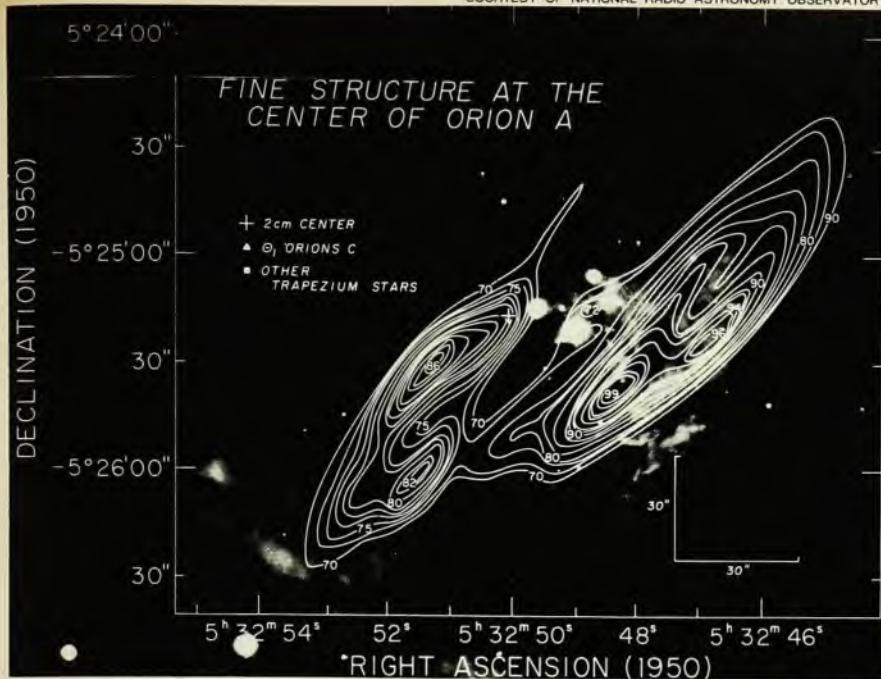
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Radio map depicts thermal emission from Orion Nebula. White blocks on the superimposed optical photograph of the nebula mark the bright stars that heat up diffuse surrounding matter.

ry, and why does the book cost so much? For a book that is so expensive, the buyer might expect the material to be written by authors chosen for their expertise and writing ability, without regard to their affiliation. One argument for this restricted choice of authors might be to insure a high degree of uniformity in the chapters. However, the editors point out that such uniformity was not a goal (nor was it achieved). Another argument might be that the authors were chosen to provide articles written from a different viewpoint than one might expect to get from

standard review articles, which often tend to be written by the same author. At the student level for which the book is intended, this diversification would not appear to be justified.

The book is recommended to all serious students of astronomy. It provides a great deal of information and would serve as a source for those undertaking a more extensive study of any of the subjects covered.

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Positional Astronomy

D. McNally

375 pp. Halsted, New York, 1975. \$15.95

It seems that this book has its origin in the author's frustration. After lecturing on the subject for several years with no really up-to-date text available, the British astronomer Derek McNally, well known through his contributions to astrophysics, decided to try to write one himself. But he remarks in the preface that "It might therefore cause surprise that one who has made no contribution to astrometry should have the temerity to write a book on Positional Astronomy," and he also realizes that in doing so he may have run... "the risk (undoubtedly) of arousing the wrath of my astrometric colleagues..."

Yes, both times.

Although positional astronomy is in-

dispensable for obtaining many data without which there would be no astrophysics, its practice is often tedious and requires the most painstaking attention to detail. Furthermore, the nature of this fundamental field is such that there is very little chance for an astrometrist to become famous overnight by some spectacular discovery. For this and other reasons, it is not a very widely practiced branch of astronomy, and many (especially young) astronomers have the totally mistaken notion that astrometry is not only intrinsically old-fashioned or even obsolete, but that virtually any good astrophysicist can learn in two weeks all there is to positional astronomy, teach meaningful courses and write a book about it. McNally's *oeuvre*, I fear, may be somewhat the outgrowth of this attitude.

This is sad, because the author has missed a golden opportunity—unfortunately so far also missed by the fraterni-

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1976, xii, 123 pp., illus., hardbd., \$17.50;
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