authors to write professional, objective, and constructive responses to reviewer concerns. Too many authors waste their responses by attacking the reviewers. A piece of advice that I would offer is not in the book: Authors should not try to buttress their claim for correctness or importance by invoking the name of a prestigious scientist who, they say, thinks their work is wonderful. Whenever I saw such a statement, I suspected that an author was arguing from a position of weakness. Sometimes I even checked with the scientist in question and found that the author's claim was exaggerated or not true.

Each chapter of *What Editors Want* ends with a section entitled "The Bottom Line." For me, the bottom line is that the information and advice in this book are good, not surprising, and not difficult to find elsewhere. But for a new author, it will be convenient to have all that information in one place.

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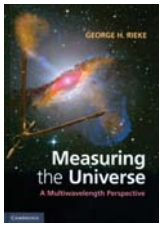
Measuring the Universe

A Multiwavelength Perspective

George H. Rieke
Cambridge U. Press, 2012. $75.00
(343 pp.). ISBN 978-0-521-76229-8

Anyone who has tried to design a course to cover the gamut of experimental astronomy comes to a realization: The subject is vast. A complete text would include methods to observe the entire electromagnetic spectrum from radio waves to gamma rays, not to mention cosmic rays, neutrinos, gravity waves, and the dark sector. The technologies involved are radically different depending on whether your instrument is in orbit above Earth, on a high-altitude site, or deep below Earth's ice, ocean, or land. Entire textbooks are devoted to each of those observational perspectives, and even then they only scratch the surface. Yet there is a clear need for texts that introduce experimental astronomy to students and no shortage of books that claim to do the job.



George Rieke's *Measuring the Universe: A Multiwavelength Perspective* joins those attempts, and in only 340 pages it largely succeeds in providing a solid introduction to the field. Rieke, deputy director of the Steward Observatory at the University of Arizona, has had a long and distinguished career working with IR instrumentation and telescopes and is well qualified to tackle the subject. Like other introductory texts—for example, C. R. Kitchin's *Astrophysical Techniques* (5th edition, CRC Press, 2008)—most of the book is devoted to fundamental principles in the optical-to-radio domain, with only brief mentions of high-energy astrophysics (20 pages), and cosmic rays, neutrinos, and gravity waves (5 pages total). That imbalance reflects the fact that most astronomers work with data obtained from optical, IR, and radio telescopes.

The chapter on detectors is excellent and its coverage is more detailed than for most other topics in the book; it even includes electrical diagrams to illustrate how charge is detected and recorded. I found the high level of detail appropriate because astronomical instruments are designed backwards from the detector. For that reason, I would have appreciated even more expert insight, such as on how small pixels can be made, how the dynamical range and noise limit are set for a given detector technology, and how detectors are likely to evolve in the future.

An introductory text such as this cannot provide students with the ability to start designing instruments or telescopes. That would require a more extensive introduction to optical and mechanical design. But *Measuring the Universe* missed opportunities to engage readers with important questions: What are the fundamental differences between forming an image—optical or radio—with focal-plane optics and with interferometry? Is it sufficient to have intensity information without phase information? Why are radio images never as good as optical images?

In certain respects, the book looks forward to a future era of observational astronomy. The most up-to-the-minute topics are arguably adaptive optics and high-contrast imaging, which Rieke largely succeeds at discussing in chapter 7. He also spends a few pages on the convoluted subject of multi-object integral field spectroscopy, a major topic in modern astronomical instrumentation.

But given that 10 pages are devoted to polarimetry, a niche topic in astronomy, one feels shortchanged that more space was not devoted to new enabling technologies. There is no mention of space-based instruments, such as the *Hubble Space Telescope*'s Cosmic Origins Spectrograph; of ultrahigh stability spectrographs for exoplanet searches; or of noise mitigation technology to suppress, for example, spectral lines of hydroxide. Nor does the book discuss the revolutionary developments in interferometry made possible by photonics. (See the article on astrophotonics that I coauthored with Pierre Kern, PHYSICS TODAY, May 2012, page 31.) I was impressed that Rieke mentions the optical vortex chronograph, but he missed an opportunity to discuss how photons have orbital angular momentum in addition to spin angular momentum.

Measuring the Universe could have made more use of supplementary material and appendices. For example, chapter 5 introduces the optical photometric system but does not define wavebands across the full spectrum. They could have been listed in like manner as in Martin V. Zombeck's *Handbook of Space Astronomy and Astrophysics* (3rd edition, Cambridge University Press, 2006). *Measuring the Universe* also does not include a lot of Web resources. Many optical and radio simulators are available online that could educate interested students, and several other websites are devoted to introductory data analysis.

Overall, *Measuring the Universe* provides a backbone of understanding to build on. Among its major strengths are its spare and uncluttered style, its good use of equations and figures, and its problem sets. I would almost certainly use it as the basis of a course for final-year undergraduates or for graduate students, but with extensive supplementary material for some of the chapters.

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new books

acoustics

Advances in Ocean Acoustics. J. Zhou, Z. Li, J. Simmen, eds. AIP, 2012. $204.00 (694 pp.). ISBN 978-0-7354-1107-4

Aerodynamic Noise: An Introduction for Physicists and Engineers. T. Bose. Springer, 2013. $89.95 (165 pp.). ISBN 978-1-4614-5018-4

Dimension-Based Quality Modeling of Transmitted Speech. M. Wältermann. Springer, 2013. $129.00 (216 pp.). ISBN 978-3-642-35018-4

astronomy and astrophysics

Astrostatistical Challenges for the New Astronomy. J. M. Hilbe, ed. Springer,