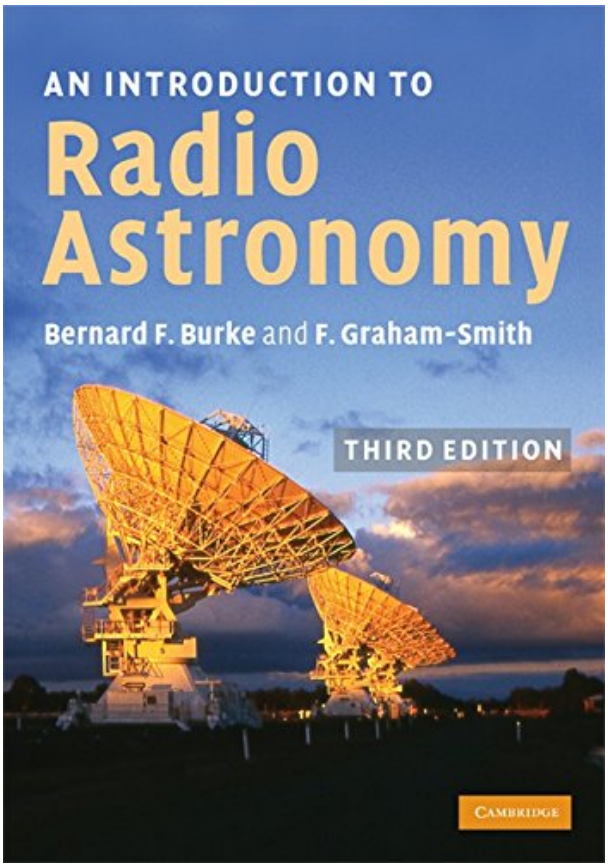
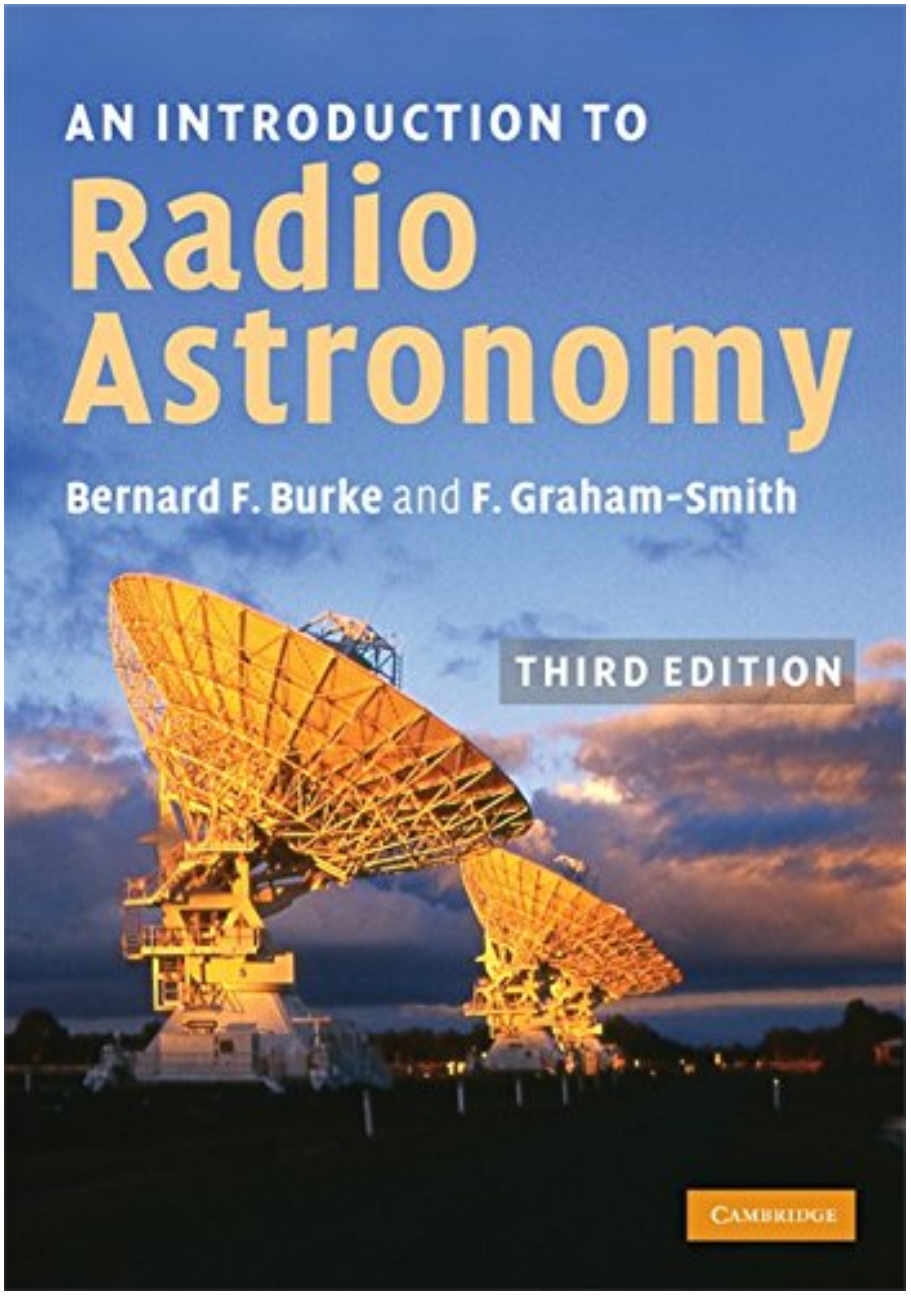
AN INTRODUCTION TO RADIO ASTRONOMY BY BERNARD F. BURKE, FRANCIS GRAHAM-SMITH





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Review

From previous editions: 'Written by two of the world's leading radio astronomers ... If you are looking for an up-to-date review of radio astronomy, from the telescopes and techniques to the fabulous wonders of the Universe they reveal, then this is the book for you.' Geoff Macdonald, Astronomy Now

'The authors are to be praised ... a comprehensive overview of the impact of radio astronomy on astrophysics.' Paul Hewett, Endeavour

'... an excellent graduate-level text - the best available by far. It is also the best reference book for the practising astronomer who wants to do radio astronomy properly ...' Carl Heiles, Physics Today

'... written by two of the world's leading radio astronomers, it provides a comprehensive review of the subject, both in terms of the instruments and techniques employed and the knowledge of the Universe that is revealed by them ... It must be stressed, however, that this is a graduate text book and thus employs a high level of mathematics throughout - perfect for its intended reader ... there is no doubt that a keen reader could ignore the mathematics and still get a very good feel of how our understanding of the Universe has been greatly enhanced by this exciting branch of astronomy.' Astronomy Now

About the Author

Bernard F. Burke is William A. M. Burden Professor of Astrophysics, Emeritus in the Department of Physics, Massachusetts Institute of Technology. He was the co-discoverer of radio noise from Jupiter, and he was later involved in the development of very-long-baseline interferometry. He has been a Visiting Professor at the University of Leiden and the University of Manchester, is a member of the National Academy of Science, and is on the governing board of the National Science Foundation.

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Written by two prominent figures in radio astronomy, this well-established, graduate-level textbook is a thorough and up-to-date introduction to radio telescopes and techniques. It is an invaluable overview for students and researchers turning to radio astronomy for the first time. The first half of the book describes how radio telescopes work - from basic antennas and single aperture dishes through to full aperture-synthesis arrays. It includes reference material on the fundamentals of astrophysics and observing techniques. The second half of the book reviews radio observations of our galaxy, stars, pulsars, radio galaxies, quasars, and the cosmic microwave background. This third edition describes the applications of fundamental techniques to newly developing radio telescopes, including ATA, LOFAR, MWA, SKA, and ALMA, which all require an understanding of aspects specific to radio astronomy. Two entirely new chapters now cover cosmology, from the fundamental concepts to the most recent results of WMAP.

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Most helpful customer reviews

13 of 14 people found the following review helpful.
Advanced Introduction - Targets Researchers and Graduate Astronomy Students, But Accessible to Others
By Michael Wischmeyer
An Introduction to Radio Astronomy (1997) targets astronomy graduate students and others committed professionally to radio astronomy. The authors - two noted radio astronomers, Bernard F. Burke and Francis Graham-Smith - also hope to interest optical astronomers and others who want to be informed of the principal ideas current in radio astronomy, and may even be thinking of carrying out radio observations that would complement other work in progress.

With a background in geophysics, I did not always find An Introduction to Radio Astronomy to be easy going, but most topics were not out of reach. That is, readers with some background in physics, electrical engineering, and/or signal processing will find substantial familiar ground, including electromagnetics, thermodynamics, Fourier analysis, and spectral analysis. I give five stars to this not-so-easy, self-contained, advanced introduction to radio astronomy.

I found the first six chapters (about 80 pages) to be the most challenging, perhaps due to my limited familiarity with radio telescopes. Key topics included radio telescopes as antenna, signal detection and noise, single-aperture radio telescopes, the two-element interferometer, and aperture synthesis.

Chapter 7 - the absorption, amplification, refraction, and attenuation of radio waves - addresses radiative transfer, astrophysical masers, radio propagation through ionized gas, Faraday rotation of polarized waves, scintillation (radio amplitude variations akin to the optical twinkling of stars), and radio propagation in the earth's atmosphere. Take your time with this chapter as the authors frequently return to these topics.

The remaining nine chapters offer a wide-ranging review of the radio universe and are more immediately accessible to a wider audience. The chapter titles are Galactic Continuum Radiation, The Interstellar Medium (ISM), Galactic Dynamics, Stars, Pulsars, Radio Galaxies and Quasars, Cosmology and the Cosmic Microwave Background (CMB), Cosmology: Discrete Radio Sources and Gravitational Lenses, and The Place of Radio in Astronomy.

Two Suggestions: I strongly urge the reader to stay the course with the first seven chapters as the later chapters require a basic understanding of radio observation methodologies, antenna temperature, radio brightness temperature, non-thermal radiation, 21 centimeter radiation, bremsstrahlung emission spectra, etc.

Also, a reader that is relatively new to radio astronomy will find it helpful to read at an early stage the three appendices: Appendix 1 - a concise review of Fourier transforms, intended as a review, not as a self-tutorial, Appendix 2 - a general overview of celestial coordinates , distance, and time, and Appendix 3 - a fascinating account of the origins of radio astronomy (1932 -1954).

38 of 47 people found the following review helpful.
Good book covering all fundamentals of radio astronomy
By A Customer
This is a most excellent introduction to Radio astronomy. The book is well layed out, has good explanations and provides many leads to further study. The book's contents are:
Radio telescopes as antennas. Signal detection and noise. Single-aperture raido telescopes. The two element interferometer. Aperture synthesis. The absorption, amplification, refraction and attenuation of radio waves. Galactic continuum radiation. The interstellar medium. Galactic Dynamics. Stars. Pulsars. Radio galaxies and quasars. Cosmology and the cosmic microwave background. Cosmology: discrete radio sources and gravitational lenses. The place of radio in astronomy.

3 of 3 people found the following review helpful.
For the physics-oriented. Radio telescopes, radio objects & emission, the ISM, & compact sources
By madbadgalaxyman
This book is well-written and the physical arguments are very clearly explained, so do ignore several ridiculous reviews that give this book a poor rating simply because a reviewer got a headache when she/he was trying to get his mind around the necessarily complex physical arguments that are presented in this astronomy+physics textbook.

This book is very valuable, because it gives you the necessary knowledge for understanding the radio data which is so common in the current literature of professional astronomy. Radio telescopes and the emission mechanisms of radio waves are concisely explained, without bamboozling the reader with too many pages of equations.
Moreover, this book describes, in substantial detail, many topics that are of enormous importance within modern astronomy; for instance, the Interstellar Medium, Galactic & extragalactic radio emission, radio galaxies, supernova remnants, and pulsars. And these are topics which often get minimal space in general textbooks on galaxies!

A large fraction of the universe is only accessible via radio observations, and it would seem that radio observations and data are, today, part of most every scientific paper that is written in astronomy and astrophysics..... therefore, familiarity with radio data is now absolutely essential for any person who wants to truly understand the universe.

This textbook was intended for graduate students and for people that have had substantial exposure to university math and physics, but much of it is accessible to people with only a smattering of maths and physics; the arguments are so clearly presented that a person with only pre-university maths and physics should able to understand large sections of it.

If you are a serious student of astrophysics, you can't do better than reading this book for getting clear explanations of the radio astronomy concepts and terminology that you will find in most of today's astrophysical papers.

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