This fully revised and updated text is a comprehensive introduction to astronomical objects and phenomena. By applying some basic physical principles to a variety of situations, students will learn how to relate everyday physics to the astronomical world. Starting with the simplest objects, the text contains thorough explanations of how and why astronomical phenomena occur, and how astronomers collect and interpret information about stars, galaxies and the Solar System. The text looks at the properties of stars, star formation and evolution; neutron stars and black holes; the nature of galaxies; and the structure of the universe. It examines the past, present and future states of the universe; and final chapters use the concepts that have been developed to study the Solar System and its formation; the possibility of finding other planetary systems; and the search for extraterrestrial life. This comprehensive text contains useful equations, chapter summaries, worked examples and end-of-chapter problem sets. It is suitable for undergraduate students taking a first course in astronomy, and assumes a basic knowledge of physics with calculus.

Marc L. Kutner obtained his doctorate in physics from Columbia University in 1972. He has been a Visiting Scientist in the Department of Astronomy at the University of Texas at Austin since 1998, prior to which he was Professor in the Department of Physics and Astronomy at the Rensselaer Polytechnic Institute, New York, and Visiting Scientist at the National Radio Observatory, Tucson, Arizona. His main area of research involves the use of radio astronomy to study of star formation in the Milky Way and other galaxies. He has also done some research in cosmology. Professor Kutner has published three successful textbooks and over one hundred research papers.
Astronomy: A Physical Perspective

Marc L. Kutner
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Abbreviations used in the figure credits

Figure credits are given in the captions. Abbreviations used are as follows.

2MASS Two Micron All Sky Survey
AUI Associated Universities Inc.
AURA Association of Universities for Research in Astronomy
Caltech California Institute of Technology
CFA Center for Astrophysics
ESA European Space Agency
ESO European Southern Observatory
GSFC ADF Goddard Space Flight Center Astrophysics Data Facility
HST Hubble Space Telescope
IFA Institute for Astronomy
IRAM Institut de Radioastronomie Millimétrique
ISO Infrared Space Observatory
JCBT James Clerk Maxwell Telescope
MIT Massachusetts Institute of Technology
MPIfR Max Planck Institut für Radioastronomie
NASA National Aeronautics and Space Administration
NM Tech New Mexico Institute of Mining and Technology
NOAA National Oceanographic and Atmospheric Administration
NOAO National Optical Astronomy Observatory (operated by AURA under contract with the NSF, all rights reserved)
NRAO National Radio Astronomy Observatory (operated by AUI, under contract with the NSF)
NSF National Science Foundation
ONR Office of Naval Research
SCUBA Submillimeter Common User Bolometer Array
STScI Space Telescope Science Institute (operated by AURA under contract with NASA)
UCLA University of California at Los Angeles
USGS US Geological Survey
The study of astronomy has blossomed in a variety of ways in the last decade of the 20th century. Every part of the electromagnetic spectrum has seen a revolution in observing techniques. While much of this has been on the ground, space-based observing has come into its own, as we are seeing the results of second and third generation space-based telescopes. These have provided sensitivity and clarity that have revolutionized all subfields in astronomy and created some new ones. These observational developments have been supplemented by massive improvements in computing power, allowing for the processing of large amounts of astronomical data, and the theoretical modeling of the results.

The most amazing aspect of all of this progress is that we can still provide reasonable answers to the naive question, 'How does it all work?' As our astronomical horizon expands, we can still use familiar physics to explain the wealth of phenomena. Even when the explanation at the research level requires a complex application of certain physical laws, there is usually still a way of understanding the phenomena based on introductory level physics. Perhaps this is just the realization that the laws of physics are small in number but apply universally. There are a few exceptions, where the astronomical problems help drive back the frontiers of physics, but these can be explained in more familiar terms.

This book is the successor to Astronomy: a Physical Perspective, published by Wiley in 1986. I am grateful to the loyal audience that book developed, and for their encouragement to work on this new version.

I am grateful to Simon Mitton at Cambridge University Press, who shared my view that a 'higher level' book could still be visually attractive. I am also grateful to Jacqueline Garget, who believed in this project, seeing it through a few rough early reviews to its completion. At every stage, she always knew exactly how to answer my email questions to keep me going.

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Preface
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