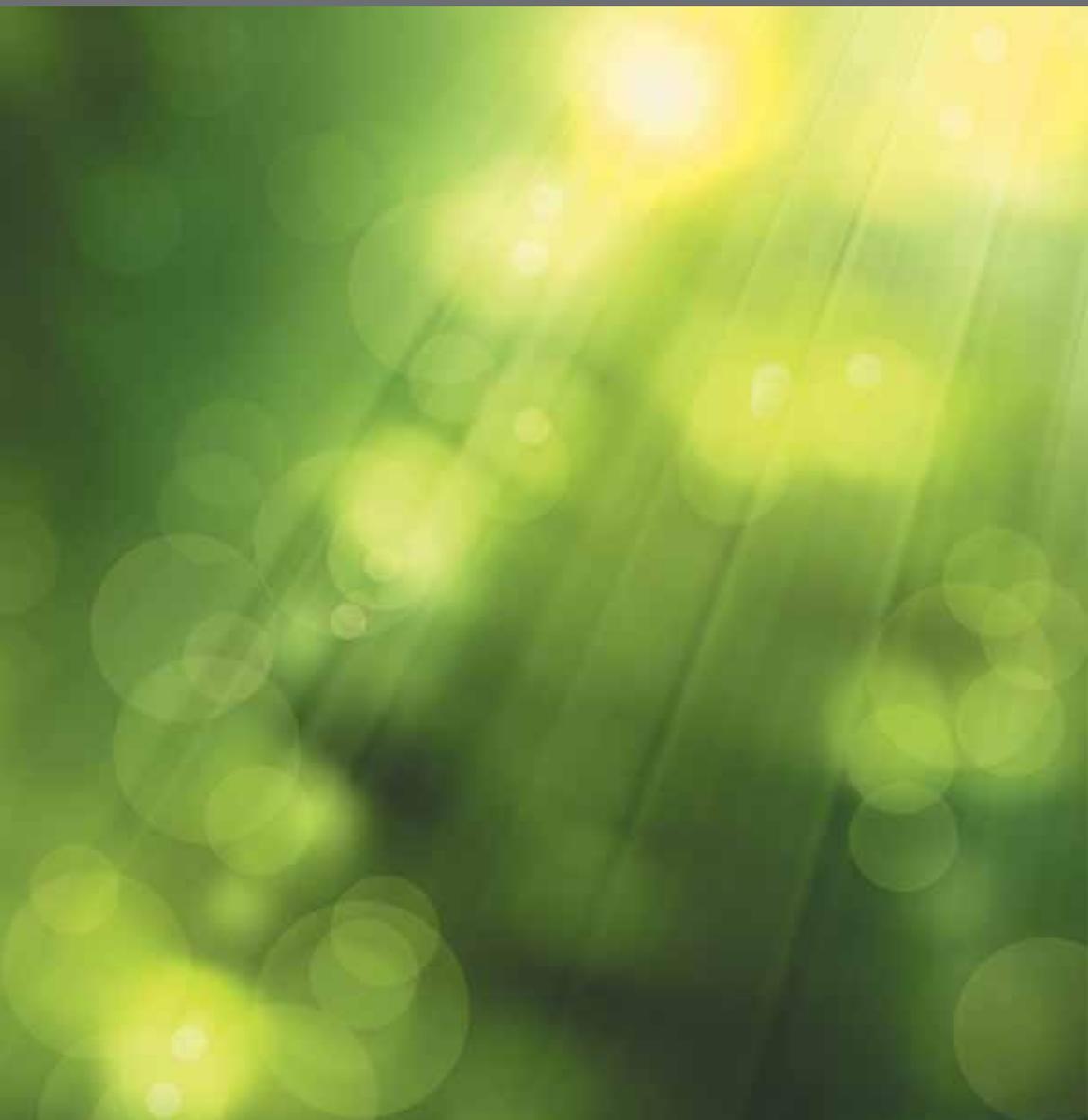


Physics & Astrophysics 2013



1 in a nutshell
2 princeton frontiers in physics
3 textbooks
7 astronomy & astrophysics
10 princeton series in astrophysics
12 physics
15 princeton series in physics
16 quantum physics

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18 mathematics, mathematical physics
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29 index | order form

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This unique textbook provides an accessible introduction to Einstein's general theory of relativity, a subject of breathtaking beauty and supreme importance in physics. With his trademark blend of wit and incisiveness, A. Zee guides readers from the fundamentals of Newtonian mechanics to the most exciting frontiers of research today.

A. Zee is professor of physics at the Kavli Institute for Theoretical Physics at the University of California, Santa Barbara.

June 2013. 696 pages. 50 halftones. 150 line illus.
Cl: 978-0-691-14558-7 \$95.00 | £65.00

Also by A. Zee
Second Edition
Quantum Field Theory in a Nutshell

See page 16 for details.

New
Classical Electromagnetism in a Nutshell
Anupam Garg



"Garg demonstrates that while the mathematical beauty of his subject is deserving of the attention it gets, the physical implications are even more seductive. This book is a treasure trove of thoughtful and incisive nuggets.

I expect to see it on the shelves of many students and professors the world over."

—R. Shankar, Yale University

This graduate-level physics textbook provides a comprehensive treatment of the basic principles and phenomena of classical electromagnetism. While many electromagnetism texts use the subject to teach mathematical methods of physics, here the emphasis is on the physical ideas themselves.

Anupam Garg is professor of physics and astronomy at Northwestern University.

2012. 712 pages. 52 halftones. 122 line illus.
Cl: 978-0-691-13018-7 \$99.50 | £69.95



Elementary Particle Physics in a Nutshell

Christopher G. Tully

"*Elementary Particle Physics in a Nutshell* gives the starting student or seasoned practitioner the substance and style of LHC physics while also giving the development of the Standard Model its due. The author has been painstaking in the exposition of paradoxes that are not normally discussed in texts at this level. A superb book."

—Peter Fisher, Massachusetts Institute of Technology

2011. 320 pages. 6 halftones. 129 line illus.
Cl: 978-0-691-13116-0 \$75.00 | £52.00

String Theory in a Nutshell

Elias Kiritsis

"An excellent reference for any graduate student interested in string theory. Kiritsis succinctly describes many of the recent developments that are necessary background to current research."

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2007. 608 pages. 18 halftones. 44 line illus. 7 tables.
Cl: 978-0-691-12230-4 \$85.00 | £59.00

Not for sale in South Asia

Quantum Mechanics in a Nutshell

Gerald D. Mahan

See page 16 for details.

Also by Gerald D. Mahan

Condensed Matter in a Nutshell

See page 17 for details.

Statistical Mechanics in a Nutshell

Luca Peliti

"Peliti's *Statistical Mechanics in a Nutshell* is a fantastic reference for those who know the subject, teach it, or need a quick technical reminder."

—*Physics Today*

2011. 416 pages. 74 line illus. 6 tables.
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Winner of the 2009 Chambliss Astronomical Writing Award, American Astronomical Society

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Dan Maoz

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—Avi Loeb, Harvard University

2007. 272 pages. 21 halftones. 68 line illus.
Cl: 978-0-691-12584-8 \$75.00 | £52.00

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Carlos A. Bertulani

"If you are looking for a text that provides the core material needed by graduate and advanced undergraduate students of physics to acquire a solid understanding of nuclear and particle science, you do not have to look further, for *Nuclear Physics in a Nutshell* is the definitive new resource."

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What Are Gamma-Ray Bursts?

Joshua S. Bloom

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—Neil Gehrels, NASA Goddard Space Flight Center

"This book gives a balanced and up-to-date overview of the field of gamma-ray bursts, one that will be useful for astronomers, physicists, and other scientists. Until now, there have been no books that I know of that deal with this subject for a broader audience of scientists and educated lay people."

—Ralph A.M.J. Wijers, University of Amsterdam

2011. 272 pages. 27 line illus.

Pa: 978-0-691-14557-0 \$28.95 | £19.95

Cl: 978-0-691-14556-3 \$85.00 | £59.00



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"[E]ngaging, fast-paced.... Loeb's infectious excitement stirs desire to join him in these endeavors.... [R]eaders will find *How Did the First Stars and Galaxies Form?* a lucid introduction to an exciting research field that is set to flourish in the next decades."

—*Science*

"Anyone interested in an introduction to this dramatic story, be they academic or educated nonprofessional, would do well to start with Loeb's book. It contains only the most important equations in the field, and its general level of mathematical sophistication is compatible with introductory courses in calculus or mathematical physics. This small book is a gem belonging to an almost extinct genre: intermediate-level monographs that are both accessible to educated non-specialists in the field and tightly focused on a problem."

—Milan M. Ćirković, *American Journal of Physics*

2010. 216 pages. 14 halftones. 17 line illus.

Pa: 978-0-691-14516-7 \$27.95 | £19.95



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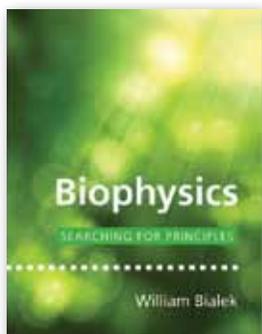
How Do Stars Die?

Robert P. Kirshner

Can the Laws of Physics Be Unified?

A. Zee

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New

Biophysics

Searching for Principles

William Bialek

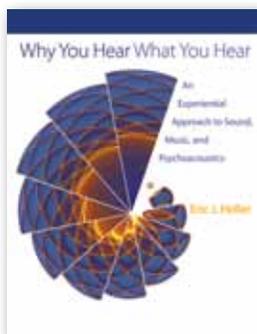
“This book is full of insights that were new to me. It explores myriad questions that are both deep background themes in biology, and also fascinating to physicists. Bialek is a dean of this field, and an inspiring teacher.”

—Philip Nelson, University of Pennsylvania

Interactions between the fields of physics and biology reach back over a century, and some of the most significant developments in biology—from the discovery of DNA’s structure to imaging of the human brain—have involved collaboration across this disciplinary boundary. For a new generation of physicists, the phenomena of life pose exciting challenges to physics itself, and biophysics has emerged as an important subfield of this discipline. Here, William Bialek provides the first graduate-level introduction to biophysics aimed at physics students.

William Bialek is the John Archibald Wheeler/Battelle Professor in Physics at Princeton University, where he is also a member of the multidisciplinary Lewis-Sigler Institute for Integrative Genomics, and is Visiting Presidential Professor of Physics at the Graduate Center of the City University of New York.

2012. 640 pages. 62 color illus. 15 halftones. 141 line illus. 1 table.
Cl: 978-0-691-13891-6 \$95.00 | £65.00



New

Why You Hear What You Hear

An Experiential Approach to Sound, Music, and Psychoacoustics

Eric J. Heller

“Rich in explanations and do-it-yourself activities, and assuming only a high school background, this is the best text I know on how sound actually works. But what makes this book truly a treasure is the degree to which it is so fully informed by Heller’s particular scientific genius: he shows by example after example how to think through complex and nonlinear systems to capture their essential features, leading to deep, novel, and practically applicable insights.”

—David Politzer, Nobel Laureate in Physics

Why You Hear What You Hear is the first book on the physics of sound for the nonspecialist to empower readers with a hands-on, ears-open approach that includes production, analysis, and perception of sound. The book makes possible a deep intuitive understanding of many aspects of sound, as opposed to the usual approach of mere description. This goal is aided by hundreds of original illustrations and examples, many of which the reader can reproduce and adjust using the same tools used by the author. Readers are positioned to build intuition by participating in discovery.

Eric J. Heller is the Abbott and James Lawrence Professor of Chemistry and Professor of Physics at Harvard University.

2013. 624 pages. 397 color illus.
Cl: 978-0-691-14859-5 \$99.50 | £69.95

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Forthcoming

Topological Insulators and Topological Superconductors

B. Andrei Bernevig

With Taylor L. Hughes

"This excellent book introduces a relatively new topic in condensed matter physics. The material is well developed and sufficient detail is given for students to follow arguments and derivations. With a hands-on, no-nonsense approach, *Topological Insulators and Topological Superconductors* will be a mainstay in the field for years to come."
—Marcel Franz, University of British Columbia

"*Topological Insulators and Topological Superconductors* deals with a very exciting subject that has become the focus of research in recent years. Bernevig and Hughes have made some of the most important theoretical contributions to this young field and this timely volume will have significant staying power. It will be of great interest to condensed matter physicists, high energy and string theorists, and mathematicians."
—Eduardo Fradkin, University of Illinois at Urbana-Champaign

This graduate-level textbook is the first pedagogical synthesis of the field of topological insulators and superconductors, one of the most exciting areas of research in condensed matter physics. Presenting the latest developments, while providing all the calculations necessary for a self-contained and complete description of the discipline, it is ideal for graduate students and researchers preparing to work in this area, and it will be an essential reference both within and outside the classroom.

B. Andrei Bernevig is the Eugene and Mary Wigner Assistant Professor of Theoretical Physics at Princeton University. Taylor Hughes is an assistant professor in the condensed matter theory group at the University of Illinois, Urbana-Champaign.

April 2013. 288 pages. 66 line illus. 1 table.
Cl: 978-0-691-15175-5 \$80.00 | £55.00



Forthcoming

The First Galaxies in the Universe

Abraham Loeb & Steven R. Furlanetto

"Loeb and Furlanetto have produced a marvelous text. The coverage is comprehensive, the selection of figures and illustrations is very judicious, and whenever key concepts are introduced, the authors explain them using simplified back-of-the-envelope derivations. *The First Galaxies in the Universe* will be peerless for quite a while, and will inspire young people to enter this exciting field at a time when the pace of discovery is heating up."
—Volker Bromm, University of Texas, Austin

This book provides a comprehensive, self-contained introduction to one of the most exciting frontiers in astrophysics today: the quest to understand how the oldest and most distant galaxies in our universe first formed. Until now, most research on this question has been theoretical, but the next few years will bring about a new generation of large telescopes that promise to supply a flood of data about the infant universe during its first billion years after the big bang. This book bridges the gap between theory and observation. It is an invaluable reference for students and researchers on early galaxies.

Abraham Loeb is Frank B. Baird, Jr. Professor of Science, chair of the Astronomy Department, and director of the Institute for Theory and Computation at Harvard University. Steven R. Furlanetto is associate professor of physics and astronomy at the University of California, Los Angeles.

Princeton Series in Astrophysics

February 2013. 568 pages. 32 color illus. 24 halftones. 152 line illus. 6 tables.

Pa: 978-0-691-14492-4 \$80.00 | £55.00
Cl: 978-0-691-14491-7 \$130.00 | £90.00

Forthcoming

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Kerry H. Cook

"Climate change and its impacts are being embraced by a wider community than just earth scientists. A useful textbook, *Climate Dynamics* covers the basic science required to gain insights into what constitutes the climate system and how it behaves. While still being quantitative, the material is written in a lecture-note style that creates a simplified, but not simple, approach to teaching this complex subject."

—Chris E. Forest, Pennsylvania State University

Climate Dynamics is an advanced undergraduate-level textbook that provides an essential foundation in the physical understanding of the earth's climate system. The book assumes no background in atmospheric or ocean sciences and is appropriate for any science or engineering student who has completed two semesters of calculus and one semester of calculus-based physics.

Describing the climate system based on observations of the mean climate state and its variability, the first section of the book introduces the vocabulary of the field, the dependent variables that characterize the climate system, and the typical approaches taken to display these variables. The second section of the book gives a quantitative understanding of the processes that determine the climate state—radiation, heat balances, and the basics of fluid dynamics. Applications for the atmosphere, ocean, and hydrological cycle are developed in the next section, and the last three chapters of the book directly address global climate change. Throughout, the textbook makes connections between mathematics and physics in order to illustrate the usefulness of mathematics, particularly first-year calculus, for predicting changes in the physical world.

Kerry H. Cook is a professor in the Department of Geological Sciences at the Jackson School of Geosciences at the University of Texas, Austin.

April 2013. 248 pages. 81 halftones. 38 line illus. 7 tables.
Cl: 978-0-691-12530-5 \$65.00 | £44.95



New

Philosophy of Physics

Space and Time

Tim Maudlin

"Maudlin adroitly guides readers through the mathematical, physical, and philosophical subtleties of Newtonian physics and special and general relativity.... A major contribution."

—David Wallace, University of Oxford

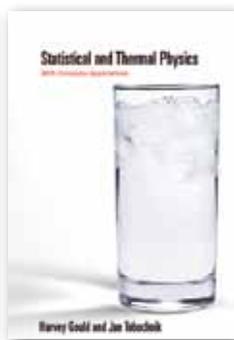
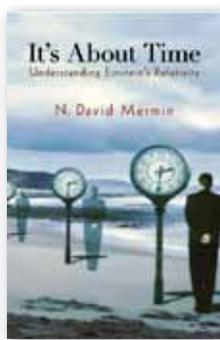
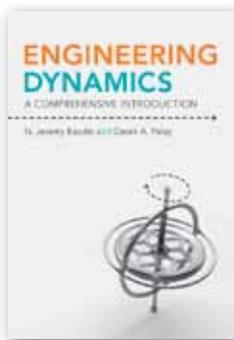
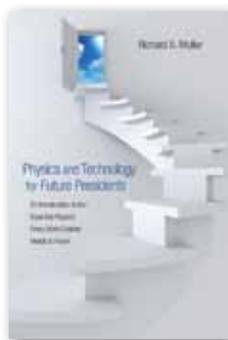
This concise book introduces nonphysicists to the core philosophical issues surrounding the nature and structure of space and time, and is also an ideal resource for physicists interested in the conceptual foundations of space-time theory.

Tim Maudlin's broad historical overview examines Aristotelian and Newtonian accounts of space and time, and traces how Galileo's conceptions of relativity and space-time led to Einstein's special and general theories of relativity. Maudlin explains special relativity using a geometrical approach, emphasizing intrinsic space-time structure rather than coordinate systems or reference frames. He gives readers enough detail about special relativity to solve concrete physical problems while presenting general relativity in a more qualitative way, with an informative discussion of the geometrization of gravity, the bending of light, and black holes. Additional topics include the Twins Paradox, the physical aspects of the Lorentz-FitzGerald contraction, the constancy of the speed of light, time travel, the direction of time, and more.

Tim Maudlin is professor of philosophy at New York University.

Princeton Foundations of Contemporary Philosophy

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Translated by Emmanuel Kowalski

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—*Current Engineering Practice*

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Heart of Darkness

Unraveling the Mysteries of the Invisible Universe

Jeremiah P. Ostriker & Simon Mitton

"If you want a clear and fair assessment of the astonishing recent progress in understanding the cosmos—and of the mysteries that remain to be addressed—then this is the book for you. Ostriker and Mitton write with authority, and with style as well."

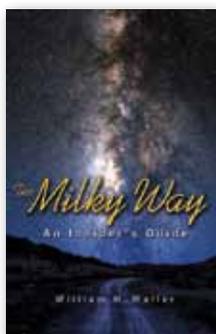
—Martin Rees, Master of Trinity College, University of Cambridge, and Astronomer Royal

Heart of Darkness describes the incredible saga of humankind's quest to unravel the deepest secrets of the universe. Over the past thirty years, scientists have learned that two little-understood components—dark matter and dark energy—comprise most of the known cosmos, explain the growth of all cosmic structure, and hold the key to the universe's fate. The story of how evidence for the so-called "Lambda–Cold Dark Matter" model of cosmology has been gathered by generations of scientists throughout the world is told here by one of the pioneers of the field, Jeremiah Ostriker, and his coauthor Simon Mitton.

Jeremiah P. Ostriker is professor of astrophysical sciences at Princeton University. Simon Mitton is an affiliated research scholar in the history and philosophy of science and a fellow of St. Edmund's College, University of Cambridge.

Science Essentials

February 2013. 328 pages. 16 color illus. 40 halftones.
Cl: 978-0-691-13430-7 \$27.95 | £19.95



Forthcoming

The Milky Way

An Insider's Guide

William H. Waller

"*The Milky Way* takes readers on a nontechnical journey through our Galaxy, and strikes a nice balance between the personal, the poetic, and the educational—it also moves at a good pace. Waller communicates the true wonder of nature, but he is also quite thorough and deep in his coverage of the latest science."

—Mark Whittle, University of Virginia

This book offers an intimate guide to the Milky Way, taking readers on a grand tour of our home Galaxy's structure, genesis, and evolution, based on the latest astronomical findings. In engaging language, it tells how the Milky Way congealed from blobs of gas and dark matter into a spinning starry abode brimming with diverse planetary systems—some of which may be hosting myriad life forms and perhaps even other technologically communicative species.

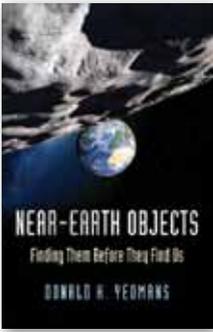
William Waller makes the case that our very existence is inextricably linked to the Galaxy that spawned us. Through this book, readers can become well-informed galactic "insiders"—ready to imagine humanity's next steps as fully engaged citizens of the Milky Way.

William H. Waller is an astronomer, science educator, and writer.

May 2013. 296 pages. 32 color illus. 44 halftones. 49 line illus. 2 tables.
Cl: 978-0-691-12224-3 \$29.95 | £19.95



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New

Near-Earth Objects

Finding Them Before They Find Us

Donald K. Yeomans

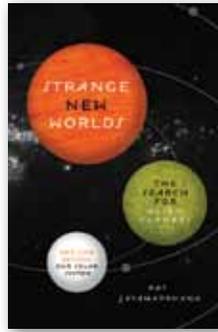
"This is a wonderful and timely book, not to mention a great read! Asteroids are indeed wondrous objects, and it is simply a matter of time before we find one with our address on it. Yeomans's unparalleled expertise, storytelling skills, and wry sense of humor are a savory delight. Enjoy!"

—Rusty Schweickart, *Apollo 9* astronaut

Of all the natural disasters that could befall us, only an Earth impact by a large comet or asteroid has the potential to end civilization in a single blow. Yet these near-Earth objects also offer tantalizing clues to our solar system's origins, and someday could even serve as stepping-stones for space exploration. In this book, Donald Yeomans introduces readers to the science of near-Earth objects—its history, applications, and ongoing quest to find near-Earth objects before they find us.

Donald K. Yeomans is a fellow and senior research scientist at the Jet Propulsion Laboratory, where he is manager of NASA's Near-Earth Object Program Office and supervisor of the Solar System Dynamics Group.

2012. 192 pages. 20 halftones. 19 line illus. 6 tables.
Cl: 978-0-691-14929-5 \$24.95 | £16.95



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—Chris Tinney, *Nature*

In *Strange New Worlds*, renowned astronomer Ray Jayawardhana brings news from the front lines of the epic quest to find planets—and alien life—beyond our solar system. Only in the past two decades, after millennia of speculation, have astronomers discovered planets around other stars—thousands in fact. Now they are closer than ever to unraveling distant twins of the Earth. Jayawardhana vividly tells the stories of the scientists and the remarkable breakthroughs that have ushered in this extraordinary age of exploration.

Ray Jayawardhana is professor and Canada Research Chair in Observational Astrophysics at the University of Toronto, as well as an award-winning science writer.

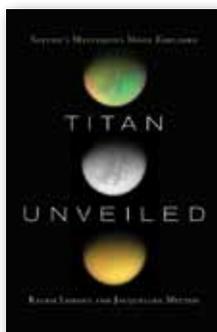
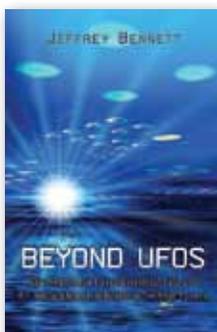
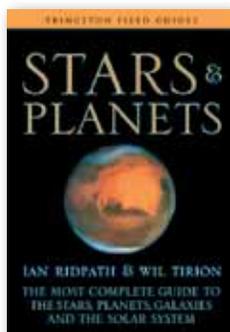
May 2013. 280 pages. 3 halftones. 25 line illus. 4 tables.

Pa: 978-0-691-15807-5 \$17.95 | £12.50

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David A. Weintraub

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—Michael Brooks, *New Scientist*

"Telling the story of how one fundamental scientific question has developed over the last 2,000 years of human history is a daunting task. Yet it's one that David Weintraub has risen to admirably."

—Alastair Gunn, *BBC Sky at Night Magazine*

David A. Weintraub is professor of astronomy at Vanderbilt University.

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—*Science News*

Princeton Field Guides

2008. 400 pages. 300 color illus.
Pa: 978-0-691-13556-4 \$19.95 | £13.95
For sale only in North America and the Philippines

Winner of the 2010 Eric Hoffer Book Award, *US Review of Books*
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Nautilus Book Awards
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American Astronomical Society

With a new afterword by the author

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Pa: 978-0-691-14988-2 \$18.95 | £12.95
Cl: 978-0-691-13549-6 \$26.95 | £18.95

With a new afterword by the authors

Titan Unveiled

Saturn's Mysterious Moon Explored

Ralph Lorenz & Jacqueline Mitton

"An engrossing firsthand account of one of humankind's greatest adventures of recent years."

—Fred Taylor, *American Scientist*

2010. 288 pages. 19 color illus. 71 halftones. 21 line illus. 2 tables.
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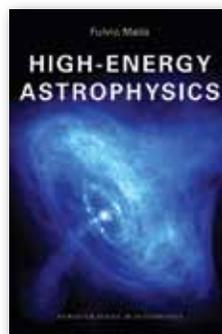
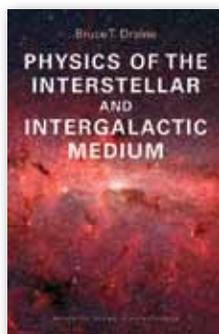
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David Merritt is professor of physics at the Rochester Institute of Technology.

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See page 4 for details.

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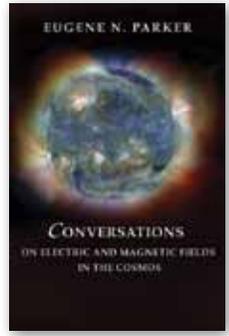
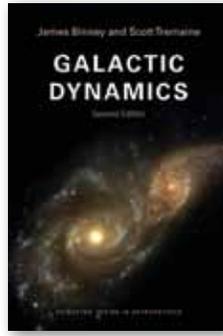
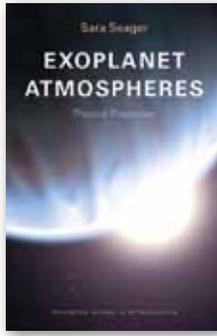
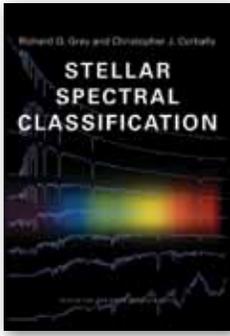
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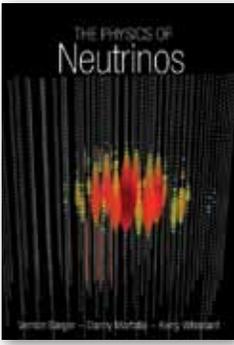
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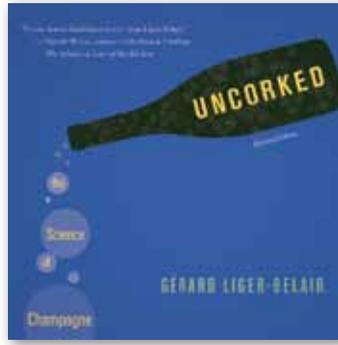
Vernon Barger, Danny Marfatia & Kerry Whisnant

"This book provides a comprehensive snapshot of the current state of neutrino physics, and is a useful reference for particle physicists and astrophysicists who are interested in learning what has been going on in the field. All three authors have played a major role in advancing our understanding of neutrino physics, and are very well positioned to write a book on the subject."
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The physics of neutrinos—uncharged elementary particles that are key to helping us better understand the nature of our universe—is one of the most exciting frontiers of modern science. This book provides a comprehensive overview of neutrino physics today and explores promising new avenues of inquiry that could lead to future breakthroughs.

Vernon Barger is professor of physics at the University of Wisconsin—Madison. Danny Marfatia is associate professor of physics at the University of Kansas. Kerry Whisnant is professor of physics at Iowa State University.

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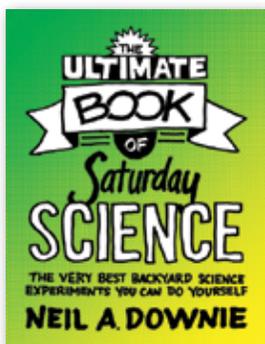
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Gérard Liger-Belair is a physics professor at the University of Reims, located in the Champagne region of France.

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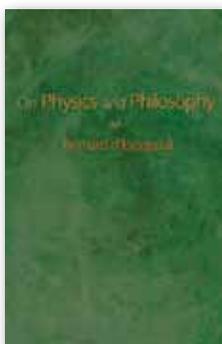
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Neil A. Downie is a lead scientist with Air Products and Chemicals, Inc., and visiting professor of multidisciplinary engineering at the University of Surrey.

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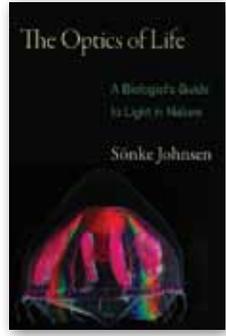
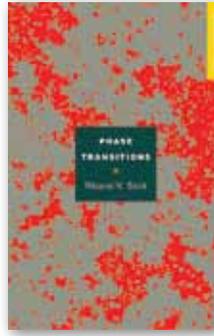
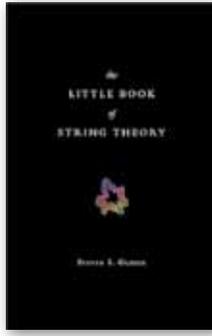
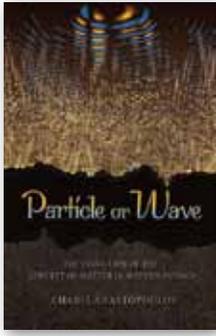
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Bernard d'Espagnat is professor emeritus of physics at the University of Paris-Orsay, where he was director of the Laboratoire de Physique Théorique et Particules Élémentaires (Laboratory of Theoretical Physics and Elementary Particles) from 1970 to 1987.

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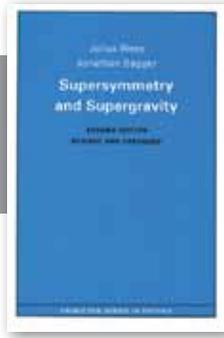
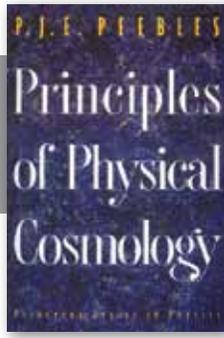
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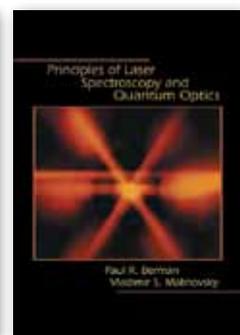
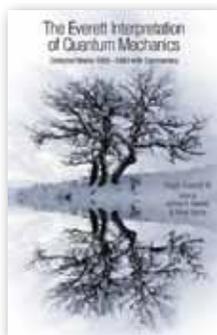
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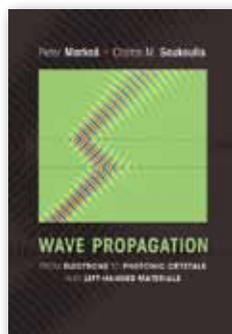
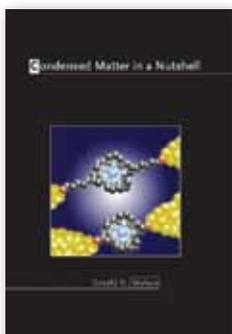
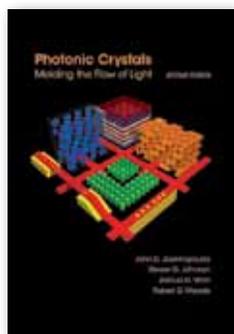
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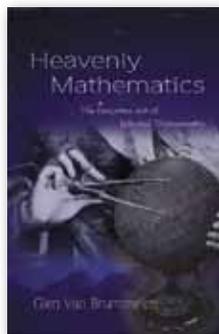
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Daniel L. Stein is professor of physics and mathematics at New York University's Courant Institute of Mathematical Sciences. Charles M. Newman is professor of mathematics at NYU's Courant Institute of Mathematical Sciences.

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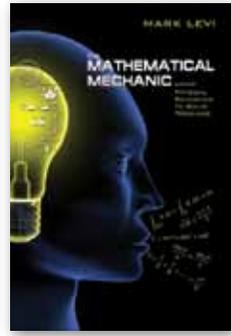
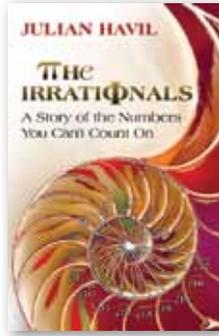
—David J. Helfand, president of the American Astronomical Society

Glen Van Brummelen is coordinator of mathematics and the physical sciences at Quest University Canada and president of the Canadian Society for History and Philosophy of Mathematics.

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Dana Mackenzie is a frequent contributor to *Science*, *Discover*, and *New Scientist*.

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Julian Havil is a retired former master at Winchester College, England, where he taught mathematics for more than three decades.

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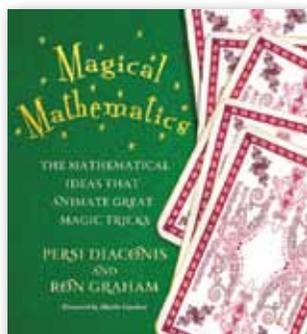
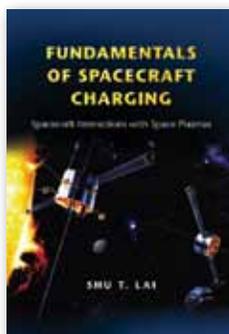
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Amy N. Langville is associate professor of mathematics at the College of Charleston. Carl D. Meyer is professor of mathematics at North Carolina State University.

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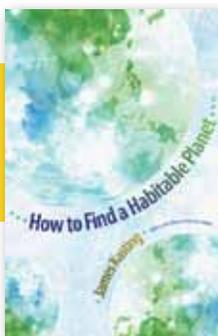
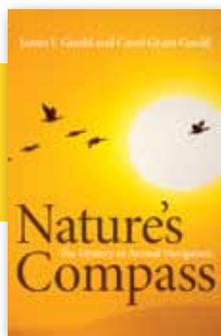
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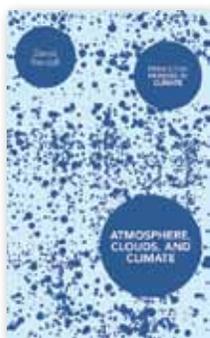
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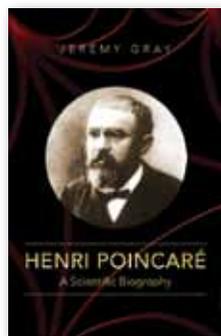
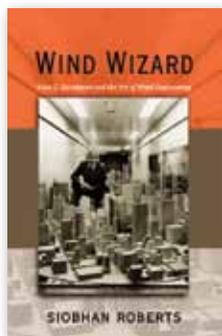
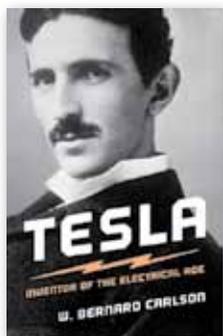
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W. Bernard Carlson is professor of science, technology, and society in the School of Engineering and Applied Science and professor of history at the University of Virginia.

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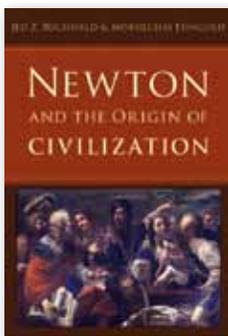
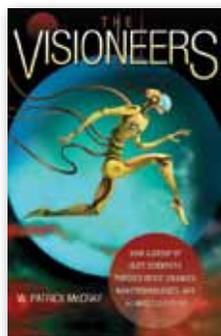
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Jed Z. Buchwald is the Doris and Henry Dreyfuss Professor of History at the California Institute of Technology. Mordechai Feingold is professor of history at the California Institute of Technology.

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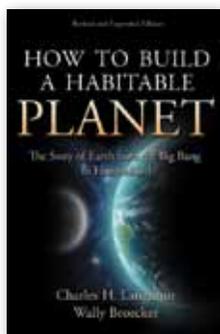
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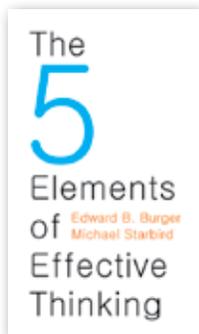


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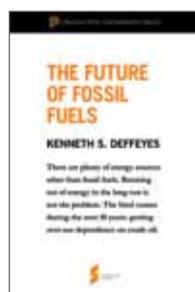
Edward B. Burger is the Francis Christopher Oakley Third Century Professor of Mathematics at Williams College, an educational and business consultant, and a former vice provost at Baylor University. Michael Starbird is University Distinguished Teaching Professor at The University of Texas at Austin and an educational and business consultant.

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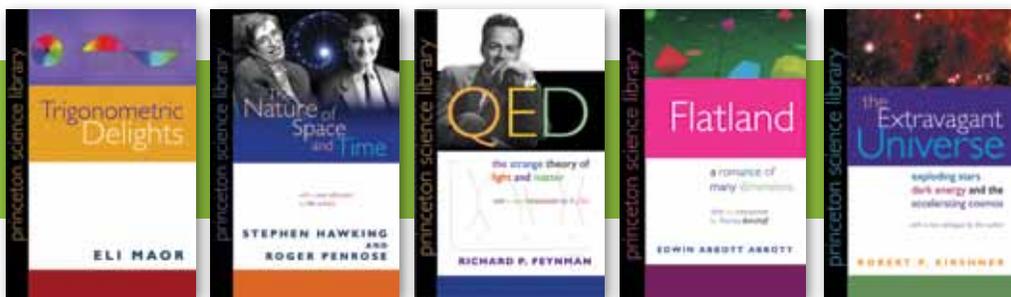
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