

# The Accelerating Universe Infinite Expansion The Cosmological Constant And The Beauty Of The Cosmos

MercuryWelcome to the UniverseYour Place in the UniverseHow to Live ForeverSpacecraft for AstronomyElementary CosmologyTime and the Shape of HistoryBlack Bodies and Quantum CatsThe Wraparound UniverseThe Accelerating UniverseUnconditional LifeHow to Clone the Perfect BlondeThe Cosmic Mystery TourFormal Ontology and Conceptual RealismInfinity, Faith, and TimeLiving Simply AbundantOur UniverseThe Expanding Worlds of General RelativityDiscovering the Essential Universe, Second EditionThe expanding universeBrilliant BlundersThe Whole ShebangContemporary AuthorsThe Infinite CosmosThe Universe WithinPhysical Foundations of CosmologyIntroduction to CosmologyLectures on General Relativity, Cosmology and Quantum Black HolesBlack Holes and the UniverseThe Beginning and the End of EverythingThe Extravagant UniverseA Universe from NothingThe CosmosThe Universe Is Expanding and So Am IThe Expanding Universels God a Mathematician?Many Worlds in OneEndless UniverseGod's EquationSupernovae and Gamma-Ray Bursters

**Mercury**

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Two world-renowned scientists present an audacious new vision of the cosmos that “steals the thunder from the Big Bang theory.” —Wall Street Journal The Big Bang theory—widely regarded as the leading explanation for the origin of the universe—posits that space and time sprang into being about 14 billion years ago in a hot, expanding fireball of nearly infinite density. Over the last three decades the theory has been repeatedly revised to address such issues as how galaxies and stars first formed and why the expansion of the universe is speeding up today. Furthermore, an explanation has yet to be found for what caused the Big Bang in the first place. In *Endless Universe*, Paul J. Steinhardt and Neil Turok, both distinguished theoretical physicists, present a bold new cosmology. Steinhardt and Turok “contend that what we think of as the moment of creation was simply part of an infinite cycle of titanic collisions between our universe and a parallel world” (Discover). They recount the remarkable developments in astronomy, particle physics, and superstring theory that form the basis for their groundbreaking “Cyclic Universe” theory. According to this theory, the Big Bang was not the beginning of time but the bridge to a past filled with endlessly repeating cycles of evolution, each accompanied by the creation of new matter and the formation of new galaxies, stars, and planets. *Endless Universe* provides answers to longstanding problems with the Big Bang model, while offering a provocative new view of both the past and the future of the cosmos. It is a “theory that could solve the cosmic mystery” (USA Today).

## **Welcome to the Universe**

A new edition of Freeman's briefest astronomy text providing just the essentials at a student-friendly price.

## **Your Place in the Universe**

Describes the scientific research that led to the discovery of the accelerating expansion of the universe, the discovery and measurement of the dark energy that causes cosmic acceleration, and the implications of these findings in terms of modern physics and cosmology.

## **How to Live Forever**

What shape is the universe? Is it curved and closed in on itself? Is it expanding? Where is it headed? Could space be wrapped around itself, such that it produces ghost images of faraway galaxies? Such are the questions posed by Jean-Pierre Luminet in *The Wraparound Universe*, which he then addresses in clear and accessible language. An expert in black holes and the big bang, he leads us on a voyage through the surprising byways of space-time, where possible topologies of the universe, explorations of the infinite, and cosmic mirages combine their mysterious traits and unlock the imagination. *The Wraparound Universe* is a general-audience book about the overall topology or shape of the universe. The central question addressed is whether it is possible that the universe is wrapped around in an

interesting way, and what impact this would have on astronomical observations and our understanding of cosmology. Along the way many of the general features and much of the history of the modern picture of cosmology are discussed.

## **Spacecraft for Astronomy**

From time immemorial, poets and philosophers have looked in awe and wonder at the Universe. Such awe is shared by astrophysicists, too, as they seek to understand its nature, and whether it has any limits. In *The Infinite Cosmos*, Joseph Silk, Savilian Professor of Astronomy at Oxford University, cosmologist and well-known science writer, brings together the modern understanding of the Universe, its structure, its evolution, and its possible fate, combining the latest from theory and observation. The narrative is peppered with quotations from literature and philosophy, and reflects, too, on the process of scientific discovery, and the implications of our discoveries.

## **Elementary Cosmology**

Bestselling author and astrophysicist Mario Livio examines the lives and theories of history's greatest mathematicians to ask how—if mathematics is an abstract construction of the human mind—it can so perfectly explain the physical world. Nobel Laureate Eugene Wigner once wondered about “the unreasonable effectiveness of mathematics” in the formulation of the laws of nature. Is God a

Mathematician? investigates why mathematics is as powerful as it is. From ancient times to the present, scientists and philosophers have marveled at how such a seemingly abstract discipline could so perfectly explain the natural world. More than that—mathematics has often made predictions, for example, about subatomic particles or cosmic phenomena that were unknown at the time, but later were proven to be true. Is mathematics ultimately invented or discovered? If, as Einstein insisted, mathematics is “a product of human thought that is independent of experience,” how can it so accurately describe and even predict the world around us? Physicist and author Mario Livio brilliantly explores mathematical ideas from Pythagoras to the present day as he shows us how intriguing questions and ingenious answers have led to ever deeper insights into our world. This fascinating book will interest anyone curious about the human mind, the scientific world, and the relationship between them.

## **Time and the Shape of History**

Presents a history of astronomical instruments such as space telescopes and probes as well as related scientific concepts and brief biographies of important individuals.

## **Black Bodies and Quantum Cats**

The past decade has seen a considerable surge of interest in historical and philosophical studies of gravitation and relativity, due not only to the

tremendous amount of world-wide research in general relativity and its theoretical and observational consequences, but also to an increasing awareness that a collaboration between working scientists, historians and philosophers of science is, in this field, particularly promising for all participants. The expanding activity in this field is well documented by recent volumes in this Einstein Studies series on the History of General Relativity as well as by a series of international conferences on this topic at Osgood Hill (1986), Luminy (1988), and Pittsburgh (1991). The fourth of these conferences, hosted by the Max Planck Institute for the History of Science, was held in Berlin from 31 July to 3 August 1995, with a record attendance of some 80 historians and philosophers of science, physicists, mathematicians, and astronomers. Based on presentations at the Berlin conference, this volume provides an overview of the present state of research in this field, documenting not only the increasing scope of recent investigations in the history of relativity and gravitation but also the emergence of several key issues that will probably remain at the focus of debate in the near future.

RELATIVITY IN THE MAKING The papers of this section deal with the origins and genesis of relativity theory.

## **The Wraparound Universe**

Since the dawn of mankind, observers of the sky have wondered at the sudden appearance of new stars on the seemingly unchanging heavens and, for at least 2000 years, have recorded these phenomena in their annals and archives. Even in more modern times,

since the discovery of SN1885A in S Andromeda which figured in the important “island universe” discussions of the 1920’s, the puzzle of supernovae (SNe) has played an important role in astrophysics. Only with the seminal work of Fritz Zwicky and Walter Baade in the 1930’s did we begin to understand the differences between novae and SNe and the importance of SNe as the fonts of energy for the interstellar medium and as drivers of chemical evolution in galaxies. As recently as the 1940’s and 1950’s the early days of radio astronomy were heavily influenced by the familiar names of Cassiopeia A and Taurus A, two young supernova remnants, and two Nobel prizes have been awarded for discovery and study of a related phenomenon, pulsars. In spite of the great age of the study of SNe, since at least the Chinese records of SN185 and probably earlier, the field is, in fact, very young having only attracted a large devoted following since the spectacular Type II SN1987A in the Large Magellanic Cloud, the first naked-eye SN in more than 400 years.

## **The Accelerating Universe**

Whilst general relativity is not complex in its formulation, the physical interpretation of its mathematical descriptions gives rise to a range of exciting consequences in cosmology. A detailed understanding of general relativity is therefore a prerequisite for students wishing to pursue further courses or commence research projects in cosmology and its various captivating subfields including black holes and gravitational waves. This is not a book on

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general relativity per se and the author's treatment of this fundamental topic is concise, with the required differential geometry summarized in an appendix. Instead, the primary goal of this book is to allow students to understand in a critical way two pillars of modern theoretical physics: inflationary theory, and quantum black holes and the information-loss problem. Accordingly, the book extensively introduces black holes and cosmology before proceeding to the important issues found in inflation and the information-loss problem. Other important topics discussed in detail include the cosmological constant and its relation to dark energy and an introduction to quantum field theory on curved backgrounds. Including numerous exercise problems, the material provides a single rigorous text for advanced students in theoretical physics and mathematics requiring an introduction to the implications and interpretation of general relativity in areas of cosmology. Readers of this text will be well prepared to follow the theoretical developments in the field and undertake research projects as part of an MSc or PhD programme.

## **Unconditional Life**

Using Einstein's theories to explain the most recent contributions of cosmology, the author celebrates the great physicist through his research and personal correspondence, arguing that his work stands at the center of the search for the origins of the universe.

## **How to Clone the Perfect Blonde**

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Want to travel back in time to your high school prom? Wish your brain had a "hard drive" that remembered all of your appointments? Wouldn't you love to have a permanent size 6 figure? Why can't robots make your bed every morning? Believe it or not, these questions aren't as far-fetched as they sound. In *How to Clone the Perfect Blonde*, award-winning journalist Sue Nelson and Richard Hollingham show how cutting-edge science has the power to make all of your wildest dreams come true. Through ironic "instructions" on "How to Turn Back Time," "How to Build a Robotic Servant," and other fantasies, they offer an up-to-the-minute exploration of time travel, robotics, teleportation, cyborgs, cloning, gene therapy, and other scientific mysteries. Every page brings fresh and new scientific insights. In the chapter explaining "How to Shorten Your Commute," you'll learn how Austrian scientists "teleported" a photon across a laboratory--and why human beings could be next. In the chapter describing "How to Clone the Perfect Blonde," you'll discover that people have been harvesting and eating clones for centuries (strawberries and potatoes are just two of the many plants that are identical to their parents). And in the chapter "How to Live Forever," you'll tour America's thriving cryonics industry (where recently deceased volunteers are frozen to  $-320^{\circ}\text{F}$  and stored indefinitely). In the tradition of bestselling pop-science books like *The Physics of Star Trek* and *How to Build a Time Machine*, this entertaining read explores the science of science fiction--and proves that anything is possible!

## **The Cosmic Mystery Tour**

Inflationary cosmology has been developed over the last twenty years to remedy serious shortcomings in the standard hot big bang model of the universe. This textbook, first published in 2005, explains the basis of modern cosmology and shows where the theoretical results come from. The book is divided into two parts; the first deals with the homogeneous and isotropic model of the Universe, the second part discusses how inhomogeneities can explain its structure. Established material such as the inflation and quantum cosmological perturbation are presented in great detail, however the reader is brought to the frontiers of current cosmological research by the discussion of more speculative ideas. An ideal textbook for both advanced students of physics and astrophysics, all of the necessary background material is included in every chapter and no prior knowledge of general relativity and quantum field theory is assumed.

## **Formal Ontology and Conceptual Realism**

Your students and users will find biographical information on approximately 300 modern writers in this volume of Contemporary Authors® .

## **Infinity, Faith, and Time**

Jo Dunkley combines her expertise as an astrophysicist with her talents as a writer and teacher to present an elegant introduction to the structure, history, and enduring mysteries of the universe.

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Among the cutting-edge phenomena discussed are the accelerating expansion of the universe and the possibility that our universe is only one of many.

## **Living Simply Abundant**

The Cosmic Mystery Tour takes us on a lightning tour of the mysteries of the universe enlivened by brief stories of the colourful characters who created modern science. It explores hot topics in physics and astronomy, including the recent discovery of gravitational waves; the quest for the origin of dark matter; the study of the supermassive black hole at the centre of the galaxy; the ongoing search for Earth-like exoplanets; the search for signals from extraterrestrials; and the development of technologies to send spacecraft to the stars. The first part of the book explores the laws that govern the universe. Physics is a spiritual quest to find deep meaning in the cosmos. Its goal is to provide a concise, but accurate description of the world that accounts for all the amazing features that it contains. The second part takes a look at the history of the cosmos, studies its geography and explores some of its architectural highlights such as red giants, white dwarfs, neutron stars and the ultimate cosmic mysteries-supermassive black holes. The last part considers the possibility that life might exist elsewhere in the universe, and explores the cosmos from the outer fringes of science fiction to the ongoing search for alien civilizations.

## **Our Universe**

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In this lively comedy of love and money in sixteenth-century Venice, Bassanio wants to impress the wealthy heiress Portia, but lacks the necessary funds. He turns to his merchant friend, Antonio, who is forced to borrow from Shylock, a Jewish moneylender. When Antonio's business falters, repayment becomes impossible, and by the terms of the loan agreement, Shylock is able to demand a pound of Antonio's flesh. Portia cleverly intervenes, and all ends well (except of course for Shylock).

## **The Expanding Worlds of General Relativity**

A popular account of the properties and significance of black holes.

## **Discovering the Essential Universe, Second Edition**

Drawing on philosophy, history, and critical theory, Unconditional Life introduces a new perspective on the significance of post-war international law developments. The book examines the public discourse regarding technological risk in World War II texts of unconditional surrender, in the World Trade Organization's EC-Biotech dispute, and in the International Court of Justices' Nuclear Weapons Advisory Opinion. The volume describes international law in terms of its management of, and relation to, the risks associated with technological innovation in war and in trade. It proposes that international law, too, is itself a kind of technology: one intended to

manage the material and existential risks inherent in the creation of a new international, postcolonial, political community emerging out of the Second World War. Members of this community are imagined to possess a universal quality: humanness, which itself is underscored by a power of invention. Yoriko Otomo demonstrates how international lawyers' inability to adjudicate questions of large-scale technological risk is due to the competing and intractable claims of international law. Offering a feminist analysis of the political economy that has created this crisis of governance, the book provides a way of understanding the structural inequities that will need to be addressed if international law is to remain a relevant forum for the adjudication of war and trade into the 21st century.

## **The expanding universe**

A Leading Figure in the Development of the New Cosmology Explains What It All Means Among his peers, Alex Vilenkin is regarded as one of the most imaginative and creative cosmologists of our time. His contributions to our current understanding of the universe include a number of novel ideas, two of which—eternal cosmic inflation and the quantum creation of the universe from nothing—have provided a scientific foundation for the possible existence of multiple universes. With this book—his first for the general reader—Vilenkin joins another select group: the handful of first-rank scientists who are equally adept at explaining their work to nonspecialists. With engaging, well-paced storytelling, a droll sense of

humor, and a generous sprinkling of helpful cartoons, he conjures up a bizarre and fascinating new worldview that—to paraphrase Niels Bohr—just might be crazy enough to be true.

## **Brilliant Blunders**

### **The Whole Shebang**

Traces key advances in physics, explaining its basics using examples from films and literature such as "Back to the Future," which demonstrates special relativity, and Poe's "The Purloined Letter," which illustrates neutrinos.

### **Contemporary Authors**

"[Mackler's] teens feel lived in to me--smart, observant, but realistic in terms of their insecurities and limitations. I particularly appreciate the candid and non-judgmental way she depicts teen sensuality and female desire . . . Much to discuss here in the age of #metoo." --Gabrielle Zevin, New York Times bestselling author From Carolyn Mackler, author of the Printz Honor-winning *The Earth, My Butt, and Other Big Round Things*, comes a story of what happens when the "happily ever after" turns out to be less than perfect. It's been five months since sixteen-year-old Virginia Shreves thought her life was finally back on course: she has come to terms with who she is both inside and out, and she's even started to rebuild her relationship with her older brother Byron,

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whose date-rape charge completely shattered everything. But just as she's getting used to the new normal, Virginia's world turns upside down again. Sparks with boyfriend Froggy Welsh the Fourth fade, her best friend Shannon bombshells bad news, and then the police arrest Byron. As Virginia struggles to cope, she meets Sebastian, an artist with his own baggage. The pair make a pact not to share their personal dramas. But secrets have a way of coming out, and theirs have the potential to ruin everything. In this follow-up to the acclaimed *The Earth, My Butt, and Other Big Round Things*, Carolyn Mackler brings Virginia's story satisfyingly full circle in a hope-filled tale of forgiveness, love, friendship, and the beauty in life's imperfections.

### **The Infinite Cosmos**

Bestselling author and acclaimed physicist Lawrence Krauss offers a paradigm-shifting view of how everything that exists came to be in the first place. "Where did the universe come from? What was there before it? What will the future bring? And finally, why is there something rather than nothing?" One of the few prominent scientists today to have crossed the chasm between science and popular culture, Krauss describes the staggeringly beautiful experimental observations and mind-bending new theories that demonstrate not only can something arise from nothing, something will always arise from nothing. With a new preface about the significance of the discovery of the Higgs particle, *A Universe from Nothing* uses Krauss's characteristic wry humor and

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wonderfully clear explanations to take us back to the beginning of the beginning, presenting the most recent evidence for how our universe evolved—and the implications for how it's going to end. Provocative, challenging, and delightfully readable, this is a game-changing look at the most basic underpinning of existence and a powerful antidote to outmoded philosophical, religious, and scientific thinking.

## **The Universe Within**

A non-technical account of recent astronomical research makes all that is known about the universe accessible to the average reader, in a study that integrates scientific personalities with hard facts, vivid explanations, and authoritative speculation

## **Physical Foundations of Cosmology**

The Lives Less Ordinary series brings you the most exciting, adventurous and entertaining true-life writing that is out there, for men who are time-poor but want the best. Lives Less Ordinary drops you into extreme first-hand accounts of human experience, whether that's the adrenaline-pumping heights of professional sport, the brutality of the modern battlefield, the casual violence of the criminal world, the mind-blowing frontiers of science, or the excesses of rock 'n' roll, high finance and Hollywood. Lives Less Ordinary also brings you some of the finest comic voices around, on every subject from toilet etiquette to Paul Gascoigne. Everyone wants to live forever, right? Well award-winning science journalists Richard

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Hollingham and Sue Nelson explain how the latest cutting-edge science might mean your fantasy is closer to being true than you might believe. From advances in medicine, cryogenics and ways of preserving your consciousness, they explain all the mind-blowing options with a mix of insight and dry humour. This digital bite has been extracted from Sue Nelson and Richard Hollingham's fascinating book *How to Clone the Perfect Blonde*.

## **Introduction to Cosmology**

An exciting introduction to astronomy, using recent discoveries and stunning photography to inspire non-science majors about the Universe and science.

## **Lectures on General Relativity, Cosmology and Quantum Black Holes**

*Infinity, Faith, and Time* is an exploration of Renaissance literature and the importance of a powerful tradition of Christian-Platonist rational spirituality derived from St Augustine and Nicholas of Cusa. John Spencer Hill argues that this tradition had a formative role in the thought of Renaissance writers by enabling them to assimilate into their world view two central discoveries of the Renaissance - that the universe is infinite and that human existence is bound and regulated by the passage of time.

## **Black Holes and the Universe**

## **The Beginning and the End of Everything**

We all make mistakes. Nobody is perfect. And that includes five of the greatest scientists in history -- Charles Darwin, William Thomson (Lord Kelvin), Linus Pauling, Fred Hoyle, Albert Einstein. But the mistakes that these great scientists made helped science to advance. Indeed, as Mario Livio explains in this fascinating book, science thrives on error; it advances when erroneous ideas are disproven. All five scientists were great geniuses and fascinating human beings. Their blunders were part of their genius and part of the scientific process. Livio brilliantly analyses their errors to show where they were wrong and right, but what makes his book so enjoyable to read is Livio's analysis of the psychology of these towering figures. Along the way the reader learns an enormous amount about the evolution of life on earth and in the universe, but from an unusual vantage point -- the mistakes of great scientists rather than the achievements that made them famous.

## **The Extravagant Universe**

'Prepare to have your mind blown! A brilliantly written overview of the past, present and future of modern cosmology.' - DALLAS CAMPBELL, author of *Ad Astra*

The Beginning and the End of Everything is the whole story as we currently understand it - from nothing, to the birth of our universe, to its ultimate fate. Authoritative and engaging, Paul Parsons takes us on a rollercoaster ride through billions of light years to tell the story of the Big Bang, from birth to death.

13.8 billion years ago, something incredible happened. Matter, energy, space and time all suddenly burst into existence in a cataclysmic event that's come to be known as the Big Bang. It was the birth of our universe. What started life smaller than the tiniest subatomic particle is now unimaginably vast and plays home to trillions of galaxies. The formulation of the Big Bang theory is a story that combines some of the most far-reaching concepts in fundamental physics with equally profound observations of the cosmos. From our realization that we are on a planet orbiting a star in one of many galaxies, to the discovery that our universe is expanding, to the groundbreaking theories of Einstein that laid the groundwork for the Big Bang cosmology of today - as each new discovery deepens our understanding of the origins of our universe, a clearer picture is forming of how it will all end. Will we ultimately burn out or fade away? Could the end simply signal a new beginning, as the universe rebounds into a fresh expanding phase? And was our Big Bang just one of many, making our cosmos only a small part of a sprawling multiverse of parallel universes?

## **A Universe from Nothing**

The New York Times bestselling tour of the cosmos from three of today's leading astrophysicists Welcome to the Universe is a personal guided tour of the cosmos by three of today's leading astrophysicists. Inspired by the enormously popular introductory astronomy course that Neil deGrasse Tyson, Michael

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A. Strauss, and J. Richard Gott taught together at Princeton, this book covers it all—from planets, stars, and galaxies to black holes, wormholes, and time travel. Describing the latest discoveries in astrophysics, the informative and entertaining narrative propels you from our home solar system to the outermost frontiers of space. How do stars live and die? Why did Pluto lose its planetary status? What are the prospects of intelligent life elsewhere in the universe? How did the universe begin? Why is it expanding and why is its expansion accelerating? Is our universe alone or part of an infinite multiverse? Answering these and many other questions, the authors open your eyes to the wonders of the cosmos, sharing their knowledge of how the universe works. Breathtaking in scope and stunningly illustrated throughout, *Welcome to the Universe* is for those who hunger for insights into our evolving universe that only world-class astrophysicists can provide.

## **The Cosmos**

Advance Praise for *The Accelerating Universe* "The *Accelerating Universe* is not only an informative book about modern cosmology. It is rich storytelling and, above all, a celebration of the human mind in its quest for beauty in all things." —Alan Lightman, author of *Einstein's Dreams* "This is a wonderfully lucid account of the extraordinary discoveries that have made the last years a golden period for observational cosmology. But Mario Livio has not only given the reader one clear explanation after another of what astronomers are up to, he has used them to

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construct a provocative argument for the importance of aesthetics in the development of science and for the inseparability of science, art, and culture." —Lee Smolin, author of *The Life of the Cosmos* "What a pleasure to read! An exciting, simple account of the universe revealed by modern astronomy. Beautifully written, clearly presented, informed by scientific and philosophical insights." —John Bahcall, Institute for Advanced Study "A book with charm, beauty, elegance, and importance. As authoritative a journey as can be taken through modern cosmology." —Allan Sandage, Observatories of the Carnegie Institution of Washington

## **The Universe Is Expanding and So Am I**

An astrophysicist presents an in-depth yet accessible tour of the universe for lay readers, while conveying the excitement of astronomy. How is a galaxy billions of lightyears away connected to us? Is our home nothing more than a tiny speck of blue in an ocean of night? In this exciting tour of a universe far larger than we can imagine, cosmologist Paul M. Sutter emphasizes how amazing it is that we are part of such a huge, complex, and mysterious place. Through metaphors and uncomplicated language, Sutter breathes life into the science of astrophysics, unveiling how particles, forces, and fields interplay to create the greatest of cosmic dramas. Touched with the author's characteristic breezy, conversational style--which has made him a breakout hit on venues such as The Weather Channel, the Science Channel, and his own popular Ask a Spaceman! podcast--he

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conveys the fun and wonder of delving deeply into the physical processes of the natural universe. He weaves together the past and future histories of our universe with grounded descriptions of essential modern-day physics as well as speculations based on the latest research in cosmology. Topics include our place in the Milky Way galaxy; the cosmic web--a vast web-like pattern in which galaxies are arranged; the origins of our universe in the big bang; the mysteries of dark matter and dark energy; how science has dramatically changed our relationship to the cosmos; conjectures about the future of reality as we know it; and more. For anyone who has ever stared at the starry night sky and wondered how we humans on Earth fit into the big picture, this book is an essential roadmap.

## **The Expanding Universe**

Cosmology is the study of the origin, size, and evolution of the entire universe. Every culture has developed a cosmology, whether it be based on religious, philosophical, or scientific principles. In this book, the evolution of the scientific understanding of the Universe in Western tradition is traced from the early Greek philosophers to the most modern 21st century view. After a brief introduction to the concept of the scientific method, the first part of the book describes the way in which detailed observations of the Universe, first with the naked eye and later with increasingly complex modern instruments, ultimately led to the development of the "Big Bang" theory. The second part of the book traces the evolution of the

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Big Bang including the very recent observation that the expansion of the Universe is itself accelerating with time.

## **Is God a Mathematician?**

Winner of the Lane Anderson Award, longlisted for the Charles Taylor Prize, shortlisted for the Libris Award for Non-Fiction and selected as an Amazon.ca Best Book "With [The Universe Within's] deeply thoughtful reflections on the place of science in society, on the need to educate the underserved, and on plenty of other topics rarely addressed in this sort of book, Turok takes you where no physicist has gone before. It's well worth making the journey with him." — TIME Magazine The most anticipated nonfiction book of the season, this year's Massey Lectures is a visionary look at the way the human mind can shape the future by world-renowned physicist Neil Turok. Every technology we rely on today was created by the human mind, seeking to understand the universe around us. Scientific knowledge is our most precious possession, and our future will be shaped by the breakthroughs to come. In this personal, visionary, and fascinating work, Neil Turok, Director of the Perimeter Institute for Theoretical Physics, explores the transformative scientific discoveries of the past three centuries — from classical mechanics, to the nature of light, to the bizarre world of the quantum, and the evolution of the cosmos. Each new discovery has, over time, yielded new technologies causing paradigm shifts in the organization of society. Now, he argues, we are on the cusp of another major

transformation: the coming quantum revolution that will supplant our current, dissatisfying digital age. Facing this brave new world, Turok calls for creatively re-inventing the way advanced knowledge is developed and shared, and opening access to the vast, untapped pools of intellectual talent in the developing world. Scientific research, training, and outreach are vital to our future economy, as well as powerful forces for peaceful global progress. Elegantly written, deeply provocative, and highly inspirational, *The Universe Within* is, above all, about the future — of science, of society, of ourselves.

## **Many Worlds in One**

Theories about the ontological structure of the world have generally been described in informal, intuitive terms. This book offers an account of the general features and methodology of formal ontology. The book defends conceptual realism as the best system to adopt based on a logic of natural kinds. By formally reconstructing an intuitive, informal ontological scheme as a formal ontology we can better determine the consistency and adequacy of that scheme.

## **Endless Universe**

*Living Simply Abundant* takes the reader on a journey to reconcile two divergent philosophies. Belief in abundance consciousness gives us the ability to see ourselves as co-creators in an infinite and malleable universe. Meanwhile, we live on a beautiful gem of a planet called Earth that is seemingly finite and

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suffering under the weight of enormous human impacts. With science, history, and personal stories, the author explores the abundant qualities of Earth and the cosmos, as well as the microscopic scale of quantum physics. In contrast to that abundance is the history of civilization that has devastated the Earth and polluted the human spirit with fear, war and aggression. Therein rests the question: Is the universe finite and subject to our abuse? Or is it infinitely abundant? *Living Simply Abundant* shows the reader the true abundance of the universe and how we, as conscious beings, can interact with the Universal energy field and co-create the world that we want.

## **God's Equation**

A substantial update of this award-winning and highly regarded cosmology textbook, for advanced undergraduates in physics and astronomy.

## **Supernovae and Gamma-Ray Bursters**

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