

Welcome Universe Neil Degrasse Tyson

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RIVERA HOLLAND

Exploring the Invisible Henry Holt and Company

Though astrophysicists have developed a theoretical framework for understanding how the first stars and galaxies formed, only now are we able to begin testing those theories with actual observations of the very distant, early universe. We are entering a new and exciting era of discovery that will advance the frontiers of knowledge, and this book couldn't be more timely. It covers all the basic concepts in cosmology, drawing on insights from an astronomer who has pioneered much of this research over the past two decades. Abraham Loeb starts from first principles, tracing the theoretical foundations of cosmology and carefully explaining the physics behind them. Topics include the gravitational growth of perturbations in an expanding universe, the abundance and properties of dark matter halos and galaxies, reionization, the observational methods used to detect the earliest galaxies and probe the diffuse gas between them--and much more. Cosmology seeks to solve the fundamental mystery of our cosmic origins. This book offers a succinct and accessible primer at a time when breathtaking technological advances promise a wealth of new observational data on the first stars and galaxies. Provides a concise introduction to cosmology Covers all the basic concepts Gives an overview of the gravitational growth of perturbations in an expanding universe Explains the process of reionization Describes the observational methods used to detect the earliest galaxies

The Extravagant Universe National Geographic Books

Answers popular astronomy questions such as "How big are the craters on the Moon?," "Why are solar eclipses considered so dangerous to look at?," and "How does a black hole affect time and mass?"

[Accessory to War: The Unspoken Alliance Between Astrophysics and the Military](#) Joseph Henry Press
A New York Times bestseller! The historic race that reawakened the promise of manned spaceflight
A Finalist for the PEN/E. O. Wilson Literary Science Writing Award Alone in a Spartan black cockpit, test pilot Mike Melvill rocketed toward space. He had eighty seconds to exceed the speed of sound and begin the climb to a target no civilian pilot had ever reached. He might not make it back alive. If he did, he would make history as the world's first commercial astronaut. The spectacle defied reason, the result of a competition dreamed up by entrepreneur Peter Diamandis, whose vision for a

new race to space required small teams to do what only the world's largest governments had done before. Peter Diamandis was the son of hardworking immigrants who wanted their science prodigy to make the family proud and become a doctor. But from the age of eight, when he watched Apollo 11 land on the Moon, his singular goal was to get to space. When he realized NASA was winding down manned space flight, Diamandis set out on one of the great entrepreneurial adventure stories of our time. If the government wouldn't send him to space, he would create a private space flight industry himself. In the 1990s, this idea was the stuff of science fiction. Undaunted, Diamandis found inspiration in an unlikely place: the golden age of aviation. He discovered that Charles Lindbergh made his transatlantic flight to win a \$25,000 prize. The flight made Lindbergh the most famous man on earth and galvanized the airline industry. Why, Diamandis thought, couldn't the same be done for space flight? The story of the bullet-shaped SpaceShipOne, and the other teams in the hunt, is an extraordinary tale of making the impossible possible. It is driven by outsized characters—Burt Rutan, Richard Branson, John Carmack, Paul Allen—and obsessive pursuits. In the end, as Diamandis dreamed, the result wasn't just a victory for one team; it was the foundation for a new industry and a new age.

The Sky Is Not the Limit Princeton University Press

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 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.

[One Universe](#): National Geographic Books

“Who can ask for better cosmic tour guides?” —Michio Kaku Our true origins are not only human, or even terrestrial, but in fact cosmic. Drawing on recent scientific breakthroughs and cross-pollination among geology, biology, astrophysics, and cosmology, *Origins* illuminates the soul-stirring leaps in our understanding of the cosmos. This revised and updated edition features such startling discoveries as the now more than 5,000 detected exoplanets that promise to reveal exciting possibilities for life in the cosmos, and data from a new generation of ground-based and spaceborne observatories that have fundamentally changed what we know about the expanding universe—and maybe even the laws of physics themselves. From the first image of a galaxy’s birth to tantalizing evidence of water not only on Mars but also on the asteroid Ceres, as well as on moons of Jupiter and Saturn, coauthors Neil deGrasse Tyson and Donald Goldsmith conduct an exhilarating tour of the cosmos with clarity and exuberance.

The Pluto Files: The Rise and Fall of America's Favorite Planet Princeton University Press

The authoritative story of the headline-making discovery of gravitational waves—by an eminent theoretical astrophysicist and award-winning writer. From the author of *How the Universe Got Its Spots* and *A Madman Dreams of Turing Machines*, the epic story of the scientific campaign to record the soundtrack of our universe. Black holes are dark. That is their essence. When black holes collide, they will do so unilluminated. Yet the black hole collision is an event more powerful than any since the origin of the universe. The profusion of energy will emanate as waves in the shape of spacetime: gravitational waves. No telescope will ever record the event; instead, the only evidence would be the sound of spacetime ringing. In 1916, Einstein predicted the existence of gravitational waves, his top priority after he proposed his theory of curved spacetime. One century later, we are recording the first sounds from space, the soundtrack to accompany astronomy’s silent movie. In *Black Hole Blues and Other Songs from Outer Space*, Janna Levin recounts the fascinating story of the obsessions, the aspirations, and the trials of the scientists who embarked on an arduous, fifty-year endeavor to capture these elusive waves. An experimental ambition that began as an amusing thought experiment, a mad idea, became the object of fixation for the original architects—Rai Weiss, Kip Thorne, and Ron Drever. Striving to make the ambition a reality, the original three gradually accumulated an international team of hundreds. As this book was written, two massive instruments of remarkably delicate sensitivity were brought to advanced capability. As the book draws to a close, five decades after the experimental ambition began, the team races to intercept a wisp of a sound with two colossal machines, hoping to succeed in time for the centenary of Einstein’s most radical idea. Janna Levin’s absorbing account of the surprises, disappointments, achievements, and risks in this unfolding story offers a portrait of modern science that is unlike anything we’ve seen before.

Starry Messenger Princeton University Press

Semi-autobiographical discussion of astronomy and astronomers, and history of astronomy and cosmology.--

Universe Down to Earth Princeton University Press

The *Extravagant Universe* tells the story of a remarkable adventure of scientific discovery. One of the world's leading astronomers, Robert Kirshner, takes readers inside a lively research team on the quest that led them to an extraordinary cosmological discovery: the expansion of the universe is accelerating under the influence of a dark energy that makes space itself expand. In addition to

sharing the story of this exciting discovery, Kirshner also brings the science up-to-date in a new epilogue. He explains how the idea of an accelerating universe—once a daring interpretation of sketchy data—is now the standard assumption in cosmology today. This measurement of dark energy—a quality of space itself that causes cosmic acceleration—points to a gaping hole in our understanding of fundamental physics. In 1917, Einstein proposed the "cosmological constant" to explain a static universe. When observations proved that the universe was expanding, he cast this early form of dark energy aside. But recent observations described first-hand in this book show that the cosmological constant—or something just like it—dominates the universe's mass and energy budget and determines its fate and shape. Warned by Einstein's blunder, and contradicted by the initial results of a competing research team, Kirshner and his colleagues were reluctant to accept their own result. But, convinced by evidence built on their hard-earned understanding of exploding stars, they announced their conclusion that the universe is accelerating in February 1998. Other lines of inquiry and parallel supernova research now support a new synthesis of a cosmos dominated by dark energy but also containing several forms of dark matter. We live in an extravagant universe with a surprising number of essential ingredients: the real universe we measure is not the simplest one we could imagine.

Space Chronicles: Facing the Ultimate Frontier Simon and Schuster

Presents an entertaining and engaging look at some of nature's most remarkable creatures ... Shows not only how studying these animals can provide deep insights into how life evolved, but also how scientific discovery can be filled with adventure and fun--Adapted from cover.

Origins: Fourteen Billion Years of Cosmic Evolution W. W. Norton & Company

An epic, full-color visual journey through all scales of the universe In *The Zoomable Universe*, the award-winning astrobiologist Caleb Scharf and the acclaimed artist Ron Miller take us on an epic tour through all known scales of reality, from the largest possible magnitude to the smallest. Drawing on cutting-edge science, they begin at the limits of the observable universe, a scale spanning 10^{27} meters—about 93 billion light-years. And they end in the subatomic realm, at 10^{-35} meters, where the fabric of space-time itself confounds all known rules of physics. In between are galaxies, stars and planets, oceans and continents, plants and animals, microorganisms, atoms, and much, much more. Stops along the way—all enlivened by Scharf’s sparkling prose and his original insights into the nature of our universe—include the brilliant core of the Milky Way, the surface of a rogue planet, the back of an elephant, and a sea of jostling quarks. *The Zoomable Universe* is packed with more than 100 original illustrations and infographics that will captivate readers of every age. It is a whimsical celebration of discovery, a testament to our astounding ability to see beyond our own vantage point and chart a course from the farthest reaches of the cosmos to its subatomic depths—in short, a must-have for the shelves of all explorers.

Welcome to the Universe W. W. Norton & Company

Presenting a rich array of stereoscopic color images, which can be viewed in 3D using a special stereo viewer that folds easily out of the cover of the book, this book reveals your cosmic environment as you have never seen it before. Journey into the vast depths of the observable universe by visualising the most spectacular images in astronomy in stereoscopic 3D. *Welcome to the Universe* in 3D takes you on a grand tour of the observable universe, guiding you through the

most spectacular sights in the cosmos a in breathtaking 3D. Astronomy is the story of how humankind's perception of the two-dimensional dome of the sky evolved into a far deeper comprehension of an expanding three-dimensional cosmos. This book invites you to take part in this story by exploring the universe in depth, as revealed by cutting-edge astronomical research and observations. You will journey from the Moon through the solar system, out to exoplanets, distant nebulas, and galaxy clusters, until you finally reach the cosmic microwave background radiation (or CMB), the most distant light we can observe. The distances to these celestial wonders range from 1.3 light-seconds to 13.8 billion light-years. Along the way, the authors explain the fascinating features of what you are seeing, including how the 3D images were made using the same technique that early astronomers devised to measure distances to objects in space. The dramatic 3D images in this one-of-a-kind book will astonish you, extending your vision out to the farthest reaches of the universe. You will never look up into the night sky the same way again.

Welcome to the Universe Princeton University Press

New York Times Bestseller A luminous companion to the phenomenal bestseller *Astrophysics for People in a Hurry*. Astrophysicist Neil deGrasse Tyson has attracted one of the world's largest online followings with his fascinating, widely accessible insights into science and our universe. Now, Tyson invites us to go behind the scenes of his public fame by revealing his correspondence with people across the globe who have sought him out in search of answers. In this hand-picked collection of 101 letters, Tyson draws upon cosmic perspectives to address a vast array of questions about science, faith, philosophy, life, and of course, Pluto. His succinct, opinionated, passionate, and often funny responses reflect his popularity and standing as a leading educator. Tyson's 2017 bestseller *Astrophysics for People in a Hurry* offered more than one million readers an insightful and accessible understanding of the universe. Tyson's most candid and heartfelt writing yet, *Letters from an Astrophysicist* introduces us to a newly personal dimension of Tyson's quest to explore our place in the cosmos.

At the Edge of Time Princeton University Press

A picture-book biography about science superstar Neil deGrasse Tyson, the groundbreaking American astrophysicist whose work has inspired a generation of young scientists and astronomers to reach for the stars! Perfect for STEM curricula and readers of all ages. Young Neil deGrasse Tyson was starstruck when he first visited the sky theater at the Hayden Planetarium in New York City. He couldn't believe the crowded, glittering night sky at the planetarium was real--until a visit to the country years later revealed the impossible. That discovery was like rocket fuel for Neil's passion about space. His quest for knowledge took him from the roof of his apartment building to a science expedition in northwest Africa, to a summer astronomy camp beneath a desert sky, and finally back home to become the director of the Hayden Planetarium, where it all began. Before long, Neil became America's favorite guide to the cosmos. This story of how one boy's quest for knowledge about space leads him to become a star astrophysicist is perfect for young readers who are fascinated by the universe, aspiring scientists, and the dreamer in all of us. It will ignite your own sense of wonder.

Letters from an Astrophysicist Ballantine Books

How science changed the way artists understand reality *Exploring the Invisible* shows how modern

art expresses the first secular, scientific worldview in human history. Now fully revised and expanded, this richly illustrated book describes two hundred years of scientific discoveries that inspired French Impressionist painters and Art Nouveau architects, as well as Surrealists in Europe, Latin America, and Japan. Lynn Gamwell describes how the microscope and telescope expanded the artist's vision into realms unseen by the naked eye. In the nineteenth century, a strange and exciting world came into focus, one of microorganisms in a drop of water and spiral nebulas in the night sky. The world is also filled with forces that are truly unobservable, known only indirectly by their effects—radio waves, X-rays, and sound-waves. Gamwell shows how artists developed the pivotal style of modernism—abstract, non-objective art—to symbolize these unseen worlds. Starting in Germany with Romanticism and ending with international contemporary art, she traces the development of the visual arts as an expression of the scientific worldview in which humankind is part of a natural web of dynamic forces without predetermined purpose or meaning. Gamwell reveals how artists give nature meaning by portraying it as mysterious, dangerous, or beautiful. With a foreword by Neil deGrasse Tyson and a wealth of stunning images, this expanded edition of *Exploring the Invisible* draws on the latest scholarship to provide a global perspective on the scientists and artists who explore life on Earth, human consciousness, and the space-time universe.

Death by Black Hole: And Other Cosmic Quandaries Scientific American / Farrar, Straus and Giroux

"This is a condensed edition of *Welcome to the Universe* - essentially a pocket-sized version of the original "astrophysical tour" of the cosmos. In 8 chapters (compared to the original 24 chapters), the reader learns the essential astrophysics everyone should know -- about the size and scale of the universe; the solar system; the lives/deaths of stars; the search for life in the galaxy; our Milky Way; galaxies, the Big Bang and the expanding universe; inflation and the multiverse; and our future in the cosmos. For those who may have felt that *Welcome to the Universe* was a bit beyond them, this book covers all the essentials in an even more accessible and concise fashion, while imparting real physical insight into how the universe works by the book's end"--

Cosmos Prometheus Books

An essential companion to the New York Times bestseller *Welcome to the Universe* Here is the essential companion to *Welcome to the Universe*, a New York Times bestseller that was inspired by the enormously popular introductory astronomy course for non science majors that Neil deGrasse Tyson, Michael A. Strauss, and J. Richard Gott taught together at Princeton. This problem book features more than one hundred problems and exercises used in the original course—ideal for anyone who wants to deepen their understanding of the original material and to learn to think like an astrophysicist. Whether you're a student or teacher, citizen scientist or science enthusiast, your guided tour of the cosmos just got even more hands-on with *Welcome to the Universe: The Problem Book*. The essential companion book to the acclaimed bestseller Features the problems used in the original introductory astronomy course for non science majors at Princeton University Organized according to the structure of *Welcome to the Universe*, empowering readers to explore real astrophysical problems that are conceptually introduced in each chapter Problems are designed to stimulate physical insight into the frontier of astrophysics Problems develop quantitative skills, yet use math no more advanced than high school algebra Problems are often multipart, building critical

thinking and quantitative skills and developing readers' insight into what astrophysicists do Ideal for course use—either in tandem with *Welcome to the Universe* or as a supplement to courses using standard astronomy textbooks—or self-study Tested in the classroom over numerous semesters for more than a decade Prefaced with a review of relevant concepts and equations Full solutions and explanations are provided, allowing students and other readers to check their own understanding *Alien Oceans* Disney Electronic Content

The New York Times bestseller: "You gotta read this. It is the most exciting book about Pluto you will ever read in your life." —Jon Stewart When the Rose Center for Earth and Space at the American Museum of Natural History reclassified Pluto as an icy comet, the New York Times proclaimed on page one, "Pluto Not a Planet? Only in New York." Immediately, the public, professionals, and press were choosing sides over Pluto's planethood. Pluto is entrenched in our cultural and emotional view of the cosmos, and Neil deGrasse Tyson, award-winning author and director of the Rose Center, is on a quest to discover why. He stood at the heart of the controversy over Pluto's demotion, and consequently Plutophiles have freely shared their opinions with him, including endless hate mail from third-graders. With his inimitable wit, Tyson delivers a minihistory of planets, describes the oversized characters of the people who study them, and recounts how America's favorite planet was ousted from the cosmic hub.

Cosmos Welcome to the Universe

The story of unmanned space exploration, from Viking to today *Dreams of Other Worlds* describes the unmanned space missions that have opened new windows on distant worlds. Spanning four decades of dramatic advances in astronomy and planetary science, this book tells the story of eleven iconic exploratory missions and how they have fundamentally transformed our scientific and cultural perspectives on the universe and our place in it. The journey begins with the Viking and Mars Exploration Rover missions to Mars, which paint a startling picture of a planet at the cusp of habitability. It then moves into the realm of the gas giants with the Voyager probes and Cassini's ongoing exploration of the moons of Saturn. The Stardust probe's dramatic round-trip encounter with a comet is brought vividly to life, as are the SOHO and Hipparcos missions to study the Sun and Milky Way. This stunningly illustrated book also explores how our view of the universe has been brought into sharp focus by NASA's great observatories—Spitzer, Chandra, and Hubble—and how the WMAP mission has provided rare glimpses of the dawn of creation. *Dreams of Other Worlds* reveals how these unmanned exploratory missions have redefined what it means to be the temporary tenants of a small planet in a vast cosmos.

Princeton University Press

Inside the epic quest to find life on the water-rich moons at the outer reaches of the solar system Where is the best place to find life beyond Earth? We often look to Mars as the most promising site in our solar system, but recent scientific missions have revealed that some of the most habitable real estate may actually lie farther away. Beneath the frozen crusts of several of the small, ice-covered moons of Jupiter and Saturn lurk vast oceans that may have existed for as long as Earth, and together may contain more than fifty times its total volume of liquid water. Could there be organisms living in their depths? *Alien Oceans* reveals the science behind the thrilling quest to find out. Kevin Peter Hand is one of today's leading NASA scientists, and his pioneering research has taken him on expeditions around the world. In this captivating account of scientific discovery, he brings together insights from planetary science, biology, and the adventures of scientists like himself to explain how we know that oceans exist within moons of the outer solar system, like Europa, Titan, and Enceladus. He shows how the exploration of Earth's oceans is informing our understanding of the potential habitability of these icy moons, and draws lessons from what we have learned about the origins of life on our own planet to consider how life could arise on these distant worlds. *Alien Oceans* describes what lies ahead in our search for life in our solar system and beyond, setting the stage for the transformative discoveries that may await us.

StarTalk W. W. Norton & Company

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 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.