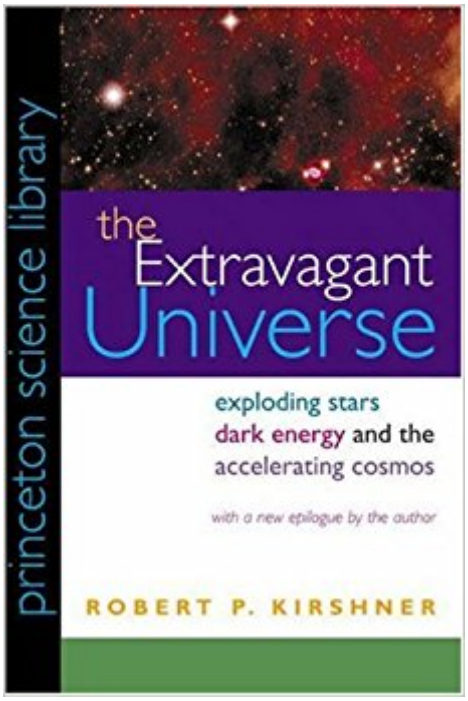
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The Extravagant Universe: Exploding Stars, Dark Energy, And The Accelerating Cosmos (Princeton Science Library)



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Synopsis

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. This book invites any reader to share in the excitement of a remarkable adventure of discovery.

Book Information

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Customer Reviews

Astronomer Kirshner, the Clowes Professor of Science at Harvard University and head of the optical and infrared division at the Harvard-Smithsonian Center for Astrophysics, is part of a team studying supernovae that, by their apparent brightness, make it possible to measure distances in the universe. "The observations of distant supernovae show that we live in a universe that is not static as Einstein thought, and not just expanding as Hubble showed, but accelerating! We attribute this increase in expansion over time to a dark energy with an outward-pushing pressure.... Dark energy makes up the missing component of mass-energy that theorists have sought, reconciles the ages of objects with the present expansion rate of the universe, and complements new measurements of the lingering glow of the Big Bang itself to make a neat and surprising picture for the contents of the universe." It is an extravagant universe: "It has neutrinos as hot dark matter; something unknown as cold dark matter; inflation in the first 10-35 second after the Big Bang; and acceleration by dark energy now." Kirshner makes the story sing and the concepts of astronomy vivid. Editors of Scientific American

Winner of the 2002 Award for Best Professional/Scholarly Book in Physics and Astronomy, Association of American Publishers Finalist for the 2003 Aventis General Prize"Kirshner is a talented writer, and both experts and general readers will find his book a consistently enjoyable read. . . . The Extravagant Universe is a personal book. . . . For the general reader interested in the excitement of how science is done, this strategy makes for a fascinating account. . . . The story . . . is irresistible in its own right, and is related with verve and good humor. . . . Books like this one will help inspire the next generation of physicists."--Sean Carroll, Nature "An extravagant and thoroughly enjoyable account of our amazing universe."--Michael S. Turner, Science "Robert Kirshner has written an excellent insider’s account of the race to discover the fate of the cosmos. . . . Kirshner shows an impressively deft touch with complex explanations, and he doesn’t hesitate to bridge gaps in the reader’s knowledge with an apt metaphor. . . . The Extravagant Universe delivers the promise of its subtitle extremely well, and should serve as the definitive insider’s story of how Kirshner led his motley group of astronomers to glory in their search to find the fate of the universe."--Donald Goldsmith, Natural History "Fellow astronomers--and generations of Harvard

undergraduates--have long appreciated [Kirshner] as a raconteur of exceptional eloquence, so it is hard to imagine anyone better suited to give us the inside story on the new discoveries. [He] does not disappoint. He tells, in large part, a story of how improved technology has enabled astronomers to look farther into the distance and thus further into the past."--Laurence Marschall, Discover Magazine "The Extravagant Universe is hugely enjoyable. . . . It's wonderful . . . an entertaining and witty account of one of the biggest scientific stories of the past 10 years: how exploding supernovae show that the expansion of the Universe is accelerating. . .. Do buy this delightful book."--Michael Rowan-Robinson, New Scientist "More than one book already exists about this momentous discovery, but this new entry, The Extravagant Universe, by Robert Kirshner, is probably the best one to read. . . . This is an insider's account of how the work was done. Besides giving an up-to-the-minute account of the science, Mr. Kirshner lets us share vicariously in the thrill of discovery."--The Economist "[A] witty new book."--Sharon Begley, Wall Street Journal "A pleasure to read."--Maggie McDonald, New Scientist "The Extravagant Universe isn't the only accessible book about dark energy and cosmic acceleration on the market. However, it provides a unique behind-the-scenes feeling for the heady days leading up to the discovery. I found it ever harder to put down as I drew closer to the crucial moment when Kirshner and his colleagues found themselves staring the cosmological constant in the face."--Joshua Roth, Sky & Telescope "Talented researcher Kirshner clearly describes the scientific detective work responsible for current ideas about the history of the universe. . . . Kirshner has been at the forefront of these developments. . . . He brings everything together using simple, effective, and often humorous analogies and anecdotes to explain how research teams interact as they built the chronology of how the universe developed and evolved to where it is today."--Choice "The gripping story of how two competing groups of scientists came to make, and finally believe, the surprising measurements on which a radical new view of the universe depends. . . . It is an evocative reminder that cosmology, too, is now a true observational, experimental science, securely grounded in the messy practical realities of making measurements."--Michael Riordan, The New York Times Book Review "[A] delightful and accessible book. . . . And Kirshner's unique combination of after-dinner-style repartee and physics-for-novices analogies makes for a very entertaining read."--Richard Ellis, Physics World "An insider's scoop on what is arguably the hottest astronomy story of our time. Kirshner has written a book that is not only history of modern cosmology, but also a case study in the scientific process. . . . Kirshner uses wonderfully simple and sometimes amusing analogies to explain complicated concepts."--Jennifer Birriel, Mercury "A wonderfully informative and engaging book on one of the most exciting developments in modern cosmology."--Alex Filippenko, Astronomy "A readable,

entertaining, and informative account of an ancient and familiar--yet newly reinvigorated--branch of science."--James Case, SIAM News "I loved this book. Kirschner writes with passion, humanity and generosity."--Margaret Dobbins, The Daily Telegraph "Kirshner's book represents a high point in popular science publishing. It works at several levels, especially the personal, in which he offers a well-written, even classic, account of the life of a working scientist.... The Extravagant Universe is a book that will be read for pleasure. . . . Kirshner has a real gift for visualizing the shape and structure of the universe."--Martin Ince, Times Higher Education Supplement "The first eight chapters provide an introduction to cosmology at the level of Astronomy 101. . . . That tale is often told, but seldom so engagingly. The analogies are apt, the anecdotes are amusing, and the writing is brisk and witty--in places downright funny. . . . Kirshner succeeds in conveying the difficulty and excitement of the hunt for remote supernovae."--David Branch, Physics Today

I loved it! The wit and humor of Robert Kirshner is found in every page, as he tells the story of the discovery of accelerating universe. He gives credit to so many individuals involved in the pursuit. From Caltech to Harvard, astronomers from the past and present, take his praise and his humorous barbs.He tells the story of the people and the science behind the discovery. The telescopes, the instruments, the technology, but above all the people. He shows science as a very human endeavor filled with competition, different personalities, and struggles. Teamwork is an essential component of large scientific projects today, and Kirshner fully gives credit to both teams who were involved in this undertaking. The book is just rich in astronomical insights, from different types of supernova's, galaxies, the CMB, the age of the universe, to dark matter, and dark energy. I loved it. Buy it. Read it. And enjoy the journey...

I have avidly read my copy of the orginal 2002 edition. I saw this 2016 publication date and got really excited, because so much more knowledge has been obtained in the 14 years following the original edition. Alas, this is simply a reissue of the 2002, nothing new regarding present knowledge.The entire book did not need to be rewritten, just additional paragraphs to the epilogue could have been added to include the new data obtained. It might also have been mentioned that members of the Hi-Z team, as well as Saul Perlmutter, received the Nobel prize in 2011 for their work.

This book traces current and historical developments in cosmology from the viewpoint of a brilliant astrophysicist at the leading edge of science. Kirshner knows what he is talking about since his Hi-Z

Supernova team was responsible for discovering the acceleration in cosmic expansion. Two of his protÃƒÂ©gÃƒÂ©s have been awarded Nobel Prizes in physics, and this book is a fascinating tale of the hard work and luck that leads to monumental scientific discoveries. From his memorable anecdotes as a graduate student at Caltech in a basement office with old folders of supernova data, rubbing shoulders with luminaries like Fritz Zwicky, Minkowski and Sandage, to his clear and easily understandable explanations of complex concepts in astrophysics - EinsteinÃƒÂ¢Ã â ¬Ã â„¢s equations, the Hubble constant, white dwarfs, dark matter and dark energy - the book animated my own thinking and was a joy to read. The universe might be 14 billion years old, and we are merely humans living brief lives on a small planet, but KirshnerÃƒÂ¢Ã â ¬Ã â„¢s work is built upon the foundation fortified by the greatest scientific minds in history, and his contribution to our understanding of the universe is equally significant.

Imagine if the James Watson who wrote The Double Helix were an astrophysicist rather than a biologist and was writing about a race against another team to find the nature of the cosmos (or the expansion of the universe) rather than the nature of DNA. Now make the harder step of imagining a James Watson with a terrific sense of humor, a wry take on how science gets conducted, a tendency toward self deprecation and above all a tendency to downplay his own contributions to his project's success while going out of his way to credit others. Add to the mix a willingness to question one's own results and to emphasize what remains unknown and problematic rather than simply celebrating what was found, and you have Kirshner's book. I read this book after having read Brian Greene's marvelous book The Fabric of the Cosmos. It was a little bit like seeing a blow-up of a section of painting after having taken in and admired the entire canvass. Kirshner is at his best when he is conveying material that says as much about the sociology of the science than the science itself. The description of the competition between the Harvard high Z team led by Kushner and the Berkeley team led by Saul Perlmutter (Who along with 2 Z team members but not Kirshner received a Nobel prize for the effort - the prize can only be split 3 ways) is a bit reminiscent of Watson's race with Pauling to find the structure of DNA, but there was more sharing and unlike DNA the convergence of results from two different approaches contributed to its almost immediate acceptance, so the zero-sum aspect to the competition to be first isn't the same. One learns something about astronomy and cosmology along the way and even more about supernovae and the role they have played as assumed "standard cancels." At some points,however, one wishes more had been said by way of explanation and a few matters remain murky, at least if one is reading along and not stopping to puzzle over particular points. Kirshner uses analogy effectively to

communicate with non-scientists like me but his gift for analogy is not at the level of Greene's. Nevertheless, his writing is almost always easy to comprehend. It's strong suit is found in asides that convey the personality and style that have made Kirshner an outstanding undergraduate teacher. A trivial example is a disdainful remark about power point toward the end of the book which is followed by a footnote pointing out that a great advance in literature was the replacement of the scroll, which constrained one to read in a particular order with the codex which allowed one to flip pages. Power Point, Kushner notes, is a return to the scroll. Another personality revealing tidbit, although part of the story and not an aside, astronomers name their newly discovered supernovae before they are given their official prosaic labels based on their world-wide discovery order (2913a,2013b,etc.). The Berkeley team labeled theirs with names of composers in alphabetical order, the High Z team used cartoon characters like Skooby-Doo for theirs. One final point. Science moves fast and this book is about a decade old. An update or at least a book with a new final chapter or appendix update is in order. It should discuss how modern cosmology has been influenced by these findings, what more is known about dark energy and the inside story, that is surely there, of the Nobel Prize and thebsubsequentbcareers and discoveries of those central to the prize-winning effort.

Very good, by a very talented scientist. A lot has been learned since it was written. You can learn a lot from it, still.

Excellent and gripping story of the discovery of dark energy. A profound revelation in cosmology leading to Nobel Prizes. Easily accessible to the lay reader.

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