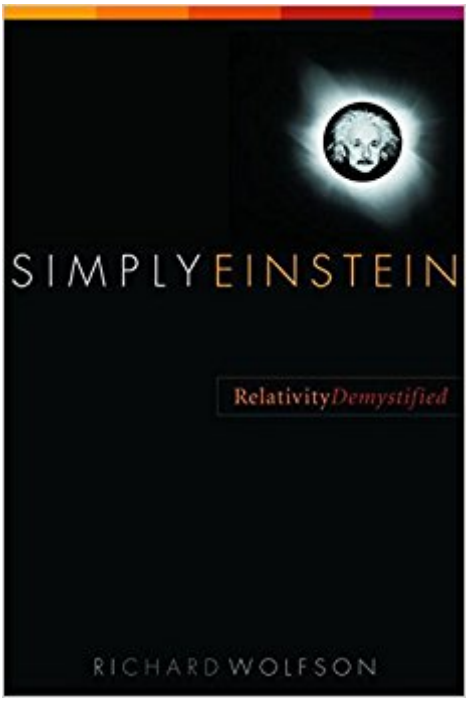
Simply Einstein: Relativity Demystified



Synopsis

With this reader-friendly book, it doesn’t take an Einstein to understand the theory of relativity and its remarkable consequences. In clear, understandable terms, physicist Richard Wolfson explores the ideas at the heart of relativity and shows how they lead to such seeming absurdities as time travel, curved space, black holes, and new meaning for the idea of past and future. Drawing from years of teaching modern physics to nonscientists, Wolfson explains in a lively, conversational style the simple principles underlying Einstein’s theory. Relativity, Wolfson shows, gave us a new view of space and time, opening the door to questions about their flexible nature: Is the universe finite or infinite? Will it expand forever or eventually collapse in a "big crunch"? Is time travel possible? What goes on inside a black hole? How does gravity really work? These questions at the forefront of twenty-first-century physics are all rooted in the profound and sweeping vision of Albert Einstein’s early twentieth-century theory. Wolfson leads his readers on an intellectual journey that culminates in a universe made almost unimaginably rich by the principles that Einstein first discovered.

Book Information

Paperback: 288 pages

Publisher: W. W. Norton & Company; Reprint edition (November 17, 2003)

Language: English

ISBN-10: 0393325075

ISBN-13: 978-0393325072

Product Dimensions: 5.6 x 0.8 x 8.3 inches

Shipping Weight: 8.8 ounces (View shipping rates and policies)

Average Customer Review: 4.5 out of 5 stars 51 customer reviews

Best Sellers Rank: #283,115 in Books (See Top 100 in Books) #152 inÂ Books > Science & Math > Physics > Relativity #1692 inÂ Books > Science & Math > History & Philosophy #11147 inÂ Books > Textbooks > Science & Mathematics

Customer Reviews

Wolfson, a physics professor at Middlebury College, takes the fear out of Einstein’s relativity theory in this brisk piece of pop science. The author uses a tennis game on Venus and a cup of hot tea to elucidate the basics of relativity, i.e., that the laws of physics are the same regardless of one’s state of motion. Wolfson’s economy and his handiness with hip, offbeat examples make this slim book a mind-bendingly satisfying read. The author’s tutorial on the history of physics reminds readers that all the big names up to the late 19th century-Copernicus, Galileo, Newton, Maxwell, etc.-were

concerned with the question of motion, whether of celestial bodies, falling apples or waves of light. He then shows why it required a genius like Einstein to arrive at such a simple idea as relativity. The most well-known and seemingly counterintuitive consequence of Einstein's thought, which Wolfson renders perfectly sensible, is the notion that space and time are not absolute but instead relative to one's frame of reference. The author then addresses the problem of gravity in Einstein's theory, which led the German scientist to develop his general theory of relativity. For readers, this means warped and rippling spacetime, black holes, and expanding and parallel universes. Wolfson's economical and vivid tutorial should open doors for lay readers encountering Einstein's principles for the first time. His popular style, with a minimum of math, should make this a must-have book for Einstein buffs as well. 48 illus. --This text refers to an out of print or unavailable edition of this title.

Many people think that Einstein's theory of relativity is over their heads, but Wolfson (physics, Middlebury Coll.) has proved them wrong. In a clear style, he spreads before his readers the historical and conceptual background of the theory, emphasizing its simplicity at every opportunity. He also offers beautifully clear explanations of such classic puzzles as the Twin Paradox. Perhaps it is this devotion to making Einstein accessible to the masses that leads to repetitive passages. Still, this is a strong overview for the lay reader with a grasp of high school math and a willingness to learn the mind-bending subject matter. More advanced readers may want to take advantage of the "Further Readings" section. Recommended for public and academic libraries and school libraries with collections for gifted students. [See also David Bodanis's E=mc : A Biography of the World's Most Famous Equation.-Ed.]--Marcia R. Franklin, St. Paul, MN --This text refers to an out of print or unavailable edition of this title.

Books about relativity all suffer from the problem that the truths of relativity do not seem real to us until we have practiced seeing them. We need to be presented with the same truths repeatedly in order to see them more easily; but to keep their readers interested, authors perhaps need to vary just a little the way that they present these truths. This book does very well with its explanation of our cultural way of seeing, and how the common view of the universe has changed a little with each major discovery from an essentially static one to one in which position and speeds are relative. I don't think that Wolfson was quite as convincing with concepts such as time dilation; but I doubt that there will ever be a single book that makes the concept of the speed of light being a fundamentally unsurpassable limit, and the consequences of that assertion, immediately understandable. Wolfson

leads us expertly to the trough of knowledge but we can only drink so much at one time. I feel that reading and re-reading the topic, and reading as many different books on the topic as possible, is the only way to begin to intuitively understand the consequences of relativity. I certainly liked this book and I do recommend this book to anyone with ambition to understand relativity, but I can not recommend reading only this book. Andrew W

The consensus on this book was nearly unanimous at our book club - it was the hardest book we have read by far, but also one of the best, most interesting, and most thought-provoking. Reading a book like this really highlighted the difference between reading literature for pure pleasure and reading non-fiction to learn complex concepts. Both can be rewarding experiences but they use completely different parts of our brains.Mark thought this was the best book we read so far, and I liked this book so much that after returning my borrowed copy to the library I purchased a copy for my bookshelf. I will freely admit that I had to re-read several sections of the book to allow the concepts to make sense.The topic of the book is Einstein’s Special Theory of Relativity, which is difficult for most of us to comprehend because it deals with physical phenomenon that manifest themselves most observably at speeds we have never experienced -- many thousands of miles per second. Because nearly everything we know and experience on Earth travels far less than even a single mile per second (3,600 miles per hour), we simply don’t experience the effects of relativity, and therefore find them difficult to comprehend.In many ways, trying to teach humans about relativity is similar to explaining to snails how race cars zooming around a track need a very steep banked wall during the turns, to counterbalance centripetal acceleration. Any human who has ever watched a NASCAR race (or exited a highway at high speed) understands this principal intuitively.But most snails never would likely be completely puzzled by the concepts of inertia and acceleration and banked curves, because any snail that moves faster than one foot per minute is a likely candidate for the land speed record for snails. And centripetal forces at such small speeds are simply not noticeable, regardless of how smart the snails may be.And so it is for us humans who, as Adam pointed out in our book club discussion, think that "space" and "time" are two completely different concepts, when the reality of the universe is that space and time are both manifestations of a single concept called spacetime. In his book, Wolfson does an excellent job of explaining how Einstein built on the work of Newton and others to eventually realize that time is not a universal constant but rather is inextricably intertwined with space.The classic analogy used to explain how massive objects curve spacetime (and cause the perception of gravity) is by causing an indentation on a flat surface, such as in this picture of the sun. The analogy is incomplete, however, because

spacetime is four dimensional and we lack the tools to properly represent four dimensions in a two-dimensional medium such as a book or webpage. (We also learn that gravity isn't a force like magnetism but rather is a simple consequence of the topology of spacetime being curved and distorted by massive objects.)What this means as a practical matter is that when someone travels at thousands of miles per second, time slows down. Not from the perception standpoint, as in "I'm bored this class is taking forever," but in the real physical tangible sense that the passage of time itself changes and slows when someone (or an object) is moving near the speed of light of 186,000 miles per second.This concept is mind-boggling when you understand that for a person moving near the speed of light (relative to us on Earth) their clock is not "running slow." To an observer traveling at three quarters of the speed of light, time seems to "run" normally. But time is "passing" for him at a much slower rate than for everyone else on Earth.Wolfson does a very nice job of expanding on Einstein's famous explanation about what would happen to a pair of identical twins when one took a trip on a spaceship traveling at near the speed of light, to another star, and then returned years later: From the perspective of the space-traveling twin, only five years have passed. But when he returned home he would find that his brother had experienced and aged twenty years because time itself is not a constant - the speed at which time "ticks" varies depending on one's speed relative to another. Both twins experience time normally in their local space but their entire frame of reference experiences time differently.My own analogy is to think of two boats on an ocean, hundreds of miles apart. Both boats have their motors on and are moving northeast at 5 miles per hours, but one boat is floating in the middle of the Gulf Stream, which is also moving northeast at 5 miles per hour.As I said, this concept is mind-boggling, because we on Earth all experience time moving at the exact same speed "through time" because we are all essentially at rest when compared to the blazingly fast speed of light.Wolfson also does a nice job of explaining how, because space (distance) and time are not separate principles but rather are both part of "spacetime," it is equally valid to say that "distances" change as it is to say that "time" changes. Wolfson is a patient, methodical writer who does an admirable job of explaining one of the most astonishing concepts in science without resorting to high level math or mumbo jumbo. This equation is about as hard as it gets and he spends several pages breaking it down and explaining it.

Having acquired a masters in psychology, I am far from being an expert in physics but I wanted to have a basic understanding of Einstein's relativity theory and its view on the concepts of time and space. This book was extremely helpful as it gives a clear explanation of the core principles of relativity in a language that is easy to understand for non-scientists. I was surprised to learn how

much of the physics I had studied thirty-five years ago was either incomplete or flatly wrong. This book is truly captivating as it discusses concepts like black holes, the possibility of time-travel and the possibility of a univers that is eternal as it constantly rejuvenates itself. I fully recommend this book to anyone who wants to obtain a basic understanding of modern physics but doesn't have the mathematical background to understand most other books hat were written on the subject.

It's pretty good introduction to special relativity and I was pleasantly surprised by the author's ability to describe the overwhelming majority of the concepts in simple terms - clearly - without resorting to mathematical apparatus. The overview of general relativity and is also present and main ideas are communicated equally well, though not to such a great detail - as a more complex topic which it is presumingly harder to describe without having to use mathematical formulas.I give it 5 stars even though I would actually have preferred to have more maths in the Appendices for those who would like to delve into it. But the referenced book "Spacetime" by J. Wheeler is a good next stepping-stone for those who'd like to get a more thorough understanding with algebra unleashed.

I've always been fascinated with Einstein and science in general, so I decided to give this book a try as my first Einstein read. The author definitely keeps it simple and uses real world experiences to relate the theory of relativity in a way almost anyone could understand easily. The book's first few chapters lead up to his theory with the discoveries of some of the other greats (Newton, Galileo, Ptolem, Aristotle, Kepler etc). Definitely a good starting point if you want to learn more about Einstein and his mind.

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