



Icarus at the Edge of Time

By Brian Greene

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Download and Read Free Online *Icarus at the Edge of Time* By Brian Greene

Editorial Review

Amazon.com Review

Product Description

From one of America's leading physicists--a moving and visually stunning futuristic re-imagining of the Icarus fable written for kids and those journeying with them toward a deeper appreciation of the cosmos.

With a minimum of words set on 34 full color boardbook pages, *Icarus* travels not to the sun, but to a black hole, and in so doing poignantly dramatizes one of Einstein's greatest insights.

Unlike anything Brian Greene has previously written, *Icarus at the Edge of Time* uses the power of story, not pedagogy, to communicate viscerally one small part of the strange reality that has emerged from modern physics. Designed by Chip Kidd, with spectacular images from the Hubble Space Telescope, it's a short story that speaks to curiosity and wisdom in a universe we've only begun to fathom.

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An Interview with Author Brian Greene



Q: After writing two big four-hundred-plus page bestselling books, what made you decide to write an illustrated book for all ages?

A: There's an emotional side to science which the general public rarely experiences. When Einstein's calculations in 1916 showed that his new general theory of relativity could explain strange aspects of the planet Mercury's motion, he experienced--by his own description--heart palpitations. He'd revealed a fundamental cosmic truth and it filled him with awe and reverie. Yet, by contrast, in the public sphere science is still largely viewed as merely a cold body of knowledge. To

many people, science is aloof, distant, abstract. I remember, some years back, reading a poem of Whitman's about an astronomy student who grows tired and frustrated by his professor's teachings, and blissfully leaves the class to go outside, look skyward, and simply experience the wonderment of the star filled heavens. There are many for whom this poem would resonate. This highlights for me the need for people to connect with science in a new way--outside of the classroom and beyond the textbooks. My two previous books tried to make some heady ideas of modern physics widely available, and they did this through straightforward exposition. In *Icarus At The Edge Of Time*, my intention is to open a different kind of avenue onto science--a more visceral, more emotional side that a fictional narrative more readily accesses.

Q: Where did the idea to re-imagine the Icarus legend (set in outer space and involving black holes!) come from?

A: I recently told my two and a half year old son a bedtime story that involved space travelers moving near

the speed of light. Within days he was telling his own animated stories of dinosaurs and monsters outrunning a new and wonderful concept--"the speed of dark." Which got me thinking. Storytelling is our most basic and powerful means of communication. We listen with a different kind of intensity--and open ourselves most fully--to a gripping tale. So why not allow some of science's greatest wonders to be experienced not through pedagogy but through the force of narrative? Science in fiction, as opposed to science fiction. Scientific insights that are absorbed rather than studied. *Icarus At The Edge Of Time* is my first attempt to explore this terrain. Instead of a journey near the sun--a "light" star--Icarus heads to a black hole--a "dark" star. And then the wonders of Einstein's relativity kick in, warping the more familiar ending into a painful conclusion, to be sure, but perhaps one that's more hopeful than the original.

Q: The story of Icarus is a cautionary tale, what do you think it has to say when applied (as it is here) to the nature of scientific exploration of the universe?

A: Great scientists are great adventurers, boldly exploring unknown terrain--"anxiously searching" as Einstein once put it "for a truth one feels but cannot find, until final emergence into the light." Icarus's fearlessness fits this profile to a "T". But there's another side to scientific exploration. Scientific research has the capacity to reveal realms that turn the status quo on its head. And when this happens, we're often not prepared--as a society we're often not sufficiently mature--to take on the responsibility that such new realms can require.

From nuclear knowledge to stem cells, from global climate change to cloning, science not only opens up new vistas but confronts us with profound challenges. In this new version of the Icarus tale, Icarus's unrestrained explorations take him, literally, to a startling new realm--one in which the universe as he knew it becomes forever beyond his reach. We can imagine him maturing into his new life and experience, but we also feel the wrenching pain of his being torn from his familiar reality--and from his family--and entering a completely new world--the very process of maturation we collectively navigate as science rewrites the rules of what's possible.

Q: Who do you see as the audience for this book?

A: The intended audience is broad. While I've found that science-enthusiasts get a big kick out of the story (it's not often that general relativity is the lynch pin in a narrative!), I wrote the story with two kinds of imaginary readers looking over my shoulder--adults who don't generally have much contact with science, and kids who love a short adventure story.

Q: Since the writing of your last book you have become a father. How has fatherhood impacted you as a writer?

A: I feel a stronger urge to go beyond a connection with readers that's purely intellectual. The intellectual side is critical of course. But I think you communicate far more effectively if you can engage the reader on multiple levels. I've always felt this way. But I now experience it everyday--all the time--with my son, and also my one-year-old daughter. Fatherhood has heightened my recognition that to communicate you need an emotional link.

Q: Your passion for science and making it come alive for people of all ages is well known--as evidenced through your founding of The World Science Festival and also in a recent *New York Times* op-ed in which you wrote about "the powerful role science can play in giving life context and meaning," and stated, "It's the birthright of every child, it's a necessity for every adult, to look out on the world . . . and see that the wonder of the cosmos transcends everything that divides us." How do you feel about the way Science is taught in most schools today and what would be the biggest changes you would recommend?

A: We need to get beyond the urge--however important--of merely teaching kids the results of science, the

methods of science. We need to communicate the stories of science. If a kid thinks of science as a subject taught in a classroom, we've failed. Kids need to think of science as the greatest of adventure stories as we've sought to understand ourselves and the universe around us. Kids need to recognize that science is a perspective, a way of life--it's something you hold with you long, long after you leave the classroom.

Q: What were some of the books that most inspired your passion for Science?

A: When I was really young, it wasn't actually books that inspired me. It was great teachers. From my dad (a self-educated high-school drop-out) to a couple of public school teachers where I grew up in New York City, I was fortunate to be surrounded by people who knew how to nurture and excite a young mind.

Q: So do you think anyone will ever actually find out what happens at the center of a black hole?

A: Absolutely. But not by jumping in.

Q: Is it a challenge, as a physicist and mathematician to write in a way that everyone understands?

A: It is a challenge, but for me its both a useful and exciting one. I find that translating cutting-edge research into more familiar language forces me to strip away extraneous details and zero in on the core ideas. Often, this helps me to organize my own thoughts and has even suggested research directions. And it's exciting to see ideas that are close to my heart and those of other researchers in the field reach a wider audience. The questions we are tackling are universal, and everyone deserves the right to enjoy the progress we're making.

Q: What are black holes and what do they tell us about the nature of universe?

A: Black holes are regions of space filled with such intense gravity that anything which gets too close, even light, is unable to escape. Although Albert Einstein's insights led to the idea of black holes, he remained skeptical about their existence. Yet, in the decades since, a wealth of astronomical observations have provided strong evidence that black holes not only exist in the cosmos, they're commonplace.

Black holes have a profound effect on time: their gravitational force pulls on time itself, slowing its rate of passage ever more as one gets ever nearer a black hole's edge. Because of this, black holes provide for a specific kind of time travel. Were you to hover near the edge of a black hole, time for you would pass more slowly than for everyone else who remained far away. On returning to Earth you would thus find that hundreds or even thousands of years had elapsed, depending on the size of the black hole and how close you ventured to its edge.

Scientists still haven't figured out what happens at the very center of a black hole. Einstein's mathematics breaks down and so provides no insight. Some scientists have suggested that a black hole's center is where time comes to an end while others have proposed that it's a portal to another universe. Finding the definitive answer is widely recognized as one of the great remaining challenges in our continuing quest to understand space, time and the cosmos.

Q: How close are we to really understanding the nature of the universe?

A: Sometimes I think the final theory is just around the corner. Sometimes I think such thoughts are naive. The bottom line is I don't know, but what we're learning is so startling, that in a way it doesn't matter. When or if we reach the deepest understanding, it will be a major moment for our species. But until then, making progress at unraveling the cosmos is its own reward.

Q: Where did you get the idea to illustrate this book with photos from the Hubble Space Telescope?

A: That was Chip Kidd's idea. On reading the story he immediately felt that an abstract, as opposed to literal, visual treatment would be most effective. I agreed completely. And was kind of blown away when he came up with this design. It is so simple, but so powerful.

(Photo Credit: Andrea Cross)

Designer Chip Kidd Discusses His Vision for *Icarus at the Edge of Time*



Q: So Chip, where did the inspiration for this design come from?

A: The genesis, if you will, of the design and art direction of *Icarus at the Edge of Time* represents (for me), a prime example of design challenges at its purest and most exhilarating. In the spring of 2007, Marty Asher (Brian Greene's editor at Knopf) brought me Brian's manuscript of a fable of a teenage boy-genius (Icarus) who lives on a starship heading back to Earth after a generations-long mission and, against the stern warnings of his scientist father, commandeers a sort of pod-ship to go explore a black hole. When he returns from doing so, he finds that everything he knew has changed, and he learns a devastating lesson.

The story takes place in deep space, and as I was reading it, my mind instantly flashed to those incredible images that have been beamed back from the Hubble telescope. A quick investigation into the Hubble website bore out the fact that a) these images are in the public domain, and b) you can literally download good hi-resolution files of them from the site. Honestly, this discovery made me feel good about paying my taxes for the first time in decades. Anyway, the idea was born to illustrate the text metaphorically rather than literally. Although it is a fantastic tale, Brian grounds it in very real science, so the most appropriate thing was to show actual pictures of space (which happen to be jaw-droppingly gorgeous) as opposed to having someone draw or paint them.

In that sense it became like designing the cover of *Jurassic Park* all over again--you start with something concrete and real (a diagram of an existing T-Rex skeleton) and apply it to a fictional conceit. So you end up with what just might be outside Icarus's window as he hurtles through space. Added to that is a graphic element that represents the approaching and receding black hole, which is literally that--a small black circle appears smack dab in the center of the second spread and slowly grows as you read the book. Then, when it's so relatively large it threatens to completely consume everything, it slowly starts shrink (as Icarus pulls the pod-craft back away from it), until by the end of the book it disappears and is replaced by the Earth. If you have trouble picturing that, you'll just have to see the book! I thank Brian for the opportunity to work on it, and urge you all to check it out. Learning scientific space-physics was never so beautiful. –CK

(Photo Courtesy of Chip Kidd)

A Look Inside *Icarus at the Edge of Time*

(Click on Images to Enlarge)



From Publishers Weekly

Be forewarned: this is not like anything else the bestselling physicist Greene (*The Elegant Universe*) has written. Nor is it a children's book, though it looks like one, with simple, didactic text and Chip Kidd's design for spectacular photos, taken by the Hubble Space Telescope, of nebulae, galaxies and other cosmic phenomena, all on thick board. So what is this strange book? According to the publishers, it's a science title, but really it's a retelling of the myth of Icarus for the Star Wars generation. In Greene's version, Icarus, like his father, will live out his life on the starship Proxima, headed on a 23-trillion-mile journey to a planet that had sent intelligible radio signals to Earth. But the 14-year-old yearns to escape the Proxima's confines. So he gears up his Runabout-with a "micro-warp-drive engine" of his own design-and flits nimbly to the edge, not of the Sun, but of a black hole. But Icarus has forgotten about gravity's ability to warp time, and he will never reunite with his father or the Proxima again. Greene's impulsive teenager embodies well our insatiable desire to explore the universe, and Greene offers an ingenious transposition of the Icarus myth for the modern era. Yet the lesson Greene wants readers to take away is unclear: rather than dying, this Icarus is granted a stunning, if unbelievably optimistic, view of the future.

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Review

"Terrific . . . Page after page shows gorgeous, swirling color set in the blackness of infinity . . . Against these stunning visuals is a retelling of the classical myth of Icarus."

—Meghan Cox Gurdon, *Wall Street Journal*

"Do your part to get kids psyched about science with physicist Brian Greene's **Icarus at the Edge of Time**, a futuristic fable that will take you and your budding scientists to the ends of the universe and back. Full-color photos from the Hubble Space Telescope bring the beauty of the cosmos right to your fingertips."

—*Parade Magazine*

"A perfect book for smart parents to read to smart children. Plus, it will make all concerned even smarter."

—Tim Follos, *Washington Post Express*

“Moving and successful . . . Beautifully illustrated . . . The images frame the deep and complex thought at the heart of the tale . . . [Greene] weaves the wonder of modern physics through the fabric of his story—and thus enables his readers to confront its strangeness themselves.”

—Thomas Levenson, *Seed Magazine*

Users Review

From reader reviews:

Roxie Lloyd:

In this 21st one hundred year, people become competitive in most way. By being competitive currently, people have do something to make them survives, being in the middle of often the crowded place and notice through surrounding. One thing that oftentimes many people have underestimated that for a while is reading. Yeah, by reading a guide your ability to survive enhance then having chance to endure than other is high. In your case who want to start reading any book, we give you this particular Icarus at the Edge of Time book as nice and daily reading publication. Why, because this book is usually more than just a book.

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