

IT'S ALL RELATIVITY: 10 MUST-READ PHYSICS BOOKS

Selene Angier | Textbooks.com | May 3, 2017

That electric drill you put up your IKEA shelves with. The sunset trek across the Golden Gate Bridge. The ride in last night's Uber. The laptop you're reading this article on. You can thank a physicist for all that (or a team of engineers who got good grades in physics). And while they might not be household names, the dudes who developed the underlying mathematical principles are. Think Galileo, Newton, Einstein, and Archimedes.

We wanted to go beyond $E = mc^2$ and asked professor Chad Orzel to get us there by digging in on some of his must-read physics books. And bonus: They're a little cheaper than the "world's first physics textbook" that [just sold \\$790K](#).

An associate professor of physics and astronomy at Union College in Schenectady, New York, Orzel takes an entertaining approach to distilling complex scientific ideas for his students and for a general audience (hey, that's you and me). Be it on his blog, via Twitter, a [TED Talk](#), in Forbes Science, or in his books (the titles to his Fido-inspired books – “How to Teach Quantum Physics to Your Dog” and “How to Teach Relativity to Your Dog” – say it all.)



But he's still reverent in his irreverence, and firmly footed in the look-think-test-tell camp. And his list of top physics books reflects that.

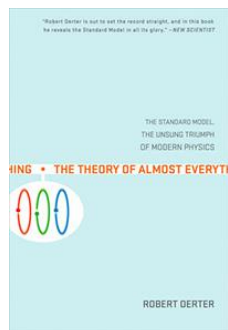
“I’m drawn to books that talk about real, solid, verified science – over those that delve into speculation about theories beyond what we know now,” says Orzel. “[These books] really emphasize the process of physics: the experiments that made people say, ‘Huh. That’s weird...’ and start digging into the bizarre behavior underlying seemingly simple phenomena. And even the more textbook-like ones, the Mermin and Takeuchi books, have a strong emphasis on practicalities of measurement used to verify the strange phenomena that are uncovered when you start poking at the fundamentals of space and time.”

For his students, look-think-test-tell means research. Testing theory, applying findings, failing time and again. For a successful career in physics and scientific research, he says, you need perseverance and a simplifying mindset.

“I half-jokingly describe physics as the science of knowing when it’s okay to approximate cows as spheres, and there’s a lot of truth to that,” he says. “One of the defining traits of a good physicist is the ability to look at a complex situation and think of a simplified model that captures the essence of what’s going on. ... And about doggedly pursuing a goal even through repeated failures, tracking down and fixing all the little problems that inevitably come up.”

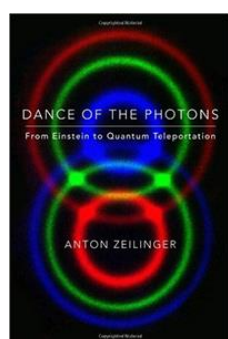
This list of must-read physics books isn’t solely for physics, engineering, or math majors either, says Orzel.

“These aren’t books written as texts for a class, so they should be accessible even to those who don’t have much background in the physical sciences,” he says. “The historical books focus a lot on the unique personalities who made key contributions, so they’re fascinating even if you don’t care about the underlying science.”



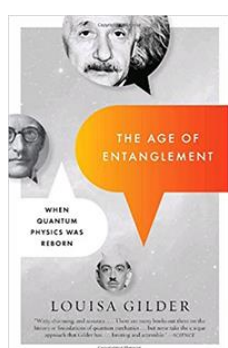
[The Theory of Almost Everything: The Standard Model, the Unsung Triumph of Modern Physics](#) by Robert Oerter

“A very nice, compact summary of the physics behind the Standard Model of particle physics, our best current theory of fundamental physics. I like this because the emphasis is on what we know to be true now, not hugely speculative ideas about what might be true.”



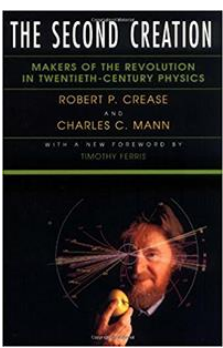
[Dance of the Photons: From Einstein to Quantum Teleportation](#) by Anton Zeilinger

“A book about quantum entanglement from one of the biggest names in the field of quantum optics. This is great because it works through the idea of entanglement using simulated data, providing an unusual degree of insight into how real experiments are done and interpreted.”



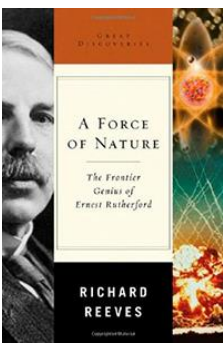
[The Age of Entanglement: When Quantum Physics Was Reborn](#) by Louisa Gilder

“A great look at the historical development of quantum physics, using imaginary ‘conversations’ reconstructed from the letters and other writings of the principal figures in the field – folks like Einstein, Bohr, Feynman, etc.



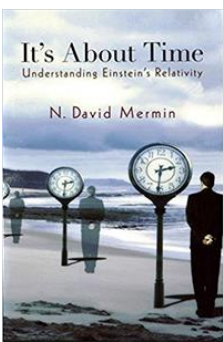
[The Second Creation: Makers of the Revolution in Twentieth-Century Physics](#) by Robert P Crease and Charles C Mann

“Another historical overview of quantum physics. This one is based on interviews with the surviving members of the original group of physicists, and goes into more detail than many books about the series of experiments that led physicists to the strange ideas of quantum electrodynamics.”



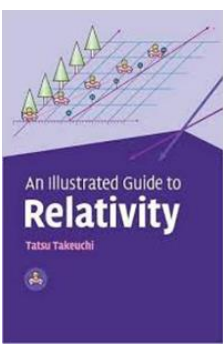
[A Force of Nature: The Frontier Genius of Ernest Rutherford](#) by Richard Reeves

“A short and fun biography of one of the greatest experimental physicists ever.”



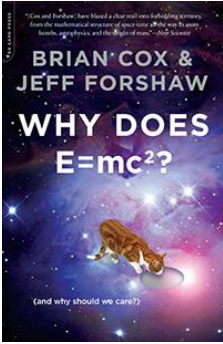
[It's About Time: Understanding Einstein's Relativity](#) by N. David Mermin

“Based on a course for non-science majors, but with plenty of math, this is one of the clearest descriptions I’ve read of the essential role of clocks and practical issues of measurement in relativity.”



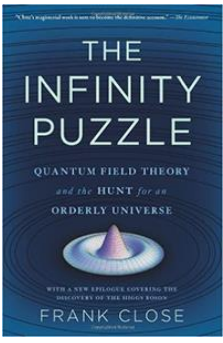
[An Illustrated Guide to Relativity](#) by Tatsu Takeuchi

“Another text from a non-majors course, this one using diagrams and graphical tricks to illustrate the key phenomena of special relativity.”



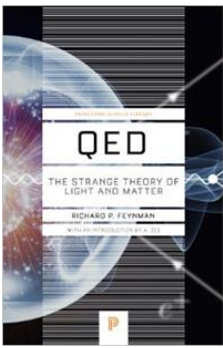
[Why Does E = mc²? \(And Why Should We Care?\)](#) by Brian Cox and Jeff Forshaw

“Has the best answer to the title question I’ve seen in any general-audience book on relativity.”



[The Infinity Puzzle: Quantum Field Theory and the Hunt for an Orderly Universe](#) by Frank Close

“Another historical book about the development of the Standard Model. What I really like about this is that it doesn’t streamline the process at all, but gets into the details of all the false starts and missed opportunities that mark the development of the theory. Those steps are an essential part of science, but it’s not often that you see them described.”



[QED: The Strange Theory of Light and Matter](#) by Richard P. Feynman and A. Zee

“Based on a set of lectures Feynman gave about the theory he helped invent, it’s a masterful explanation of an extremely complicated topic, showing how he earned his reputation as a great explicator of physics.”

Connect with Chad on his website ChadOrzel.com or on Twitter [@orzelc](https://twitter.com/orzelc)

MORE ON THE MATTER

Orzel says his talking-dog books are “heavily indebted” to some of the books on his must-read physics books list, and he recommends "Eureka" to those who enjoy “the history and process of science.”



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