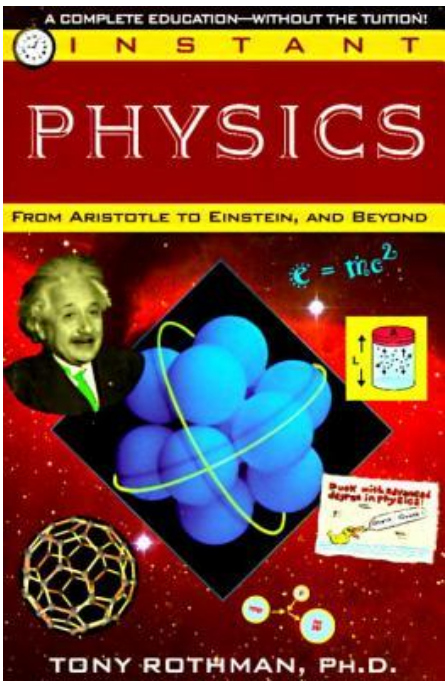

Instant Physics: From Aristotle to Einstein, and Beyond

Tony Rothman

Instant Physics: From Aristotle to Einstein, and Beyond

Tony Rothman

Instant Physics: From Aristotle to Einstein, and Beyond Tony Rothman
For all of you who break out in a sweat at the thought of thermodynamics, or freeze up at the mention of quantum mechanics, like a bolt from the blue, INSTANT PHYSICS will zap you through the fascinating history of our most basic, yet baffling, science.
From the thousand-year search for proof of the existence of the ever-elusive atom to the varied and heated arguments behind the big bang theory, INSTANT PHYSICS answers all the heavy questions with a light touch. You'll learn:
* How the Greek philosophers used the sledgehammer of mathematics to break apart the mysteries of the physical universe.
* Why gravity is a "romantic" force.
* How to tell the difference between a gluon, a meson, and a quark, even if you can't see them.
INSTANT PHYSICS is crammed with special features, including chapter summaries, who's who lists, biographical and historical tidbits, and a host of illustrations, photos, equations, diagrams, and drawings.

Instant Physics: From Aristotle to Einstein, and Beyond Details

Date	:	Published February 21st 1995 by Ballantine Books
ISBN	:	9780449906972
Author	:	Tony Rothman
Format	:	Paperback 242 pages
Genre	:	Science, Physics, Nonfiction, Academic, School

From Reader Review Instant Physics: From Aristotle to Einstein, and Beyond for online ebook

Stacy says

I registered a book at BookCrossing.com!
http://www.BookCrossing.com/journal/3734468

Bob Nichols says

“Physics,” the author writes, “is best thought of as the search for rules that govern the behavior of the universe.” Magical explanations are not welcome. The path toward Enlightenment is to “become a True Believer” in rules, though there’s ample room for mystery. “Things happen for a reason,” he writes. “Those reasons are mechanical; they involve forces that can be measured.” In the West, this (the replacement of chaos with logos/law and kosmos/order/universe) was the perspective of the pre-Socratics, but Rothman writes that “Plato and Aristotle got in the way.” Plato’s real world lay beyond “the realm of the senses and was not accessible to experiment…a completely anti-scientific approach,” he writes, and Aristotle’s “Earth-centered monstrosity” dominated science until Copernicus.

This opening chapter sets the stage for Rothman to lay out the evolution of physics in his succeeding chapters: the clockwork universe, the atom, energy, electromagnetism, Einstein’s special and general relativity theory, the nucleus and its (micro) quantum world, the (macro) world of gravity, and the relationship between the quantum mechanics and gravity. This book, written for the lay person, made or raised some interesting points:*

1. There’s no definition of mass: “This term is not defined in physics,” Rothman states, “but can be thought of as the amount of ‘stuff’ in an object. One can also view it as an object’s ‘resistance to acceleration.’” This is an interesting disclaimer given that a mass is packed with energy per Einstein; masses attract via gravity (energy is drawn to itself?); and resistance involves the amount of mass/energy relative to other amounts of mass/energy (subject to the inverse square law).

2. Rothman says that “objects falling freely under the acceleration of gravity feel no gravitational force.” Is it a contradiction to state it this way? If gravity is that which accelerates, then how is the object that is attracted “free”? (Walter Lewin writes, “Free fall is when the force acting on you is exclusively gravitational, and no other forces act on you.”) And doesn’t “falling,” as opposed to “moving,” imply falling “from or to” some defined reference point in a universe where nothing is fixed?

3. Acceleration is defined as a change of velocity (speed in a given direction per unit of time), but then there is the more causal expression about an object, “it is accelerating,” or “accelerated masses,” which almost suggests an “accelerator” that creates “acceleration.” If there is no accelerator, does this mean that everything non-organic moves around, self-propelled in a way, bumping into things, causing acceleration? Then, there’s a question about life vs. non-life: both are accelerators, except that the former is intentional (though also unintentional and, interestingly, thus akin to non-life).

4. If acceleration is on-going, everywhere, does this mean that everything cosmic is in motion, perpetually, and is this why space and time are linked together? With everything moving, time never occurs in fixed

space, and space always involves time as there is no simultaneity in the movement in space from X to Y. If acceleration involves perpetual impacting of one object on another, is this how causality is to be understood – embedded within the cosmos?

5. Regarding the speed of light and its independence from of all other object motion (neither additive nor subtractive from the velocity of moving objects), what, speculatively, might that mean about the nature of the cosmos (there's a question in here someplace)?

6. Because the energy needed to move an object at the speed of light is “infinite” (no additional energy can make an object move faster?), is this “absolute velocity?” I don’t see that terminology.

7. Regarding Rutherford’s discovery that the “atom was mostly empty space,” what happens to the collapse of atomic space in a singularity event? Is this where cosmic macro force (gravity) joins up with cosmic micro forces of the quantum world, and what happens then?

8. In speaking of the atomic nucleus, Rothman notes that negatively charged electrons are 1,800 times lighter than protons and neutrons, and that electrons and protons have the same sized charge. What is the relationship between atomic weight and charge? If weight (number of neutrons plus number of protons) is “mass” and charge “energy,” how would this relate to Einstein’s formulation that mass and energy are equivalent? What is the relationship between the positively charged proton and the neutral neutron, and why is it significant that the neutron (no charge) is (slightly) heavier than a proton?

9. Rothman makes the innocuous statement that energy comes in discrete intervals. As “discrete” implies a distinct break of some sort, does this mean that it's a “particle” but that, when it moves across a series of intervals, it's a wave (Rothman writes that Planck “posited that light sometimes acts as particle [‘quanta’], each of which carries energy”)?

The book alternates between distractingly breezy language and mathematical formulas. It makes inconsistent references to natural laws, conservation laws, laws of thermodynamics, laws of nature, making it hard to distinguish which is which. But, still, there’s more than enough in this book for the introductory reader.

*For the lay readers of his book, Rothman opens his first chapter with his first mantra: “Don’t memorize, understand.” He opens his last chapter, with, “If you ask a stupid question, you may feel stupid; if you don’t ask a stupid question, you remain stupid.”

Einsteinjr says

This is a great introduction to physics for a young student, or for an old one who regrets not being interested in it in high school or college. But to be honest, I enjoy reading this book even now. Dr. Rothman's pedagogy borders on the absurd, and I enjoy every minute of it. One or two of his examples may also have made their way into my classroom.

Grace Jensen says

I've actually had this book for awhile on my shelf, but just got to reading it. What stopped me short was the condescending tone and lack of seriousness that was taken with the subject. Everything from claiming to debunk Star Trek science to labeling levels of difficultly as "mild," "spicy," and "hot."
Maybe this would be best for people who don't take physics seriously, but just want to feel superior while reading it. For everyone else, I would pick up something else entirely.

Joe says

Okay, I'm a total qeek for enjoying such books.

Science For The People says

Recommended on Skeptically Speaking show #90 on December 17, 2010.
http://skepticallyspeaking.ca/episode...

Kasia says

It's enjoyable which isn't that common to say about books that tackle with physics or science on the whole. Although the language can be too blunt sometimes and delivery may seem too straightforward. Nevertheless, it has the potential to get someone into science and that's always very much appreciated!

Br. Justin Marie Brophy, O.P. says

Good intro to physics. Partly mathematics, partly theory. Good mix and simple introduction. Author has an axe to grind against Aristotle and religion. Probably would have gotten 4 stars if he weren't so heavy-handed. Good sense of humor though so the book is entertaining and easy to read.

Tracy E. says

I read this as a refresher. Although it's "a complete education—without the tuition," I wouldn't recommend it for beginners unless you have a natural knack for it already. Even after taking intro physics, astronomy, and college algebra/precalculus, I found many of the equation explanations and derivations difficult. I do like that it's heavy on history and starts with the Presocratics rather than the Greeks. It's all from Western history though. No Asian or Middle Eastern mathematical roots are discussed. The author is a former teacher, so the writing is lecture-style, but it's also laced with playfully sarcastic, geeky humor and mild swearing. I like it, but others might not. Also, the book is 21 years old so some of the joke references might be lost on younger readers. Despite the tagline, the book doesn't cover all types of physics, even Rothman admits that. I do like his brief discussion at the end about the "end of physics," something I hadn't thought about before. Overall, it did work as a refresher for me, I learned some new things, and previously foggy concepts became clearer, but I didn't master understanding of all the equations. 3.5/5 rounded to 4.

"If you ask a stupid question, you may feel stupid; if you don't ask a stupid question, you remain stupid."

Jess says

I am really enjoying this. The author does tend to have a not-so-silent "duh" at the end of a lot of paragraphs, but he's really funny and explains complicated subject matter in an understandable manner. My favorite line so far is when he's explaining about the importance of testing hypotheses: "As Confucius say: "Without the data, yo' chatta' don' matta'.""
