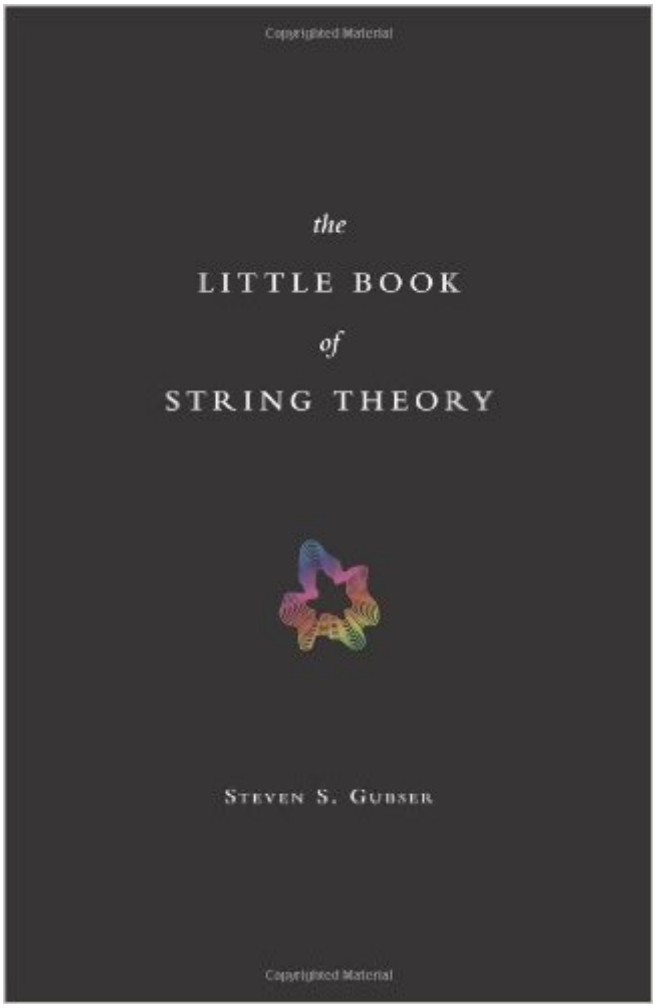
The Little Book Of String Theory (Science Essentials)



Synopsis

The Little Book of String Theory offers a short, accessible, and entertaining introduction to one of the most talked-about areas of physics today. String theory has been called the "theory of everything." It seeks to describe all the fundamental forces of nature. It encompasses gravity and quantum mechanics in one unifying theory. But it is unproven and fraught with controversy. After reading this book, you'll be able to draw your own conclusions about string theory. Steve Gubser begins by explaining Einstein's famous equation E = mc2, quantum mechanics, and black holes. He then gives readers a crash course in string theory and the core ideas behind it. In plain English and with a minimum of mathematics, Gubser covers strings, branes, string dualities, extra dimensions, curved spacetime, quantum fluctuations, symmetry, and supersymmetry. He describes efforts to link string theory to experimental physics and uses analogies that nonscientists can understand. How does Chopin's Fantasie-Impromptu relate to quantum mechanics? What would it be like to fall into a black hole? Why is dancing a waltz similar to contemplating a string duality? Find out in the pages of this book.The Little Book of String Theory is the essential, most up-to-date beginner's guide to this elegant, multidimensional field of physics.

Book Information

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Customer Reviews

I quite enjoyed Dr. Gubser's effort to explain in words what can only make sense in higher mathematics. Cutting edge physics is, in this layperson's opinion, a mess of theories premised on ideas that nobody has even begun to figure out how to prove. The author effectively uses simile and

metaphor to illustrate an exceptionally difficult topic. As an attorney whose scientific quest came to a crashing halt in second semester Calculus, I think I understood his argument that modern physics is like pre-Mendeleevian chemistry. We are finding all manner of new particles and ideas regarding their relationships and interactions but have not yet found a framework to make sense of the new discoveries as did the Periodic Table of Elements to chemistry. Now, that idea I can understand; not since Dr. Michio Kaku's book on Hyperspace have I encountered an author who is both willing and able to bring such thorny ideas into focus.If you pick up this book and think you'll even begin to understand string theory--try again. However, my understanding of the field advanced more from this book than from any of the other general science offerings out there. While challenging, it was much easier to read and to understand than any textbook or scientific paper. I believe that anyone who truly masters a field of understanding can teach it to anyone else--the ability to teach is a measure of the teacher's understanding. I sympathize with those who say that the field cannot be taught without equations; however, that should not prevent the physicists from making an attempt to do so and I felt that Dr. Gubser succeeded admirably in breaking some new ground with this book.

This book starts with a brief introduction to the basic laws of physics, and the search for an ultimate theory to explain the physical reality. When the author starts describing the string theory, things get complicated. The reader must bear in mind that this is not an easy field to appreciate since it involves multi-dimensions of space and one time dimension; string theory has 26 dimensions, and superstring theory has 10 dimensions. Besides this, the fundamental particles exist as different vibrations of strings in multi spacetime. It is hard to envision how a four dimensional space would look like, and it would be even harder to appreciate the subject given the amount of mathematics that goes into constructing the theory. Although the book doesn't involve any mathematics but the author does his best to make the difficult subject interesting.A brief summary of the book is as follows: In string theory, the myriad of fundamental particle types is replaced by a single fundamental building block, a string. These strings can be closed, like loops, or open, like a hair. A string is infinitely thin and has an infinitesimal length of 10e(-34) meters. As the string moves through time it traces out a tube or a sheet (the two-dimensional string worldsheet). Furthermore, the string is free to vibrate, and different vibrational modes of the string represent the different particle types. The particles known in nature are classified according to their spin into bosons (integer spin) or fermions (odd half integer spin). The bosons carry forces, for example, the photon carries electromagnetic force; the gluon carries the strong nuclear force, and the graviton carries gravitational force. Fermions make up the matter like the electron or the quark.

There is an enormous hunger among the educated public, not only students but professionals trained in non-physical science fields (law, medicine, business, arts) to understand the progress of modern physics, perhaps the most exciting intellectual enterprise in all history. Moreover, the educated public deserves to know more about such things; we all live in the same universe. Working scientists have an obligation to share; this is especially so in the US where the public (in many cases, through the US Dept. of Energy) generously supports their work.Unfortunately, this short book by Prof. Steven Gubser fails almost completely to accomplish the mission. It is written so as to be largely incomprehensible to the target audience, a sort of high level review article packing in each and every issue of contemporary string theory circa 2010 (which means already out of date experimentally and theoretically in 2013) with the equations stripped out but no real skill of communication. Feynman had such a personal and intuitive grasp of physics that he could explain the dynamics of an electromagnetic wave using only arithmetic. Gubser is not that kind of guy; he is a nerd's nerd, tries to cover far too large a span of knowledge in 170 pages, and seems to have no sense whatsoever how the lay reader will receive it. The book has two cursory and insubstantial chapters on relativity and quantum theory, even though both subjects can be (and have been) taught very effectively with minimal mathematics. It then goes on to throw out a few first-grade type cartoons of concepts like symmetry (circle can be rotated any angle, squares only 90 degrees, thank you very much) and salted, appropos of nothing with "human interest" stories about the author's mountain climbing and piano playing.

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