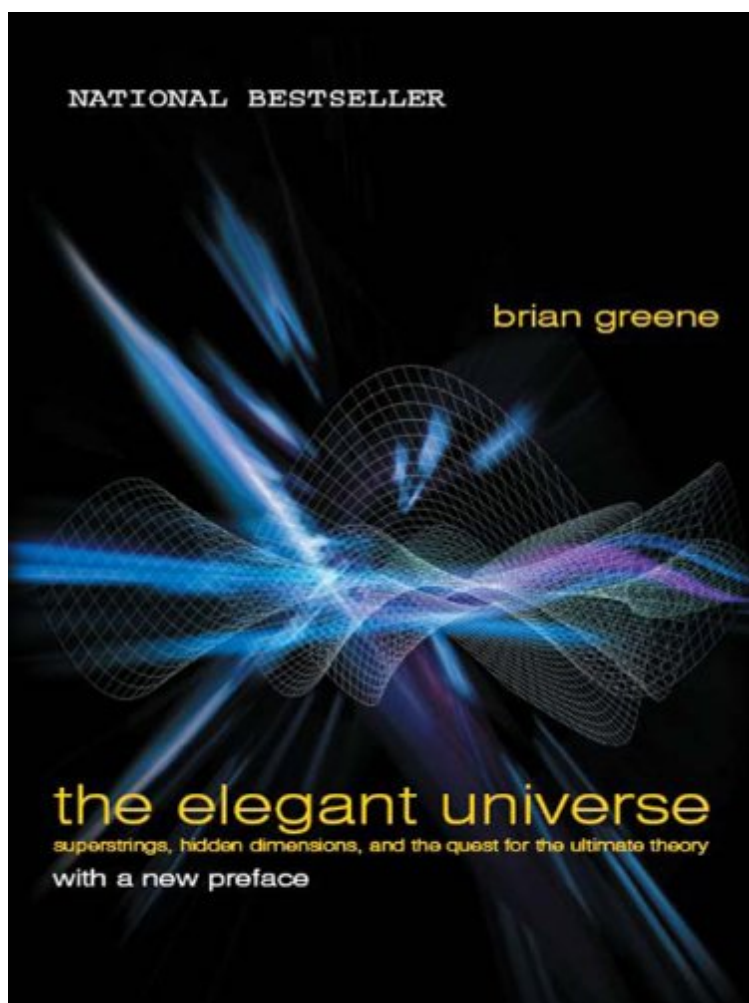


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The Elegant Universe: Superstrings, Hidden Dimensions, and the Quest for the Ultimate Theory



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Description :

Prsentation de l'diteurA new edition of the New York Times bestsellernow a three-part Nova special: a fascinating and thought-provoking journey through the mysteries of space, time, and matter.Now with a new preface (not in any other edition) that will review the enormous public reception of the relatively obscure string theorymade possible by this book and an increased number of adherents amongst physicistsThe Elegant Universe "sets a standard that will be hard to beat" (New York Times Book). Brian Greene, one of the world's leading string theorists, peels away the layers of mystery surrounding string theory to reveal a universe that consists of eleven dimensions, where the fabric of space tears and repairs itself, and all matterfrom the smallest quarks to the most gargantuan supernovasis generated by the vibrations of

microscopically tiny loops of energy. Today physicists and mathematicians throughout the world are feverishly working on one of the most ambitious theories ever proposed: superstring theory. String theory, as it is often called, is the key to the Unified Field Theory that eluded Einstein for more than thirty years.

Finally, the century-old antagonism between the large and the small—General Relativity and Quantum Theory—is resolved. String theory proclaims that all of the wondrous happenings in the universe, from the frantic dancing of subatomic quarks to the majestic swirling of heavenly galaxies, are reflections of one grand physical principle and manifestations of one single entity: microscopically tiny vibrating loops of energy, a billionth of a billionth the size of an atom. In this brilliantly articulated and refreshingly clear book, Greene relates the scientific story and the human struggle behind twentieth-century physics' search for a theory of everything. Through the masterful use of metaphor and analogy, *The Elegant Universe* makes

some of the most sophisticated concepts ever contemplated viscerally accessible and thoroughly entertaining, bringing us closer than ever to understanding how the universe works. There is an ill-concealed skeleton in the closet of physics: "As they are currently formulated, general relativity and quantum mechanics cannot both be right." Each is exceedingly accurate in its field: general relativity explains the behavior of the universe at large scales, while quantum mechanics describes the behavior of subatomic particles. Yet the theories collide horribly under extreme conditions such as black holes or times close to the big bang. Brian Greene, a specialist in quantum field theory, believes that the two pillars of physics can be reconciled in superstring theory, a theory of everything. Superstring theory has been called "a part of 21st-century physics that fell by chance into the 20th century." In other words, it isn't all worked out yet. Despite the uncertainties—"string theorists work to find approximate solutions to approximate equations"—Greene gives a tour of string theory solid enough to satisfy the scientifically literate. Though Ed

Witten of the Institute for Advanced Study is in many ways the human hero of *The Elegant Universe*, it is not a human-side-of-physics story. Greene's focus throughout is the science, and he gives the nonspecialist at least an illusion of understanding—or the sense of knowing what it is that you don't know. And that is traditionally the first step on the road to knowledge. —Mary Ellen Curtin From *Publishers Weekly*

One of the more compelling scientific (cum-theological) questions in the Middle Ages was: "How many angels can dance on the head of a pin?" Today's version in cutting-edge science is, "How many strings...?" As posited by string theory physics, strings are furiously vibrating loops of stuff. The concept of strings was devised to help scientists describe simultaneously both energy and matter. The frequency and resonance of strings' vibration, just like those of strings on an instrument, determine charge, spin and other familiar properties of energy—and eventually the structure of the universe: a true music of the spheres. There's a chance that strings are themselves made up of something still smaller. But scientists can prove their existence only on the

blackboard and computer, because they are much too tiny—a hundred billion billion times smaller than the nucleus of an atom—to be observed experimentally. Brian Greene, professor of physics and mathematics at Cornell and Columbia universities, makes the terribly complex theory of strings accessible to all. He possesses a remarkable gift for using the everyday to illustrate what may be going on in dimensions beyond our feeble human perception. Just when we might be tempted to dismiss strings as grist for the publish-or-perish mill, Greene explains how they have demonstrated connections between mathematics and physics that have helped solve age-old conundrums in each field. This book will appeal to astronomy as well as math and physics fans because it probes the important insights string theory gives into hotly debated issues in cosmology. Later chapters require careful attention to Greene's explications, but the effort will prepare readers to follow the scientific advances likely to be made in the next millennium through application of string theory. Author tour. Copyright 1999 Reed Business Information, Inc.