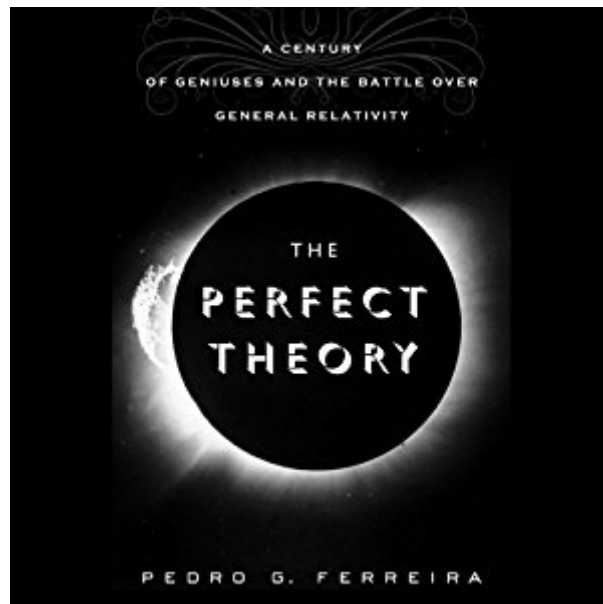


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# The Perfect Theory: A Century Of Geniuses And The Battle Over General Relativity



## Synopsis

How did one elegant theory incite a scientific revolution? Physicists have been exploring, debating, and questioning the general theory of relativity ever since Albert Einstein first presented it in 1915. Their work has uncovered a number of the universe's more surprising secrets, and many believe further wonders remain hidden within the theory's tangle of equations, waiting to be exposed. In this sweeping narrative of science and culture, astrophysicist Pedro Ferreira brings general relativity to life through the story of the brilliant physicists, mathematicians, and astronomers who have taken up its challenge. For these scientists, the theory has been both a treasure trove and an enigma, fueling a century of intellectual struggle and triumph. Einstein's theory, which explains the relationships among gravity, space, and time, is possibly the most perfect intellectual achievement of modern physics, yet studying it has always been a controversial endeavor. Relativists were the target of persecution in Hitler's Germany, hounded in Stalin's Russia, and disdained in 1950s America. Even today, doctorate students are warned that specializing in general relativity will make them unemployable. Despite these pitfalls, general relativity has flourished, delivering key insights into our understanding of the origin of time and the evolution of all the stars and galaxies in the cosmos. Its adherents have revealed what lies at the farthest reaches of the universe, shed light on the smallest scales of existence, and explained how the fabric of reality emerges. Dark matter, dark energy, black holes, and string theory are all progeny of Einstein's theory. We are in the midst of a momentous transformation in modern physics. As scientists look farther and more clearly into space than ever before, *The Perfect Theory* reveals the greater relevance of general relativity, showing us where it started, where it has led, and where it can still take us.

## Book Information

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## Customer Reviews

Pedro Ferreira's book "The Perfect Theory: A Century of Geniuses and the Battle over General Relativity" essentially tells us what other people did with Einstein's general theory of relativity after he developed it. While one chapter is devoted to Einstein's hard struggle with learning the non-Euclidean geometry and building the field equations that define the theory, the book really takes off after 1917 when a series of men and women discovered the awesome implications of these equations. The book is a fast read and it does a very good job portraying the colorful personalities and exciting discoveries unearthed by general relativity. By 1919 the theory had been well-established as part of the scientific enterprise, especially after it retrodicted the correct value of the perihelion of mercury and predicted the bending of starlight observed by Arthur Eddington, a discovery that splashed Einstein's name on the front pages of the world's leading newspapers. Eddington was Einstein's heir, thoroughly learning the theory and grasping its implications for stellar structure. Ironically he did not dare to take these implications to their logical conclusion. That task was left to a young Indian astrophysicist named Subrahmanyan Chandrasekhar who paved the way toward the discovery of black holes by considering what happens when stars run out of fuel and collapse under gravitational contraction. Famously Eddington rebuked Chandrasekhar's findings and revealed himself to be much like Einstein, a revolutionary in young age and a reactionary in old age. The story of black holes is one important thread that the book follows. Chandrasekhar's ideas were further developed by Lev Landau, Fritz Zwicky and Robert Oppenheimer in the 30s.

This book is the story of the Theory of General Relativity, Einstein's explanation of gravity, beginning with its conception in his thought experiments, its being overshadowed by quantum mechanics, its reemergence due to its cosmological significance and finally the inevitable last stage of all scientific theories, its being attacked, adjusted and perhaps ultimately replaced by scientists as they seek to better understand and predict Nature. Since first studying relativity as a graduate student I have over the many years continued to be fascinated by it, and have read and studied various works on it, including a short book by Einstein which I re-read every few years and which invariably teaches me something new every time. The theory is amazingly seductive to me, something which I have pondered. Perhaps it is the fact that it is the ultimate example of pure reason, epitomized by the image of the young Einstein sitting alone on his lunch break with just a

pad, pen and ideas and formulating an almost transcendently elegant and indeed beautiful physical theory captured by complex but inviting mathematics. Many have tried to encompass Relativity within the intellectual framework which included Freudian psychoanalysis and artistic Cubism in the beginning of the 20th century, but to me it is really a perfect example of classical science as opposed to the post modernism of quantum mechanics with its uncertainty and conceptual ambiguity. Perhaps the Theory's allure lies in the feeling of satisfaction one gets when even a small part of it is understood. When you begin to grasp the true meaning of spacetime and see why Relativity is considered a geometrical explanation of gravity you cannot help but feel Einstein at your shoulder, smiling, and that is a heady feeling indeed.

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