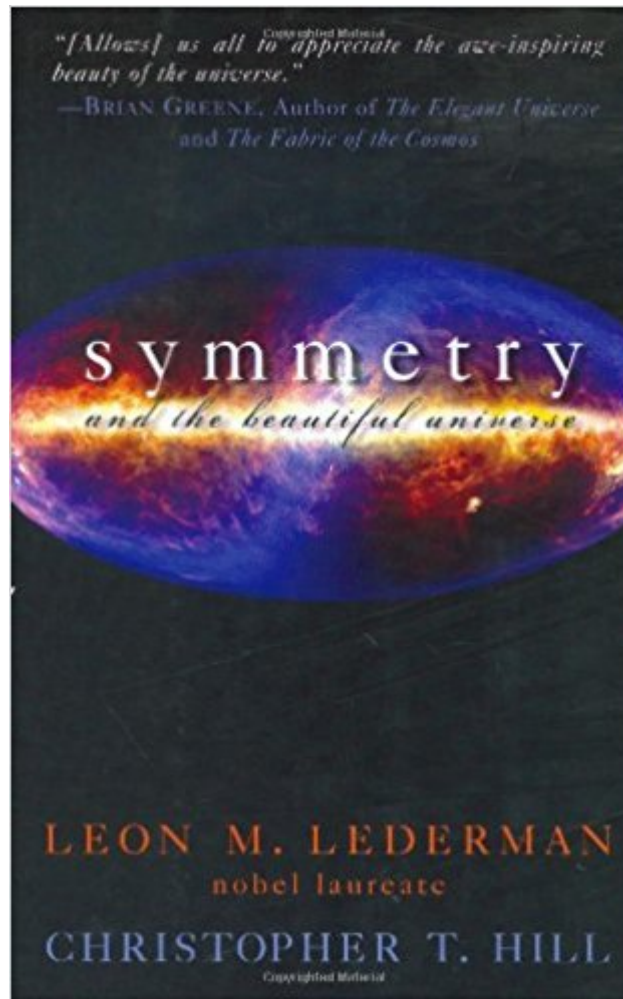


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# Symmetry And The Beautiful Universe



## Synopsis

"If there is one principle that has guided the spectacular advances in our understanding of the cosmos during the last hundred years, it is the concept of symmetry. In SYMMETRY AND THE BEAUTIFUL UNIVERSE, Leon Lederman and Chris Hill have captured the essence of this simple yet profound concept and conveyed its wonders with art and precision. In accessible and entertaining language, the authors provide readers with a crystal-clear window to physics' most refined theories, allowing us all to appreciate the awe-inspiring beauty of the universe." BRIAN GREENE, Author of THE ELEGANT UNIVERSE and THE FABRIC OF THE COSMOS; Professor of Physics, Columbia University "Symmetry is the way in to understanding the world; symmetry is part of beauty. Lederman and Hill, the most skillful of guides, show us the multitude of ways in which the physical world is shaped by symmetry. They take us on a lively tour of our subtle symmetry (and understandably asymmetric) world, from planets to quarks. In Lederman and Hill's book we are led masterfully to an appreciation of the crucial role of symmetry in this world." ROALD HOFFMANN, Nobel Laureate; Frank H. T. Rhodes Professor of Humane Letters, Department of Chemistry and Chemical Biology, Cornell University "An enigma of twentieth-century physics is the question of symmetry as a guiding principle of nature. Did nature start with the idea of symmetry, or is it an accidental consequence? Is symmetry, with its aesthetic appeal, a fundamental principle? In this penetrating and lucid book the authors, both top physicists, take on symmetry as a basic principle. They succeed in a marvelous way, and consequently this book is a must for the serious student of nature." MARTINUS VELTMAN, Nobel Laureate; Author of FACTS AND MYSTERIES IN ELEMENTARY PARTICLE PHYSICS "Formidable as a snow-covered peak, the concept of symmetry looms as a central challenge to all those who would understand modern physics. In this delightful but instructive book, Leon Lederman and Christopher Hill have rendered the great service of making this concept accessible to lay readers." J. MADELEINE NASH, Author of EL NINO: UNLOCKING THE SECRETS OF THE MASTER WEATHER-MAKER.

## Book Information

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## Customer Reviews

We are often delighted by the sight of symmetry when we observe it in a beautiful flower, in hexagonal snowflakes, or in man-made structures such as arches or bridges. But how many of us realize that symmetries are closely related to the conservation laws of physics? Lederman and Hill, 2 well-known and practicing physicists, describe the multiple facets of this topic, discussing how symmetry in the flow of time is related to energy conservation. They use this concept as a springboard to expand upon the importance of energy in this period of our civilization with real facts and figures. The first few chapters deal with symmetries of space and time and their relation to the conservation of momentum and energy. Fascinating stories like that about perpetual motion machines abound, and there are personal vignettes like one about Amalia Noether, a young lady who discovered the deeper connection between symmetries and physical laws and still suffered trials and tribulations as a woman seeking an academic position. Hill and Lederman take on the task of describing symmetries throughout physics, from classical mechanics to quantum mechanics, all the way to modern topics of particle physics. The book is intended for readers at an advanced high-school level or non-physics majors at university. Chapter 6, for instance, gives a refreshing account of the law of inertia- how it was formulated (incorrectly) by the ancient Greeks, later to be discovered by Galileo and to become a basic postulate in the relativity theory. Relativity is expounded upon in Ch. 7, whereby full appreciation of its contents requires some guidance. Other chapters describe e.g., symmetries of quarks and leptons, which currently stimulate public imagination.

Wow. This is some book. Unlike many books that describe the evolution of modern cosmological theory, this one is dedicated to the understanding of physics itself, both its history and it's collation of knowledge about reality. Through the course of the text, the history of discoveries in physics is described, giving all contributors from Aristarchis, Galileo and Newton, to Einstein, Feynman and Guth, among others, their just due. That it has been a globe effort is evident from the source nationalities of these intellects, as diverse as Scotland and Japan. The narration clearly illustrates

that good science is the result of the cumulative efforts of many different individuals, from many different cultures throughout history. Interesting too is that the book's basic starting point is the intellectual contribution of a brilliant female mathematician, Amalia Noether, working at about the same time and in the same country as the better known Einstein. It is her theory of symmetry in physics, worked out in mathematical theorems, that created a major connecting link between physics and mathematics. Although the book is not in depth enough to actually make her contribution clearer than "Noether's Theorem," her discoveries are obviously at the core of the entire movement in modern physics. It's nice to know that my old high school math teacher, who so disparaged the math abilities of his female students was wrong, wrong, wrong. The book is well conceived in its presentation of the information. It begins with the earliest efforts of the ancient Greeks and Romans to understand the workings of nature. Their concepts, sometimes startlingly close to the truth, served as the starting point for later researchers.

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