

Symmetry and the Beautiful Universe

By Leon M. Lederman, Christopher T. Hill

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"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 **SYMMENTRY 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**.

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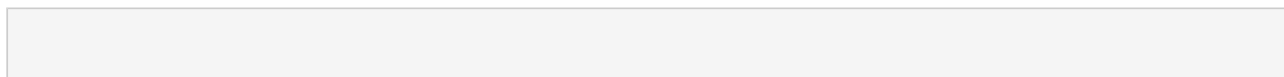
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Editorial Review

From Publishers Weekly

The concept of symmetry has seen increasing service in science popularizations as a metaphor to convey the intuitive appeal of physics, a vogue that continues in this dense treatise. Nobel Laureate Lederman (*The God Particle*) and theoretical physicist Hill deploy mathematical symmetry as a unifying theme in a tour of physics from Newton's laws to quarks and superstrings. Sometimes, as in a demonstration that the invariance of physical laws through time implies the law of conservation of energy, this approach yields insights. But usually, as in their confusing exposition of special relativity, symmetry considerations get in the way. The authors keep things readable with lots of physics-for-poets bits, including some tie-ins to environmentalism, comparisons of modern cosmology with ancient Greek myths, and a fictional dialogue—partly in Italian—between two newlywed physicists and Galileo's ghost. Unfortunately, symmetry is a forbiddingly abstract branch of mathematics that was peripheral to the development of much of physics and gives little tangible feel for its substance, and the point where it becomes indispensable to discussions of modern physics is also the tipping point where the book, like many others, topples into total incomprehensibility to laypeople. Readers who think symmetry implies clarity and grace will be disappointed. Photos.

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Review

"A **tour de force** of physics made simple...."

— *Times Literary Supplement*

"Thought-provoking...."

— *Discover*

"Few books about modern physics are as fascinating, far-ranging, and readable as this. It would be appreciated by anyone interested in the nature of science and the beauty of the universe...."

— *NSTA Recommends*

"A compelling and accessible discussion...."

— *Science Books & Films*

From the Inside Flap

The idea that an object's appearance can remain the same after some sort of physical change is both aesthetically pleasing and mathematically interesting, whether one is observing a delicate snowflake or appreciating a majestic Bach organ fugue. Yet in the twentieth century, humans discovered that this principle means a great deal more - the very structure of nature depends on it.

When scientists peer through telescopes at distant galaxies or use gigantic particle accelerators to examine the fabric of matter, they find universal and steadfast laws of physics governing the whole universe, at all times and places. Physicists recognize this as a form of symmetry, which is now believed to be the basic underlying principle that controls the universe. This insight is one of the greatest conceptual breakthroughs of modern science and drives the contemporary effort to discover a grand unification of all the laws of physics, such as superstring theory.

In SYMMETRY AND THE BEAUTIFUL UNIVERSE, Nobel laureate Leon M. Lederman and theoretical

physicist Christopher T. Hill explain the elegant concept of symmetry and its profound ramifications for art, music, and life of Earth, from quarks to the universe at large. This eloquent and accessible work of popular science not only illuminates concepts normally reserved only for physicists and mathematicians but also portrays the profound beauty of nature's inherent design.

Central to the story of symmetry is an ascetic, unpretentious, and gifted mathematician named Emmy Noether. Though still little known to the world, she dazzled no less a savant than Albert Einstein, who praised her "penetrating mathematical thinking." She proved that the law of the conservation of energy is centrally connected to the idea of symmetry and time and laid the groundwork for the most important conceptual revolution of modern physics.

Lederman and Hill reveal concepts about the universe, based on Noether's work, that are largely unknown to the public yet have wide-ranging implications for the big bang, Einstein's theory of relativity, quantum mechanics, and many other areas of physics. Through ingenious analogies and illustrations, they bring these astounding notions to life. This book will open your eyes to a universe you never knew existed.

Users Review

From reader reviews:

Cora Gallien:

This Symmetry and the Beautiful Universe book is not ordinary book, you have after that it the world is in your hands. The benefit you receive by reading this book is actually information inside this guide incredible fresh, you will get info which is getting deeper you actually read a lot of information you will get. This Symmetry and the Beautiful Universe without we comprehend teach the one who examining it become critical in pondering and analyzing. Don't always be worry Symmetry and the Beautiful Universe can bring whenever you are and not make your case space or bookshelves' come to be full because you can have it with your lovely laptop even cellphone. This Symmetry and the Beautiful Universe having good arrangement in word and layout, so you will not feel uninterested in reading.

Waldo Gates:

Now a day people who Living in the era wherever everything reachable by connect with the internet and the resources inside can be true or not demand people to be aware of each information they get. How a lot more to be smart in receiving any information nowadays? Of course the solution is reading a book. Reading through a book can help people out of this uncertainty Information especially this Symmetry and the Beautiful Universe book since this book offers you rich data and knowledge. Of course the info in this book hundred % guarantees there is no doubt in it you may already know.

Valerie Bell:

The knowledge that you get from Symmetry and the Beautiful Universe may be the more deep you excavating the information that hide inside words the more you get serious about reading it. It doesn't mean that this book is hard to be aware of but Symmetry and the Beautiful Universe giving you enjoyment feeling of reading. The author conveys their point in certain way that can be understood by anyone who read it because the author of this book is well-known enough. This kind of book also makes your vocabulary

increase well. Making it easy to understand then can go with you, both in printed or e-book style are available. We suggest you for having that Symmetry and the Beautiful Universe instantly.

Loretta Jones:

The actual book Symmetry and the Beautiful Universe has a lot of knowledge on it. So when you make sure to read this book you can get a lot of advantage. The book was compiled by the very famous author. The author makes some research previous to write this book. This particular book very easy to read you can get the point easily after scanning this book.

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