Knocking On Heaven's Door: How Physics And Scientific Thinking Illuminate The Universe And The Modern World

Synopsis

The latest developments in physics have the potential to radically revise our understanding of the world: its makeup, its evolution, and the fundamental forces that drive its operation. Knocking on Heaven’s Door is an exhilarating and accessible overview of these developments and an impassioned argument for the significance of science. There could be no better guide than Lisa Randall. The bestselling author of Warped Passages is an expert in both particle physics (the study of the smallest objects we know of) and cosmology (the study of the largest). In Knocking on Heaven’s Door, she explores how we decide which scientific questions to study and how we go about answering them. She examines the role of risk, creativity, uncertainty, beauty, and truth in scientific thinking through provocative conversations with leading figures in other fields (such as the chef David Chang, the forecaster Nate Silver, and the screenwriter Scott Derrickson), and she explains with wit and clarity the latest ideas in physics and cosmology. Randall describes the nature and goals of the largest machine ever built: the Large Hadron Collider, the enormous particle accelerator below the border of France and Switzerland - as well as recent ideas underlying cosmology and current dark matter experiments. The most sweeping and exciting science book in years, Knocking on Heaven’s Door makes clear the biggest scientific questions we face and reveals how answering them could ultimately tell us who we are and where we came from.

Book Information

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Customer Reviews

I am a lawyer, not a scientist. I found this book understandable for someone like me. Fortunately, the author added an introductory section about the discovery of the Higgs-Boson because it had not

yet been discovered when the book was published. Randall is a highly competent writer. This is not a simple book. One have to re-read a few paragraphs to understand them. The primary subjects are physics, particularly particle physics, and astronomy. I read a lot of popularized science material; my brother, who is as intelligent as I but doesn't read much science, found the book very tough going and quit it. Randall is awed by the beauty of science and by the work done by other scientists and convey her enthusiasm very well.

I just finished Randall's book Warped Passages and enjoyed it very much. So it was with anticipation that approached reading this book. Randall notes the intended audience for this book saying that it "is intended for an interested lay reader who would like to have a greater understanding of current theoretical and experimental physics and who wants a better appreciation of the nature of modern science - as well as the principles of sound scientific thought." The title is explained in the book: "Scientists knock on heaven's door in an attempt to cross the threshold separating the known from the unknown."She begins by discussing the many misconceptions people have about science today and introduces us to the concept of effective theories, which is a technique scientists use to study "particles and forces that have effects at the distances in question." A whole chapter is then spent on the contribution of Galileo in establishing the foundations of science thought. Some time is spent discussing the different aims for science and religion. She notes that the goals of science and religion are intrinsically different. Science addresses physical reality, whereas religion tends to be concerned with psychological or social human desires. Early modern scientists actually viewed the "Book of Nature" and the "Book of God" as similar paths to edification and revelation.We are next taken on a journey from the sub-atomic scales all the way down to something known as the Planck length (10-33 cm). We learn of the discoveries of electrons and quarks, fixed-target verses particles colliders, the Higgs mechanism, and more.Section III of the book delves into the machinery and measurements behind the science, notably the Large Hadron Collider (LHC) at CERN. A chapter is spent discussing the conception, construction, first tests, and problems encountered with the LHC. Some feared the LHC would be capable of producing black holes, and maybe even destroy the earth. Randall puts our fears at bay by explaining all we need to know about this. She continues by discussing calculating and dealing with risk citing common examples such as climate change and the financial crisis and explains how risk can be mitigated. The next topic deals with measurement and uncertainty where we learn the meaning of the terms accuracy, precision, and systemic uncertainty. A chapter is devoted to the CMS and ATLAS experiments. These are the two general purpose detectors of the LHC. They are

incredibly large and extremely complex wonders of engineering. Perhaps Randall's own theories will be verified here. Space is devoted to explaining in more detail the detection system. Here we have the trackers (innermost part of the detector), the electromagnetic calorimeter, the hadron calorimeter, and on the outermost part of the detectors we have the muon detector. There are many images provided to show us all that is described in the text.Section IV of the book deals with the topics of modeling and prediction of results. The concept of beauty and its relationship to science is explored, and we are given some insight into the process of model building. This segues into the nature of the Higgs boson, the Higgs field, symmetry breaking, and how the Higgs imparts mass to particles via something called the Higgs mechanism. We also learn about how the particles produced in the LHC can be used to identify the "fingerprints" of the latest theories. One theory of the author, called the Randall-Sundrum theory, proposes a warped geometry involving two types of branes in close proximity. Randall expresses the anxiety provoking nature of waiting for the LHC results. She notes that "They could change our view of the underlying nature of reality [...] When the results are in, whole new worlds could emerge. Within our lifetimes, we just might see the universe very differently." The text would not be complete with a discussion of inflation, dark matter and dark energy. We are informed of the various dark matter detection methods, and the various experiments worldwide that are being conducted in a attempt to detect it.Randal has given us here a glimpse into the world of high-energy physicists and cosmologists, their hopes, and the experiments that could answer the fundamental questions about the universe we live in.

Light on physics, heavy on Randall's opinions and life experiences. A lot of these physics books have a ton of history of physics for the fist 5 chapters or so (like "from Archimedes to Einstein", so to speak) but then they dive into the modern physics that the reader was looking for. In Randall's book, instead of history of physics, the first chapters are all about the history of her professional life, lectures, books, political conversations, etc.. Disappointing.

Good book in terms of philosophy. A majority of the book is spent on Randall harping about how people don't understand science and that scientific thinking can make the world better. If you are already a proponent of science and want to uncover good arguments for its continuance then get this book. However, if you are like me looking for a book about modern science and explanations of phenomena look elsewhere. There is barely any actual talk of physics in this book other than to use it as a quick example to prove why science is important.

Knocking on Heaven’s Door is quite broad in topic. The author discusses physics and religion, the scientific method as well as gives a comprehensive overview of current particle physics and current experiments at the LHC. The book is very approachable to the non-expert and there is a lot of important information throughout the book. However, the organization is a bit poor and the topics dont follow naturally, in addition the experimental physics side is much stronger than the philosophy side. There is much commentary that, though not wrong, is poorly directed. I will try to be more elaborate below.The author sets the stage by going into the concept of scale. The book is primarily about the scale that is penetratable by the LHC and as a result, familiarizing the reader with the scale that is to be examined requires taking us to the completely unintuitive. The author weaves in philosophy and describes the difference between scientific reasoning and religious reasoning. The account is readable but not as engaging as other parts of the book.The author then moves on to the LHC. This was for me the most interesting part of the book. The LHC is a remarkable achievement for mankind. The history and engineering of the project are discussed in detail and though the reader cant really grasp the intricacy one does get a good sense of it. The utility of the LHC as a tool to test various models of fundamental interactions are discussed with various examples. Through this exercise the reader begins to appreciate how the LHC can potentially bring much insight into the working of the world. Included in the section is a discussion of how in physics one can tackle and be objective about experiments and how physicists do not aim to understand dynamical systems as much as they try to understand repeatable experiments. In particular the difference between the objectivity of proceeding with the LHC project despite the "risks" of emerging black holes vs the subjectivity of energy policy and economics is analysed. This part is where the author seriously dissappoints. Most physics is not dismissing the ludicrous... Had the author been objective, she would have tackled a more difficult question like nuclear energy in Japan in the face of Fukushima. That is an area which is more challenging- and the topic would have been a lot more sensible considering the author points out we are being irresponsible with global warming (which i completely agree with).The author continues and discusses the scientific method. She discusses the goals of physics to be outcomes not elegance in solutions (which are subjective by nature). The collaboration on projects like the LHC are shown to be incredibly fruitful for both experimentalists as well as theorists. All in all, there is a lot of interesting material in the book. I think the comments about the rigour and uniqueness of physics results is true but uninteresting and trivial- the author could challenge topics more by crossing the border into applied physics and how decisions and cost benefit analysis is done in such areas. The section on the LHC and the experiments being done and planned is fascinating and very readable. Definitely happy I read this, though the content doesnt

always flow.

Knocking on Heaven’s Door: How Physics and Scientific Thinking Illuminate the Universe and the Modern World DARK ENERGY: The Biggest Mystery In The Universe (dark matter, how the universe works, holographic universe, quantum physics) (black holes, parallel universe, the string theory) Positive Thinking: 50 Positive Habits to Transform you Life: Positive Thinking, Positive Thinking Techniques, Positive Energy, Positive Thinking,, Positive ... Positive Thinking Techniques Book 1) CRITICAL THINKING: A Beginner’s Guide To Critical Thinking, Better Decision Making, And Problem Solving ! (critical thinking, problem solving, strategic thinking, decision making) Elementary Particles : The Building Blocks of the Universe - Physics and the Universe | Children’s Physics Books Who’s That Knocking on Christmas Eve? Uwe Rosler My Autobiography - Knocking Down Walls Door to Door: The Magnificent, Maddening, Mysterious World of Transportation Physics for Scientists and Engineers with Modern Physics: Volume II (3rd Edition) (Physics for Scientists & Engineers) The Door Within (Door Within Trilogy) The Door Within: The Door Within Trilogy - Book One Build Your Own Secret Bookcase Door: Complete guide with plans for building a secret hidden bookcase door. (Home Security Series) The Black Door: The Black Door Series, Book 1 Hong Kong: Front Door/Back Door Jakarta at Your Door (Culture Shock! At Your Door: A Survival Guide to Customs & Etiquette) Moscow at Your Door (Culture Shock! At Your Door: A Survival Guide to Customs & Etiquette) Chicago at Your Door (Culture Shock! At Your Door: A Survival Guide to Customs & Etiquette) Illuminate: Ignite Change Through Speeches, Stories, Ceremonies, and Symbols Making Candles & Potpourri: Illuminate and Infuse Your Home Shawn Mendes - Illuminate