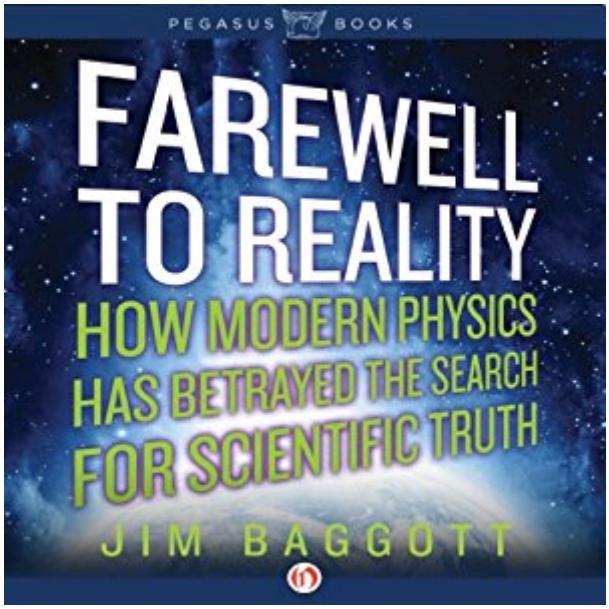
Farewell To Reality: How Modern Physics Has Betrayed The Search For Scientific Truth



Synopsis

From acclaimed science author Jim Baggot, a pointed critique of modern theoretical physics. In this stunning new volume, Jim Baggott argues that there is no observational or experimental evidence for many of the ideas of modern theoretical physics: Super-symmetric particles, super strings, the multiverse, the holographic principle, or the anthropic cosmological principle. These theories are not only untrue; they are not even science. They are fairy-tale physics: Fantastical, bizarre and often outrageous, perhaps even confidence-trickery. This book provides a much-needed antidote. Informed, comprehensive, and balanced, it offers lay readers the latest ideas about the nature of physical reality while clearly distinguishing between fact and fantasy. With its engaging portraits of many central figures of modern physics, including Paul Davies, John Barrow, Brian Greene, Stephen Hawking, and Leonard Susskind, it promises to be essential reading for all readers interested in what we know and don’t know about the nature of the universe and reality itself.

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Customer Reviews

Farewell to Reality: How Modern Physics Has Betrayed the Search for Scientific Truth by Jim Baggott"Farewell to Reality" is a critical book of the current state of affairs of modern theoretical physics. Award-winning science writer and former scientist, Jim Baggott questions the veracity for many of the "fairy-tale" ideas proposed by modern theoretical physics. "The stuff is not only not true, it is not even science." The author describes what modern physics can reasonably say about the nature of our physical reality and where it has abandoned the scientific method. Theoretical physics

is difficult and this book will test your patience but ultimately the author succeeds in making clear where theoretical physicists have gone astray and its implications. This challenging 336-page includes the following twelve chapters: 1. The Supreme Task, 2. White Ambassadors of Morning Light, Quantum Theory and the Nature of Reality, 3. The Construction of Mass Matter, Force and the Standard Model of Particle Physics, 4. Beautiful Beyond Comparison, 5. The (Mostly) Missing Universe, 6. What's Wrong with this Picture?, 7. Thy Fearful Symmetry, 8. In the Cemetery of Disappointed Hopes, 9. Gardeners of the Cosmic Landscape, 10. Source Code of the Cosmos, 11. Ego Sum Ergo, and 12. Just Six Questions.Positives:1. Well-researched and well-written book.2. Good format. Each chapter begins with a chapter-appropriate quote from Albert Einstein.3. Fair and even-handed. The author does a wonderful job of not overstepping his bounds. He is a defender of good science and that includes being able to say I don't know over wild speculations presented as plausible theories.4. The current state of modern theoretical physics clearly stated. "Speculative theorizing of a kind that cannot be tested, that cannot be verified or falsified, a kind that is not subject to the mercilessness of the scientific method, is now almost common currency."5. Does a good job of defining what science is all about. "Science is the pursuit of knowledge and understanding of the natural and social world following a systematic methodology based on evidence."6. Baggott provides six principles about reality, science and truth. They principles define what it is that we apply science to, what science is and how we think we know when it is "true".7. The three components of the scientific method discussed.8. The first half of the book focuses on what is good science. The author provides a lot of good information of what is understood in theoretical physics. The science, the theories and the scientists behind them.9. The difference between Newtownian and quantum physics. The difficulties of measurements at the quantum level.10. The forces of nature and the particle zoo. The taxonomy of particles. The origin of mass.11. Special and general theories of relativity. Understanding spacetime. Interesting tidbits on how Einstein came up with some of his great ideas. "`Spacetime tells matter how to move; matter tells spacetime how to curve."12. The big bang theory explained. The ironic inception of the term.13. Dark matter and dark energy. "The problem of dark matter demands a solution that lies beyond the current standard model of particle physics."14. Baggott is not afraid to be critical but is fair about it. "What kind of fundamental theory of particle physics is it that can't predict the masses of its constituent elementary particles? Answer: one that is not very satisfying.?15. Stephen Hawking and black holes. His battles with other scientists. Interesting stuff.16. The shortcomings of science. "The standard model is a triumph. But don't be misled. It is not a unified theory of the fundamental atomic and subatomic forces."17. The disappointment in finding the Theory of Everything. "We assume that

a unique eleven-dimensional superstring theory is possible in principle, although we don’t yet know what this theory is."18. Confronting one of the biggest obstacles in science. "The problems that SUSY, superstring theories and M-theory seek to address pale almost into insignificance compared with one of the most fundamental problems inherent in contemporary physical theory -- the quantum measurement problem."19. Strong conclusions. "I would conclude that the strong anthropic principle is not science".20. Endnotes and formal bibliography included.Negatives:1. This is a difficult book to read at times. Theoretical physics is very complex and even at its bare-bone it will test your patience and focus.2. More illustrations would have added value.3. The fine-tuning argument could have been handled better. Refer to my further recommendations.In summary, Baggott makes the compelling case that in many instances modern theoretical physics have abandoned the scientific method. He states specifically that in fairy-tale physics the scientists have lost sight of empirical content and as a result can’t make testable predictions. The book at times is very challenging, theoretical physics even at its simplest is very complex and it will test the patience of many laypersons. It will test your resolve but ultimately the author succeeds in making strong arguments in favor of his case. Recommended with reservations noted.Further recommendations: "Spectrums" by David Blatner, "The Elegant Universe: Superstrings, Hidden Dimensions, and the Quest for the Ultimate Theory" and "The Hidden Reality: Parallel Universes and the Deep Laws of the Cosmos" by Brian Greene, "A Universe from Nothing: Why There Is Something Rather than Nothing" by Lawrence M. Krauss, "About Time: Cosmology and Culture at the Twilight of the Big Bang" by Adam Frank, "Higgs Discovery: The Power of Empty Space (Kindle Single)" and "Warped Passages" by Lisa Randall, "The Grand Design" by Stephen Hawking, "The Quantum Universe" by Brian Cox, "The Blind Spot" by William Byers, and "The Fallacy of Fine-Tuning: Why the Universe Is Not Designed for Us" and "God and the Atom" by Victor Stenger.

The standard narrative that most people are exposed to is that science is confidently moving toward a solution to the ancient questions of humanity. Science is pushing all other modes of human experience to the side as it makes continuous and consistent progress in knowing the things that are worth knowing. Chief among the sciences is physics, which is uniquely able to answer our questions and can show that, for example, according to Lawrence Krauss, something can come from nothing.The truth is that the standard narrative may be all wrong and physicists may have been going down the wrong path for the last thirty years.Jim Baggott’s Farewell to Reality is excellent for its exploration of the metaphysics of science, but for the lay reader, the physics itself may be more than a little daunting. For example, while I understand the signficance of the "Bell Inequality," I’m still

pretty sure that I don’t understand the experiment that proved (or disproved) it. Nonetheless, the take-away that the measurement of one "entangled" beam of photons determines the quantum state of another entangled beam of photons faster than the speed of light is still an astonishing concept.Baggott’s book is roughly divided into three sections. A section on the metaphysical foundation of science, a section on the standard narrative of the standard model of physics and a section on how the standard narrative distorts or ignores the metaphysical foundations of science.The first section is, in my opinion, worth the price of admission. It is heartening to hear someone make the "no bones" admission that science has metaphysical foundations that do not come from science. Far too often I have heard science loving internet atheists repeat their view that philosophy is "bunk" and only science matters. This view seems to have been sucked up into - or emanated down from - scientists themselves. I’ve heard Richard Dawkins and Lawrence Krauss make the same argument.Baggott, in contrast, rationally points out that science is necessarily "metaphysical" because we do not have access to things in themselves, but only to the things as we measure them. There is a reality that doesn’t go away when we aren’t measuring it, but we access that reality only through measurements and sense perception, which involves interpretation and reasoning, and, therefore, logic and human understanding. Thus, science is inherently tied up with metaphysics, and the important thing is to make sure that our metaphysics are correct (and out in the open so we know what we are doing.) With that in mind, Baggott lays out 6 principles that he believes makes science to be "science," to wit:1. The Reality Principle - "Reality is a metaphysical concept, and as such it is beyond the reach of science."2. The Factual Principle - "Our knowledge and understanding of empirical reality are founded on verified scientific facts derived from careful observation and experiment. But the facts themselves are not theory-neutral. Observation and experiment are simply not possible without reference to a supporting theory of some kind."3. The Theory Principle - "Although physical theories are constructed to describe empirical facts about reality, they are nevertheless founded on abstract mathematical (we could even say metaphysical) concepts. the process of abstraction from facts to theories is highly complex, intuitive and not subject to simple, universal rules applicable to all science for all times."4. The Testability Principle - "The principle requirement of a scientific theory is that it should in some way be testable through reference to existing or new facts about empirical reality."5. The Veracity Principle - "It is not possible to verify a scientific theory that it provides absolute certainty for all times. A theory is instead accepted (or even tolerated on the basis of its ability to survive the tests and meet additional criteria of simplicity, efficacy, utility, explanatory power and less rational, innately human measures such as beauty."6. The Copernican Principle - "The universe is not organized for our benefit and we

are not uniquely privileged observers. Science strives to remove ’us’ from the centre of the picture, making our existence a natural consequence of reality rather than the reason for it."Baggott does a great job of explaining the basis for his principles by offering historical examples showing how science works in reality as opposed to how it has been romanticized by its fans.The second section presents the standard narrative of the standard model of particle physics and cosmology. This is an important section to read, although it does become impenatrable on a fairly regular basis. On the other hand, there are points of crystline clarity, so it is worth reading, and essential for the next section. Also, even though Baggott seems to be presenting the view as the most sincere fan of physics would present it, there are times when we see problems peeking through the golden nimbus of scientific confidence.The great virtue of this section is that it takes the reader along, step by step, so that the reader can understand the good faith and logic that have led physicists to the place they find themselves in. The notion of "string theory" and "M-theory" and "many worlds" has coherence. They meet the "test of truth as coherence," i.e., the idea that one idea that is coherent with a true idea should share in that truth. The problem is that science is not a system of "truth as coherence," such as philosophy or theology. Rather, science is a system based on "truth as correspondence" to external reality. When science abandons that perspective, it starts looking more and more like philosophy and theology - not bad enterprises as such, just not science.The third section takes the hood off of the standard model for a peek at the engine. The problem with the standard model is that for thirty years it has failed to produce any new developments or testable theories. Physics has been faced with anomalies in the production of new particles and physical constants and laws that seem to be mathematically generated to fit observations. These constants and laws do not predict anything. Worse, they predict things - particles and extra dimensions - that have eluded any kind of observation or test. Worse still, these theories don’t even purport to offer a theory that can be tested.Baggott’s particular criticism is directed to "string theory" and "M-theory" - which isn’t a theory - and the various kinds of "superstrings" and "supersymmetries," and the "many worlds" theories and the rest of the "gosh-wow!" baggage that we - particularly those of us who are science fanboys or science fiction geeks - are fed as the latest, true thing. The problem is that they are not science, according to Baggott. With respect to the "multiverse theory," Baggott explains:’’In case we’ve forgotten, let’s quickly remind ourselves of the status of the multiverse described by superstring/ M-theory. We first assume that elementary particles can be represented as vibrations in filaments of energy. We assume a supersymmetric relationship between fermions and bosons. We assume that superstring theory’s extra spatial dimensions are compactified in a Calabi- Yau space. We accept the M-theory conjecture. We assume that our universe is but one of a large number (possibly an

infinite number) of inflating spacetime regions in a multiverse. We assume that the 10500 different possible Calabi- Yau shapes are physically realized in different universes, resulting in universes with different physical parameters -- different particle spectra, different physical constants and laws. There is no observational or experimental evidence for any of these assumptions. So, my degree of belief in hM is virtually non-existent. Applying Bayesian logic at this point doesn't change the picture much, if it all."Baggott, Jim (2013-08-06). Farewell to Reality: How Modern Physics Has Betrayed the Search for Scientific Truth (pp. 282-283). Pegasus Books. Kindle Edition.In other words, it's all turtles all the way down, but in this case, it's all assumptions.and math all the way down, unconnected to reality.Baggott calls this kind of physics "fairy tale" physics.How did we get here? For those of us who are philosophy-lovers, Baggott offers this tantalizing rejoinder to literalists like the physicist Lawrence Krauss' s attacks on philosophy:"Metaphysics is an inherent and perfectly natural part of the language we use in our dialogue with nature. Eliminate it completely and the language becomes devoid of real meaning. We find we can no longer hold a sensible conversation in it."Baggott, Jim (2013-08-06). Farewell to Reality: How Modern Physics Has Betrayed the Search for Scientific Truth (p. 286). Pegasus Books. Kindle Edition.There are many good features to Baggott's book. It is less confrontational or provocative than Alexander Unzicker'sÂ Bankrupting Physics: How Today's Top Scientists are Gambling Away Their CredibilityÂ and so less of a "thrill ride" than that book. Baggott doesn't seem interested in burning his bridges with the physics community in the same way that I imagine that Unzicker has. Baggott's caution may be right. For all we know, string theory could be right. Tomorrow, there might be a discovery that will demonstrate that something as crazy as six additional dimensions wrapped up on themsleves on the Planck scale.On still another hand, Baggott's final advice seems properly moderate, as well - keep an open mind and don't swallow everything that "science" is allegedly saying. Baggott writes:"In the meantime, we have to square up to the challenge posed by fairy-tale physics. And this is all I ask of you. Next time you pick up the latest best-selling popular science book, or tune into the latest science documentary on the radio or television, keep an open mind and try to maintain a healthy scepticism. By all means allow yourself to be entertained, but remember Hume's quote above. What is the nature of the evidence in support of this theory? Does the theory make predictions of quantity or number, of matter of fact and existence? Do the theory's predictions have the capability -- even in principle -- of being subject to observational or experimental test?Come to your own conclusions."Baggott, Jim (2013-08-06). Farewell to Reality: How Modern Physics Has Betrayed the Search for Scientific Truth (p. 300). Pegasus Books. Kindle Edition.That seems like very good advice.

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