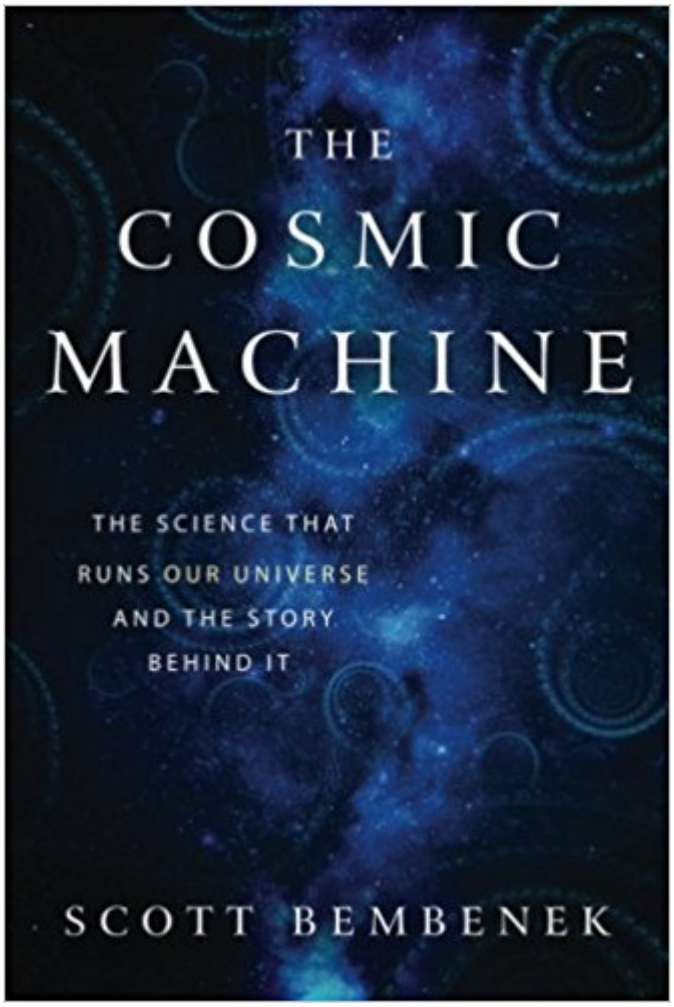
The Cosmic Machine: The Science That Runs Our Universe And The Story Behind It



Synopsis

#1 Best Seller in Chemical Physics and Quantum Chemistry"A superb resource for science fans or those struggling to understand the subject; an impressive fit in an age of Bill Nye and Neil deGrasse Tyson web videos." -Kirkus Reviewsâ ‹Â "The Cosmic Machineâ ‹Â succeeds on all accounts." -Midwest Book ReviewEnergy, Entropy, Atoms, and Quantum Mechanics form the very foundation of our universe. But how do they govern the world we live in? What was the difficult path to their discovery? Who were the key players that struggled to shape our current understanding?The Cosmic Machineâ ‹Â takes you from the earliest scientific inquiries in human history on an exciting journey in search of the answers to these questions. In telling this fascinating story of science, the reader is masterfully guided through the wonderment of how scientific discoveries (and the key players of those discoveries) shaped the world as we know it today.Â With its unique blend of science, history, and biographies,Â The Cosmic Machineâ ‹Â provides an easily accessible account without sacrificing the actual science itself. Not only will this book engage, enlighten, and entertain you, it will inspire your passion and curiosity for the world around us.

Book Information

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Customer Reviews

"Injecting the 'popular' back into science is no light task and involves a balance between keeping the science accessible to lay readers, making it interesting enough to engage non-scientists, and being certain it's accurate enough to be authoritative. Of all these tasks, the 'lively' portion is the biggest challenge, and where competing books often fall short. The Cosmic Machine succeeds on all accounts." â “Midwest Book Review "I wanted to start by

saying that I really enjoyed this book. ... at all times [the] writing was clear, well paced and easy to follow .... I started to discover that I was taking something unexpected from the book. I stopped focusing on the individual steps and, instead, started to see a 'story' behind the story. I found this enlightening." â “Gary Smailes, BubbleCow Founder "A superb resource for science fans or those struggling to understand the subject; an impressive fit in an age of Bill Nye and Neil deGrasse Tyson web videos." â “Kirkus ReviewsÂ --This text refers to the Hardcover edition.

Scott has a PhD in theoretical chemical physics, was a National Research Council Fellow, and currently works as a computational chemist doing drug discovery research. He resides in San Diego, California, with his family.

I purchased this book for my father who is 88 and loves to read! He could not put the book down! In his words the book "made him think".

In attempting to make science available to everyone the chemical physicist Scott Bembenek thoroughly covers the history of physics for the lay person. While many physics books can be loaded with jargon and beyond the grasp of the non-physicist, "The Cosmic Machine" adeptly and deftly explains the methods behind the development of physics.Much like the show "Cosmos", this book covers many famous names and their work, such as Galileo, Christian Huygens, LaPlace, Bohr, Rutherford, Copernicus, James Clerk Maxwell, Democritus, Aristotle, Boltzmann, Leibniz, Avagadro, Newton, Einstein, Planck, Schrodinger, Heisenberg, et al. It’s a veritable "Who’s who" of chemistry and physics. Not only do we meet the game-changers in the evolution of the empirical sciences, but the book explains concepts in an accessible way. Topics covered include energy, conservation, force, matter, heat, atomic theory, philosophy of nature, Newtonian and quantum mechanics, and entropy. If you liked "Cosmos" but want to go a little more in depth, then this book is for you.For readers that have perused a diverse array of physics books, much of this may be a refreshing of topics you have covered before. For the physics reader that typically covers more modern material who wishes to know the history of the subject, this would be something to pick up. This is an excellent choice for the lay person with an interest in science who wishes to begin their education in physics.Since I’ve covered what the book is, I should also say what this book is not. It is not an ultra-modern reader in advanced topics. If you’re looking for the latest particle physics from the Large Hadron Collider, a breakdown of string theory, an explanation of multiverse theory, or an argument about whether the passage of time is a real property of the universe, etc. then you’ll want

to look elsewhere.Even though this is Bembenek’s first attempt as a science writer, he accomplishes his mission of making his work accessible to all with an interest. The book is well-written and organized into categories. It’s not only something to read, but something you’ll want to keep on the shelf as a reference. The table of contents is clear and concise, making it easy to go directly to a topic that one might wish to review or revisit. If one considers the goal of the author and the quality of the writing, then this work merits a high rating.Disclaimer: An electronic copy of this book was provided directly by the fine author free of charge for the purpose of advance review. Since this is an advance review copy, the material may have changed by the time it is released.Further disclaimer: Any author who provides me with a quality book free of charge will be referred to as a "fine author".

The author kindly sent me a preview copy of this and I am so glad to have had the chance to read it. Having done A level physics and been constantly intrigued by the discoveries of the subject but frequently confused by the whole thing I was hoping that this would bring a bit of sense to it all. And it did just that. By focusing on four main areas and passing the information across as a story of discovery Bembenek makes the confusing and complicated understandable. He takes you through the first theories and experiements for each subject area, showing the process followed and logic trail that each physicist went down. This breaks the whole lot down into smaller parts which makes the principles so much easier to follow and understand. There were still bits that I had to re-read a couple of times but that could well just be me as on the whole the writing kept things simple and explained everything it needed to. I think this would be enjoyable for anyone with an interest in the subject regardless of what level of background knowledge you have. And it still has all the formula, diagrams and indices that you would expect from a physics book, they’re just referenced in a less scary manner.

This review is based on an advance reader copy provided by the author.BembenekÃ¢Â Â™s goal is to make learning physics interesting for the non-scientist. In this he largely succeeds with a proviso. This is not a light read. It is for the lay reader with a deep interest in physics. The difficulty is not the included equations. These are straightforward, well explained and help clarify the text. Rather it is that complex concepts are not glossed over. They are presented in detail that goes beyond many popular books. Bembenek does not try to make something simpler than it is. Many times I realized my understanding was exactly that.Given books with similar sounding titles, some might think this is a book about cosmology or astrophysics. ItÃ¢Â Â™s not. We donÃ¢Â Â™t learn about the

beginning or end of the universe, the multiverse or string theory. Bembenek reviews basic concepts in energy, entropy, atoms and quantum mechanics covering considerable ground in 300 pages. For this reader the level of detail was very welcome. Already familiar with simpler explanations of these topics, The Cosmic Machine hit my sweet spot. The material was often presented in ways I had not seen in other books.We also get a history of physics thought and discoveries. We are introduced to a myriad of scientists. And while there are biographical sketches, more than people we are following their ideas. If you want to trace the concept of the atom through history from Democritus to Einstein, The Cosmic Machine is an excellent way to do it. When Bembenek explains classical mechanics he painstakingly takes us through GalileoÃ¢Â Â™s experiments. We learn by seeing how great scientists frame problems to find solutions. The human interest factor helps you maintain attention.The four sections (energy, entropy, the atom, and quantum mechanics) are presented in that order. It is beneficial to read them in the order presented. Energy as depicted in classical mechanics and thermodynamics is critical to understanding entropy and in turn concepts and tools used to define entropy such as an ideal gas and statistical mechanics are important to PlanckÃ¢Â Â™s, EinsteinÃ¢Â Â™s and SchrodingerÃ¢Â Â™s exploration of the of the atom. Bembenek connects the dots showing how modern concepts developed. The following four paragraphs outline the discussions in each topic.ENERGY: In the early seventeenth century Galileo experiments with pendulums and inclined planes demonstrating kinetic and potential energy and its relationship to work. Later that century Descartes, Huygens, Leibniz and Newton further define the relationships of force and matter. Newton establishes the conservation of momentum. Next we come to heat. In the late eighteenth century Laplace and Lavoisier believe heat is a fluid called caloric followed by Count Rumford who sees heat as motion. Nineteenth century experiments by Joule show heat can produce work winning a belated but vigorous endorsement by William Thomson. In 1847 Helmholtz holds that heat is a form of energy and establishes Ã¢Â Âœthe conservation of energyÃ¢Â Â•, the first law of thermodynamics.ENTROPY: In the early nineteenth century Carnot visualizes an ideal reversible heat engine from which he builds a theory of heat efficiency opening the door for thermodynamics. In 1852 Thomson builds on JouleÃ¢Â Â™s work with his Law of Dissipation, essentially the second law of thermodynamics. Clausius then formulates the second law mathematically and later in 1865 coins the term entropy which he viewed as Ã¢Â Âœheat over temperatureÃ¢Â Â•. In 1860 Maxwell pioneers statistical mechanics with his kinetic energy distribution of an ideal gas. In 1868 Boltzmann then defines a total energy distribution which presumes the existence of atoms, a concept not commonly accepted at the time.THE ATOM: We begin reviewing ancient concepts of matter including Democritus prescient concept of the atom.

However it wasnÃ¢Â Â™t until the late seventeenth century that the chemist Boyle recognizes individual elements. In the late eighteenth century John Dalton recognizes compounds formed in definite proportions leading him to postulate atoms, atomic weights and molecules. Gay-Lussac and Avogadro refine DaltonÃ¢Â Â™s theories and then Cannizzaro establishes a reliable system for determining atomic weights in 1858. Finally Einstein proves that atoms really do exist in his 1905 paper on Brownian motion.QUANTUM MECHANICS: Kirchhoff in 1859 shows that an object both emits and absorbs thermal radiation at the same frequencies indicating a single process is involved. Kirchhoff searches for the spectrum of an idealized object that would emit and absorb all frequencies, a blackbody. In 1900 Max Planck describes that spectrum and establishes that an exchange of energy is quantized. In 1905 Einstein explains the photoelectric effect holding that light is a quantum particle, a photon. In 1909 he realizes that lightÃ¢Â Â™s momentum also possesses the properties of a wave, a duality. In 1913 Bohr finds that changes to energy states of electrons in atoms equal EinsteinÃ¢Â Â™s light quanta. In 1923 de Broglie holds that matter also has wave characteristics. In 1925 inspired by de Broglie and applying the statistical techniques of Bose to an ideal gas, Einstein again shows the duality of light. That year Schrodinger builds on de BroglieÃ¢Â Â™s work to develop a wave equation and wave function for matter suggesting the motion of quantum particles is subject to a new quantum probability. That same year Heisenberg shows the more we knew about a particleÃ¢Â Â™s positon the less we knew about its momentum and vice versa.If these topics interest you and you are a physics buff ready to step beyond the typical pop science book, The Cosmic Machine may be your cup of tea. BembenekÃ¢Â Â™s combination of history and theory make difficult concepts more accessible. Showing how each scientistÃ¢Â Â™s findings were used by the next gives you the background to better understand their work. The equations become clearer because you see the logic that went into constructing them. Thus what they represent has more meaning. Based on what I got out of The Cosmic Machine I give it five stars. I came away with a better understanding of many challenging concepts. I think other physics fans could as well.

This book started out very good as a history of science with clear language. The descriptions of energy and work, for example, are great. But as the book progressed, it became more mathematical and less descriptive, to the point where I stopped enjoying the book. However the book does have an interesting focus and it might be more fun for people who like more math, but it just didnÃ¢Â Â™t suit my taste.Disclosure: I received a complimentary copy of this book via Netgalley for review purposes.

The Cosmic Machine: The Science That Runs Our Universe and the Story Behind It 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) He Runs, She Runs: Why Gender Stereotypes Do Not Harm Women Candidates Our Cosmic Story: Exploring Life, Civilization, and the Universe (OCS Book 1) BREAD MACHINE COOKBOOK: 120 Most Delicious Bread Machine Recipes (bread, bread bible, bread makers, breakfast, bread machine cookbook, bread baking, bread making, healthy, healthy recipes) The Copernicus Complex: Our Cosmic Significance in a Universe of Planets and Probabilities Mammals Who Morph: The Universe Tells Our Evolution Story: Book 3 (The Universe Series) From Lava to Life: The Universe Tells Our Earth Story: Book 2 (The Universe Series) The Universe Is a Green Dragon: A Cosmic Creation Story Star Trek The Official Guide to Our Universe: The True Science Behind the Starship Voyages Edge of the Universe: A Voyage to the Cosmic Horizon and Beyond You Are the Universe: Discovering Your Cosmic Self and Why It Matters Cosmic Catastrophes: Exploding Stars, Black Holes, and Mapping the Universe Beyond Einstein: The Cosmic Quest for the Theory of the Universe Is Anybody Out There?: An Expanded Excerpt From Our Cosmic Story (OCS Book 2) Inheritance: How Our Genes Change Our Lives--and Our Lives Change Our Genes The Mind-Gut Connection: How the Hidden Conversation Within Our Bodies Impacts Our Mood, Our Choices, and Our Overall Health Gurps Atomic Horror: Science Runs Amok in B-Movie Adventures! (Steve Jackson Games) The Thread That Runs So True: A Mountain School Teacher Tells His Story Boom, Bust, Boom: A Story About Copper, the Metal that Runs the World