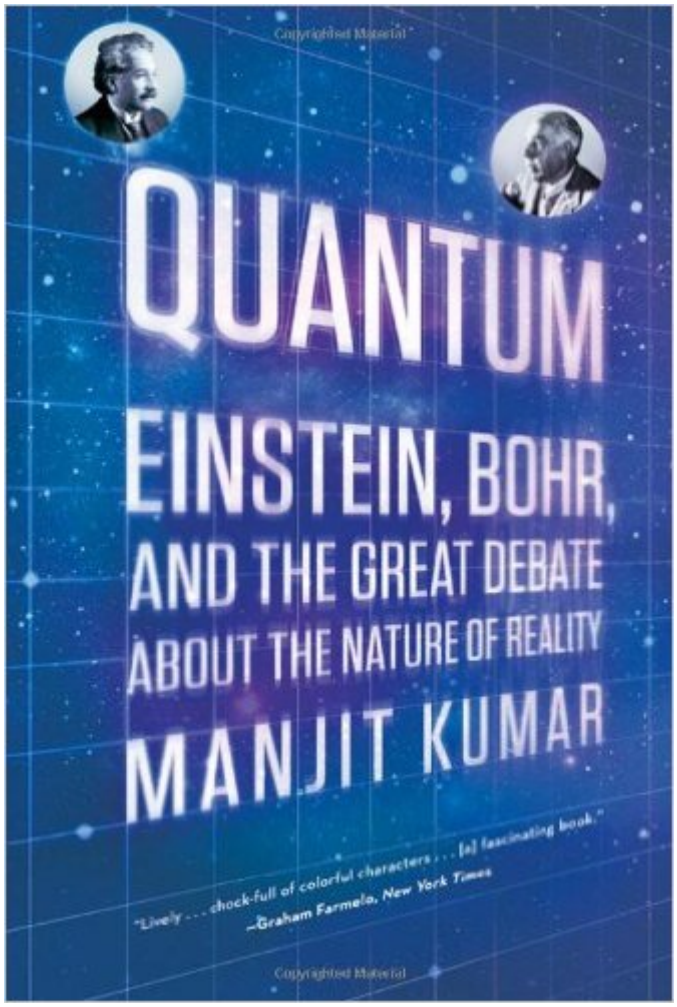
Quantum: Einstein, Bohr, And The Great Debate About The Nature Of Reality



Synopsis

â œA lucid account of quantum theory (and why you should care) combined with a gripping narrative.â •â ”San Francisco Chronicle Quantum theory is weird. As Niels Bohr said, if you werenâ ™t shocked by quantum theory, you didnâ ™t really understand it. For most people, quantum theory is synonymous with mysterious, impenetrable science. And in fact for many years it was equally baffling for scientists themselves. In this tour de force of science history, Manjit Kumar gives a dramatic and superbly written account of this fundamental scientific revolution, focusing on the central conflict between Einstein and Bohr over the nature of reality and the soul of science. This revelatory book takes a close look at the golden age of physics, the brilliant young minds at its coreâ ”and how an idea ignited the greatest intellectual debate of the twentieth century. 16 pages of photographs

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Customer Reviews

The development of quantum physics through the 20th century is one of the great adventures of science, and here at last is a book aimed at the layperson which clearly explains its key concepts, while situating the scientific development in its broader setting. The result is a challenging and enthralling read.Quantum is appropriately sub-titled, Einstein, Bohr and the Great Debate about the Nature of Reality. The long theoretical duel between these two giants of modern physics is a recurring theme of the book, but the story starts before them with the build-up to the discovery of Planck’s constant at the turn of the century, and continues beyond their deaths (in 1955 and 1962 respectively) to take in Bell’s Theorem and Everett’s "many worlds" interpretation. Along the way we

meet other great physicists such as Rutherford, Heisenberg, Pauli, SchrÃ¶dinger, Dirac and Bohm.One might suspect that a book of such scope would be in danger of being overcrowded with theories and theorists, yet Kumar rises to the challenge, displaying a novelist's sense of pacing allied with an impressive scientific clarity and succinctness. Clearly he has taken to heart the famous injunction attributed to Einstein to "make it as simple as possible, but no simpler!" He also strikes a judicious balance between scientific explanation and human context. This provided for me a welcome alternation between the physics and the lives of the physicists, with each stimulating an interest in the other.What is so powerful and inspiring about this book is the way it conveys the passion for truth of those great pioneers. No doubt ego played its part as well, they would hardly have been human otherwise, but it is always secondary to the great quest to fathom the nature of sub-atomic reality.

The great Einstein-Bohr debate about physical reality is interesting not only to physicists, but also to great many readers interested in understanding the nature. This discussion between Bohr and Einstein over the interpretation of quantum theory began in 1927 at the fifth Solvay Conference. The debate over the ability of quantum theory to describe nature was fueled by many leading physicists of the time, some of whom directly contributed to the development of quantum physics, but later found themselves arguing against the theory they helped to create. Notable examples include Erwin Schrodinger, Paul Dirac, and Max Planck; the latter two did not actively participate in challenging the quantum reality. Bohr and Einstein spent many years intensely debating the nature of reality, and their discussions are known for very famous Einstein's comments such as; "God does not play dice,' or "God is slick, but he ain't mean," and Bohr's response was "don't bring God into this (discussion of quantum physics)." Bohr argued vigorously against both deterministic and realistic world, but Einstein was equally adamant to defend these two physical and philosophical concepts. Deterministic philosophy was spurred by Newtonian mechanics; if we know a system and its physical properties (size, color, or position) at one point in time, then at some point in future we can predict the system based on these physical properties. Bohr argued that complete knowledge of the present can result only in a description of what the future most probably will be like, but there is no such thing as certainty in quantum world. This thought is mystified by what is commonly called Copenhagen interpretation, and its strong proponents were Niels Bohr, Werner Heisenberg, and Max Born.

There are a number of very striking themes and trends in Quantum that other reviewers have not

brought out, being dazzled, no doubt, by the swift pacing, tantalizing prose and cliffhanger hooks that Kumar employs so magnificently in Quantum.First, as someone who has struggled to understand quantum mechanics when it is presented in textbooks as a whole system, I was delighted to find that physicists have the same problem. Even (if not especially) Albert Einstein. By taking us through the history of it, and enjoying the exhilaration of every incremental discovery, theory and step, I find I am really comfortable reading about it, and have no difficulty assimilating it. When you're along for the ride instead of the textbook, it makes a gigantic difference. Bravo, Kumar.Second, it became painfully obvious that physics is far more philosophy than science. I felt like the arguments came from my Logic 101 class. Socrates would have enjoyed crossing swords with Bohr. The arguments of the scientists were really basic, philosophical differences of opinion, not the least bit esoteric or idiosyncratic. It seems that medicine is not the only "science" where they tell you to get a second opinion. That was a revelation, and it made physics all that more human.Third, Quantum confirms a lifelong suspicion that this was and is a young man's game. It seems that every time things started to get stale, some precocious 26 year old student would come along with a new portion of a theory, and rock the establishment. And then live off that discovery for the rest of his life - winning the Nobel Prize (as almost every one of them eventually did), getting professorships - but never shaking the tree again. In music we would call them one hit wonders.

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