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HART AYDIN

Six Impossible Things Cambridge University Press
Quantum theory is so shocking that Einstein could not bring himself to accept it. It is so important that it provides the fundamental underpinning of all modern sciences. Without it, we'd have no nuclear power or nuclear weapons, no TV, no computers, no science of molecular biology, no understanding of DNA, no genetic engineering. In Search of Schrodinger's Cat tells the complete story of quantum mechanics, a truth stranger than any fiction. John Gribbin takes us step by step into an ever more bizarre and fascinating place, requiring only that we approach it with an open mind. He introduces the scientists who developed quantum theory. He investigates the atom, radiation, time travel, the birth of the universe, superconductors and life itself. And in a world full of its own delights, mysteries and surprises, he searches for Schrodinger's Cat - a search for quantum reality - as he brings every reader to a clear understanding of the most important area of scientific study today - quantum physics. In Search of Schrodinger's Cat is a fascinating and delightful introduction to the strange world of the quantum - an essential element in understanding today's world.
The Quantum World Hachette UK
This monograph identifies the essential characteristics of the objects described by current quantum theory and considers their relationship to space-time. In the

process, it explicates the senses in which quantum objects may be consistently considered to have parts of which they may be composed or into which they may be decomposed. The book also demonstrates the degree to which reduction is possible in quantum mechanics, showing it to be related to the objective indefiniteness of quantum properties and the strong non-local correlations that can occur between the physical quantities of quantum subsystems. Careful attention is paid to the relationships among such property correlations, physical causation, probability, and symmetry in quantum theory. In this way, the text identifies and clarifies the conceptual grounds underlying the unique nature of many quantum phenomena.

Quantum Reality Cambridge University Press

We would like to take this opportunity to welcome you to the fascinating and perplexing world of quantum physics, where there is a realm of uncertainty and paradox that replaces the well-known principles of conventional physics. In the book "Exploring the Quantum Realm: Unraveling the Mysteries of Physics," we go on an exciting voyage through the depths of quantum mechanics. This journey provides us with the opportunity to test our intuition and broaden our understanding of the cosmos.

Surfing the Quantum World World Scientific

SHORTLISTED FOR THE ROYAL SOCIETY INSIGHT INVESTMENT SCIENCE BOOK PRIZE 2019. 'An accessible primer on all things quantum' - Sunday Times Quantum physics is strange. It tells us that a particle can be in two places at once. Indeed, that particle is also a wave, and everything in the quantum world can be described entirely in terms of waves, or entirely in terms of particles, whichever you prefer. All of this was clear by the end of the 1920s. But to the great distress of many physicists, let alone ordinary mortals, nobody has ever been able to come up with a common sense explanation of what is going on. Physicists have sought 'quanta of solace' in a variety of more or less convincing interpretations. Popular science master John Gribbin takes us on a delightfully mind-bending tour through the 'big six', from the Copenhagen interpretation via the pilot wave and many worlds approaches. All of them are crazy, and some are more crazy than others, but in this world crazy does not necessarily mean wrong, and being more crazy does not necessarily mean more wrong.

A Short History of Time, Space and the Quantum World World Scientific

Everybody has heard that we live in a world made of atoms. But far more fundamentally, we live in a universe made of quanta. Many things are not made of atoms: light, radio waves, electric current, magnetic fields, Earth's gravitational field, not to mention exotica such a neutron stars, black holes, dark energy, and dark matter. But everything, including atoms, is made of highly unified or "coherent" bundles of energy called "quanta" that (like everything else) obey certain rules. In the case of the quantum, these rules are called "quantum physics." This is a book about quanta and their unexpected, some would say peculiar, behavior--tales, if you will, of the quantum. The quantum has developed the reputation of being capricious, bewildering, even impossible to understand. The peculiar habits of quanta are certainly not what we would have

expected to find at the foundation of physical reality, but these habits are not necessarily bewildering and not at all impossible or paradoxical. This book explains those habits--the quantum rules--in everyday language, without mathematics or unnecessary technicalities. While most popular books about quantum physics follow the topic's scientific history from 1900 to today, this book follows the phenomena: wave-particle duality, fundamental randomness, quantum states, superpositions (being in two places at once), entanglement, non-locality, Schrodinger's cat, and quantum jumps, and presents the history and the scientists only to the extent that they illuminate the phenomena.

Something Deeply Hidden Springer Science & Business Media

For the better part of a century, attempts to explain what was really going on in the quantum world seemed doomed to failure. But recent technological advances have made the question both practical and urgent. A brilliantly imaginative group of physicists at Oxford University have risen to the challenge. This is their story. At long last, there is a sensible way to think about quantum mechanics. The new view abolishes the need to believe in randomness, long-range spooky forces, or conscious observers with mysterious powers to collapse cats into a state of life or death. But the new understanding comes at a price: we must accept that we live in a multiverse wherein countless versions of reality unfold side-by-side. The philosophical and personal consequences of this are awe-inspiring. The new interpretation has allowed imaginative physicists to conceive of wonderful new technologies: measuring devices that effectively share information between worlds and computers that can borrow the power of other worlds to perform calculations. Step by step, the problems initially associated with the original many-worlds formulation have been addressed and answered so that a clear but startling new picture has emerged. Just as Copenhagen was the centre of quantum discussion a lifetime ago, so Oxford has been the epicenter of the modern debate, with such figures as Roger Penrose and Anton Zeilinger fighting for single-world views, and David Deutsch, Lev Vaidman and a host of others for many-worlds. An independent physicist living in Oxford, Bruce has had a ringside seat to the debate. In his capable hands, we understand why the initially fantastic sounding many-worlds view is not only a useful way to look at things, but logically compelling. Parallel worlds are as real as the distant galaxies detected by the Hubble Space Telescope, even though the evidence for their existence may consist only of a few photons.

The Quantum Ten Abramis

Introduction to quantum physics for the general reader.

Quantum Motion Hachette UK

This clearly explained layman's introduction to quantum physics is an accessible excursion into metaphysics and the meaning of reality. Herbert exposes the quantum world and the scientific and philosophical controversy about its interpretation.

In Search of Schrodinger's Cat Jones & Bartlett Learning

Already Einstein could never see quantum mechanics as a complete theory. Nowadays, many researchers, including 't Hooft, view quantum mechanics as a statistical description of some underlying

reality. The workshop Beyond the Quantum, organized in Spring 2006 at the Lorentz Center in Leiden, The Netherlands, was one of the first meetings completely devoted to physics that may need an explanation beyond quantum mechanics. A broad variety of subjects was covered. The present book reflects this.
Beyond the Quantum Princeton University Press
When you insert a straight stick in water, you will surprisedly find that the stick appears bent. Yet, this is in fact an optical illusion resulting from the refraction of light. Nature always hides her secret with attractive veiling. This may also be true for the motion of objects. Although everything around us appears to move in a continuous and lawful way, it is in all probability that their motion is discontinuous and random in reality as the microscopic phenomena reveal. This book presents a clear exposition of the intriguing idea of random discontinuous motion and its implications for quantum theory and relativity. Once you realize that motion is actually discontinuous and random, you may finally understand the mysterious quantum world, where an electron can pass through two slits at the same time. I fully agree with your idea of discontinuous movement. ---- Antoine Suarez, Center for Quantum Philosophy, Zurich The idea of using discontinuous motion as a realist interpretation of quantum mechanics is original. If it can be made to work, it would add an interesting new ontology to our stock of quantum mechanical interpretations. ---- Reviewer of Foundations of Physics Its very existence is at any rate, an excellent illustration of the extent to which physical data force us to depart from commonsense ideas when we try to depict reality "as it really is". ---- Bernard d'Espagnat, University of Paris-Orsay
Where Does The Weirdness Go? Icon Books
In the past, books dealing with these issues have been constrained by two complementary difficulties. At the instructional level, because the theoretical apparatus of quantum theory is complex and unfamiliar, textbooks are forced to concentrate on the technical aspects of the theory. At the popular level, considerable attention is devoted to the theoretical questions, but such presentations are necessarily limited by their nontechnical nature.
Quantum Reality World Scientific
“An elegant and accessible” investigation of quantum mechanics for non-specialists—“highly recommended” for students of the sciences, sci-fi fans, and anyone interested in the strange world of quantum physics (Forbes) Rules of the quantum world seem to say that a cat can be both alive and dead at the same time and a particle can be in two places at once. And that particle is also a wave; everything in the quantum world can described in terms of waves—or entirely in terms of particles. These interpretations were all established by the end of the 1920s, by Erwin Schrödinger, Werner Heisenberg, Paul Dirac, and others. But no one has yet come up with a common sense explanation of what is going on. In this concise and engaging book, astrophysicist John Gribbin offers an overview of six of the leading interpretations of quantum mechanics. Gribbin calls his account “agnostic,” explaining that none of these interpretations is any better—or any worse—than any of the others. Gribbin

presents the Copenhagen Interpretation, promoted by Niels Bohr and named by Heisenberg; the Pilot-Wave Interpretation, developed by Louis de Broglie; the Many Worlds Interpretation (termed “excess baggage” by Gribbin); the Decoherence Interpretation (“incoherent”); the Ensemble “Non-Interpretation”; and the Timeless Transactional Interpretation (which theorized waves going both forward and backward in time). All of these interpretations are crazy, Gribbin warns, and some are more crazy than others—but in the quantum world, being more crazy does not necessarily mean more wrong.

What Is Real? Bantam

Using a selection of key experiments performed over the past 30 years or so, we present a discussion of the strikingly counter-intuitive phenomena of the quantum world that defy explanation in terms of everyday "common sense" reasoning, and we provide the corresponding quantum mechanical explanations with a very elementary use of associated formalism. Most, but certainly not all, of the experiments we describe are optical experiments involving a very small number of photons (particles of light). We begin with experiments on the wave-particle duality of electrons, proceed to experiments on the particle nature of light and single photon interference, delayed choice experiments and interaction-free detection, then go on to experiments involving the interference of two photons, quantum entanglement and Bell's Theorem, quantum teleportation, large-scale quantum effects and the divide between the classical and quantum worlds, addressing the question as to whether or not there is such a divide.

The Mathematical Language of Quantum Theory Oxford University Press

INSTANT NEW YORK TIMES BESTSELLER A Science News favorite science book of 2019 As you read these words, copies of you are being created. Sean Carroll, theoretical physicist and one of this world’s most celebrated writers on science, rewrites the history of 20th century physics. Already hailed as a masterpiece, Something Deeply Hidden shows for the first time that facing up to the essential puzzle of quantum mechanics utterly transforms how we think about space and time. His reconciling of quantum mechanics with Einstein’s theory of relativity changes, well, everything. Most physicists haven’t even recognized the uncomfortable truth: physics has been in crisis since 1927. Quantum mechanics has always had obvious gaps—which have come to be simply ignored. Science popularizers keep telling us how weird it is, how impossible it is to understand. Academics discourage students from working on the "dead end" of quantum foundations. Putting his professional reputation on the line with this audacious yet entirely reasonable book, Carroll says that the crisis can now come to an end. We just have to accept that there is more than one of us in the universe. There are many, many Sean Carrolls. Many of every one of us. Copies of you are generated thousands of times per second. The Many Worlds Theory of quantum behavior says that every time there is a quantum event, a world splits off with everything in it the same, except in that other world the quantum event didn't happen. Step-by-step in Carroll's uniquely lucid way, he tackles the major objections to this otherworldly revelation until his case is inescapably established. Rarely does a book so fully reorganize how we

think about our place in the universe. We are on the threshold of a new understanding—of where we are in the cosmos, and what we are made of.

Exploring Mysteries of Quantum World MIT Press

A primer on the conceptual foundations of quantum physics for all. A course on topics that you won't find elsewhere, explained at introductory level. It is designed to be a comprehensive A-Z guide that will save you a ton of time in searching elsewhere trying to piece all the different information together.

Beyond Weird Penguin

"A thorough, illuminating exploration of the most consequential controversy raging in modern science." --New York Times Book Review An Editor's Choice, New York Times Book Review Longlisted for PEN/E.O. Wilson Prize for Literary Science Writing Longlisted for Goodreads Choice Award Every physicist agrees quantum mechanics is among humanity's finest scientific achievements. But ask what it means, and the result will be a brawl. For a century, most physicists have followed Niels Bohr's solipsistic and poorly reasoned Copenhagen interpretation. Indeed, questioning it has long meant professional ruin, yet some daring physicists, such as John Bell, David Bohm, and Hugh Everett, persisted in seeking the true meaning of quantum mechanics. What Is Real? is the gripping story of this battle of ideas and the courageous scientists who dared to stand up for truth. "An excellent, accessible account." --Wall Street Journal "Splendid. . . . Deeply detailed research, accompanied by charming anecdotes about the scientists." --Washington Post

The Quantum Divide Bodley Head Childrens

Early theorists believed that in science lay the promise of certainty. Built on a foundation of fact and constructed with objective and trustworthy tools, science produced knowledge. But science has also shown us that this knowledge will always be fundamentally incomplete and that a true understanding of the world is ultimately beyond our grasp. In this thoughtful and compelling book, physicist F. David Peat examines the basic philosophic difference between the certainty that characterized the thinking of humankind through the nineteenth century and contrasts it with the startling fall of certainty in the twentieth. The nineteenth century was marked by a boundless optimism and confidence in the power of progress and technology. Science and philosophy were on firm ground. Newtonian physics showed that the universe was a gigantic clockwork mechanism that functioned according to rigid lawsâ€"that its course could be predicted with total confidence far into the future. Indeed, in 1900, the President of the Royal Society in Britain went so far as to proclaim that everything of importance had already been discovered by science. But it was not long before the seeds of a scientific revolution began to take root. Quantum Theory and the General Theory of Relativity exploded the clockwork universe, proving beyond a shadow of a doubt that our knowledge was, at best, incompleteâ€"and would probably remain that way forever. There were places in the universe, such as black holes, from which no information at all could ever be obtained. Chaos Theory also demonstrated our inherent limits to knowing, predicting, and controlling the world around us and showed the way that chaos can often be

found at the heart of natural and social systems. Although we may not always recognize it, this new world view has had a profound effect not only on science, but on art, literature, philosophy, and societal relations. The twenty-first century now begins with a humble acceptance of uncertainty. From Certainty to Uncertainty traces the rise and fall of the deterministic universe and shows the evolving influences that such disparate disciplines now have on one another. Drawing on the lessons we can learn from history, Peat also speculates on how we will manage our lives into the future.

The World in the Wave Function Joseph Henry Press

The ideas and phenomena of the quantum world are strikingly unlike those encountered in our visual world. This book shows why and how this is so via a gentle introduction to the principles of quantum theory. It is used to explain both ordinary microscopic phenomena like the structure of the Periodic Table of Elements and mind-bending phenomena

The Quantum World Unveiled by Electron Waves Joseph Henry Press

Philosophy of physics title by highly regarded author, fully revised for this paperback edition.

The Quantum World Basic Books

Entanglement was initially thought by some to be an oddity restricted to the realm of thought experiments. However, Bell’s inequality delimiting local - havior and the experimental demonstration of its violation more than 25 years ago made it entirely clear that non-local properties of pure quantum states are more than an intellectual curiosity. Entanglement and non-locality are now understood to ?gure prominently in the microphysical world, a realm into which technology is rapidly hurtling. Information theory is also increasingly recognized by physicists and philosophers as intimately related to the foun- tions of mechanics. The clearest indicator of this relationship is that between quantum information and entanglement. To some degree, a deep relationship between information and mechanics in the quantum context was already there to be seen upon the introduction by Max Born and Wolfgang Pauli of the idea that the essence of pure quantum states lies in their provision of probabilities regarding the behavior of quantum systems, via what has come to be known as the Born rule. The signi?cance of the relationship between mechanics and information became even clearer with Leo Szilard’s analysis of James Clerk Maxwell’s infamous demon thought experiment. Here, in addition to examining both entanglement and quantum infor- tion and their relationship, I endeavor to critically assess the in?uence of the study of these subjects on the interpretation of quantum theory.