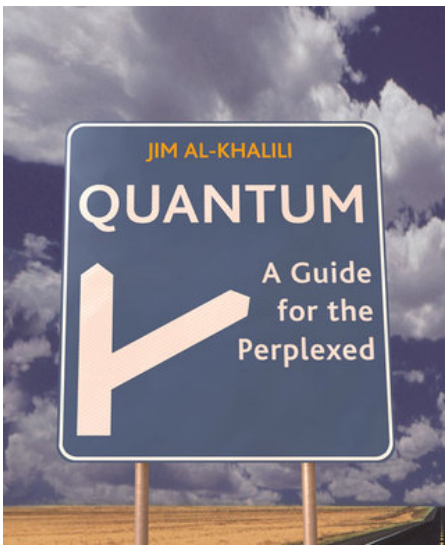

Quantum: A Guide for the Perplexed

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In this lively look at quantum science, a physicist takes an entertaining and enlightening journey through the basics of subatomic physics

Along the way he examines the paradox of quantum mechanics—beautifully mathematical in theory but confoundingly unpredictable in the real world. Marvel at the Dual Slit experiment as a tiny atom passes through 2 separate openings at the same time. Ponder the peculiar communication of quantum particles, which can remain in touch no matter how far apart. Join the genius jewel thief as he carries out a quantum measurement on a diamond without ever touching the object in question. With its clean, colorful layout and conversational tone, this text will hook you into the conundrum that is quantum mechanics.

Quantum: A Guide for the Perplexed Details

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From Reader Review Quantum: A Guide for the Perplexed for online ebook

WarpDrive says

Nice introduction to the main elements of quantum mechanics. The part about the different interpretations of quantum mechanics is really interesting and masterfully accomplished; it should also be pointed out that this is one of the few very books on the subject that do not fall into the usual trap of only considering the Copenhagen interpretation. Being myself particularly attracted to the De Broglie-Bohm interpretation, I found the treatment of this item by the author particularly interesting and balanced.
This book does not provide any quantitative description/treatment of QM, so while it left me a bit dissatisfied for this reason, I must admit that it may be appealing to people interested in the conceptual apparatus of QM but unwilling to go through the required mathematics.
I personally think that, in order to really understand QM, a minimum of mathematical depth is required, otherwise there is a significant risk of misunderstanding and over-simplification: as far as this particular book is concerned, while the author managed to explain some complex concepts in a admiringly simple and lucid manner, I have the impression that only with a prior more quantitative exposure to QM the reader would really be able to fully appreciate and understand the examples and arguments developed by the author.
Overall, a very good read, recommended to people with some prior, even if not at practitioner level, exposure to QM.

Gustavo Ladeira says

Eu realmente acho que o problema aqui fui eu, não o livro. Eu ouvi duas vezes na esperança de entender, mas realmente acho que tenho uma dificuldade severa em entender os conceitos e explicações da física quântica.
O autor explica a história da física quântica, como e por quem os efeitos foram descobertos, teorizados e/ou testados. Isso é sempre melhor que aquele método maravilhoso do nosso ótimo sistema de ensino, que consiste em jogar as descobertas no colo do aluno como se um único cientista tivesse tirado uma ideia genial do c* num fim de semana chuvoso. Gostei de ver como o modelo do átomo foi evoluindo ao longo do livro sem a necessidade de parar pra falar só disso.
Também gostei da discussão sobre alternativas ao modelo de Copenhagen, com pontos fortes e fracos. Me ajudou a entender um pouco melhor como alguns conceitos teóricos bem loucos seriam possíveis.
O autor termina o livro com aplicações atuais e (possivelmente) futuras da física quântica.

Talvez o livro mereça uma nota maior, mas serei aquele chato que insiste que uma explicação só é boa o bastante quando qualquer um é capaz de compreender.

Anita Pomerantz says

This book made my brain hurt. Seriously. I simultaneously realized how smart and creative theoretical physicists really are, and my little brain pales in comparison.

I really couldn't rate this book in all fairness because I'm way too conflicted about it. The author had a

wonderful voice, and the book is beautifully illustrated. I seriously give him five stars for effort. He really, really tried to make this stuff understandable. He used examples. He used pictures. He didn't use sophisticated language.

Nonetheless, I just couldn't really understand a whole lot of it. I was doing pretty good in the first few chapters -- and only because I have taken a couple of years of calculus. But later on, I was just lost and also a bit bored because some of the concepts were just eluding me, and you needed those concepts to understand the latter part of the book.

I did come away with incredible admiration for folks who actually do understand this stuff and can apply it to real world applications. Because it seriously is the most counterintuitive thing I've ever come across.

A part of me would like to try another book on the subject to see I would come away any more enlightened.

A part of me would like to remain blissfully ignorant.

Another very strange thing about this book is that some of the concepts are so counter to reason that it really casts doubt in my mind on my own atheistic beliefs which are seriously derived from reason and rationale thought.

Quantum physics really seems to highlight the limits of our understanding while simultaneously showing how brilliant we are. We can create predictive mathematical formulas that WORK under all sorts of experimental conditions. But we don't know why they work.

Brain. hurts. bad.

All in all, hats off to the author for even attempting to bring this subject down to layperson's terms even if he wasn't 100% successful with this particular layperson.

John Jessee says

This is a good introduction for those of us that aren't fully versed in the intricacies of physics. I couldn't quite breeze through it due to the difficulty of the subject matter but the examples given and particularly the great design of the materials really helped me to feel like I walked away with a conversational grasp of the material. It's definitely one that I may pick up again in the future to help cement my understanding.

Pap L?rinc says

Very professional, well written, with good humor: a no-nonsense, in-depth intro to the world of quantum weirdness.

Kriegslok says

I used to be quite fascinated with UFOs, paranormal, conspiracy theories and such like. While Forteana still interests me the utter banality and fantasy (or nowadays unpleasantness) of the rest has lost its appeal. Fortunately I discovered the world of Quantum Physics which offers more empirical weirdness, tales of the unexplained and just downright outrageous improbability than a library full of UFO lore and conspiracy ever could. Things like this: "Unless actively observed most physicists believe that the electron does not exist as a classical particle with a definite location, that all that exists is its wave function". The best thing about it is that it's there to be explored and it's not dependent on some grainy photos or voice-overs of some shady character filmed in a darkened room. Jim Al-Khalili is my favourite theoretical physicist. Beside being very good at what he does he is also very good at explaining it in terms a CSE maths failure, such as myself, can understand (he is also very handsome and has a good sense of humour). It is a clever and humourous brain that explains wave probability through the movements of an unrepentant thief and his pursuers. Al-Khalili is not afraid to meet the issues raised head on "You are not supposed to be comfortable with the conclusions of quantum mechanics" and "... I am just as baffled as the next person. My advantage over you is that I am convinced there is no simple answer or straightforward and intuitive explanation". The book opens with some basics about what quantum is and is not. It introduces some of the key thinkers and discoverers. It explores the discussions and disagreements which have given the subject its foundation. It looks at the the theoretical predictions and their experimental proofs. Al-Khalili also manages to open the Pandora's box of particle physics and guide the reader slowly and carefully through the literal minutiae of particles and their peculiar behavior. One of the things I like about physics, even if I can't come close to claiming to understand is the symmetry and patterns which seem to make up the building blocks of nature. The book also gives a sense of the excitement in unraveling secrets of the Universe "A surprising and still mysterious discovery is that the arrangement of energy levels in quantum chaology is related to one of the deepest problems in mathematics, involving patterns in the prime numbers". It also examines the problem of interacting with the quantum world where ".. to learn something about a system we must measure it, but in so doing we often unavoidably change it and will therefore not know its true nature. This problem can be circumvented in the macroscopic world but not in the quantum domain". I actually got to chapter eight before I started to feel I'd lost the thread (I have to add that I've read quite a few introductory books on quantum mechanics and if I hadn't would no doubt have struggled a lot more with this one) and had to recap (which helped a little). The book concludes with a look at the practical applications and benefits of quantum research and development (quite an eye opener) as well as looking to where future developments might lead. Quantum theory is a meeting point of science and philosophy, it is as exciting as it is confusing but it is also addictive. It is about the very stuff we, and everything else is composed of, how it behaves and why. I can't think of anything more exciting and urgent to want answers to. Not perhaps an easy read but one of the best I've read. As Jim says "The quest for the ultimate truths is always a quest for beauty and simplicity".

Krzy? Dz says

Bardzo przyjemna ksi??ka, na prawie 300-tu stronach kondensuje ca?? popularnonaukow? wiedz? o kwantach, z zaledwie symbolicznym rysem historycznym i bez zb?dnych filozofii. Ksi??ka idealna zarówno dla osób, które chc? zacz?? swoj? przygod? z kwantami, jak i dla osób, które swoj? wiedz? o kwantach chc? uporz?dkowa?.

Charles Victus says

This was a fascinating discussion covering both entry level, to mid level conceptual topics of quantum mechanics, and quantum physics. It was a great read because I feel it covered the basics pretty well, and then dove even further without any fluff. The more interesting part was the authors views on the implications of quantum research, and the potential (no pun intented) outcomes of those implications.

For anyone looking to understand quantum theory, mechanics, and research just a bit further, and what it could mean on a bit of a higher level, I'd highly recommend this book.

Jim says

after discussion of the double slit experiment, the author talks about the birth of quantum physics and who should be credited with what. interesting....

Al-Khalili argues that the tradition wave-particle view being the main feature of quantum physics is limited (and has somewhat poisoned the water in picturing quantum physics)

The author talks about the different schools of thoughts / interpretations of which none are perfect .He adheres to the shut up and calculate school of QP.

Some feel. if two people have a differing opinions but no one way of settling them thorough empirical fact then their conflicting statements are meaningless and they should go and have a beer instead.

Bohrs/Heisenberg/Pauli's Copenhagen interpretation is more of a set of rules to abide by so we can use it without having to make sense of the formal explanation. (Jim A's view)

Also the C Interp. says nothing of how the process of wavefunction collapses occurs.

An number of different guest spots from academics in this book, where they talk about their specialty and research. a nice touch.

Lee says

I was fortunate enough to see Jim Al-Khalili speak about quantum mechanics a few months ago. The lecture hall was full to bursting, so I sat on the cold hard steps. An hour later I'd been treated to a fast-paced tour through fundamental physics and its possible applications to other sciences; and yet my head hurt less than my hind. I choose to interpret this as evidence that Jim Al-Khalili is an excellent speaker, able to get across complex ideas with clarity and enthusiasm. Or I might just have a delicate bottom. Either way, this is a nice book on quantum mechanics, albeit not the best starting point if you want to get into the subject.

Terry says

This short book focuses clearly and succinctly on the confusions and difficulties of understanding the world created by quantum mechanics. With clarity beyond any other meditation on the topic I've encountered, the author quickly tackles and dissects what a strange world we live it at the very small scales.

The author doesn't spend too much effort to come up with complicated metaphors as that would defeat the purpose of the book, to explain and elucidate. The author stresses "this doesn't make intuitive sense nor should it".

Unlike other quantum mechanics texts, the author doesn't spend too much time rehashing the history of physics.

All in all, this book is a wonderful introduction to the strangeness of the small. Other books have better dissections or better explains how quantum mechanics fits, but few will give you an appreciation for the field as well as this one.

Doram Jacoby says

Let me start by saying that I'm not a scientist.
I see myself as a science enthusiast but can't speak numbers myself.

I found this book heavier than my usual cup of tea but have enjoyed it none the less.
It took me on a very confusing journey of understanding.
From understanding very little, to suddenly getting some of it and back to seeing how little I actually understand.
mechanic
What I can tell you after finishing this book is that I understand Quantum mechanics better than I did before :)

A bit frustrating at times but worth a read.

Abdullah Diab says

A great book that introduces you to Quantum Physics, and as usual Jim's way is amazing, simple, clear and beautiful. You will not get bored with this book, not even if you haven't heard of Quantum, and on the other hand this book answers so many questions that you might have if you heard those stories about Quantum that make no sense (spoiler alert: they do make sense once you finish the book). The essays in the book are a good addition, they enriched the book and explained other ideas without letting the book branch into them and lose its goal. The only point that you need to notice is that this book was written in 2003, I can't imagine that this was 12 years ago, but it is, so some stuff that the book says we haven't reached or couldn't yet implement actually exist already, not necessarily in production, but at least in test labs, one example I sure know of is more than one implementation of the quantum computer. Also the book wouldn't mention the

discovery of the Higgs boson and the breakthrough it made and its effects on the standard model of particle physics. But still all the ideas that are explained in this book are still valid so you really need to read it to get yourself aware of the amazing world we live in, and to prepare yourself for the future.

Firas Ghomraoui says

As an avid fan of physics since my adolescence, this book is impressive as a gate to the mysterious (and somewhat new) world of quantam physics. Throw all classical Newtonian physics aside and stare in awe and wonder as the author/theoretical physicist helps you find some solace in this intriguing world- after he stumps all logic and reason with the simple double-slit experiment, leaving you to ponder thoroughly as you decipher Schrödinger's equation for the "wavefunction", or look at the many aspects of determinism vs uncertainty. The book's simple popularizing theme coupled with the author's avoiding of chalkboard equations is what attracts a person such as myself- chest deep in medical terminology while throwing back at some good 'ole physics. This book is definitely "for the perplexed".

John Jeffcoat iii says

"Quantum Physics"... the term causes many people to either roll their eyes in an expression of pointlessness, or to just fall asleep for lack of seeing any applicable use, or to drift into apathy from an assumption that the subject is far beyond their ability to grasp. That is unfortunately because quantum physics is at its heart the study of the nature of reality, in a way that far transcends the esoteric realm of philosophy... but in a way that is not quite classic "science" either.
What I love in particular about this book, is its many color illustrations that help (at least slightly) to visualize what is being discussed. Much like the popular "For Dummies" series of books... but in a far more visually appealing way... this book seeks to show the non-scientist masses just how fascinating, weird, disturbing, and to use an overused business phrase "paradigm-shifting" the discoveries of quantum physics really are.
Your cell phone, your computer, and the GPS in your car... none of them would work at all without the principles of quantum physics. Quantum is a study of the unimaginable small. And when we look closely at such things... atoms and parts of atoms... we discover that the world around us may just be an illusion of sorts. Looking "too closely" at the fabric of matter exposes us to a world where effect can precede cause, information can travel faster-than-light, objects can absolutely be in in more than one place at the same time, and matter and energy blur into the same thing. Even more spooky and disturbing, we discover than when human beings look at an atom, the act of looking at it - being aware of its position or its velocity in our minds - actually changes its nature into being different than it was before we looked at it... because looking at it imparts an energy unto it.
Remember back in high school when they taught us that electrons go around the nucleus of an atom like the moon goes around the earth? Wrong. And they knew it was wrong when they taught us that, decades ago... it's just that you cannot explain to most high school teenagers what electrons REALLY do, so they dumb it down to an analogy of one object circling another. What's really happening within every atom in the universe? Those electrons don't orbit the nucleus... they occupy quantum areas of probability of location around the nucleus... "superpositions"... in more than one place at the same time. At least until we look at them using an electron microscope. Then, they suddenly "collapse" into being in one place, as if we caught them with their hands in the cookie jar.
The implications of this are shocking. Forget about such trivial mind games as "If a tree falls in the forest

and nobody is there, does it make a sound?" The real question is "If nobody is in the forest... is the forest still there... or does the forest only collapse from a potential state into a real state upon someone being there to experience it?" To take this mind-twister out of the realm of science and drag it kicking and screaming into the realm of theology... "We don't leave lights on in rooms we are not using... so why do we assume that God wastes vast amounts of energy maintaining physical reality in areas where and when nobody is looking?" Sure, it's easy to dismiss all this as "silly talk"... until you take a moment to actually LOOK at what quantum physic experiments have been proving beyond any doubt in recent decades. Then, it's not so easy to dismiss the facts.

If you've ever seen the movie, The Matrix... there is a scene where Morpheus asks Neo if he wants to take the red pill and be made aware of the true nature of reality... or if he wants to take the blue pill, and wake up in his bed at home, and continue in blissful ignorance. I encourage you to "take the red pill" and read this book.
