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Science

Absolutely Small: How Quantum Theory Explains Our Everyday World
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Everything most of us think we know about how nature works is wrong.

In fact, the traditional or “classic” mechanical explanations for why objects behave the way they do are fundamentally incorrect. Only with an understanding of quantum mechanics can the basic nature of all things, from the most massive black hole to the tiniest subatomic particle, be truly understood.

Until around 1900, our everyday world was readily explained by the properties of physics developed since the time of the ancient Greeks and refined by such intellectual giants as Galileo and Newton. After all, the ways objects in motion behave and interact can be readily determined by observation and experimentation. Even today, to be sure, classical mechanics continues to be accurate enough to predict the most mundane events—such as the path a baseball will take when hit by a bat at a certain angle—or even the vastly complex, like the precise orbit a distant planet transcribes around its sun. Engineers still use classical mechanics to build bridges and skyscrapers, and classical mechanics took us to the moon and back.

And yet, classical mechanics is not sufficient to explain the true functioning of nature. Only with an understanding of quantum mechanics—that is, the properties of subatomic particles which comprise all matter, and how they interact—can we truly comprehend the world around us. For example, only quantum mechanics explains why cherries are red and blueberries are blue, why greenhouse gases are bad for our planet, and why a photon in a beam of light can actually be in two places at once.

As a professor of chemistry at Stanford University and a member of the National Academy of Sciences, the author is eminently qualified to explain the complexities of this topic. He has won major prizes and honors in physics, chemistry, and molecular spectroscopy. His ability to explore this difficult topic with a conversational writing style makes the book accessible, and he adroitly uses everyday experiences and analogies. For example, he uses the

properties of a racquetball court to explain how fruits get their colors.

Nevertheless, the subject matter is challenging, and it forces thinking and re-thinking. While this book is by no means an easy read, it will appeal to anyone with a curious mind who has ever wondered what all the quantum mechanics fuss is about, and to those who simply want to understand the everyday world.

Alan J. Couture