# INTRODUCTION

Time is the most mysterious thing in the universe. For thousands of years, it has lain outside the grasp of human understanding. The most we have been able to say about time in everyday language is that it passes—sometimes quickly, sometimes slowly—and that it is different from space. We know it exists, but we have not been able to say definitively what it is or how it works. In fact, the two most successful theories describing the universe—General Relativity and Quantum Mechanics—have completely different views on the subject. In General Relativity, time is considered to be a dimension that is "melded" to the three dimensions of space. Together, space and time are considered to constitute a four-dimensional field (three spatial dimensions plus one time dimension) called spacetime. According to the theory, spacetime is an active player in the universe. It influences and responds to physical events: Two often-quoted statements by noted scientist John Wheeler are that "spacetime tells matter how to move" and "matter tells spacetime how to curve."[1] In Quantum Mechanics, space and time are considered to be separate things and to have no involvement in physical events. Space is considered to be a flat, fixed arena in which events just happen, and time a mysterious, separate thing that ticks away regularly "somewhere out there."

For many years, scientists have sought to combine General Relativity and Quantum Mechanics into a single theory. This is because, to date, all of the observed fundamental phenomena in the universe are described by one or the other of these two theories, so by combining them, they would have one theory describing everything—all observed fundamental phenomena. Therefore, they call this single theory the Theory of Everything. Despite a great deal of work in this area, scientists have not been able to develop this theory. As might be expected, the principal problem that emerges concerns time: When scientists combine the mathematics of General Relativity with the mathematics of Quantum Mechanics, time vanishes. That is, they get an equation called the Wheeler-DeWitt equation—named after John Wheeler and Bryce DeWitt, another noted scientist—that basically says time does not exist in the universe. They call this problem, naturally, the problem of time. However, not only do we intuitively understand that time exists, time plays an important role in both General Relativity and Quantum Mechanics, so an equation that is born from the combination of these two theories that says the universe has no time is puzzling. What's wrong here?

The answer is nothing. Time should vanish from the math when General Relativity and Quantum Mechanics are combined. The Wheeler-DeWitt equation, with its "time equals zero" solution, indeed provides the clearest and most complete picture of time in the universe. The reason many people have found this puzzling is because they have not understood one very important thing, that General Relativity and Quantum Mechanics are actually describing the same process—that is, the same *temporal* process—but from opposite perspectives. Therefore, when the two theories are combined, the math, through the Wheeler-DeWitt equation, appears to indicate that there is zero time in the universe. Consider this: If I were to walk east five steps, turn around, walk west five steps, and then turn back around, mathematically it would look like I traveled zero steps; after all, at the end of the process, I would still be at my original starting point. However, I would have actually traveled more than ten steps. This is basically the situation with regard to General Relativity, Quantum Mechanics, and the Wheeler-DeWitt equation concerning time. It is not that time does not exist; there are simply two equal, yet opposite temporal processes occurring simultaneously in the universe. General Relativity describes one; Quantum Mechanics describes the other. Put them together, and they cancel each other out mathematically. Not understanding that General Relativity and Quantum Mechanics are opposite sides of the same temporal coin has been the principal obstacle preventing the successful combination of these two theories into the Theory of Everything.

In this book, a new theory is described—the *Temporal Energy Theory*. Without going into mathematical detail, it presents a new theory of time and, through that theory, adds to the prevailing interpretations of General Relativity and Quantum Mechanics, showing how these two theories might be successfully combined. The book also uses the theory to connect the dots between additional scientific concepts and, in the process, build a consistent model of how the universe likely operates on the small and grand scales.