

Introduction

“Because of its indispensable role in science, many scientists—especially physicists—invest the ultimate reality of the physical world in mathematics. A colleague of mine once remarked that in his opinion the world was nothing but bits and pieces of mathematics. To the ordinary person, whose picture of reality is tied closely to the perception of physical objects, and whose view of mathematics is that of an esoteric recreation, this must seem astounding. Yet the contention that mathematics is a key that enables the initiate to unlock cosmic secrets is as old as the subject itself.”

—Paul Davies, *The Mind of God*

“It’s only cranks who try to solve the big problems at one go.”

—Martin Rees, *“In the Matrix,” The Edge Foundation*

This story began with my wife’s young student, Luke.

A youth leader at our church responded to a question about Genesis with the “God in the Gaps” naturalist interpretation: the creation story is allegorical, there are millions and billions of years to the earth’s history—not six literal days of creation nor the mere thousands of years counted up in Genesis genealogies.

Luke’s parents are Young Earth Creationists; they hold that what the Lord said in His ten commandments (and wrote on stone tablets) is true: he made “heaven and earth, the sea, and all that in them is” in six literal days (Exodus 20:11). In their view, a church leader had told their son that Scripture is false. They began looking for a different church.

All concerned—youth leader, student, and parents—are dedicated Christians, obedient to our Lord. But they are being divided by an interpretation of theology and science.

My fellow believers in Christianity, we have a problem. The most common inter-

pretations of the Genesis creation story do not seem to be compatible with the most common perceptions of what science and natural philosophy tell us about this world. The apparent conflict between Scripture and science has encouraged division in our body, discouraged belief in Scripture, and emboldened the opponents of our faith.

Dear readers, there may not actually be a conflict between Scripture and science. If we alter our interpretation of Genesis just a little, if we accept some conjectures of modern physics regarding the nature of our world as possibly valid, then the conflict between Scripture and science can shrink to a minor disagreement.

Given the nature of the science involved, I wish to stress this point: this book tells a story, and only a story. There will be a great deal of modern science involved in telling it, so it may start to seem as if some parts of the story have an air of reality. And perhaps they do. But in the end, no point of this argument can be *proven*. It is really important that you always remember—it's just a story.

This is a book of speculations, which are really just stories: speculations in theology and speculations in science and natural philosophy, especially physics. Speculation in theology is nothing new, of course. There is always lots of speculation in theology. Christian and Jewish theology both depend on Scripture, on the Bible, but there are many, many parts of Scripture where we can only guess at meaning. About the creation story in Genesis 1, pretty much all we have is speculation. Nobody knows how something like the world we see around us could have been made, so all we can really do is tell stories about it. This book just offers one more interpretation, one more creation story.

It may come as a surprise to some readers, though, that the situation is very similar in physics. In many areas of physics, the details of why stuff does what it does are unknown—all we can do for now is guess. That is especially true for the fundamentals of physics: what our universe is made of and how it basically works. We know a lot about what stuff in our universe *does*, but almost nothing about what stuff *is*. A little history may help show the limits of our scientific knowledge.

For many centuries, at least since the time of the ancient Greeks, the study of our world and how it works was called natural philosophy. Part of natural philosophy turned into what we now call physics in the 1600s, when Galileo Galilei, Isaac Newton, and others had tremendous success applying mathematics to explain and predict the physical behavior of the world. Newton, for example, used a newly developed branch of mathematics now called calculus (a mathematics describing changing condi-

tions) and a simple mathematical description of the force of gravity (force = Gm_1m_2/r^2) to exactly predict the motions of the planets, the changing phases of the moon, the times of future lunar and solar eclipses, and the tides in the oceans. The motions of the planets had been studied and debated for thousands of years; the ocean tides were thought to have something to do with the moon, but the details were unknown. Newton's mathematical analysis provided answers, or at least a path to answers, for almost all of these questions.

But there was at least one question Newton could not answer: what causes the gravitational force? We know quite a bit more about gravitation today, but we still have no definite answer to that question. In 1915 Albert Einstein explained gravitational force with a mathematical model that describes space and time bending and curving in the presence of mass-energy. Einstein's model, like Newton's model before it, has been successful at predicting and describing some very odd physical behavior, but it adds more questions: Space can bend? Time can bend? Wouldn't that mean they are made of something bendable? What are they made of? What is mass-energy, and how does it bend space and time? Why are space and time physically connected? Nobody knows.

Natural philosophers, now called physicists and mathematicians, applied the mathematical approach of Galileo and Newton to the observable world for the next two hundred years. They developed a large body of mathematical models, now called classical physics, which accurately described and predicted the physical behavior of the world as they saw it.

The models of classical physics, based on observed behavior, often provide nearly complete insight into the questions of how and why physical objects do what they do. But some observations, some experiments, could not be explained by classical physics. It all started to fall apart around 1890, and by 1930 or so, classical physics had been completely replaced by what we call modern physics. With this new era, all certainty withered away. Einstein led the way with his theories of special and general relativity: mathematical models that describe a curving spacetime. Heisenberg, Schrodinger, and many others developed quantum mechanics: mathematical models that describe the tiny bits and pieces that make up our world as physically existing but forever hidden possibilities. Particle physics began to be developed around 1900. Mathematical models inspired by particle behavior have gradually revealed a world made of flitting ghosts that can only be described by abstract, unreal mathematics.

Classical physics showed us a picture of a sensible, understandable world. Classical physics, however, was wrong; it could not accurately predict some physical behaviors (mostly relating to the interactions between matter and electromagnetic radiation). Modern physics is capable of extremely accurate predictions of behavior and has shown us physical possibilities that could not have been found any other way. But modern physics paints a picture of a world that is not, as far as we know, sensible—and is not, so far, understood.

Of course, many guesses have been made by various physicists and philosophers about how the world works. But so far, none have been convincingly proven by experiment. So just as we can only speculate about the meanings of some parts of Scripture, we can only speculate about how the physical world really works and what it really is.

That is why this book can only be read as speculation—as a story.

In this particular story, some of our more obscure speculations about the physical nature of the world will be used as a setting for some of the more obscure events of Scripture. The goal of the story is to see how physics and Scripture might fit together. In your author's opinion, modern physics and Scripture fit together pretty well. Not perfectly, but well enough to be surprising, well enough that they could both be true. Scripture, at least the creation story in Genesis 1, does not fit particularly well with classical physics—but that might be because classical physics is wrong, not because Scripture is untrue.

The physical setting for Genesis 1 offered here uses some mainstream physics, plus a couple of very unconventional streams. The mainstream physics are the theories of special and general relativity, the Copenhagen interpretation of quantum mechanics, and the standard model of particle physics. The unconventional streams are the Feynman-Stueckelberg interpretation of antimatter and the notion described in the quote at the beginning of this introduction—that our entire reality might actually have a mathematical basis.

The major conflict between Scripture and science has always been the time scale of the Genesis creation story: the six days of creation versus the millions and billions of years of cosmological and geologic time. The Feynman-Stueckelberg interpretation of antimatter supports a very different perspective of time, a perspective that allows both Genesis and science to be literally true. As Saint Augustine said long ago in his *Confessions* (11:40, written in 397–400 AD): God's time and our time are not the same. The six days of creation are in God's time. The millions and billions of years are in

ours. Much more on this subject later.

The idea that our reality might have a mathematical basis is not a requirement for the speculations in this book, but it is convenient. It is convenient because it paints a picture of how our world might work that hangs comfortably between truth and understanding: detailed enough to possibly shed light on a process that is really beyond us, but still simple and familiar enough for us all (with a little preparation) to follow the story.

Christians are the intended audience for this book. Scriptural theology and doctrine are woven intimately into the presentation. I have tried to keep the presentation of the science impartial, but I realize that to a nonbeliever, much of this book will probably seem a little “weird.” There is an inescapable difference in perspective between nonbelievers and believers as we regard our universe. To nonbelievers, this reality is basically a pile of rocks. It can be an interesting pile of rocks, even quite attractive in parts, but it is still just a pile of rocks: a wholly natural world that just happened. It is the way that it is because that’s the way it is.

To believers, this is our Lord’s creation, made for his own pleasure. It is, at least partly, a work of art; it is beautiful because part of its purpose is to be beautiful. As with all works of art, it shows us some of the character of the artist (he likes beauty).

Living in this art museum, in this Louvre, believers see sculpture and paintings where nonbelievers see only oddly shaped stones and dried glop on canvas. The best example of this that I can give is bacteria. Microbiologists study them mostly in self-defense because they sometimes cause human diseases. Among the larger community of biologists, the prevailing attitude seems to be that bacteria are primitive organisms worthy only of a cursory glance before passing on to larger, more interesting critters. When I first encountered bacteria in some detail, I saw something quite different: they are a tough, resilient, astoundingly adaptive community of organisms that, together, form the foundation of life on this planet. None of us could survive without them. To a believer they are an absolutely brilliant solution to a very tough (but crucial) biological design problem, that of packing enough DNA to allow adaptability into an organism small enough to live on low natural nutrient concentrations. To use engineering design terminology, bacteria are not primitive; they are elegant. What many do not understand is that simple, compact, effective things are by far the hardest to make.

The intended audience for this book is also specifically Christians who do not have any formal training in physics or science. The first chapters briefly present the

basics of modern physics along with some additional science and natural philosophy that will be used in the interpretation of the Genesis creation story. Although the presentation of the science is, I think, as brief as it can reasonably be and only covers the highlights, there is still a lot of material to go through.

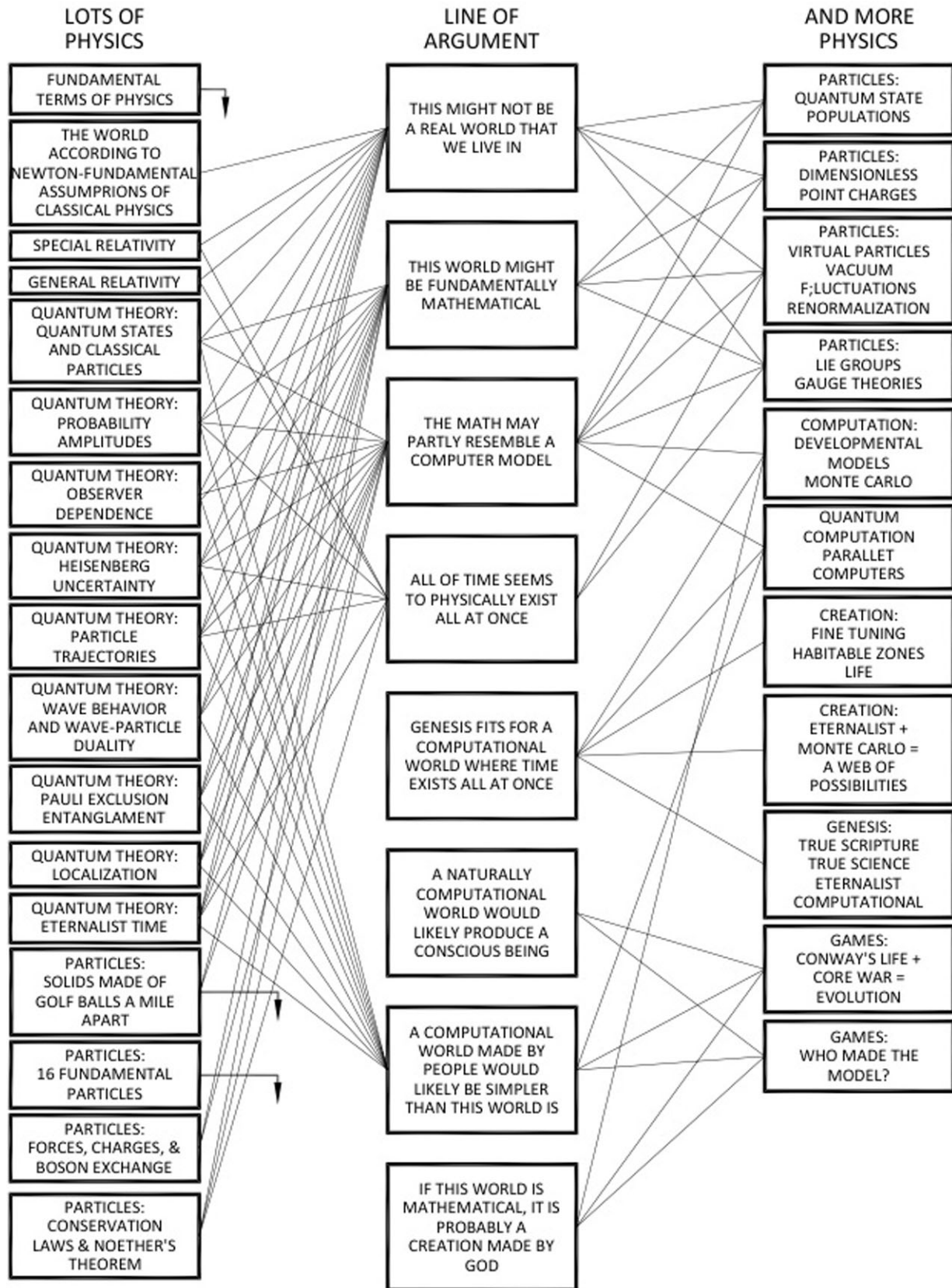
A few features have been included in this book to help you follow the presentation. A glossary and subject index are located in the back. The glossary includes definitions of some of the more important terms used in the science. In some cases, the definitions in the glossary are more complete than the descriptions of terms and concepts in the book.

It is customary in technical books written for nontechnical readers to emphasize important points with pages and pages of description. There is some of that in *Quantum Genesis*, but only for a few, really crucial parts of the presentation—namely energy and quantum object localization. Many other points are also important, but to keep the book as short as possible, your author has mentioned them only briefly. To help identify them, points of moderate importance will be emphasized (like this sentence here).

Because there is so much material and because the narrative frequently jumps from topic to topic before it all comes together later in the discussion of Genesis, it can be easy to get lost. I hope the following map of the argument will help to keep all of the bits and pieces in their proper places (next page).

A quick look at the map will reveal that there is more to the book than just the interpretation of Genesis. Apologies, dear readers, but I just could not resist the temptation. So many apologetics doors stand open after a presentation of modern physics that I just had to go through some of them. This book makes several apologetic arguments based on modern physics:

- The Genesis creation story can (and probably should) be interpreted using modern physics.
- The Genesis creation story (interpreted using modern physics) is compatible with the millions and billions of years of geology and cosmology.
- The Genesis creation story (interpreted using modern physics) is compatible with the geology and fossil record we see on Earth.
- Modern physics is probably not in conflict with the prophecies and miracles in Scripture.
- It is possible to postulate a reality that would likely result in the physical existence of a being resembling God.



- Modern physics and the interpretation of the Genesis creation story offered in this book can provide strong rebuttals for many of the most common arguments made against Scripture by opponents of our faith.
 - Modern physics implies that it is logically most likely that we are living in a creation made by God.
 - As Scripture says, this creation attests to the existence and the power of God.
- First, though, we need to begin with a little science.

An Aside for Terminology: Science and Natural Philosophy

Before the scientific method became really popular, what we now call science was called “natural philosophy.” In my opinion, the term still applies to some of the observational information we will be using to interpret Genesis 1. Most definitions of “science” today are quite complex, and different definitions often do not agree in the details. I suspect that some of the difficulty results from trying to lump together areas of study that are based on scientific method (like physics) with areas of study where scientific method is mostly impractical (like geology, paleontology, and archeology). The fundamental difference is that, in science, the theories that win are those verified by experiment. In natural philosophy, the theories that win are the ones that seem the most reasonable to the majority of the practitioners. Plenty of science is used in the various areas of natural philosophy, but it only goes so far; there is often not enough of it available to be conclusive.

For the rest of this book I will try to use the term “science” for concepts that have been entirely derived using scientific method (physics, chemistry, astrophysics, and cosmology) and “natural philosophy” for ideas that haven’t (geology, paleontology, and evolutionary biology). Natural philosophy isn’t necessarily wrong; it just has not been proved in the same way. There will be quite a lot of natural philosophy used to interpret Genesis 1.