GOD

and

COSMOS

A Christian View of Time, Space, and the Universe

Revised Edition

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Preface

This book is addressed to anyone concerned with defending the Christian faith in an age dominated by naturalistic science. Much has been written about the relationship between science and religion, but relatively little addresses the specific interaction between cosmology and theology.

This book aims to move beyond the usual questions of origins and to explore more deeply the underlying philosophical and theological issues. Emphasis is placed on the philosophical presuppositions and theological implications of modern cosmology, on the one hand, and, on the other, on the significance of the Bible for cosmological understanding.

To remain accessible to the general reader, no prior technical knowledge of cosmology is assumed. While specific cosmological models are often highly mathematical, this book includes only a few simple equations.

I thank the many theological and scientific colleagues who provided feedback on parts of this book. Particular thanks go to Dr. Cornelis Van Dam, Emeritus Professor of Old Testament Studies at the Canadian Reformed Theological Seminary in Hamilton, Ontario, and to Dean Davis, Director of *Come Let Us Reason*, a ministry specializing in apologetics and worldview studies.

1. Some Basic Questions

Cosmology is the most important subject in the world.

Why? Because it tells the story of the entire universe—its origin, structure, purpose, and destiny. As inhabitants of this universe, its story inevitably forms the backdrop to our own. It shapes our deepest beliefs, values, and hopes.

Our cosmology influences how we answer the most fundamental questions of human existence. It affects our morality, religion, and culture. In short, it plays a central role in shaping our worldview.

This book seeks to examine and develop a cosmology rooted in the Christian faith. In brief, Christianity teaches that God created, from nothing, a two-realm universe: a visible world and a heavenly realm, both unfolding according to God's glorious plan. The original creation was good. It culminated in the creation of Adam, made in the image of God, to serve and glorify Him. Tragically, Adam's fall into sin corrupted both humanity and the physical world. Yet, by God's grace, redemption is possible through the saving work of Christ. At the Day of Judgment, believers will be transformed to reign with Christ on a renewed earth, cleansed of sin and corruption.

The chief rival to Christian cosmology is Big Bang cosmology—the mainstream secular model embraced by most Western scientists and educators. It is widely taught in schools and universities.

According to Big Bang cosmology, the universe began with an immense explosion—the "Big Bang"—of a highly compressed ball of energy-matter. Since then, the universe has expanded and evolved, producing galaxies, stars, planets, and eventually life. On Earth, simple life forms allegedly arose and gradually evolved into more complex organisms, culminating in humans.

Big Bang cosmology seeks to explain everything solely in terms of natural laws. It claims to be fully scientific—based only on observation and reason—while excluding divine revelation and miracles.

In this way, Big Bang cosmology provides the foundational narrative for naturalism. Naturalism is the belief that only the physical universe exists—that there is no God, no spiritual realm, no absolute morality, and no ultimate purpose. In this view, the universe is a colossal accident. Humans are unintended by-products of evolution. We live without purpose, and at death, we cease to exist. Morality and religion are merely human inventions.

Clearly, naturalism stands in sharp contrast to Christianity (for a detailed comparison, see Byl 2022). If the Big Bang account of origins is true, then Christianity must be false. Since Big Bang cosmology is widely regarded as a scientifically proven fact, it poses a significant challenge to the Christian faith.

How should Christians respond?

At first glance, Big Bang cosmology might seem to support belief in a Creator, since it implies that the universe had a beginning. Some have used this as a point of contact for Christian apologetics. But this raises important questions: To what extent is Big Bang cosmology consistent with the Bible? Is it possible to construct a Christian version of Big Bang cosmology? If so, what changes would that require in how we interpret Scripture? And what theological consequences would follow?

Alternatively, if the theological cost is too great, Christians might consider modifying their cosmological models. But how well established is Big Bang cosmology? Is there scientific room for alternative cosmologies that better align with a Christian worldview?

This book aims to explore these deeper questions. Our study will take us into the realms of cosmology—the scientific study of the universe as a whole—and theology—the study of God and His revelation.

How do theology and cosmology relate? To what extent is cosmology shaped by theological or philosophical assumptions? What theological consequences flow from cosmological claims? These will be the guiding questions of our study. Our theological focus will be Christian, and our primary source of divine revelation will be the Bible.

What Is the Cosmos?

What Is the Cosmos? (Revised)

Cosmology (from the Greek *kosmos*, “world,” and *logia*, “study of”) is the study of the universe as a whole—everything that exists. To exist means to be real or actual, rather than merely possible or fictional. To exist is to *be*, and to be *somewhere* in space.

So, what exists?

First, there is the physical world of humans, trees, stars, and galaxies—things we can see or sense. This includes not only physical objects but also the space in which they exist and the changes that occur over time.

Physical cosmology focuses primarily on this physical aspect of the universe. It seeks to describe and explain the origin, development, and ultimate fate of astronomical phenomena—such as stars and galaxies—using natural laws.

Second, reality also includes more abstract entities, such as human thoughts. These are located in human minds, which are housed in human brains. It also includes abstract realities like the laws of logic, mathematics, and morality, as well as the natural laws that govern physical objects.

Further, although many modern people assume that nothing exists beyond the physical world and human thought, Christians believe that everything was created by an almighty God, whose existence transcends His creation. God is, in fact, the necessary ground of all being and the upholder of abstract laws.

Finally, Christians affirm the existence of an invisible realm of heavenly beings—angels and demons—who can influence events in the visible world.

How Can We Know the Cosmos?

Our knowledge of the cosmos comes through various means.

Observations Are Foundational

Like all sciences, cosmology is grounded in our observations of the physical universe. We observe the sun, moon, planets, stars, supernovae, galaxies, and more. Thanks to increasingly sophisticated telescopes and instruments, our celestial observations have become more detailed and precise. Today, we possess a vast trove of astronomical data.

Yet, our study of the universe is limited. We can observe it only from one spatial location—near Earth—and over a relatively short time span—the past few centuries. What we currently see may represent only a tiny fraction of the entire physical universe.

Theories Explain and Extend

To interpret the data gathered by Earth-bound instruments, we must make various assumptions about the universe. For example, to conclude that light received by a telescope in AD 2025 left a galaxy billions of years ago, we assume that the light originated from that galaxy, that the distance calculation is accurate, that the speed of light remained constant, and so on. These assumptions, however plausible, are difficult to verify.

Cosmology aims not only to *observe* the universe but also to *explain* its structure, to reconstruct its past, and to predict its future. Scientists look for patterns, regularities, and laws in the data. The goal is to explain phenomena using known physical laws, and to explain those laws in terms of deeper principles and theories.

For instance, observations of planetary motion suggest that planets orbit the sun in ellipses. This pattern is explained by gravitational theories such as Newtonian mechanics or Einstein's general relativity.

Because theories are constructed to explain data, reliable observational data always trumps theoretical models. Scientific reconstructions of the past should not contradict ancient observations preserved in trustworthy historical records.

Cosmology focuses more on the overall structure and history of the universe than on the details of individual astronomical objects. To this end, cosmologists build simplified mathematical models of the universe. These models often assume that the universe is *isotropic* (the same in all directions) and *homogeneous* (the same in all places) on large scales.

Choosing Theories

Cosmological models rely heavily on theoretical assumptions. But which assumptions should we adopt? As we will see, the same observational data can often be explained by multiple, competing models.

To construct workable cosmological models, scientists must make simplifying assumptions. However, many of these assumptions cannot be directly confirmed by observation. For example, it is commonly assumed that the physical laws we observe here and now are valid everywhere and always. But this need not be the case. Perhaps the gravitational constant or the speed of light varies across space or time. Indeed, several such proposals have appeared in professional astronomical journals.

Given the wide range of possible theories, how can we hope to identify the correct one? Even if we were to stumble upon the best theory, how would we recognize it as such? Or, more modestly, how can we even choose the better of two competing theories?

The challenge is that scientific theories are not simply deduced from observations. Their origin is now widely regarded as largely subjective. Philosopher of science Karl Popper argued that "*we must regard all laws or theories as hypothetical or conjectural; that is, as guesses*" (1972:9). He described theories as "the free creations of our minds" (1963:192). Similarly, Carl Hempel observed:

> *“The transition from data to theory requires creative imagination. Scientific hypotheses and theories are not derived from observed facts but are invented in order to account for them.” (1966:15)*

In other words, theories are not so much discovered in nature as imposed upon it. They are not so much the result of rational thought as the creations of our irrational intuition.

Given the subjective origin of scientific theories, how can a particular theory be proven or disproven? A true theory should not contradict our observations. Hence, one might think that further research will falsify most theories.

In practice, however, theories are not so easily discarded. A favored theory—such as Big Bang cosmology—can always be preserved by modifying it to fit new data. A theory that requires artificial, *ad hoc* adjustments may seem implausible. Yet, however difficult it may be to prove such a theory true, it is even harder to conclusively disprove it. Philosopher Imre Lakatos remarked:

> *“Scientific theories are not only equally unprovable, and equally improbable, but they are also equally undisprovable.” (1980:19)*

Popper hoped to develop a rational method for objectively selecting theories. He proposed that genuine scientific theories should be falsifiable—that is, they should make definite, testable predictions. But if we apply this criterion to cosmology, very few theories remain. Virtually all cosmological models are currently falsified by some observations.

Moreover, Popper did not prove that falsifiable theories are more likely to be true. Nor is his proposal itself falsifiable, so it fails his own standard for a scientific theory.

Other criteria have been proposed: perhaps we should prefer theories that are mathematically simple, that make novel predictions, or that fit well with other accepted theories. While such criteria are commonly used in practice, they offer no guarantee of truth. Why should simpler theories be more likely to be true than more complex ones?

Indeed, the creation of selection criteria is no less subjective than the creation of theories. As Lakatos noted:

> *“These scientific games are without genuine epistemological content unless we superimpose on them some sort of metaphysical principle which will say that the game, as specified by the methodology, gives us the best chance of approaching the truth.” (1980:122)*

In short, science in general—and cosmology in particular—is plagued by the lack of definite, objective criteria for distinguishing true theories from false ones. At this crucial point, we must rely on extra-scientific considerations.

This is the problem of scientific knowledge: we lack justifiably valid criteria for identifying true theories. The only relatively clear distinction is between observations and the theories devised to explain them. Even here, the line is not absolute. Observations themselves are often theory-laden. Our theories influence what we look for, how we interpret what we find, and how confident we are in the reliability of any particular observation.

Still, observations are generally more secure than the theories built upon them. While some scientific disputes concern the data itself, most involve the interpretation of data within competing theoretical frameworks. Thus, we should accept as scientific fact only reliable observed data. Once we move beyond secure observation, we enter a sea of subjective interpretation and speculation.

The Role of Worldviews

Our choice of scientific theories depends largely on what we assume about the universe as a whole. These assumptions reflect our most basic notions regarding reality --our *worldview*.

Thus, also in cosmology, extra-scientific biases can play a large role. For example, the choice for or against the Big Bang is sometimes strongly influenced by religious factors. Fred Hoyle (1975:684) rejected Big Bang cosmology at least in part because the sudden appearance of the universe at a finite time in the past seemed to him to imply a supernatural cause. On the same grounds, some Christians such as William Craig (1993) and Hugh Ross (1993) embraced Big Bang cosmology partly because it aided their proof for the existence of God.

At heart, scientists cannot avoid being guided by their deepest religious and philosophical convictions. These can play a decisive role in the creation, assessment, and selection of cosmological theories.

Religious and philosophical prejudices may easily blind their adherents to blatant deficiencies in their own favoured theories and to obvious advantages in rival models. It is thus important that such presuppositions be made very explicit. To minimize undue distortion and bias, our premises and criteria should at least be openly acknowledged.

As we have already noted, the dominant worldview in modern cosmology is naturalism, which has no place for God or miracles. Modern man wants to ban supernatural causes and divine revelation from science. However, this can be done only by prior assumption, rather than by any objective proof. After all, how could one ever prove that miracles are impossible, or that God has not revealed truth?

The Christian worldview, in contrast, takes God to be the ultimate reality. Since God is our starting point, we trust His revealed Word as a most trustworthy source of knowledge beyond our observational horizon. Through it we get knowledge of God and His creation. Since God is sovereign, He sets physical laws and changes them as He wants. God's complete control makes plausible the possibility of miracles—even the colossal miracle of the instantaneous creation of the entire physical universe, by a mere divine word.

A Christian View of Knowledge

A crucial question in studying reality is how to evaluate our various sources of knowledge. In particular, from a Christian perspective, how should we assess the Bible as a source of knowledge?

The Bible is the written Word of God, revealed to human authors inspired by the Holy Spirit. Since God never errs or lies (e.g., John 17:17; 2 Tim. 3:16; Titus 1:2), His Word should be accepted as inerrant and fully authoritative in all it says—also when it concerns cosmological matters.

However, the Bible itself testifies to the importance of firsthand experience. For example, "*many believed in his name when they saw the signs that he was doing*" (John 2:23). Belief in Jesus' resurrection is grounded in the disciples' actual experiences:

> *When therefore he was raised from the dead, his disciples remembered that he had said this, and they believed the Scripture and the word that Jesus had spoken (John 2:22).*

Paul supports his claim of Christ's resurrection by appealing to eyewitnesses of the risen Christ (1 Cor. 15:5–8). John also bases his teaching on what he has personally heard and seen (1 John 1:1–5). Luke writes his gospel based on eyewitness reports so that the reader may have certainty concerning the things taught (Luke 1:1–4). Jesus rebukes Thomas, saying, “*Have you believed because you have seen me? Blessed are those who have not seen and yet have believed*” (John 20:29). For now, we see dimly, but then we shall know fully, “face to face” (1 Cor. 13:12).

Our senses are reliable because they are of divine origin: “*The hearing ear and the seeing eye, the Lord has made them both*" (Prov. 20:12). We need these to hear the gospel—"*so faith comes from hearing*" (Rom. 10:17)—and to read the Bible.

Since the Bible presents eyewitness reports of historical events, it supplies reliable observational evidence. Hence, such biblical data should constrain scientific explanations in the historical sciences, including cosmology.

Further, we must rely on deductive logic and mathematics. It is evident that God has made the universe in such a way that it exhibits logical and mathematical properties. God has endowed man, created in His image, with the analytical abilities to use discern and apply these properties. Yet, man, due to his finite and fallen nature, can make mistakes.

Our reasoning powers are not confined to logic and mathematics but also include the capacity for imaginative, theoretical thought. Unfortunately, particularly after the Fall, our reasoning can be swayed by our inner desires. As such, it can easily be misguided: "*For out of the heart come evil thoughts*" (Matt. 15:19). Clearly, man is responsible for his thoughts and therefore for their products, including scientific theories. After all, scientific theories are speculative inventions of man's creative imagination. Nowhere does the Bible suggest that God reveals Himself through fallible human theorizing. Indeed, the Bible stresses the limitations of human knowledge, especially concerning origins (see Job 38–41; Isa. 41:21–24; Eccl. 3:11).

A proper theory of knowledge (or *epistemology*) will therefore give high weight to Scripture, observation, and logic. These are all God-given and thus will be in harmony; together they form the touchstone of our knowledge.

By contrast, human theorizing, in all its forms, occupies a lower category of knowledge. If it fails the test of logic, observation, and Scripture, it must be rejected as certainly false. Even if it passes these tests, we must remain cautious: any claim that goes beyond observation and Scripture is still likely to be false.

The Nature of General Revelation

It is often said that God reveals truth through two “books”: the Bible (special revelation) and nature (general revelation). God’s revelation through nature is affirmed in texts such as:

> *“For his invisible attributes, namely, his eternal power and divine nature, have been clearly perceived, ever since the creation of the world, in the things that have been made. So they are without excuse.” (Rom. 1:20)*

> *“The heavens declare the glory of God…” (Ps. 19:1)*

Some argue that, since God is the author of both books, they cannot contradict each other. Therefore, they suggest that we should interpret the Bible in line with science.

For example, David Diehl (1987) proposed that general revelation includes not only knowledge of God but also knowledge of His works in nature. He extended this to include not just observations of nature but also scientific theories that go beyond observation. According to Diehl, some scientific views—though once controversial—are now so well established that it would be unscientific and unfair to general revelation to reject them. He argued that special and general revelation should have equal authority, each being final within its own domain.

How should we respond to this?

Certainly, we affirm the importance of observing nature. In this sense, general revelation—or better, creation—is authoritative. We must appeal to it, or at least to our experience of it, as a check on scientific theorizing.

The problem with Diehl's position arises when he extends the scope of general revelation beyond observational data and logic to include scientific theories. If, as Diehl claims, general revelation is infallible, then some scientific theories must also be infallible. But which ones? The history of science is filled with theories once held as truth that were later discarded. Newtonian mechanics, once considered absolute, was replaced by Einstein's relativity. Diehl offers no criteria for distinguishing true theories from false ones.

Historically, the two-books doctrine has often led to a decline in biblical authority. If some scientific theories are taken as divine truth, then the "book of science" begins to modify Scripture. Without valid criteria for identifying true theories, our reading of the Bible becomes subject to the latest scientific trends.

In the biblical texts cited above, nature's message concerns only the knowledge of God: His eternal power and deity. This message is immediate and clear; everyone is "without excuse." There is no need for scientific expertise. It seems God has created us with the innate ability to discern His glory in nature.

Moreover, if nature is a book, it is a picture book—unlike the Bible, which contains propositional truths. Nature's "letters" are creatures:

people, birds, trees, stars, and the like. Also, the book of nature covers all of history since Creation. But the only “pages” we can now read pertain to today. These current pages tell us nothing directly about biblical history, which ends before AD 100. There can be no real conflict between biblical history and current observable nature.

We must not confuse our observations of nature with science, which is our fallible human attempt to interpret it. The Bible, by contrast, is the reliable testimony of the Creator, offering truths that may be inaccessible to empirical investigation. Thus, we must interpret the book of nature through the lens of Scripture. General revelation never overrides or corrects special revelation; rather, it must be understood in its light.

Interpreting the Bible

Thus far, we have affirmed that the Bible is the written Word of God and should be accepted as inerrant and fully authoritative in all it teaches—including matters related to cosmology. But what exactly does the Bible say about the structure and origin of the universe? How should we interpret passages that appear to address cosmological topics? What principles should guide our interpretation?

The proper interpretation of Scripture has been debated since the early days of Christianity. To minimize human bias and distortion, sound and objective hermeneutical rules must be followed. The Reformers emphasized two foundational principles:

1. **The natural sense**: Scripture should be interpreted according to its plain, straightforward meaning, taking into account the literary and historical context—unless there is clear internal evidence suggesting a figurative or symbolic reading.

2. **Scripture interprets Scripture**: Clearer passages should be used to illuminate those that are less clear. The Bible must be read on its own terms, allowing its message to speak for itself, rather than being forced to conform to external ideas.

Applying these principles to Genesis 1–11, we observe that the text presents itself as historical narrative. Its style is prose, not poetry. The recurring phrase “these are the generations of…” (beginning in

Genesis 2:4) indicates a historical framework. Moreover, whenever other parts of Scripture refer to Genesis, they treat it as a record of actual historical events.

Jesus Himself affirmed the authority and reliability of Scripture. He declared it to be divinely inspired and unbreakable (John 10:35). He treated Genesis as literal history. For example, Jesus said:

> *"Have you not read that He who created them from the beginning made them male and female, and said, 'For this reason a man shall leave his father and mother and be joined to his wife, and the two shall become one flesh'?"*
>
> *(Matthew 19:4–5, quoting Genesis 1:27 and 2:24)*

Here, Jesus—Creator and Lord—cites both Genesis 1 and 2 as referring to the same historical event, affirming both the content and divine authorship of the text.

But what about the claims of natural knowledge? Should scientific theories influence our interpretation of Scripture?

Our hermeneutical principles must align with our epistemology. Given the critical distinction between observation and theory, we must not allow fallible human theorizing to reshape the content of God's Word.

Augustine and, later, Aquinas argued that natural knowledge should be overridden by Scripture unless it could be definitively proven. Even the lightest word from God should take precedence over the weightiest word from man—unless the latter can be conclusively demonstrated. Since God's Word cannot conflict with truth, a proven fact may call for a reinterpretation—but only then.

Yet what counts as valid proof of an extra-biblical claim? Since the rise of modern science and biblical criticism in the 16th century, many traditional interpretations of Genesis have been challenged—its account of creation, Adam's fall, Noah's flood, and more. Some Christians continued to uphold the traditional view, rejecting modern science as inconclusive. Others began to modify their interpretation of Scripture to harmonize with scientific theories.

Initially, the troublesome texts were simply reinterpreted to accord with modern learning. Flexible methods of interpretation (often called "concordism") were proposed. Consider this typical example from Christian geologist Davis Young:

> *“We need not twist or misinterpret the facts in order to get agreement between the Bible and science. Christians must realize that the Scriptures do not require us to believe in six twenty-four-hour days of creation. There is legitimate internal biblical evidence to indicate that the days of creation may have been indefinite periods of time. Moreover, the genealogies of Genesis 5 and 11 need not be taken in a rigidly literal fashion... It is not entirely clear that the Bible is talking about a geographically universal flood... There is considerable room for legitimate variation of interpretation of the creation and the flood.”*
>
> *(Young 1982:152)*

The danger of such an elastic approach is that we risk reading into Scripture what we wish to find—reducing divine revelation to a mirror of human opinion.

Interestingly, Young himself later repudiated this approach, admitting:

> *“...all the variations of the concordist theme give us a Bible that is constantly held hostage to the latest scientific theorizing. Texts are twisted, pulled, poked, stretched, and prodded to ‘agree’ with scientific conclusions, so that concordism today undermines honest, Christian exegesis.”*
>
> *(Young 1987:6)*

In short, concordism is incompatible with an epistemology that places Scripture as the supreme authority. If we are to truly hear God’s Word, we must apply hermeneutical principles that resist distortion by contemporary scientific ideas. The most direct, natural interpretation of a text should generally be preferred—unless internal evidence within Scripture itself points to an alternative meaning.

The Scope of Biblical Authority

It is noteworthy that Davis Young ultimately acknowledged that, taken on its own terms, the traditional interpretation of Genesis is exegetically preferred. Yet, based on what he considered overwhelming scientific evidence, he concluded that the traditional view must be rejected. In abandoning concordism, Young chose instead to restrict the scope of biblical authority. He reinterpreted Genesis 1 not as a record of actual history, but as ancient theological literature—rich in symbolic structure, imagery, and metaphor—intended to convey timeless spiritual truths (Young 1987:303).

This position has become increasingly common among evangelicals. It seeks to avoid conflict by claiming that science and Scripture speak to different domains of knowledge. For example, Howard Van Till (1986) argues that science answers “how” and “when” questions about the physical world, while Scripture addresses “who” and “why” questions about meaning and purpose. These perspectives, he claims, are *complementary* rather than *contradictory*.

Yet Scripture itself gives no indication that its authority is limited to theological matters. On the contrary, it speaks with clarity about historical and physical events—including the origin and structure of the cosmos. By what authority, then, can we draw boundaries around the Bible’s authority? And where should those boundaries lie?

Van Till suggests that the theological content of a passage must be separated from the “human packaging” in which it is delivered. He compares Scripture to a granola bar: its spiritual nourishment must be extracted from its outer wrapper. But who decides what is packaging and what is content? On what basis can we declare the physical details of a biblical narrative non-essential, while affirming its spiritual message? Without divine guidance, this becomes a subjective exercise, dependent on human opinion rather than revelation.

Whether through concordism or complementarianism, the authority of Scripture is diminished. Concordism bends the text to fit modern science; complementarianism confines the text to a narrow theological domain. In either case, interpretive authority shifts from the Bible to the reader—or more precisely, to the scientific consensus of the day.

A high view of Scripture requires a different approach. If Scripture is to be our epistemological foundation, then inerrancy must be presupposed. We do not test the Bible by science; rather, we interpret science in light of the Bible. This does not mean rejecting all scientific insight, but it does mean subordinating human theorizing to the sure Word of God.

Importantly, Scripture itself makes empirical claims. It describes the past, predicts the future, and reveals unseen realities. These claims may eventually be confirmed or falsified. In that sense, biblical truth is not inaccessible to testing—but our confidence in it must rest first on God's character, not on human verification.

Is such confidence still possible in the modern age? That is the central question we now face. If we limit scientific facts to direct observation, most apparent conflicts with Scripture disappear. After all, biblical history concerns events that are either long past or yet to come—events not directly observable. Scientific objections to Scripture usually stem from theoretical extrapolations, not from the data itself.

We must therefore ask: Are modern cosmological theories sufficiently established to warrant a revision of biblical interpretation? Or should our trust remain firmly anchored in the all-sufficient Word of God?

Preview

This study will focus on two foundational questions:

1. **What does theology have to say to cosmology?**

   How have theological considerations influenced the construction, evaluation, and selection of cosmological theories? What does the Bible teach about the nature and structure of the cosmos?

2. **What does cosmology have to say to theology?**

> How have cosmological models shaped theological thinking? What theological implications arise from modern cosmology? And how reliable are these cosmological models?

We begin, in the next chapter, by examining what the Bible teaches about cosmology. This will be followed by a brief historical survey, tracing cosmological views from the ancient Near East through the medieval period and into the modern era.

A subsequent chapter will explore Big Bang cosmology—its assumptions, strengths, and weaknesses—as well as alternative interpretations of the observational evidence.

Later chapters will examine the theological implications of Big Bang cosmology. We will consider how cosmological evidence has been used in arguments for the existence of God and assess the validity of such arguments. We will also explore the future of the universe, including the possibility of extraterrestrial life and the long-term prospects for life in general.

Some proponents of modern cosmology have proposed alternative “gods” they claim are more plausible than the Christian God. These modern deities—and the hope they offer for life beyond death—will be critically examined.

We will then consider the implications of Big Bang cosmology for Christianity. This will be followed by a presentation of various cosmological models grounded in biblical revelation. We will evaluate the validity and usefulness of these models, especially in the context of Christian apologetics.

The final chapter will summarize the conclusions reached throughout the study.

2. The Bible on Cosmology

What does the Bible have to say about God and his creation, particularly concerning cosmology?

God and Creation

Before the creation of the world God existed by himself from eternity. God is a spiritual being, all-knowing, all-powerful, perfectly good, wise, just, and holy. God is self-existent and self-sufficient, dependent on nothing beyond himself. God is infinite, in that he is unbounded, free from all limitations. This is shown in his *eternity*, which has no bounds in time ("*your years have no end,*" Psa.102:27), and his *immensity*, free from all spatial limitations.

God is not a distant impersonal force but a living, active God. He is tri-personal: Father, Son (Jesus Christ), and Holy Spirit. Scripture reveals that “before the foundation of the world,” God the Father loved and glorified the Son (John 17:24; 17:4). Thus, even before creation, there was love, glory, and fellowship within the divine Trinity.

God's Grand Christ-centered Plan

God did not need to create the universe. He freely chose to do so, according to his sovereign will:

> *for you created all things, and by your will they existed and were created (Rev. 4:11).*

The ultimate purpose of creation is to reveal, and share, God's magnificent glory (“the heavens declare the glory of God,” Psa.19:1), especially through the work of his Son, Jesus Christ.

Before creation, God the Father prepared His grand plan for the universe. This plan encompasses all things in heaven and on earth, which, in the fullness of time, will be united in Christ (Eph. 1:3–11).

Although the plan was ordained by the Father, it was carried out by the Son. Through Christ,

> *"all things were created in heaven and on earth, visible and invisible...all things were created through him and for him. And he is before all things, and in him all things hold together" (Col. 1:16-17).*

Christ is both the creator and sustainer of the universe. Without his continuous word of power the universe would instantly cease to exist: "*he upholds the universe by the word of his power*" (Heb.1:3).

Christ was given all authority in heaven and on earth (Matt. 28:18). Through Him, God providentially governs the universe throughout history, ensuring that His all-encompassing plan is perfectly fulfilled. Nothing happens apart from God’s will.

This plan includes the entrance of sin into the universe and its ultimate defeat through Christ. God ordained Christ to redeem the elect (1 Pet. 1:20), who were chosen before the foundation of the world (Eph. 1:4; Rev. 13:8). Christ is the Creator, Sustainer, incarnate Redeemer, Judge (2 Cor. 5:10), and ultimate Ruler of the entire cosmos.

The present state of the universe—with its pain, suffering, and disorder—is clearly not the best of all possible worlds. Yet, because God is perfectly wise, we can trust that the full story of the universe is the best possible story. It is the most complete expression of God’s character, glorifying His power, holiness, justice, mercy, and love. God’s perfect plan will culminate in the best possible world—especially for those who love Him and long to share in His glory.

Creation Out of Nothing

In the early church, one of the key theological challenges was the idea that matter had always existed. Some thinkers—known as dualists—believed that God created the universe by shaping pre-existing material. Others—pantheists—equated the world with God Himself. In contrast, the traditional Christian doctrine affirms that the universe is distinct from God and was created “out of nothing” (*creatio ex nihilo*). This means that, before creation, no physical matter existed. The entire universe, including all matter and energy, was brought into being solely by God, according to His sovereign plan.

The phrase “created out of nothing” does not appear verbatim in Scripture, but the concept is strongly supported. Genesis 1:1 declares, “In the beginning, God created the heavens and the earth,” implying a definite beginning to the physical universe. The New Testament reinforces this idea:

> *“By faith we understand that the universe was created by the word of God, so that what is seen was not made out of things that are visible.” (Heb. 11:3)*

Nothing would have existed apart from God’s will. He simply spoke, and creation came into being:

> *“For he spoke, and it came to be; he commanded, and it stood firm.” (Ps. 33:9)*

The doctrine of *creatio ex nihilo* affirms that the universe had a beginning in time and was created from nothing by the power and will of God..

Creation and Providence

Some theologians have proposed replacing the idea of *creatio ex nihilo* (creation out of nothing) with *creatio continua* (continuous creation). For example, Ian Barbour (1971:384) argued that *creatio ex nihilo*, especially when linked to an absolute beginning, is unbiblical. He suggested that while this concept suited the static universe of medieval cosmology, it is less compatible with the dynamic, evolving universe of modern science. Barbour viewed the emergence of life from matter as just as much a part of divine creation as the initial formation of matter. He merged the idea of continuing creation with divine providence, downplaying the significance of a distinct beginning.

Theologian Ted Peters, too, even though he defends *creatio ex nihilo* against Barbour, agrees on the importance of *creatio continua*. According to Peters, God's creative work is not yet done: "*we today are still somewhere within the first six day*s" (Peters 1989:96).

However, while God continually sustains the universe, the Bible clearly presents creation as a completed act in the past. At the end of the sixth day, “God saw everything that he had made, and behold, it was very good” (Gen. 1:31). Elsewhere, the six days of creation are referred to as a past event: “In six days the LORD made heaven and earth, and on the seventh day he rested and was refreshed” (Ex. 31:17).

The idea of *creatio continua*—with its implication that the universe is still evolving upward—lacks biblical support. While God’s providence governs all things, the act of creation itself was completed and declared “very good.”

The Creation of the Cosmos

Having considered general aspects of creation, we now turn to specific details from the Genesis 1 account—particularly the works of the first four days, which relate directly to cosmology.

Day One

> *In the beginning God created the heavens and the earth. The earth was without form and void, and darkness was over the face of the deep. And the Spirit of God was hovering over the face of the waters. (Gen. 1:1-2)*

Genesis starts with the well-known declaration “*in the beginning, God created heaven and earth*” (Gen. 1:1). Is this a summary of what follows, or the first act of creation? According to Old Testament scholar Cornelis Van Dam (2021:91-94), since verse 2 describes the earth as already existing, verse 1 refers to God’s initial creative act on Day One.

If verse 1 were merely a heading, the creation of the earth and the angelic heaven would be omitted from the account. Yet elsewhere Scripture affirms that both were created during the six-day period (Ex. 31:17), and that angels existed before the earth (Job 38:4–7).

Thus, God initially created two things: the heavens and a watery earth, from which the rest of the physical universe would later be formed (Gen. 1:6–19). Several cosmological insights can be drawn from this passage.

1. A Finite, Bounded, Physical Universe

The primeval earth was dark, unstructured, and largely in liquid form. Since the waters had a “face” or surface, they occupied a finite, bounded volume. Moreover, since darkness and the Spirit of God are described as being “over the face” of the waters, the physical universe appears to be embedded within a larger space—one that is empty of material things.

2. The Heavenly Realm

In addition to the physical universe, God also created a heavenly realm. The Hebrew word for “heavens” (*shamayim*) is always plural and used in three senses: the atmosphere (where birds fly, Gen. 1:20), the celestial realm (where stars dwell, Gen. 1:14), and the “heaven of heavens,” where God’s throne is located (Ps. 103:19). Since the first two are formed within the “expanse” on Day Two, the “heavens” of Day One likely refer primarily to the highest heaven—the dwelling place of God and His angels (Ps. 33:6).

Unlike the earth, which was initially formless and empty, heaven appears to have been created as structured and full. Its inhabitants—the angels—were created directly and did not multiply to fill it.

Importantly, the biblical heaven is not a mere abstraction. Jesus referred to it as a “place” (John 14:2). Scripture describes it as being above the earth, from which God looks down (Ps. 14:2). Angels occupy specific locations in heaven and can be displaced (Rev. 12:7–8).

Heaven contains physical objects: the ark of the covenant (Rev. 11:19), a sea of glass (Rev. 4:6), thrones, white robes, palm branches (Rev. 7:9), a golden altar (Rev. 8:4), trumpets (Rev. 8:6), and more. While Revelation uses symbolic language, we know that heaven certainly contains the physical bodies of Enoch (Gen. 5:24), Elijah (2

Kings 2:11), and Jesus Christ—whose glorified human body remains essential to His nature (Heb. 2:17).

Angels and demons can influence events in our world. Thus, the physical universe is not a closed system governed solely by physical causes.

Though normally invisible, heaven is sometimes opened to human view (e.g., 2 Kings 6:17; Ezek. 1:1; Mark 1:10; John 1:51). It seems to be very near—perhaps a parallel universe embedded in a higher-dimensional space.

Later in Genesis, "heaven" and "earth" are redefined more narrowly: "heaven" as the expanse (Gen. 1:8), and "earth" as dry land (Gen. 1:10).

3. God's Heavenly Throne

Although God is omnipresent, He is not present everywhere in the same way. Scripture teaches that God the Father dwells "in heaven" (Matt. 6:9), seated on His throne (Ps. 47:8), with Christ at His right hand (Heb. 1:3; Rev. 3:21; 22:1).

God's throne is the center of divine rule and judgment. It serves as the focal point of the Christ-centered universe. In the new creation, God's throne will descend to the New Jerusalem on the renewed earth.

4.The Creation of Light

> *And God said, 'Let there be light,' and there was light. And God saw that the light was good. And God separated the light from the darkness. God called the light Day, and the darkness he called Night. And there was evening and there was morning, the first day.'(Gen.1:3-5)*

The creation of light was the first of three separations that transformed the formless earth into a structured cosmos. It marked the beginning of a continuous cycle of day and night—alternating periods of light and darkness. Here, “day” is explicitly defined as a period of light, followed by darkness.

Since the sun and other celestial bodies were not created until Day Four, what was the source of light on Day One? Scripture does not say. Theologian Douglas Kelly (1997:204) suggests that the light may have emanated from the theophanic presence of God Himself. Similarly, Russell Humphreys (1994:76) proposes that the Spirit of God, hovering over the waters, served as a temporary light source—just as God will again be the light in the New Jerusalem (Rev. 21:23; 22:5). Cornelis Van Dam (2021:185), however, cautions against confusing God’s eternal divine light with the created light of Genesis 1.

Another possibility is that God created light photons directly. Since the source is not identified and apparently no longer exists, we should be cautious about drawing firm conclusions.

Day Two

> *And God said, ‘Let there be an expanse in the midst of the waters, and let it separate the waters from the waters.’ And God made the expanse and separated the waters that were under the expanse from the waters that were above the expanse. And it was so. And God called the expanse Heaven. And there was evening and there was morning, the second day. (Gen.1:6-8)*

On the second day, God created a spatial separation. He formed an “expanse” (Hebrew: *raqia*) to divide the waters into two distinct layers—those above and those below the expanse. This expanse, which God called “Heaven,” is generally understood to include both the atmosphere and the broader realm of space.

The expanse cannot be solid, as some have claimed, since the sun, moon, and stars move through it (Gen. 1:17), and birds fly across it (Gen. 1:20). It is better understood as a vast open space—what we now call the sky and outer space.

But what are the “waters above the expanse”? This has been the subject of much speculation. Many commentators, including John Calvin, interpret these waters as clouds in the atmosphere.

Others, such as Gerardus Bouw (1992:322) and Russell Humphreys (1994:35), argue that since the sun and stars are later placed *in* the expanse, the waters *above* must lie beyond the stars. They envision the universe as a vast sphere centered on Earth, surrounded by a thin shell of water. While this raises physical challenges, placing the shell beyond the observational horizon at least moves the problem out of sight.

Bible scholar G.K. Beale (2008:184) notes that the language used in Genesis 1 closely parallels that used in the construction of the tabernacle and temple. If the cosmos is a kind of temple, as Beale suggests, then temple imagery may inform our reading of Genesis 1. He proposes that the outer courtyard corresponds to the earth (where humans dwell), the Holy Place to the starry sky, and the Most Holy Place to the third heaven—God's throne room, distinct from the visible heavens (see Fig.2.1).

According to Beale, the *raqia* in Genesis 1:6:

> *"…appears to be an other-dimensional reality that separates the observable sky from the invisible heavenly temple, so that it may be a reality that overlaps with both the earthly and heavenly dimensions" (Beale 2008:203).*

James Jordan (1999:180) offers a similar view. He argues that the waters above the expanse reside in the third heaven and are associated with the "sea of glass" or "crystal" seen in heavenly visions (e.g., Ezekiel and Revelation). He finds support for this in Psalm 104:2–4, which describes God's upper chambers as being built upon the waters. In this view, the expanse separates heaven and earth, placing heaven in another dimension. This barrier will be removed in the future, when heaven and earth are renewed, the sea is no more, and the New Jerusalem descends from heaven (Rev. 21).

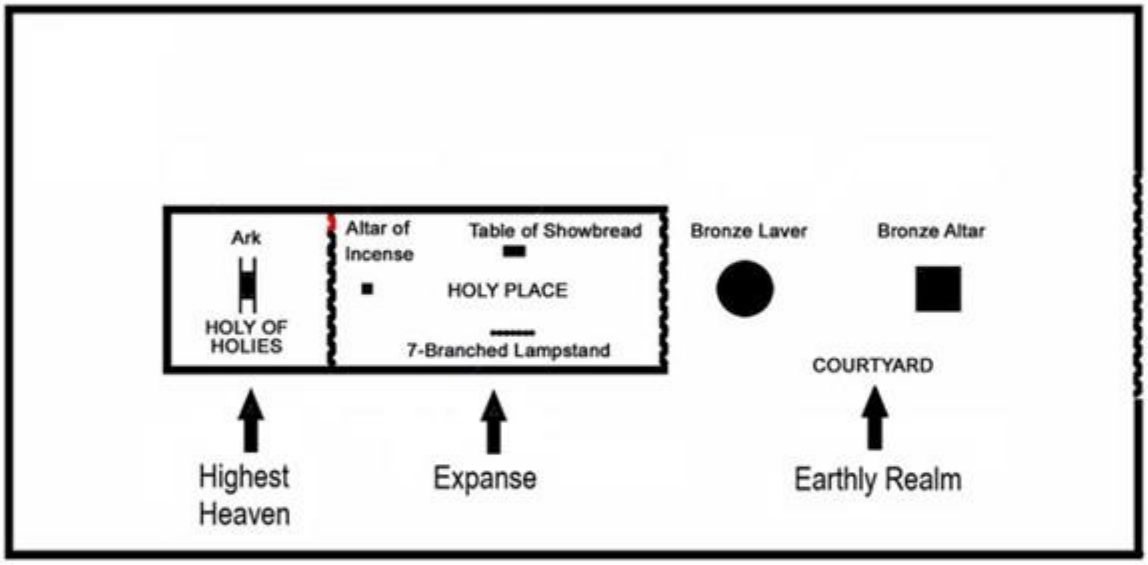


Figure 2.1. The Tabernacle as a Model of the Cosmos.

Day Three

> *And God said, 'Let the waters under the heavens be gathered together into one place, and let the dry land appear...'*
>
> *And God said, 'Let the earth sprout vegetation, plants yielding seed, and fruit trees...'*
>
> *And there was evening and there was morning, the third day. (Gen.1:9-13)*

On the third day, God brought about two major developments: the separation of land from water, and the creation of plant life.

The waters under the heavens were gathered into one place, allowing dry land to appear. This implies that both water and the elements of the earth were already present—created on Day One. Since no new material is said to be created here, the matter formed on the first day likely consisted of a mixture of undifferentiated water and mud (Kelly 1997:182).

Next, God commanded the earth to produce vegetation—plants, grasses, and fruit-bearing trees—each reproducing according to its kind. This marks the first appearance of life in the creation account.

The emphasis on reproduction "according to its kind" highlights the order and intentionality of God's design.

The creation of vegetation before the sun (Day Four) challenges naturalistic assumptions about the dependence of plant life on solar energy. Yet the text affirms that God provided sufficient light on Day One to sustain life. The sequence underscores the primacy of divine provision over natural processes.

Day Four

> *And God said, 'Let there be lights in the expanse of the heavens to separate the day from the night. And let them be for signs and for seasons, and for days and years, and let them be lights in the expanse of the heavens to give light upon the earth.' And it was so. And God made the two great lights--the greater light to rule the day and the lesser light to rule the night--and the stars.*
>
> *And God set them in the expanse of the heavens to give light on the earth, to rule over the day and over the night, and to divide the light from the darkness. And God saw that it was good. And there was evening and there was morning, the fourth day. (Gen.1:14-19)*

On the fourth day, God created the celestial bodies—the sun, moon, and stars—and placed them in the expanse of the heavens. Their purposes were clearly defined: to provide light on the earth, to separate day from night, and to serve as markers for signs, seasons, days, and years.

Some commentators (e.g., Hugh Ross, 1998:44) argue that the sun and stars were already created on Day One, and that Day Four merely describes their becoming visible as the atmosphere cleared. However, this interpretation conflicts with the text, which plainly states that God made the lights on Day Four. Moreover, if the sun had already existed, we would expect the text to say it "appeared," as it does for the dry land on Day Three—not that it was "made."

The stated functions of these lights include:

- **Illumination**: They give light upon the earth.
- **Timekeeping**: They mark days, years, and seasons.
- **Signs**: They serve as signs for navigation, agricultural cycles, and divine messages.

Celestial events also serve as signs of divine action. For example, Isaiah records a miraculous sign involving the sun's shadow (Isa. 38:7–8), and Joel prophesies cosmic signs preceding the Day of the Lord (Joel 2:30–31). Jesus likewise foretells signs in the sun, moon, and stars:

> *But in those days, after that tribulation, the sun will be darkened, and the moon will not give its light, and the stars will be falling from heaven... (Mark 13:24-25)*

One might add that another function is to glorify God:

> *"the heavens declare the glory of God; and the sky above proclaims his handiwork" (Psa.19:1).*

The fact that the sun, moon, and stars were created after the earth and for the earth underscores the earth's central role in the created order.

Is the Gospel in the Stars?

Do the stars proclaim not only the glory of God but also the gospel message?

This idea, popularized by Frances Rolleston in her 1862 work *Mazzaroth*, suggests that when God named the stars (Ps. 147:4; Isa. 40:26), those names—embedded in the constellations—formed a symbolic account of redemptive history. For example, Virgo is said to represent the virgin birth, and Leo the conquering Messiah. Advocates often appeal to Psalm 19 and Paul's use of it in Romans 10:18 as support for a gospel written in the sky.

The theory is intriguing. Many constellations and star names do have ancient origins, some predating 2000 BC. The book of Job, one of the oldest in Scripture, refers to the Pleiades, Orion, and the Mazzaroth (Job 38:31–32), suggesting familiarity with the constellations. The term “Mazzaroth” is often thought to refer to the twelve zodiacal signs—the constellations along the sun’s annual path.

However, if the constellations truly portray the gospel, when did they acquire this meaning? If prior to the Fall, it seems premature; if afterward, Scripture gives no indication that God reconfigured the heavens to accommodate a new redemptive narrative.

More troubling, if God placed the stars to convey the gospel message, why do the star patterns within each constellation not resemble their traditional figures more closely? The stars in the constellation Leo do not look like a lion, nor do those in Virgo depict a woman (see Fig. 2.2). These identifications rely heavily on human-imposed interpretation rather than obvious visual clues.

Furthermore, the theory depends on speculative etymologies of star names—often derived from Arabic, Hebrew, or Chaldean roots—that lack linguistic consensus. Different interpreters assign contradictory meanings to the same stars and constellations. For instance, some see the Centaur offering a beast on the altar as a portrayal of Christ’s atonement; others see in it echoes of the Flood story. Such variability undermines claims of an objective, universal gospel encoded in the stars.

Thus, although the naming of the constellations is undoubtedly of

Figure 2.2. The Constellations.

ancient origin, and very likely related to biblical themes, their original meanings have unfortunately been corrupted. The original message, even if it were of divine origin, is not easily recovered.

Some scholars appeal to the *star of Bethlehem* (Matt. 2:1–10) as evidence of celestial messaging. The magi, having seen “his star” rise, deduced the birth of a Jewish king. This has led to much speculation about what the star was—comet, supernova, or planetary conjunction. However, none of these explanations account for the star's supernatural behavior: its sudden reappearance, motion, and halting precisely over a house in Bethlehem. Most likely, the star was miraculous in nature. While its initial position among the constellations may have held symbolic import—perhaps in Virgo, Leo, or Pisces—the proposed astrological interpretations vary widely and remain speculative. With enough creativity, a case could be made for almost any constellation.

In sum, while the heavens do indeed declare the glory of God (Ps. 19:1), they do not proclaim salvation. The gospel is not written in the stars, but in Scripture.

Days 5, 6, and 7

On Day Five, God created the birds of the air and the creatures of the sea. On Day Six, He created the land animals. The culmination of His creative work was the creation of Adam and Eve—human beings made in the image of God.

Humanity was given a unique mandate: to be fruitful and multiply, to fill the earth, to subdue it, and to exercise dominion over every living thing (Gen. 1:28). This stewardship role reflects humanity’s special status in creation.

After completing His creative work, God surveyed all that He had made and declared it “very good” (Gen. 1:31). This pronouncement marks the completion of a perfectly ordered and harmonious creation.

On Day Seven, God rested. He blessed this day and sanctified it as a holy Sabbath (from the Hebrew word for “rest”), establishing a pattern for human life. The Sabbath commemorates God's work of creation and His rest from it:

> *"In six days the LORD made heaven and earth, the sea, and all that is in them, and rested on the seventh day. Therefore the LORD blessed the Sabbath day and made it holy." (Ex. 20:11)*

The seventh day is not merely a cessation of activity but a celebration of completed work. It sets a rhythm of work and rest that reflects God's own pattern and invites humanity into His rest.

The Nature of the Creation Days

Were the creation days of Genesis 1 literal 24-hour days, long ages, or symbolic representations? This question has generated much debate in recent years.

Several factors support the view that these were literal days. First, the text defines a "day" as a period of light followed by darkness (Gen. 1:5). The sun is created on Day Four to govern the day (Gen. 1:16), confirming that the last three days are certainly solar days. Moreover, the seventh day—the Sabbath—is clearly a real day, blessed and set apart as a pattern for human rest (Ex. 31:12–17).

Many Christian scholars acknowledge that the literal-day interpretation is exegetically preferred, but they reject it due to their commitment to mainstream scientific chronology. For example, J.P. Moreland (1998:219–220) and Gleason Archer (1994:196) affirm the clarity of the text but argue that scientific evidence points to a much older earth.

Hugh Ross (2014) advocates a "day-age" view, in which each creation day represents a long geological era. One might argue that Days One through Four—before the sun's creation—could be long periods. However, these days are still described as alternating periods of light and darkness. If Day Three, when plants were created, lasted millions of years, would the following night not also be millions of years long—too long for plants to survive without light?

Moreover, the sequence of events in Genesis contradicts mainstream science. Genesis presents fruit trees before birds, and birds before mammals; mainstream science has the reverse. Genesis has the earth created before the sun and stars; mainstream science places the sun and stars first. Thus, the day-age view satisfies neither sound exegesis nor scientific chronology.

To avoid conflict with science, some theologians (e.g., Bruce Waltke, 2001:61) interpret Genesis 1 as a literary framework, with metaphorical days. In this view, the text conveys theological truths rather than historical details. But does Genesis 1 exhibit a clear literary pattern? Various structures have been proposed, but none fits the text as well as the traditional "six days plus one" pattern affirmed in Exodus 20:8–11 (see Bedard 2013).

Even if Genesis 1 were highly stylized, that would not negate its historicity. This is a false dilemma. Genesis can be both well-structured and historically accurate. God created according to His perfect plan; hence, we might expect His work to reflect perfect order.

After reviewing the various interpretations, Cornelis Van Dam concludes:

> *"There is nothing to suggest that the days… in Genesis 1 are anything other than literal days. Indeed, grammatically, textually, and contextually the text clearly refers to a day as customarily understood. This conclusion does not mean that we can fully comprehend what those days entailed." (Van Dam 2021:138)*

Thus, the biblical text supports the historical, literal-day view: the events described actually happened, and the days were real, consecutive periods of light and darkness. This conclusion has been defended in detail by Bedard (2013) and Jordan (1999), among many others.

The Fall and its Consequences

At the end of the sixth day of creation, *"God saw everything that he had made, and behold, it was very good"* (Gen. 1:31). Yet shortly thereafter, evil entered the cosmos. According to Scripture, this evil apparently originated in heaven when Satan—the devil—who was initially created as a good angel, rebelled against God: *"The devil has been sinning from the beginning"* (1 John 3:8). Many other angels joined him in this rebellion. The devil, taking on the form of a serpent (Rev. 20:2), then tempted Eve, enticing her and Adam to sin (Gen. 3). As a result of Adam's disobedience, all humanity became enslaved to sin and subject to physical death.

Adam's Fall also had a profound impact on the earth, over which man had been appointed as steward. God cursed the ground, so that it would bring forth thorns and thistles (Gen. 3:17–18). Even the animal kingdom appears to have been affected, becoming violent and corrupt (Gen. 6:12). Many theologians—including John Calvin, Martin Luther, and more recently, philosopher Greg Welty (2018:166)—have argued that God's originally "very good" creation contained no natural evil, which only arose as a consequence of Adam's sin.

Does the entrance of sin have any implications for cosmology? The Bible does not mention specific changes to the sun, moon, or stars. Nevertheless, it clearly teaches that sin had cosmic consequences. The apostle Paul writes:

> *For the creation was subjected to futility, not willingly, but because of him who subjected it, in hope that the creation itself will be set free from its bondage to decay and obtain the freedom of the glory of the children of God. For we know that the whole creation has been groaning together in the pains of childbirth until now" (Rom. 8:20-22).*

The reference to *"the whole creation"* suggests that the entire cosmos was affected (see Venema 2000: 459–468). Indeed, the Bible's eschatological language—"renewal," "redemption," "reconciliation"—all point to a future restoration to an original, unfallen state. The entire cosmos—both heaven and earth—was tainted by sin and will be cleansed and renewed in the form of a new heaven and a new earth (e.g., Isa. 65:17; Rom. 8:18–25; 2 Pet. 3:5–13; Heb. 12:26–28; Rev. 21:1).

How might the cosmos have changed after the Fall? Could the laws of nature themselves have been altered? Some theologians and scientists have proposed that the Second Law of Thermodynamics first came into effect at that time. For instance, Henry Morris (1963:37) writes:

> *The universal validity of the second law of thermodynamics is demonstrated, but no one knows why it is true...But the biblical explanation is that it is involved in the curse of God upon this world and its whole system, because of Adam's sin...Therefore, we conclude that the Bible teaches that, originally, there was no disorder, no decay, no aging process, no suffering, and above all, no death, in the world when the creation was completed. All was 'very good.'*

It is difficult to imagine what the universe would be like without the Second Law of Thermodynamics. Would this imply, for example, that there was no friction to slow down a ball thrown through the air? If so, how could birds fly?

Whatever changes the Fall may have introduced into the cosmos, there was still much continuity. After the Fall, trees still bore fruit, birds still flew and reproduced, and humans continued to eat, digest food, and speak. This continuity suggests that although the Fall profoundly affected human well-being, the fundamental laws of nature likely remained largely intact.

Could the Second Law of Thermodynamics have operated before the Fall, but without any harmful effects? Psalm 102:26 compares the decay of the universe to the wearing out of a garment. Yet, during the Exodus, God miraculously preserved the Israelites' clothing from wear for forty years (Deut. 29:5). Perhaps God similarly sustained the cosmos before the Fall. Biologist Kurt Wise (2002:160) suggests that a special restorative force may have counteracted the degrading effects of the Second Law, preventing decay and death. After the Fall, this divine sustaining force may have been withdrawn, allowing the universe to begin its decline.

Eschatology

The cosmic scope of sin and evil is further evident when we consider biblical eschatology.

According to Scripture, the last days will be marked by dramatic celestial events. The apostle Peter writes of the heavens being consumed by fire:

> *"Waiting for and hastening the coming of the day of God, because of which the heavens will be set on fire and dissolved, and the heavenly bodies will melt as they burn! But according to his promise we are waiting for new heavens and a new earth in which righteousness dwells" (2 Pet. 3:12–13).*

Hebrews adds:

> *"At that time his voice shook the earth, but now he has promised, 'Yet once more I will shake not only the earth but also the heavens.' This phrase 'Yet once more' indicates the removal of things that are shaken—that is, things that have been made—in order that the things that cannot be shaken may remain" (Heb. 12:26–27).*

Similarly, John records:

> *"Then I saw a new heaven and a new earth, for the first heaven and the first earth had passed away" (Rev. 21:1).*

Will the sun, moon, and stars be annihilated? Some interpret passages such as the following to suggest so:

> *"And the city has no need of sun or moon to shine on it, for the glory of God gives it light, and its lamp is the Lamb" (Rev. 21:23).*

However, this verse states only that the sun and moon are no longer *needed* for light, not that they cease to exist. Further, the reference to *"the tree of life with its twelve kinds of fruit, yielding its fruit each month"* (Rev. 22:2) implies that months will still exist. The concept of a month requires the continued existence of both the sun and the moon. The mention of twelve months also suggests that the length of a year remains unchanged—unless, of course, these references are symbolic, intended merely to signify a joyful and abundant future.

From this we may conclude that the earth and heavenly bodies will not be destroyed in an absolute sense, but rather purified and transformed.

The cosmos will be renewed, liberated from corruption, and brought to a more glorious state. While significant changes will take place, there will also be notable continuity between the present and future worlds.

When Christ returns, he will *“reconcile to himself all things, whether on earth or in heaven”* (Col. 1:19–20). The apostle Peter likewise speaks of a *“restoration of all things”* (Acts 3:21). The terms *reconciliation* and *restoration* suggest a return to a prior condition—the removal of sin and decay and a return to the created order as it was intended.

Thus, the renewed creation may well resemble the original, pre-Fall world. Biblical imagery supports this: in the new creation, there is no more sin, death, pain, or mourning (Rev. 21:4–8); the curse is lifted (Rev. 22:3); wild animals are once again peaceful (Isa. 65:25); the tree of life is restored (Rev. 22:2); and unbroken fellowship with God is re-established (Rev. 22:5).

As Zachary Klein (2020) has shown, the idea that the renewed heavens and earth will resemble their pre-Fall condition has been held by many theologians. If the laws of nature were altered at the Fall, they may also be restored at the eschaton. Some have speculated that in the renewed creation, the Second Law of Thermodynamics will once again be restrained by a special restorative force, thus preventing decay and death.

The transformation at the end of the age will be instantaneous. Paul tells us that our bodies will be changed *“in the twinkling of an eye”* (1 Cor. 15:52). In his vision, John sees the new heaven and new earth already in place before the New Jerusalem descends (Rev. 21:1–2). This suggests that the re-creation will be a sudden, divine act—much like the first creation, when God spoke, and it was so.

In summary, Scripture gives limited detail about the specific changes the celestial realm has undergone due to the Fall or will undergo at Christ’s return. However, the biblical evidence points to both transformation and continuity. If significant changes have occurred, we may expect the restored cosmos to resemble the pre-Fall creation more closely than the current corrupted state.

Natural Laws and Uniformity

A foundational assumption in modern science—particularly in cosmology—is the *Principle of Uniformity*: that the laws and processes observed today operate uniformly across all of time and space.

Although this assumption seems reasonable, it cannot be proven. As philosopher David Hume pointed out in 1739, uniformity cannot be verified by observation, since we cannot observe the unobserved. Nor can it be proven by logic, for there is no logical necessity that the universe must behave uniformly. The universe beyond our experience may differ in ways we cannot imagine. Scientists assume uniformity because it is the simplest and most practical assumption—they have no better alternative.

A Christian, however, can appeal to theological grounds. God has made a covenant with creation (Gen. 8:22). He is a God of order, not confusion (1 Cor. 14:33), and has established laws and ordinances for his creation (Job 38–41; Jer. 33:25). The regularity of the cosmos reflects God's faithfulness in upholding it.

Science is possible only because God sustains his creation in an orderly and predictable way. Without such regularity, science would be futile. The consistent behavior of natural phenomena enables us to observe, study, and formulate laws and theories.

Yet this covenant of uniformity is not absolute. The apostle Peter warns against scoffers who mock the idea of Christ's return, saying, *"all things are continuing as they were from the beginning of creation"* (2 Pet. 3:4). In response, Peter reminds us that the same God who once brought the Flood will again intervene to judge the world by fire (2 Pet. 3:1–13). Thus, trust in uniformity cannot override God's sovereign power to act within creation.

As we have already noted, natural laws could well change significantly at the time of the Fall, the Flood, and the eschaton. God can change natural laws in time or space as he wants, to suit his purposes. Also, it is very likely that the natural laws of Heaven are quite different from those of our physical world.

Miracles

God’s actions are not limited to regular patterns. He also performs miracles. These should not be viewed as occasional interruptions of an otherwise autonomous natural system, since God is continually sustaining all things. Rather, laws and miracles alike are expressions of God's will—laws reflecting his regular action, miracles his extraordinary intervention.

The primary purpose of miracles is to reveal God’s power and glory: *“that you might know that the LORD is God; there is no other besides him”* (Deut. 4:35). Miracles are not limited to direct acts of God, but also occur through prophets (e.g., Elijah, Elisha), Christ’s apostles, angels (John 5:4; Acts 5:19), and even demonic forces (2 Thess. 2:9; Rev. 16:14).

Thus, in studying cosmology, we must not treat the universe as a closed system governed solely by unchanging physical laws. First, those laws may vary across time and space. Second, the universe is open to interaction with spiritual beings—angels and demons. Third, God may act miraculously at any time, in accordance with his will.

The Date of Creation

Until quite recently, most Christians believed that the world was relatively young. Theologians such as Augustine, Martin Luther, John Calvin, and Abraham Kuyper explicitly affirmed that the earth was less than 8,000 years old. Prominent scientists like Johannes Kepler and Isaac Newton held the same view. Even Davis Young—who personally rejects a young earth—concedes:

> *It cannot be denied, despite frequent interpretations of Genesis 1 that departed from the rigidly literal, that the almost universal view of the Christian world until the eighteenth century was that the earth was only a few thousand years old (Young 1982:25).*

This belief rested primarily on two scriptural foundations: the six-day creation in Genesis 1 and the genealogies in Genesis 5 and 11. According to the genealogies, Adam fathered Seth at age 130; Seth fathered Enosh at 105, and so on. Adding these generations gives approximately 2,000 years from Adam to Abraham. Since Abraham lived around 2000 B.C., this places Adam's creation near 4000 B.C.—and the creation of the world six days earlier.

The church fathers and later the Reformers generally regarded the days of creation as ordinary, literal days. While some referenced 2 Peter 3:8 ("*with the Lord one day is as a thousand years*") to draw connections between creation days and longer periods, such verses were typically applied to human history rather than to the creation week. In fact, many early theologians interpreted the six days as symbolizing six thousand years of total history—not extended creation epochs.

The widespread belief in a young earth was later challenged by geological and astronomical models requiring vastly longer timescales. In response, alternative interpretations of Genesis 1 emerged. Initially, many reinterpreted the days as long ages. When this proved unsatisfactory, others proposed that the creation days were merely a literary framework used to convey deeper theological truths rather than chronology.

As for the genealogies, it was not until 1863 that W.H. Green, a Presbyterian theologian, first suggested they might be incomplete. Pressured by the demands of mainstream scientific chronology, Green proposed that phrases like "when Seth had lived 105 years, he fathered Enosh" could be interpreted as "fathered an ancestor of Enosh." This allowed for large chronological gaps, rendering the genealogies unreliable for dating Genesis 1–11.

This avoided a clash with mainstream science. Yet, stretching the genealogies from 2000 years to more than 60,000 years meant that the vast bulk of the generations were missing.

This approach has met exegetical objections. James Sexton (2018a, b), for instance, argues that the Hebrew wording does not permit such gaps. Even if Seth did not beget Enosh directly, the text states that Seth was 105 when Enosh was born. Thus, the chronology still stands even if there were gaps.

The actual numbers in the genealogies differ somewhat between manuscripts. Allowing for uncertainties due to textual variants and the like, Chris Hardy & Robert Carter (2014) estimate that Adam was created between 5665 B.C. and 3822 B.C.

In sum, the biblical evidence points to a recent creation of Adam on Day 6, less than 8,000 years ago. Days 5 and 6 were clearly solar days. Days 1 to 4, though not tied to the sun, consisted of alternating periods of light and darkness, likely of similar length.

Whether a young universe can be integrated into a viable cosmological model will be addressed in a later chapter, when we consider various creationist cosmologies.

God, Creation, and Time

Many scientists today believe the physical universe began at a singularity—a point of infinite density—marking the origin of space and time in the so-called Big Bang. Some Christian apologists use this model to argue for God's existence: if time and space began with the universe, then the cause of the universe must transcend both, which they equate with God.

But this raises important questions: Did space and time truly begin with the universe? Or did the universe begin within a pre-existing time and space? Is God genuinely "beyond" space and time?

What Is Time?

Time is closely linked with change. We measure its passage by observing changes—a ticking clock, the sun's movement, or even our thoughts. Time allows for change and succession. A "moment" is how the universe exists at one instant. No change happens within a moment; change happens between moments. Time is thus an ordered series of states—necessary for events and history to unfold.

Without time, nothing could happen; the world would be static and frozen.

Creation and Time

Genesis begins: *"In the beginning, God created the heavens and the earth."* Elsewhere, Jesus refers to *"the beginning of creation"* (Mark 10:6), not necessarily to the beginning of time itself.

If time was created with the universe, then the universe has always existed in a sense—there was no "before" it, no time when the universe did not exist. Yet Scripture indicates that God existed before creation. God enjoyed inter-Trinitarian fellowship and formulated his redemptive Plan "before the foundation of the world." He is self-existent and independent of creation. He is the source of all other existence. The doctrine of *creatio ex nihilo* implies a time when only God existed, after which he created the universe from nothing.

Dynamic Versus Static Time

Is the passage of time real or an illusion?

The commonsense view—called *presentism*, *dynamic time*, or *A-theory time*—holds that only the present exists. The past is gone; the future has not yet come. In this view, time flows.

An alternative view—*eternalism*, *static time*, or *B-theory time*—sees all moments as equally real. The universe is a four-dimensional space-time "block," and the flow of time is illusory. This was Einstein's view.

The Bible appears to affirm presentism. It sees history unfolding, not as an eternally fixed block, but as a real progression:

> *"Behold, the former things have come to pass, and new things I now declare; before they spring forth I tell you of them" (Isa. 42:9).*
> *"Who is, and who was, and who is to come" (Rev. 1:8).*

Presentism suggests a universal time set by God. The first act of creation could be marked by moment t_1, followed by t_2, t_3, and so on, as God progressively actualizes his Plan. Since the past no longer exists, time travel to the past is impossible. We can only travel forward in time, towards the yet-to-be future, following the usual succession of moments.

But if the future doesn't yet exist, how does God know it?

He knows it because he authored it. God's Plan encompasses all future moments, much like a book or film encompasses every scene. Each "frame" of history exists first as an idea in God's mind. The Plan is static in God's knowledge, but history unfolds dynamically as each moment becomes real.

Time everlasting

A central tenet of the Christian faith, as expressed in the Apostles' Creed, as well as the Athanasian and Nicene Creeds, is belief in *"life everlasting"*—an endless future life in which believers will praise God and reign with Him forever (Rev. 22:5).

The created world has a definite beginning, a finite time ago, but it will continue forever, without end. God, by contrast, is eternal in both directions: He exists from a beginningless past to an endless future. As Scripture testifies: *"Before...ever you had formed the earth and the world, from everlasting to everlasting, you are God"* (Psalm 90:2).

Some philosophers, such as William Lane Craig (1979), have raised objections to the idea of a beginningless past. Their main concern is that, if the past were infinite, then an actual infinity of moments must have elapsed to reach the present. They argue that such an actual infinite cannot exist and is therefore impossible. However, they are generally willing to accept an *endless* future, claiming that it involves only a *potential* infinity—that is, the number of moments continually increases but never reaches an actually infinite total. The time between now and any particular future moment is always finite, no matter how far ahead.

Craig contends that actual infinites are inherently contradictory and thus impossible, drawing on paradoxes related to infinite sets. However, there is nothing logically or mathematically incoherent about infinite sets as such; they are widely used in modern mathematics. The peculiar properties of infinite sets may seem counterintuitive, especially to those familiar only with finite sets, but they do not entail contradiction. Difficulties arise only when one tries to treat infinite sets as though they were finite. A detailed critique of Craig's arguments has been offered by philosopher Wes Morriston (2010), who defends the coherence of an actual infinite past.

Moreover, there is good reason to think that an endless past is no more problematic than an endless future. Consider God's Plan, which encompasses every future moment of the universe in perfect detail. If we assign the first future moment t_1 to the number 1, the second to 2, and so on, then the Plan contains the entire set of positive integers—an actual infinite. Hence, if an actual infinity is inadmissible, this would apply as much to the future as to the past.

Likewise, if we can correlate future moments with the positive integers, why could we not also correlate past moments with the negative integers—moments that exist, at least as ideas in God's eternal memory? In that case, a beginningless past would seem to have the same ontological status as an endless future, especially in relation to God's perfect knowledge.

There is another difficulty for those who deny a beginningless past. Philosophical arguments against it can only conclude that the number of past moments is finite; they offer no specific limit. But for any finite number of past moments N that one might suggest, it is always possible to consider $(N + 1)$, which is still finite. There is no highest finite number. Therefore, the present could have been reached from any arbitrarily distant past moment. This suggests the past is, in effect, infinite—just as the set of negative integers is infinite, though the gap between any two specific negative numbers remains finite.

On this basis, it seems logically and mathematically possible for time to extend from a beginningless past into an endless future.

In conclusion, the biblical evidence supports the idea that time is governed by God, who fully controls its flow and content. God uses time to actualize His eternal Plan. Scripture reflects the commonsense view that only the present moment exists. There are no valid logical or mathematical objections to the idea that God has persisted—and will continue to persist—throughout time, from everlasting to everlasting.

God, Creation, and Space

Let us now consider what the Bible says about God, creation, and space.

What is Space?

What do we mean by "space"? Broadly speaking, space forms the background of reality. It provides the context in which things can exist. To say that something "exists" generally means that it occupies a specific location in space. Even immaterial beings—such as angels or demons—though lacking physical extension, are nevertheless located somewhere in space (Rev. 12:7–8).

For example, since unicorns have not been found anywhere in the physical world, we assume they do not currently "exist." However, the *idea* of a unicorn exists in my mind, which in turn is housed spatially within my brain.

Space may be viewed either as a container in which objects are located or as a network of relations between those objects. In either case, space enables us to separate and distinguish between distinct things.

Space in the Bible

What does the Bible say about space and creation? As noted earlier in our discussion of Genesis 1, the surface of the initial watery earth implies that the physical universe had a surface and thus occupied a bounded, finite volume—embedded in a larger space that was empty of matter.

In addition to the physical universe, God created a heavenly realm, which also occupies its own space and includes physical objects as well as angels. Though usually invisible, heaven appears to be nearby (Acts 7:55–57), as though it were a parallel universe that can interact with our own. Both realms may be embedded within a broader, multidimensional space.

God and Space

We are told that God created the heavens and the earth and everything in them—but not that he created the *larger* space that contains both heaven and earth. This leaves open the possibility that space, in some form, existed even before our universe was made.

1. Omnipresence and universal time

How does God relate to space? Scripture makes clear that God is not an abstract, spaceless idea but rather a triune, personal, living God who is fully present everywhere at once—this is his *omnipresence*. God fills both heaven and earth (Jer. 23:24); in him, we live and move and have our being (Acts 17:27–28). Indeed, not even the heavens can contain him (1 Kings 8:27). God's presence transcends all created dimensions and is not spatially limited—this is his *immensity*.

God’s omnipresence is closely tied to his *omniscience* (his knowledge of all things) and his *omnipotence* (his control over all things). Because God is fully present at every location simultaneously—and because only the present moment truly exists—it follows that every place in the universe exists within the same divine “now.” Thus, there is a single, universal time throughout creation. Earth, the rest of the physical universe, and heaven all share the same temporal flow.

2. God's throne at the center

As discussed earlier, God rules and judges from his heavenly throne. This throne serves as the central position, the ultimate standard of rest for the cosmos. Although not necessarily located at the geometric center of the universe, God's throne is the key focal point of the theocentric universe.

3. God's own space?

Where did God dwell before he created our universe? Since Scripture does not directly address this question, theologians can only speculate.

Some theologians (see Muis 2021) have proposed that God eternally exists in his own uncreated, higher-dimensional space. For example, Dutch theologian Luco van den Brom (1991) argues that God exists spatially in a more-dimensional—perhaps even infinite-dimensional—realm. Since God is spirit and has existed from eternity, van den Brom reasons, God's place—the spiritual world—must also have always existed. Thus, in creating, God made room within his own higher-dimensional domain for both the physical world and heaven.

Some Cautions

While the idea of a spatial heaven beyond our three physical dimensions—and possibly a deeper spatial reality beyond that—is plausible, we should proceed with caution.

First, any such higher dimensions might be fundamentally different from those of our familiar three-dimensional stellar realm. The physical laws that apply in our universe, such as the speed of light, may not apply—or may take entirely different forms—in higher-dimensional space. These higher dimensions should not be confused with the abstract mathematical "extra dimensions" invoked by theories like superstring theory, which are speculative and theoretical.

Second, our knowledge of God and the spiritual realm is limited to what has been revealed in Scripture. As finite, fallen human beings, we are in no position to fully comprehend God's nature or his dwelling place. We must be careful not to speculate beyond what has been clearly revealed. For now, we see through a glass darkly.

In contrast, current mainstream cosmology views the stellar universe as all that exists—a self-contained system without center, edge, or privileged position. According to this view, space-time cannot exist apart from matter. As we shall see in a later chapter, such claims go well beyond the evidence and rest largely on philosophical assumptions.

Summary

Our biblical conclusions about cosmology may be summarized as follows:

1. *God, time, and possibly space existed before the cosmos.* The universe was created *ex nihilo* (out of nothing) and has a finite history.

2. *The cosmos has two distinct realms*: the stellar universe and a heavenly realm. The stellar universe is finite and bounded within a larger three-dimensional space. Heaven also exists in its own space and contains physical entities. It runs parallel to the stellar realm and can interact with it. The physics of the stellar universe may not apply in heaven. Both realms might be embedded in a higher-dimensional spatial structure.

3. *A universal time flows through both realms*, from a no-longer-existing past to a not-yet-existing future. God oversees all in real, dynamic time.
4. *The central point of creation is God's heavenly throne*, from which he rules and judges. This throne may serve as the prime reference point in the created cosmos.
5. *God upholds the universe moment by moment* and acts through both ordinary providence and extraordinary miracles. History unfolds according to his eternal plan, established before creation.
6. *Genesis 1 should be read as historical narrative.* The creation days were alternating periods of light and darkness; Days 5–7 are clearly solar days. The *expanse* (*raqia*) refers to the atmosphere and space. The meaning of the “waters above” remains uncertain. Adam, the first human, was created on Day 6, less than 8,000 years ago.
7. *The effects of the Fall on the stellar universe are unclear.* After Christ’s return, the cosmos will be renewed—possibly restored to something very much like its original, pre-Fall condition.

3. A Brief Historical Sketch

We begin with a brief survey of the history of cosmology, with a special focus on medieval cosmology—a bold synthesis of science and theology. For background, we shall examine ancient cosmology, especially that of the Greeks. Then we will consider the rise and fall of medieval cosmology and trace cosmological developments up to the early twentieth century.

Ancient Cosmology

No doubt God had revealed to Adam, the first man, how he had created the universe. This revelation likely lies behind the creation account of Genesis 1, which formed the basis for Jewish cosmology. Since all humans descend from Adam, we might expect other ancient cosmologies to be derived, in distorted form, from Adam's original creation account. Hence, we can expect similarities between ancient cosmologies and the biblical creation account.

The creation myths of the Ancient Near East (ANE), especially those of Mesopotamia and Egypt, date back to at least 2000 BC. They typically begin with a watery chaos, from which a formless spirit emerged. The union of this spirit with the abyss produced various gods, goddesses, and eventually the visible world. These gods were thought to serve and protect humankind.

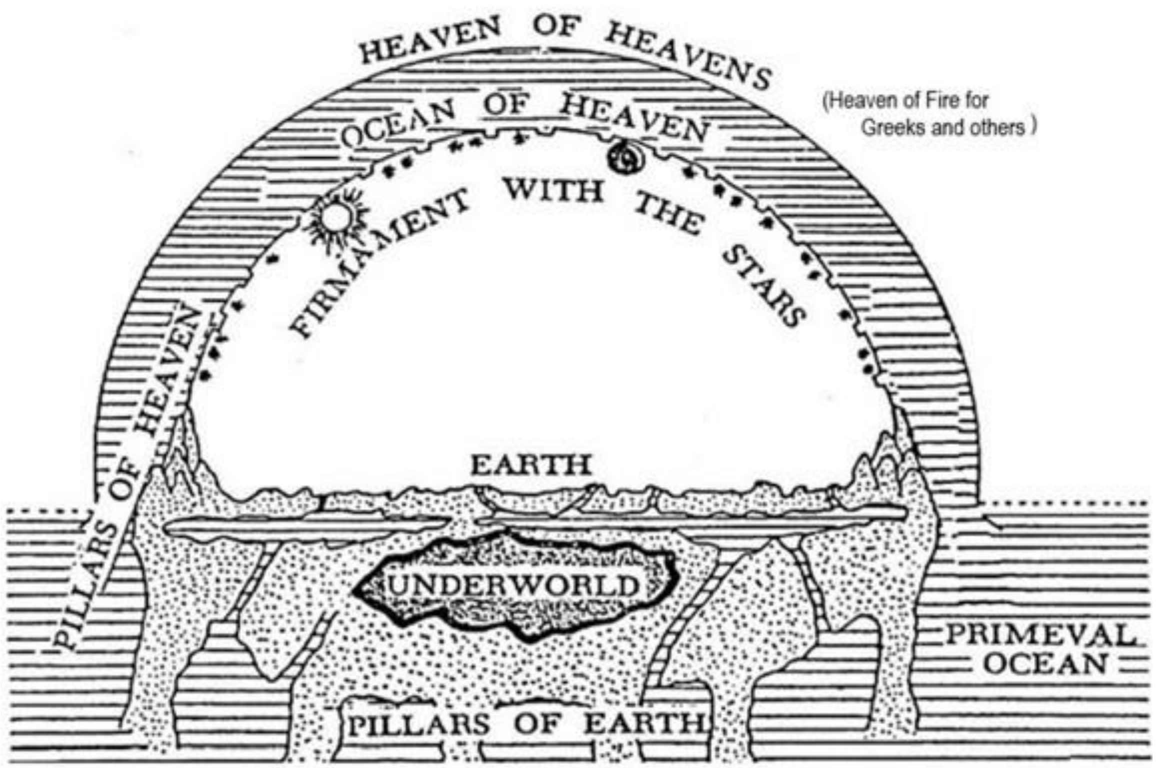
Besides contemplating cosmic origins, ancient peoples were keen observers of the skies. The Babylonians, for instance, had by 2000 BC divided the heavens into constellations. Later, they compiled star catalogs, tracked planetary motions, and devised calendars for predicting seasonal changes and lunar phases.

However, they did not unify their observations through theoretical models. Their celestial observations were not systematized into explanatory cosmologies. ANE literature lacked coherent models or diagrams of the cosmos. These cultures were more focused on mythology and their relationship with the gods than on scientific cosmology.

The Myth of the Solid Dome

A widespread modern misconception, embraced by many biblical scholars, claims that ANE peoples—including the Israelites—believed in a flat earth with a solid dome overhead (see Fig.3.1). This dome allegedly supported the sun, moon, and stars and rested on pillars or mountains. The "firmament" or *raqia* in Genesis 1 is said to reflect this supposed cosmology.

Theologian Peter Enns (2010), for instance, asserts, "Genesis 1 and 2 tell the story of creation, and it says things that are at odds with what modern people know to be true..."



Based on Peter Jenson, 1890. *Die Kosmologie der Babylonier.* Strassourg: Trubner, p. 579.

Figure 3.1. Mistaken Modern View of ANE Cosmology.

Likewise, John Walton (2009:14) argues that the Israelites, influenced by ANE thinking, were so primitive that "they did not know that the sun was further away... than the birds flying through the air." Walton believes Genesis 1, like other ANE texts, describes functionality rather than material origins. He maintains that to understand physical origins, we must consult modern science, not Genesis.

Paul Seely (1991a, b) similarly claims that the Hebrews, being scientifically unsophisticated, absorbed Babylonian and Egyptian views of the sky as a solid dome.

These scholars believe that God accommodated his message to the mistaken science of the time. For example, Seely (2008) writes:

> *“The biblical Flood account is thus not accurate history. It is an accommodated Mesopotamian historical tradition revised to teach lessons of faith and morals” (Seely 2008).*

Enns likewise concludes,

> *“any thought of Genesis 1 providing a scientifically or historically accurate account of cosmic origins, and therefore being wholly distinct from the ‘fanciful’ story in Enuma Elish, cannot be seriously entertained” (Enns 2012:40-41).*

Such views make Genesis 1–11 factually unreliable.

Yet the Bible never suggests that God teaches falsehoods for the sake of accommodation. And once we accept accommodation in one area, where do we draw the line? Could God not have accommodated theological or moral truths as well?

Who, then, decides what in the Bible is true revelation and what is cultural accommodation? Must we rely on scholars like Enns, Walton, and Seely to tell us what God really meant but couldn’t express at the time? God, who is all-knowing and all-powerful, made man in his image, created language, and spoke plainly to Adam, Noah, and Moses. Is it reasonable to think he needed modern scholars to clarify his words?

James Scott (2009) offers a detailed critique of this accommodation theory, showing that it is driven largely by a desire to avoid conflict with mainstream science. The notion of divine accommodation ultimately serves to subordinate Scripture to human reasoning, eroding its inerrancy and authority.

Not a Fixed Dome but a Rotating Sphere

Were ANE peoples and Israelites really so naive as to believe the sky was a solid dome? While ancient man lacked our technology and mathematical tools, he was neither ignorant nor unobservant. As noted, ancient observers were deeply familiar with the sky.

They saw, as we do, the sun and moon moving daily across the sky—rising in the east, setting in the west. These bodies clearly weren't attached to a rigid dome. The sun and moon, setting beyond the farthest visible mountains, were plainly more distant than birds.

What about the stars? A few hours' observation shows that stars, too, move steadily across the sky (Figure 3.2). They follow distinct, patterned motions. Those near Polaris (above the North Pole) make full circles; others rise in the east and set in the west, changing with the seasons.

This behavior suggests not a fixed dome, but a rotating celestial sphere (Figure 3.3)—an idea widespread in ancient astronomy. The stars

https://pixabay.com/photos/star-trails-night-stars-rotation-1846734/

Figure 3.2. Star-trails Time Exposure.

appeared attached to this invisible sphere that surrounded, but was not supported by, the earth.

Further, while the stars followed this general rotation, the moon completed a circuit along this rotating sphere in about a month, the sun in a year, and the planets (“wandering stars”) each in its own distinctive orbit (Gen. 1:15).

Ancient people were more attuned to the night sky than modern urban dwellers, often shielded from the stars by city lights and indoor living. They recognized the celestial motions and changing positions of planets. The idea of a solid, immobile dome could not account for this.

In fact, Egyptian astronomers began their calendar year with the first dawn appearance of Sirius, showing precise awareness of celestial timing.

Supporting this, ANE scholar Margaret Huxley (1997) concluded, based on cuneiform evidence, that the Mesopotamians conceived of the sky as a rotating sphere with a polar axis, not a solid vault.

Moreover, no ancient ANE texts actually contain diagrams resembling the “solid dome” model. That concept was constructed by 19th-century Western scholars based on faulty assumptions. In the end, this misconception says more about modern scholars than about ancient people.

In sum, there is no compelling evidence that ANE peoples—or the Israelites—believed the sky was a solid dome.

The Origin of the Myth

If the alleged solid dome is so contrary to common sense and has no historical basis, how did it come to dominate biblical scholarship?

Randall W. Younker and Richard M. Davidson (2011) trace the idea that ancient Israelites believed in a solid vault over a flat earth to the early 1800s, particularly through the influence of American writer Washington Irving (1783–1859). Irving popularized the myth that most ancient and medieval people believed in a flat earth until the time of Columbus.

Younker and Davidson conclude that, in reality, the majority of early Christian and medieval scholars "believed in a spherical earth, surrounded by celestial spheres that conveyed the sun, moon, stars, and planets in their orbits around the earth." Furthermore, the idea of a solid heavenly vault is absent from ancient Babylonian astronomical texts. It was mistakenly introduced into scholarly literature through a mistranslation (1890) of the Enuma Elish by Peter Jensen.

The Bible itself never claims the earth is flat or that the sky rests on pillars. Seely’s case hinges almost entirely on one word: *raqia* ("expanse") in Genesis 1:7, which he interprets as reflecting a common ANE belief in a solid dome.

Rather than imposing speculative ancient cosmology onto Genesis, we should simply read the text on its own terms. Genesis 1:8 identifies the *raqia* as "heaven." It cannot be solid, since birds fly in it (Gen. 1:20; cf.

Deut. 4:17), and the sun, moon, and stars move through it (Gen. 1:14–18). The *raqia* simply denotes the sky—both the atmosphere and outer space.

Moreover, ancient cosmology in the scientific sense dates from about 550 BC, when Greek science emerged. Before that, cosmology was inseparable from mythology, making it difficult to determine what people actually believed about the nature of the physical universe. Nor was there a single, uniform ANE cosmology. Sumerian, Egyptian, Canaanite, and Babylonian myths differed substantially. Noel Weeks (2006, 2016) details these differences in his critiques of Seely and Walton.

The intimate link between cosmology and mythology highlights a deeper truth. Modern scholars often view ancient people as scientifically deficient—believing in a universe one dimension short (i.e., an alleged flat earth). Yet ancient man understood the cosmos to include more than just physical dimensions. It made space for God, heaven, angels, and demons.

By contrast, modern cosmology, in its materialist reductionism, is the one truly lacking in dimension. When modern man tries to interpret the ancient, God-filled cosmos using his truncated, three-dimensional model of reality, distortion is inevitable.

Greek Cosmology

Scientific models of the universe first arose from Greek thought. Greek philosophers rejected magic and myth, seeking instead naturalistic explanations for the cosmos. They emphasized observation, critical reasoning, and mathematical simplicity—principles still foundational in science today.

The tradition began with Thales (c. 621–543 BC) of Miletus, who famously predicted a solar eclipse in 585 BC. He proposed that all things ultimately derived from a single underlying substance—water. He viewed the cosmos as evolving by natural processes from this prime element.

Thales' younger contemporary, Anaximander, advanced a more sophisticated theory. He rejected water as the sole substance, suggesting instead that all things were formed from a boundless substance he called *apeiron*. Through a whirling motion, *apeiron* generated the four classical elements—earth, water, air, and fire—and shaped these into the ordered universe. This whirling also explained the motions of the stars. In the center of the universe was the earth, which was cylindrical in shape, with humans living on one of its flat faces.

From these simple beginnings the Greeks constructed a host of cosmological models. Generally, they strove to explain the universe in terms of some key fundamental element, physical principle, or numerical concept.

While some thinkers held that the universe displayed intelligent design, others proposed purely mechanistic accounts. Among the latter were the atomists, Leucippus and his disciple Democritus. They argued that everything consisted of indivisible atoms moving through a void. These atoms, through random motion and collision, combined into various forms and later dissolved. The atomist universe was eternal, infinite, and devoid of divine oversight—an early version of materialism.

Classic Greek Cosmology

While atomism resembled some aspects of modern physics, it had little influence on medieval thought. Instead, the cosmologies of Plato (427–347 BC) and his pupil Aristotle (384–322 BC) proved foundational.

The essential features of Plato's cosmological system were presented in his book *Timaeus*. Plato believed that the Creator made the universe according to a rational plan. By this time, it had become commonly accepted—at least by philosophers—that the earth was a sphere. The earthly sphere was placed in the center of the universe (Figure 3.4).

It was formed from earth, water, air, and fire. Around the earth were seven planetary spheres and an eighth outer sphere for the stars. The outer sphere, carrying the stars, rotated daily; the intermediate spheres, carrying the planets, rotated at various rates. Intelligent spirits caused the motions of the spheres. Everything on earth was imperfect and changing, while the heavenly objects were perfect. All things were

Peter Apian's *Cosmographicus Libre* (1539). This includes Plato's inner spheres of earth and water, air, and fire.

Figure 3.4. Peter Apian's Universe.

arranged hierarchically according to their inner dignity and perfection; the whole cosmos bore witness to God's existence and his concern for his creation. According to Plato, the world was not eternal. Rather, it was made by the Creator from a model previously present in his mind. Everything was formed from an initial chaos in accordance with a perfect plan. Even time itself was created as the most perfect possible imitation of eternity.

Plato's cosmology was developed further by Aristotle. The inner, sublunar sphere held the four terrestrial elements—earth, water, air, and fire. The rest of the universe was filled with a fifth element called ether. The natural motion of the terrestrial elements was up or down, according to their weight, so that they might find their proper place. The natural motion of the ether was circular, endless, and perfect—always revolving about the earth.

Since every motion must have a cause, Aristotle reasoned that there must be a first unmoved mover, located beyond the sphere of the fixed stars. This prime mover set the outer sphere in motion, and from it, motion was transmitted to the inner spheres, producing the observed movements of the heavenly bodies. The prime mover caused motion not by pushing or pulling, but "by being loved"—it was the ultimate object of desire. For Aristotle, the universe was eternal, having existed forever in its present state. Since the outermost sphere rotated in a fixed time (24 hours), the universe had to be finite.

Both Plato and Aristotle believed the order of the universe pointed to the existence of a divine principle. For Plato, this was a personal Creator who designed the cosmos; for Aristotle, it was the unmoved mover, a final cause toward which all things strive.

This geocentric cosmos, with its nested spheres and harmonious motions, became the foundation for medieval cosmological thought.

Saving the Phenomena

This ambitious cosmology did, however, have one major deficiency. While the fixed stars moved with the expected perfect circular motion, the planets—the “wandering stars”—did not follow such simple paths. Their movements varied from the ideal of uniform circular motion. Plato recognized this discrepancy and assigned his students the challenge of formulating mathematical models that would "save the appearances." In other words, they were to reconcile theory with observation.

Aristotle attempted a solution, proposing a complex system involving 55 concentric spheres to account for planetary motions. Despite this elaborate model, it still failed to match observed data.

The challenge was eventually met by Claudius Ptolemy around AD 150. He devised a more accurate geometric system involving three main constructs: the *epicycle* (a small circle on which the planet moves), the *deferent* (a larger circle centered near the earth, along which the epicycle revolves), and the *equant* (a point from which angular motion appears uniform). These elements are illustrated in Figure 3.5.

In this model, a planet travels along an epicycle, which itself moves along a deferent. The deferent is off-center (eccentric) from the earth. The equant is a non-central point about which the epicycle moves at a constant angular rate. The resulting system accurately tracked planetary positions and allowed for successful predictions.

However, to match the increasingly detailed observations, additional epicycles had to be added—epicycles upon epicycles—resulting in a complex but effective system. Eventually, the Ptolemaic model included about 40 epicycles.

Nevertheless, despite its practical success, the model gave no physical explanation of planetary motion. Indeed, in Aristotle's cosmological model of solid spheres rotating about a central earth, motions corresponding to epicycles, eccentrics and equants were physically impossible.

To defend his model, Ptolemy adopted an anti-realist or instrumentalist stance. He argued that astronomical models were not literal descriptions of reality, but useful tools for prediction. His criteria for a good theory were (1) accurate prediction and (2) mathematical simplicity. He viewed physical explanations as speculative and unreliable, whereas mathematics offered certainty.

This view contrasted with the realist approach of Aristotle, who insisted that theories should reflect the true nature of things. Aristotle’s followers thus rejected Ptolemy’s system for contradicting Aristotle’s physical principles.

The debate between realists and instrumentalists continues to this day. Realists argue that scientific theories should describe reality;

instrumentalists caution that theories are limited to organizing and predicting phenomena, without necessarily revealing the underlying nature of the world.

Medieval cosmology

The early church fathers grappled with how to reconcile the teachings of the Bible with the scientific ideas of the Greeks. Several different approaches emerged. One group, especially associated with the Syrian church, rejected Greek cosmology outright. They insisted that truth could be found only in God's Word and dismissed Greek science and philosophy as pagan speculation.

Others, particularly in Alexandria, took the opposite view. Deeply impressed by Greek learning, they attempted to harmonize Scripture with pagan philosophy. Between these two extremes stood a more moderate position—by far the most popular—which made extensive use of Greek thought while still upholding the historical truth of Scripture. This balanced approach would form the foundation of medieval cosmology.

The Perfect Harmony

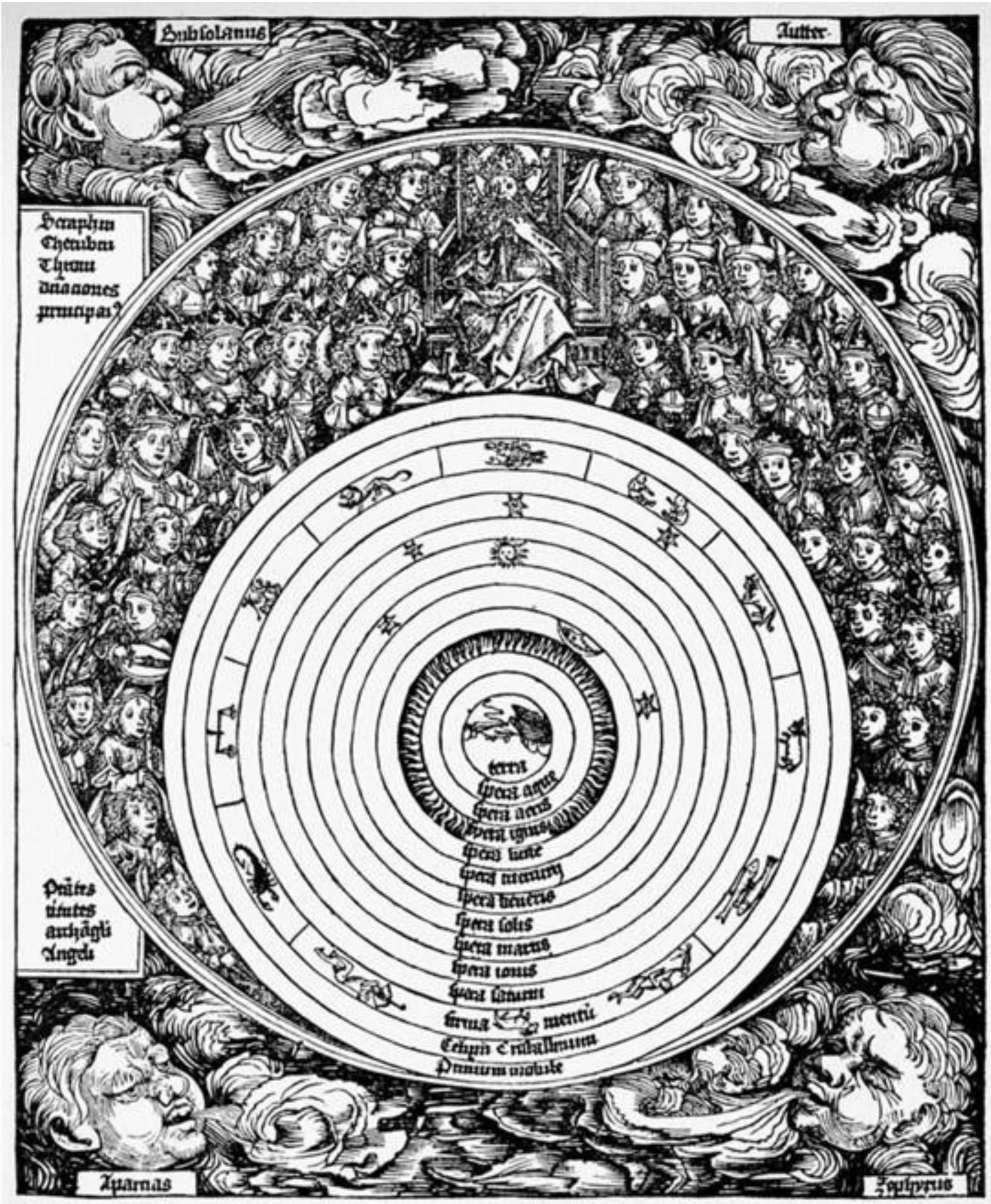
Many early Christian thinkers observed a strong resemblance between the cosmology of Plato and the opening chapters of Genesis. It was commonly believed that Plato had somehow been influenced by Moses. In both traditions, a single Creator brings the cosmos into being according to a rational plan, with the earth—particularly human life—at the center of that plan.

Plato’s ideas were introduced into Christian theology largely through the writings of Pseudo-Dionysius, who claimed to be the Dionysius converted by Paul in Acts 17:34. Writing around AD 500, his works were accepted as authentic throughout the Middle Ages and held great authority—second only to Scripture.

Pseudo-Dionysius adapted Plato’s hierarchy of cosmic spirits, who moved the spheres, by identifying them with angels. Drawing on Scripture, he organized the angels into nine orders—one for each heavenly sphere—forming a celestial hierarchy. These, in ascending order, were: angels, archangels (1 Thess. 4:16), principalities, powers, mights, and dominions (Eph. 1:21), thrones (Col. 1:16), cherubim (Ezek. 10), and seraphim (Isa. 6). Above these angelic ranks was a tenth and highest realm: the empyrean heaven, the dwelling place of God (see Figures 3.4 and 3.6). The entire universe was thus filled with a continuous hierarchy of beings, stretching from the divine throne to the depths of hell at the earth's center.

As previously noted, medieval thinkers did not believe the earth was flat. Though a few early medieval authors held such a view, C.S. Lewis (1963) observes that virtually all writers in the later Middle Ages agreed the earth was a globe.

Medieval cosmology reached its fullest development through the work of Bonaventure (1221–1274) and Thomas Aquinas (1224–1274). Aquinas, in particular, sought to reconcile newly rediscovered Aristotelian philosophy with Christian theology. One major difficulty was Aristotle's belief in the eternity of the world. Aquinas responded by affirming that, while God *could* have created an eternal universe, divine revelation makes clear that creation had a definite beginning.



From Schedel's *Nuremberg Chronicle* (1493). The nine orders of angels are listed on the left, flanking God's throne.

Figure 3.6. The Medieval Universe.

The medieval cosmos was seen as a perfectly ordered system. It consisted of a series of concentric spheres, nested like the layers of an onion. At the center stood the stationary earth, composed of the four classical elements: earth, water, air, and fire. Encircling the earth were seven planetary spheres, carrying the moon, Mercury, Venus, the sun, Mars, Jupiter, and Saturn. These, in turn, were surrounded by three more spheres: the sphere of the fixed stars, the crystalline heaven (identified with the waters of Genesis 1:6), and finally the empyrean—the abode of God. This system closely followed Aristotle's model, except that the outermost "nothingness" beyond the stars was replaced with the heavenly dwelling of God.

Following Plato and Aristotle, medieval thinkers maintained a sharp distinction between the imperfect, changeable earth and the perfect, eternal heavens. The heavenly bodies displayed circular, unchanging motion—symbolizing perfection—while earthly motion was linear and unstable.

The entire universe was organized in a great hierarchy, extending from the depths of hell at the earth's center, through the various orders of nature, society, and church, up through the planetary spheres, and culminating in the divine perfection of the empyrean. This structure is

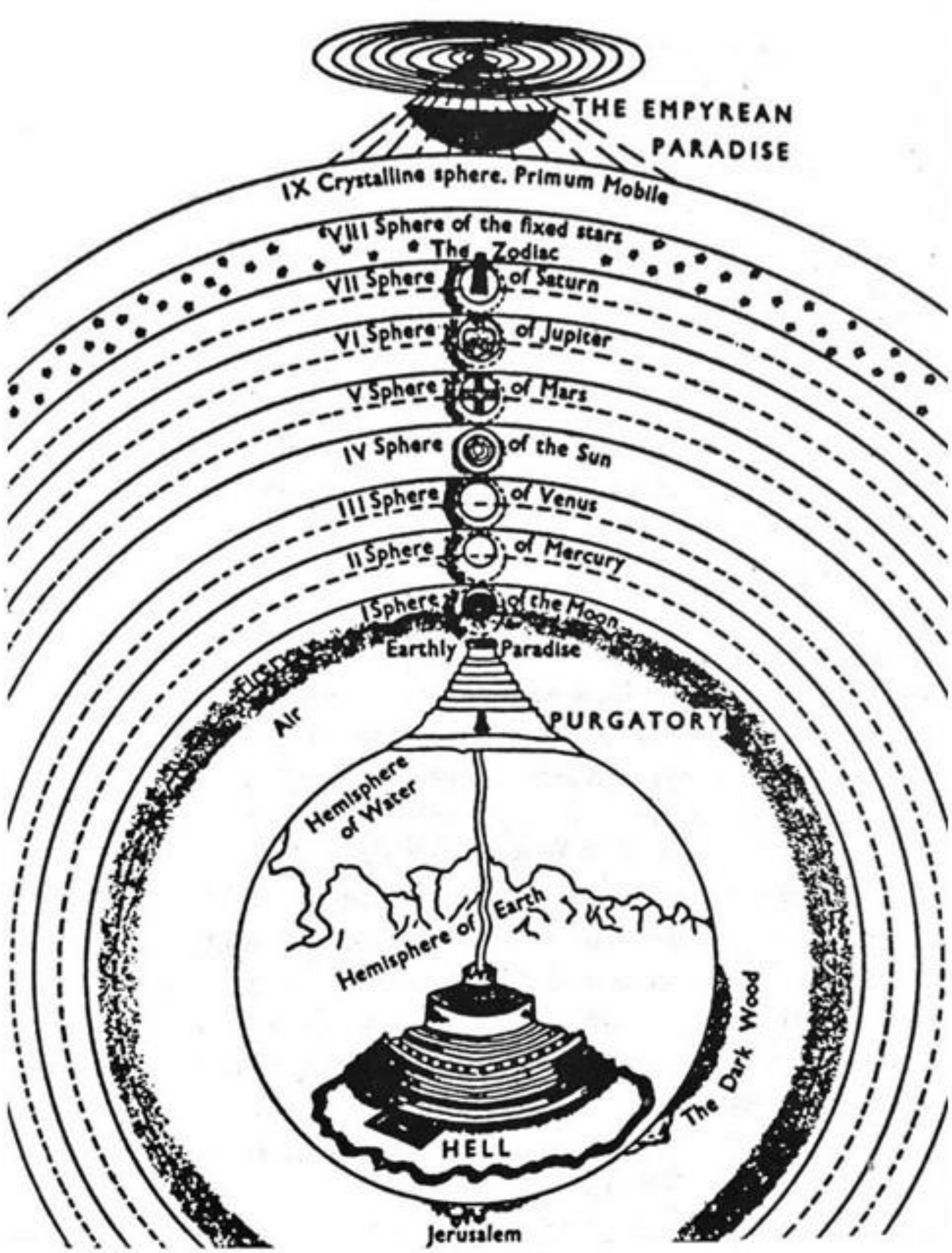


Figure 3.7. Dante's Universe

vividly portrayed in Figure 3.7, which depicts Dante Alighieri's (1265–1321) vision of the cosmos in *The Divine Comedy*.

The world machine was set in motion by God, who worked through the angels to move the spheres. The planets influenced all material things on earth and were seen as instruments of divine providence. God sustained the world not for its own sake, but for the sake of man—the crown of creation.

While the *structure* of the medieval universe was shaped by Greek philosophy, its *origin* was firmly grounded in the Bible. Medieval theologians wrote countless commentaries on the six days of creation. The prevailing view—based on the genealogies in Genesis and other biblical data—was that the world had been created only a few thousand years before the birth of Christ.

This cosmology achieved a remarkable harmony between theology, science, and human purpose. The universe reflected God's wisdom in its order, and his love in its purpose—everything was made for man, and everything pointed back to God.

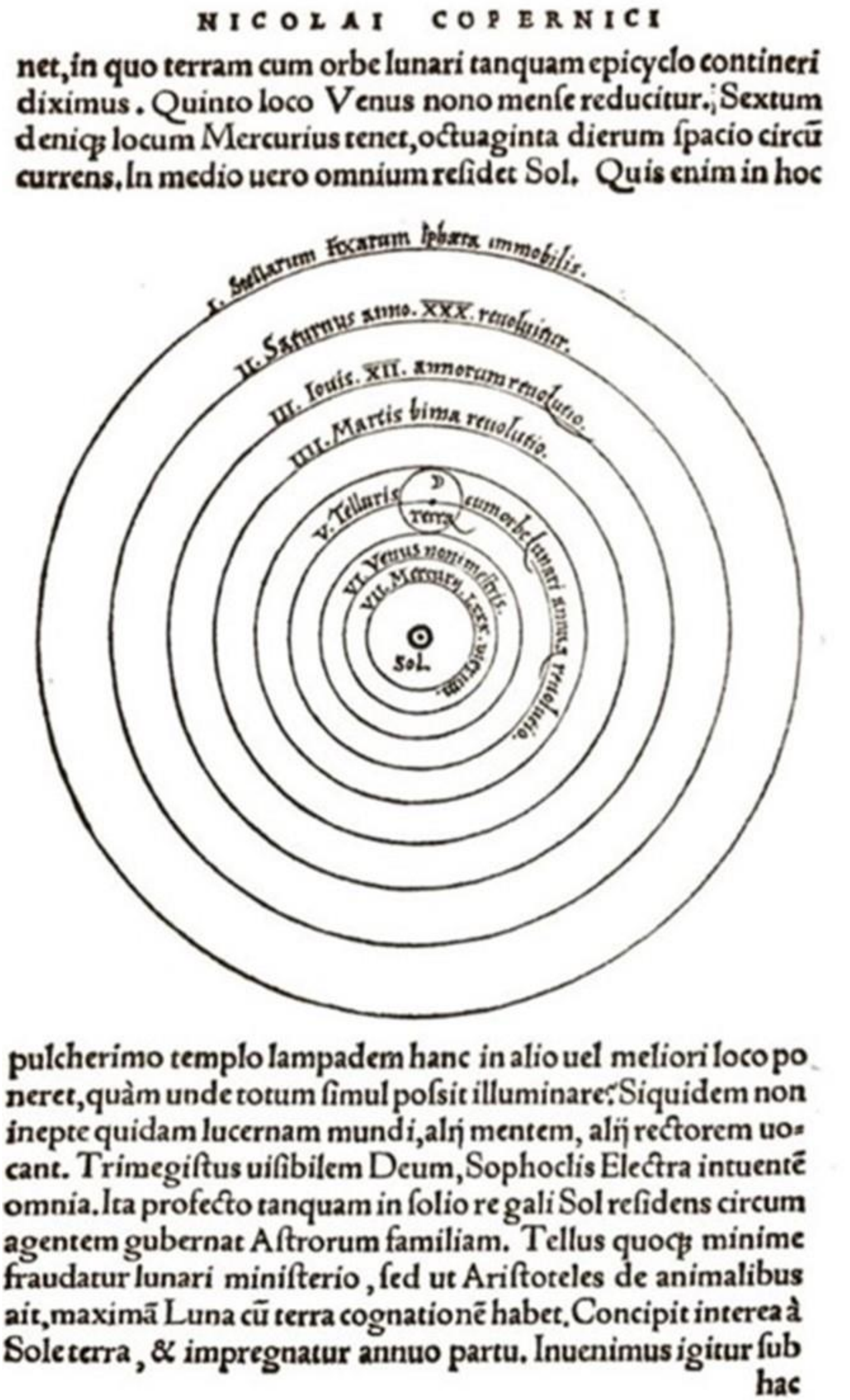
In short, the medieval universe was perfectly ordered, static, hierarchical, and centered on humanity. But this very harmony between cosmology and theology would become a liability. When medieval cosmology was eventually overturned, its theological framework was often discarded along with it.

The Demise of Medieval Cosmology

The magnificent synthesis of theology and science that defined medieval cosmology endured until the 17th century. Yet despite its harmony and grandeur, several developments gradually led to its downfall. Chief among these was the rising emphasis within the emerging modern science on direct observation and empirical evidence, rather than reliance on ancient authority. As a result, by the 16th century, serious cracks had begun to appear in both Aristotelian physics and Ptolemaic astronomy.

Two discoveries by the Danish astronomer Tycho Brahe (1546–1601) delivered heavy blows to the Aristotelian model. On November 11, 1572, Tycho observed a new star (a "nova") in the supposedly immutable heavens. According to Aristotelian doctrine, all change was confined to the sublunar region, so the appearance of a new celestial object contradicted a foundational belief. Just a few years later, Tycho recorded another significant event: the great comet of 1577. Contrary to the prevailing view that comets were atmospheric phenomena, Tycho demonstrated that this comet traveled through the planetary spheres. These findings undermined the belief in the solidity and incorruptibility of the heavens.

A few decades later, the invention of the telescope brought even more trouble for the old model. In 1610, Galileo Galilei turned his telescope to the moon and discovered that its surface was not perfectly smooth, as Aristotle had claimed, but was instead marked by mountains and valleys—features resembling those of the earth. This further challenged the sharp division between terrestrial imperfection and celestial perfection.


NICOLAI COPERNICI

net, in quo terram cum orbe lunari tanquam epicyclo contineri diximus. Quinto loco Venus nono menſe reducitur. Sextum deniq; locum Mercurius tenet, octuaginta dierum ſpacio circũ currens. In medio uero omnium reſidet Sol. Quis enim in hoc

pulcherimo templo lampadem hanc in alio uel meliori loco po neret, quàm unde totum ſimul poſsit illuminare? Siquidem non inepte quidam lucernam mundi, alij mentem, alij rectorem uo cant. Trimegiſtus uiſibilem Deum, Sophoclis Electra intuentē omnia. Ita profecto tanquam in ſolio regali Sol reſidens circum agentem gubernat Aſtrorum familiam. Tellus quoq; minime fraudatur lunari miniſterio, ſed ut Ariſtoteles de animalibus ait, maximā Luna cū terra cognationē habet. Concipit interea à Sole terra, & impregnatur annuo partu. Inuenimus igitur ſub hac

Figure 3.8. Copernicus's Universe.

Later in the 17th century, Isaac Newton would confirm this trend with even greater force. His formulation of the laws of motion and universal gravitation showed that the same physical laws applied equally to both heavenly and earthly bodies. With Newtonian mechanics, the Aristotelian distinction between the sublunar and supralunar realms was decisively erased.

The Copernican Challenge

The most serious blow to medieval cosmology, however, came with the displacement of the earth from the center of the universe. The idea of a heliocentric cosmos had already been proposed by the Greek astronomer Aristarchus of Samos (c. 310–230 BC), though it gained little traction in antiquity. It was revived by the Polish astronomer Nicolaus Copernicus (1473–1543), who sought to simplify the prediction of planetary positions. His heliocentric model is shown in *Figure 3.8*, taken from his seminal work *De Revolutionibus Orbium Coelestium* (1543).

Ironically, the Copernican system was not simpler than the Ptolemaic model—it still required 48 epicycles, compared to Ptolemy's 40. However, it did offer certain advantages. It explained several irregularities in planetary motion more naturally and allowed for the calculation of the planets' relative distances from the sun.

Yet, alternative geocentric models remained viable. Tycho Brahe, for example, proposed a hybrid system in which the planets revolved around the sun, while the sun orbited a stationary earth. Brahe's system, shown in Figure 3.9 from his *De Mundi Aetherei Recentioribus Phaenomenis* (1588), matched observational data just as well as Copernicus's.

Nevertheless, Copernicanism gradually gained acceptance, culminating in the famous conflict between Galileo Galilei (1564–1642) and the Roman Catholic Church. Galileo championed the heliocentric model, claiming that the earth orbited a stationary sun. This the Church considered contrary to Scripture, which described a fixed earth. This disagreement sparked a debate: which body was truly in motion—the earth or the sun?

Galileo’s support for Copernicanism relied heavily on evidence from the newly invented telescope. His discoveries included the phases of Venus, Jupiter’s moons, the mountainous surface of the moon, and countless previously unseen stars. These observations were consistent with the heliocentric view—but they did not conclusively prove it. A geocentric model could still be constructed to fit the data.

This lack of definitive proof led Cardinal Robert Bellarmine, a leading theologian and participant in Galileo’s 1616 trial, to write to Galileo:

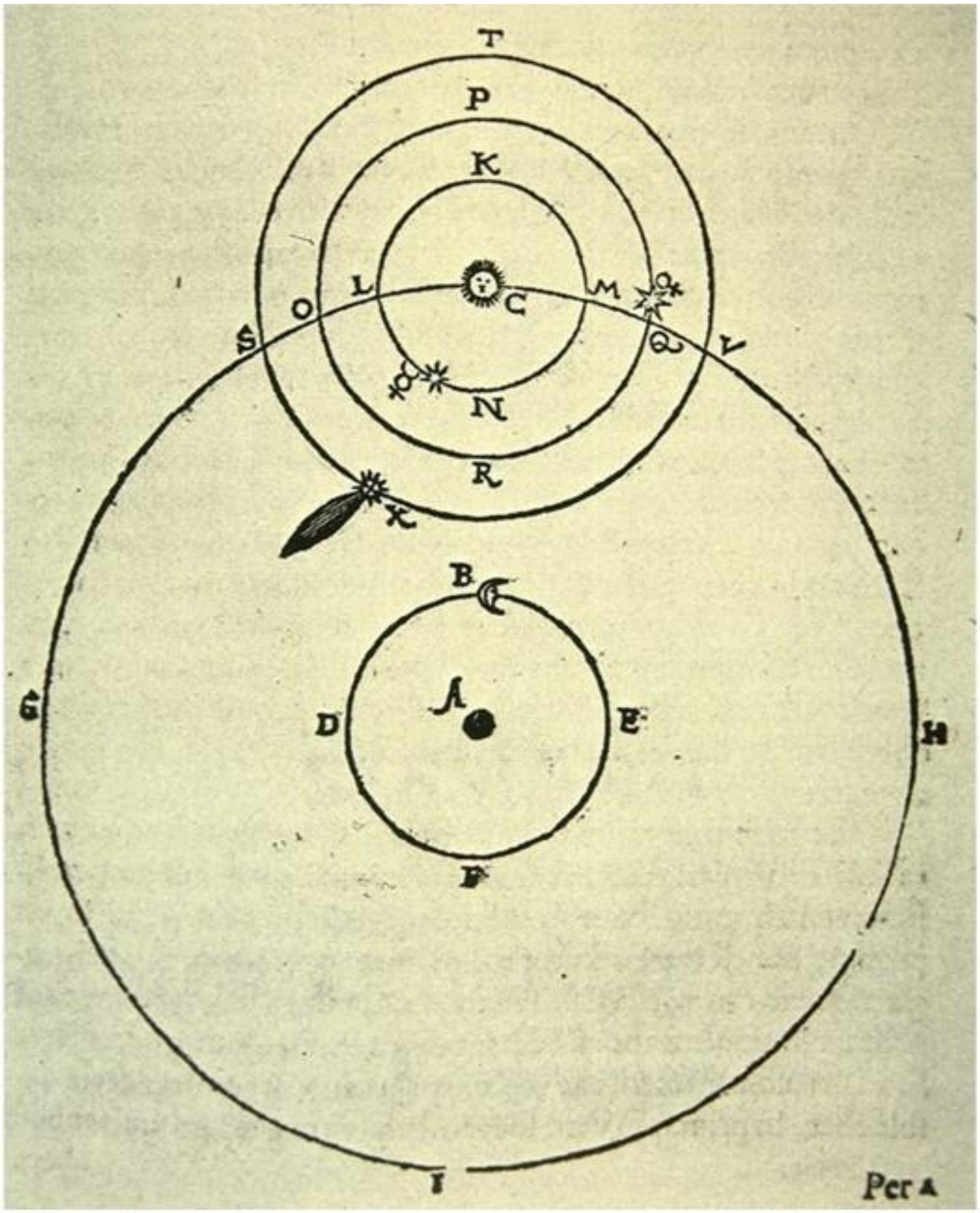


Figure 3.9. Tycho's Universe.

:

> *If there were a real proof...that the sun does not go around the earth but the earth around the sun, then we would have to proceed with great circumspection in explaining those passages of Scripture which appear to teach the contrary, and we should rather have to say that we did not understand them than declare an opinion false which is proved to be true. But I*

> *do not think there is any such proof since none has been shown to me.*
>
> *To demonstrate that the appearances are saved by assuming the sun at the center and the earth in the heavens is not the same thing as to demonstrate that in fact the sun is in the center...I believe that the first demonstration may exist, but I have grave doubts about the second; and in case of doubt, one may not abandon the Holy Scriptures as expounded by the holy Fathers... (Koestler 1968:454).*

Bellarmine had no issue treating the Copernican model as a useful hypothesis. What he opposed was accepting it as truth without irrefutable evidence.

Since Galileo could not provide such proof, the Church upheld the traditional interpretation of Scripture. On March 5, 1616, the General Congregation of the Index condemned the motion of the earth and the immobility of the sun as "false and altogether opposed to Scripture" (Koestler 1968:462). Though political, personal, and philosophical factors played a role, the primary obstacle was the long-standing biblical interpretation.

Theological Considerations

At the heart of the Galileo affair was a question of *epistemology*: how do we know what is true? More specifically, the controversy centered on the authority of Scripture and the status of scientific theories. Galileo did not merely present the Copernican model as a convenient hypothesis; he argued that it was true, and that if Scripture appeared to contradict it, then the interpretation of Scripture had to change. This directly challenged the Church's traditional hermeneutics.

Galileo outlined his views on the relationship between science and Scripture in his *Letter to the Grand Duchess Christina* (1615). There, he insisted that certain biblical texts should not be taken literally, especially when dealing with physical phenomena. One reason, he said, was that:

> *These propositions uttered by the Holy Ghost were set down by the sacred scribes in order to accommodate them to the capacities of the common people, who are rude and unlearned (Galileo 1615:182).*

Another reason he gave was that the Bible's primary concern is not cosmology, but salvation:

> *"Scripture tells us how to go to heaven, not how the heavens go" (Galileo 1615:188).*

Galileo concluded,

> *I think that in discussions of physical problems we ought to begin not from the authority of scriptural passages, but from sense experiences and necessary demonstrations...nothing physical which sense experience sets before our eyes, or which necessary demonstrations prove to us, ought to be called into question (much less condemned) upon the testimony of biblical passages which may have some different meaning beneath their words. We must take heed, in handling the doctrine of Moses, that we altogether avoid saying...anything which contradicts manifest experience and reasoning of philosophy or the other sciences. For since every truth agrees with all other truth, the truth of Holy Writ cannot be contrary to the solid reasons and experiences of human knowledge (Galileo 1615:182-6).*

For Christians, the drama of salvation had always been central, and therefore more important than nature. Now Galileo considered the Book of Nature to be as significant as the Book of Scripture, and even speaking more clearly, at least on non-salvation issues. With Galileo, the scientific enquiry of nature achieved an independent status to which Scripture had to conform.

This shift had profound implications. As theologian John Dillenberger observed:

> *...a tradition was forged in which the increasing clarity discerned through nature was set against the prevailing unclarity of Scripture, with the attendant hope that thereby the latter might*

be purged of its obscurity. In retrospect, it is clear that this can only be accomplished by a logic which no longer took its cue from the biblical revelation but from a philosophy which determined the content from its own angle of vision. In Galileo, an independent natural basis for religion had begun to determine the biblical understanding of revelation. Of this Galileo was certainly unaware (Dillenberger 1960:90).

Whether Galileo was aware of it or not, his epistemology led to a slow but steady reduction in biblical authority.

Many who embraced the new astronomy also adopted Galileo's epistemology. The prominent German astronomer Johannes Kepler (1571–1630), a devout Lutheran, was likewise prepared to reinterpret Scripture in a flexible manner through the widely held notion of *accommodation*—the idea that God adapted His revelation to the cultural and intellectual context of its original audience.

However, not all theologians agreed. Abraham Calovius (1612–1686), a leading Lutheran theologian, insisted that no error—however minor—could exist in Scripture. He argued that appealing to accommodation on one point – to appease the new science-- was like opening a hole in a dyke which would eventually destroy the entire dyke.

In the Dutch Reformed Church, these issues reached a crisis point. As historian Rienck Vermij (2002) shows, Copernicanism became a major point of contention in the Netherlands. Many theologians and academics had been influenced by René Descartes (1596–1650), who lived in the Netherlands for the last two decades of his life. Descartes emphasized the supremacy of human reason and supported heliocentrism.

By 1656, the Reformed Church in the Netherlands was divided. Some theologians, influenced by Cartesian rationalism, embraced heliocentrism and reinterpreted the Bible accordingly. Others, such as Gisbertus Voetius (1589–1676), held to the inerrancy of Scripture and rejected both Cartesianism and heliocentrism. At the time, this dispute nearly caused a schism in the Dutch Reformed Church.

The debate, then as now, centered on the nature of biblical authority. The Cartesians regarded Scripture as addressed to the common people, not as a source of scientific knowledge. Orthodox Reformed theologians, by contrast, insisted that the Bible—being God's Word—was fully authoritative and inerrant in all matters, including science. Voetius, for example, upheld the literal truth of Scripture in every domain.

Francis Turretin (1623–1687), another prominent Reformed theologian, likewise maintained that any concession to error—even in seemingly minor issues—would ultimately compromise the authority of Scripture (Dillenberger 1960:165). Thus, on biblical grounds, these theologians rejected Copernicanism. They saw that yielding to science on even one point could result in a broader collapse of theological truth.

Many intellectuals, however, chose another path. Rather than reinterpret Scripture, they concluded that it was simply wrong. If the Bible was mistaken about the structure of the universe, perhaps it could be mistaken in other areas as well. This led to a growing skepticism of revelation, and eventually to the rise of *Deism*—the belief that reason and nature, not Scripture, are the sources of true religion.

Deism gained prominence in the 18th century. God was seen not as an active sustainer, but as a distant architect who built the universe to run on its own, according to fixed natural laws. Some thinkers went even further. Atheism, which also grew in the 18th century, rejected not only revealed religion but even the very idea of God.

The triumph of Copernicanism thus had profound consequences for the Christian community. In embracing the new astronomy, many Christians also adopted a secular epistemology—one in which human reason was elevated above Scripture, at least in matters of science. As a result, the Bible was no longer regarded as the supreme authority in all areas of knowledge.

Science and the Earth's Motion

Had the Roman Catholic Church erred in condemning Galileo? Were theologians like Voetius and Turretin mistaken?

Historically, the debate concerned whether the earth was at rest in an **absolute** sense. The traditional, pre-Copernican view held that the earth was stationary at the center of the universe, with the sun revolving around it yearly, in addition to its daily rotation. The Copernican model, by contrast, proposed that a rotating earth orbited a stationary sun.

Which view is correct?

From an earthbound perspective, we observe the sun moving across the sky. But an observer situated on the sun would perceive the earth in motion. Motion, then, is relative to the observer's vantage point. Even with the aid of telescopes, all we can ever observe is **relative motion**. The observable phenomena appear identical whether we assume a moving sun and stationary earth—or the reverse.

So how do we prove that the earth is "really" moving? To determine **absolute motion**, we need a fixed, **absolute reference point**. But what could that be? The sun? A distant galaxy? And how do we know that such a point is truly at rest? To choose between a rotating earth in a fixed universe and a rotating universe around a fixed earth, one would have to step outside the cosmos—to a fixed platform beyond creation. Only God can do that.

The Copernican view gained major scientific support in 1687, when Isaac Newton published his *Principia Mathematica*. Newton's laws of motion and gravity successfully explained planetary motions and many other physical phenomena. He defined **absolute rest** as that reference frame in which his laws held true. According to this framework, the earth was indeed in absolute motion—as evidenced by phenomena like its equatorial bulge, the Coriolis effect, and stellar aberration. With that definition of absolute rest, even the sun moves with respect to the stars.

Newtonian mechanics came to be widely regarded as revealing the divine order of the universe. Thus, most people believed Newton had conclusively proven that the earth was in motion.

However, not everyone agreed. The British philosopher George Berkeley (1685–1753) and the German physicist Ernst Mach (1838–1916), for example, challenged the very idea of absolute motion. They argued that only relative motion was meaningful and observable. Mach proposed that physics should be rephrased entirely in relative terms, dispensing with Newton's absolute frame of reference.

This challenge was taken up by Albert Einstein, whose general theory of relativity (1915) dethroned Newtonian physics. Einstein eliminated the concept of absolute space. He wrote:

> *“Either coordinate system could be used with equal justification. The two sentences ‘the sun is at rest and the earth moves’ or ‘the earth is at rest and the sun moves’ would simply mean two different conventions concerning two different coordinate systems.”*
> *—Einstein (1938:248)*

The philosopher Bertrand Russell echoed this relativist position:

> *Before Copernicus, people thought that the earth stood still and that the heavens revolved about it once a day. Copernicus taught that "really" the earth revolves once a day, and the daily rotation of sun and stars is only "apparent"... But in the modern theory the question between Copernicus and his predecessors is merely one of convenience; all motion is relative, and there is no difference between the two...*
>
> *Astronomy is easier if we take the sun as fixed than if we take the earth... But to say more for Copernicus is to assume absolute motion, which is a fiction. It is a mere convention to take one body as at rest. All such conventions are equally legitimate, though not all are equally convenient (Russell 1958:13).*

In support of this, Lynden-Bell, Katz, and Bičák (1995) showed that, under general relativity, a universe rotating around a fixed earth would produce all the same physical effects usually attributed to a rotating earth—such as the equatorial bulge and Coriolis forces. Even changes in the earth’s rotation (e.g., due to earthquakes) would, in this model, be instantly reflected by the entire rotating cosmos.

Would this not result in galaxies revolving about the earth at speeds greater than the speed of light? Yes. However relativity doesn't forbid such speeds—it only requires that two passing objects not exceed the speed of light relative to each other. If the entire cosmos rotated as a unit, this restriction would be satisfied.

Thus, general relativity allows a geocentric model as scientifically viable. However, there are no scientific grounds for preferring it. Today, most physicists acknowledge that the question of absolute motion is not a scientific question at all.

The Absolute Standard of Rest

If science cannot answer the question of absolute motion, we must turn to divine revelation. Ultimately, only the Creator can establish an absolute standard of rest for the universe.

To a naturalist, the idea of the entire universe revolving around a tiny earth may seem highly implausible. But Christians understand that God's creation includes not only the physical cosmos but also the invisible realm of heaven, the abode of God and his angels. In medieval cosmology, the earth was understood to be at rest with respect to heaven.

The true center of creation is God's heavenly throne, from which He rules all things. This throne—God's own dwelling—surely represents the most appropriate reference point for absolute rest. As the Lord says:

> *"Heaven is my throne, and the earth is my footstool; what is the house that you would build for me, and what is the place of my rest?" (Isaiah 66:1)*

Genesis 1–2 places the focus on the earth, which is created before the sun and stars. The close connection between earth and heaven is evident in events such as the ascensions of Elijah and Christ. This link will become even more profound in the renewed creation, when God's dwelling will descend to earth (Revelation 21:1–4), and the throne of God and of the Lamb will be established on earth itself (Revelation

22:1–5). Ultimately, the universe is not heliocentric or geocentric, but Christo-centric.

In this framework, the earth is proposed to be fixed relative to a currently invisible heaven. This has no necessary scientific implications. It does not require that the earth be located at the geometric center of the solar system, galaxy, or visible universe. It does not suggest that stars and galaxies are symmetrically arranged around the earth. Nor does it imply that geocentric dynamics are superior to Newtonian or relativistic mechanics. The laws governing the physical universe may not apply to heaven, which may have its own distinct laws. Thus, scientific analyses of the earth's motion within the visible cosmos may not apply when considering the earth's position and motion in relation to God's throne.

In conclusion, biblical geocentricity does not entail any specific observational or scientific claims. Yet, in relating the earth's rest to God's heavenly throne, it points us beyond the material world, reminding us of the nearness of God and the rich, multi-dimensional character of His creation.

Geocentricity and Genesis

Today, although a few Christian scientists—such as Gerardus Bouw (1992) and Robert Sungenis and Robert Bennett (2010)—still promote geocentricity, most Christians mistakenly believe it has been scientifically disproven.

For example, after centuries of ridicule, the Roman Catholic Church formally reversed its judgment on Galileo in October 1992. Ironically, by that time, the scientific community itself had shifted its view. The editor of the British science journal *Nature* (5 November 1992:2), while chiding the Vatican for its delay in rehabilitating Galileo, openly questioned whether the earth orbits the sun in anything more than a relative sense. He remarked, "Galileo was probably too good a scientist to commit himself to an absolute view." But this is incorrect: it was precisely Galileo's insistence on the earth's absolute motion that led to his conflict with Church authorities.

Even most creationists today reject geocentricity. A representative example is the article "Why the Universe does not revolve around the Earth" by Robert Carter & Jonathan Sarfati (2015), published by Creation Ministries International. They argue that geocentricity is flawed both scientifically and biblically.

Their scientific objections are, however, based mainly on Newtonian mechanics, with its outdated concept of absolute motion. These fall short in refuting geocentricity. They do concede that, under Einstein's theory of general relativity, a geocentric frame—where the earth is stationary and everything else moves around it—is just as valid scientifically as any other frame of reference. Nevertheless, they are that it is inconsistent to use relativity to argue that geocentrism is scientifically acceptable while also claiming it is uniquely true.

Geocentrists, in response, might agree that science treats all frames as equally valid, but argue that Scripture identifies the earth as the true, absolute frame—something science alone cannot determine.

As to the biblical evidence, Carter and Sarfati maintain that scriptural references to the sun's movement and the earth's stability are merely using phenomenological language—that is, the language of appearance. Thus, they claim, such texts can be harmonized with either a fixed or a moving earth. The danger here lies in suggesting that Scripture only describes appearances, while science unveils the true reality beyond mere appearances.

More significantly, their argument fails to engage with the deeper theological dimension—namely, the earth's relation to God's heavenly throne. Throughout their article, Carter and Sarfati consider only the physical universe and base their judgments entirely on empirical and mechanical standards. They do not address the moderate geocentric perspective outlined earlier.

There are important parallels between the seventeenth-century conflict over Copernicanism and today's debate on origins. In both cases, biblical authority is challenged by speculative scientific claims that go beyond the available observational data. In both cases, the same data can be interpreted through alternative frameworks that better align with

Scripture. And in both cases, many theologians have capitulated too quickly—placing undue confidence in human science while failing to uphold the full authority of God’s Word.

The issues are also interconnected. Consider the Dutch theologian N. H. Ridderbos, who, on exegetical grounds, was convinced that the days of creation in Genesis were literal. However, he concluded that a literal reading implied geocentricity, since, among other reasons, the earth was created before the sun and stars. Believing geocentricity to be scientifically refuted, Ridderbos consequently adopted a non-literal interpretation of Genesis 1 (Ridderbos 1957:42–44).

Similarly, the Reformed theologian R. Scott Clark (2008) noted that, before Copernicus, all Christians accepted geocentrism. Today, however, almost none do. According to Clark, this shift occurred because Christians altered their interpretation of Scripture in response to scientific developments. Therefore, he advises caution in using the Bible to resolve scientific matters. Like Ridderbos, Clark concludes that we should not interpret Genesis 1 literally but, rather, we should prefer a non-literal understanding.

In sum, the shift away from geocentricity illustrates how easily theological convictions can be reshaped by prevailing scientific claims. What began as a concession to Copernicanism later influenced how many Christians approached the historicity of Genesis. If geocentrism could be abandoned in the name of science, why not also the literal days of creation, or the special creation of man? One compromise invites another.

The deeper issue is not simply the earth’s position in space, but the authority of Scripture itself. Once biblical teaching is made subordinate to scientific theories—especially when those theories exceed what can be observed—confidence in the plain meaning of the text erodes.A truly biblical cosmology begins with God’s Word, not with human speculation.

Newtonian Cosmology

The cosmological model of Copernicus was still bounded by the outer sphere of fixed stars, but now centered on the sun rather than on the earth. However, since the apparent motion of the stellar sphere was now attributed to the motion of the earth, the stellar sphere could be at rest. The removal of the motion of the stellar sphere swept away the prime argument for its finite size. Thus, as a natural consequence of Copernican cosmology, an infinite universe could now be contemplated.

This concept was first proposed in 1576 by the English astronomer Thomas Digges (1543–1595), an early advocate of Copernicanism. He removed the boundary of the universe and envisioned heaven and its celestial beings within an infinite expanse of stars. Figure 3.10, taken from Digges' A Perfect Description of the Celestial Orbs (1576), illustrates this new cosmological vision.

Isaac Newton played a decisive role in shaping the new cosmology. With his laws of motion and universal gravitation, the universe was increasingly seen as a vast machine governed by mathematical laws. Yet this mechanical universe was not self-sustaining. Newton believed that divine intervention was required from time to time to maintain the stability of the solar system. Ironically, Newton saw this limitation as evidence for God's ongoing governance. This need for divine adjustment was later removed by Pierre-Simon Laplace (1749–1827), who demonstrated that Newtonian mechanics could, in principle, ensure long-term planetary stability without supernatural aid.

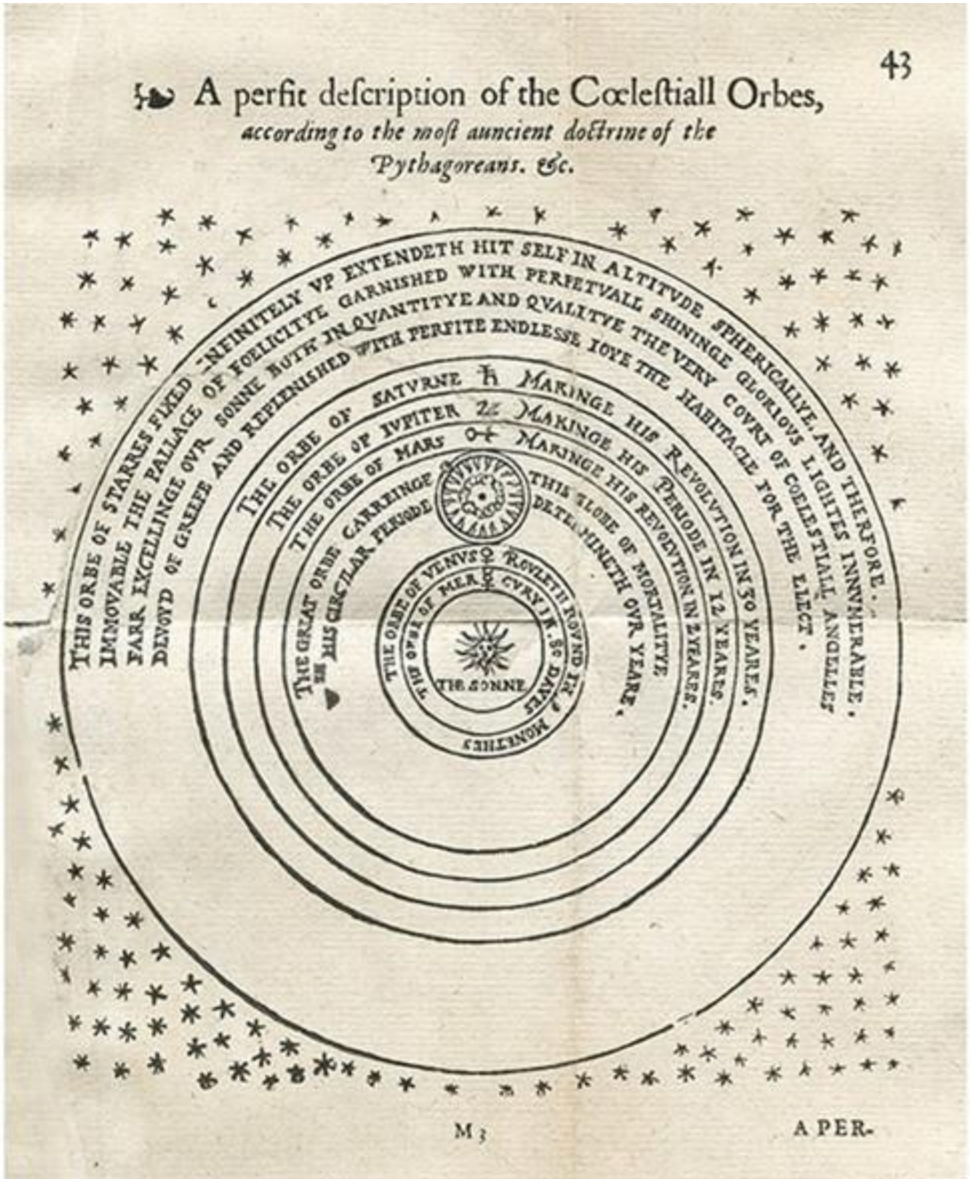


Figure 3.10. Digges' Universe.

According to Newton, space and time were absolute and eternal. He held that the material universe had been created in an infinite, pre-existing, empty space. Newton believed the material world to be finite in extent. His followers, however, soon let the material universe fill all infinite space, since they saw no reason to limit God's creative activity to just a small part of space. Similar reasoning led to the removal of restrictions on God's creative action in time: the created world became infinite in both space and time. Since an infinite and eternal world has no need of creation, God soon became superfluous as a creator.

Though Newton initially saw space as a kind of divine attribute—the medium of God's presence—this theological perspective was eventually lost. Space became reinterpreted as a neutral void, much like the ancient Greek atomists envisioned. Space was emptied of everything - including God (see Koyre 1957:274-6). Despite Newton's aim to bolster a theistic worldview, Newtonian mechanics paved the way for a secular, mechanistic cosmos that had no need for God.

Thomas Kuhn summarized this shift: in the clockwork universe, God appeared as the clockmaker who set things in motion and then withdrew. This view, known as deism, gained popularity in the 17th and 18th centuries. As it advanced, belief in miracles declined, since they implied a suspension of natural law and a direct intervention by God. By the end of the 18th century, many saw no need to invoke God at all.

In medieval cosmology, heaven was a real place located beyond the sphere of the fixed stars. The Copernican shift, by removing the boundary of the universe and introducing infinite space, displaced this heaven. Even though Thomas Digges still associated the heavens with the realm of God, as seen in Figure 3.10, the idea of a physical heaven gradually vanished. In time, the stars remained, but heaven was gone. Humanity was left alone in a cold and infinite cosmos.

This trajectory was later reinforced by theologians like Rudolf Bultmann (1984), who denied the existence of a physical heaven and rejected traditional beliefs such as Christ’s ascension or return. For Bultmann, such ideas were untenable in light of modern science, which had supposedly revealed a closed system governed solely by natural laws.

The Dynamic Universe

While Newton initially envisioned a static cosmos, by the 18th century, thinkers began to emphasize change and development. This shift was especially noticeable in geology and biology, and soon extended to cosmology. New theories sought to explain the origin of stars and planets.

The infinite Newtonian universe abandoned both geocentrism and heliocentrism. Early models assumed that stars were uniformly distributed throughout space. But further observations showed that stars were mostly concentrated in the Milky Way. In 1750, Thomas Wright proposed that the Milky Way was a disc or sphere of stars rotating around a central point. He also suggested that nebulae were distant galaxies like our own, implying a universe filled with countless such systems. See Figure 3.11 for Wright's depiction of a structured, star-filled cosmos.

Immanuel Kant expanded this idea in 1755 by proposing a fully naturalistic origin for celestial bodies. He theorized that the universe began as a diffuse gas that, under gravity, formed stars and planets through a gradual, mechanical process. Laplace later developed this further into the "nebular hypothesis," suggesting that the solar system formed from a rotating cloud of gas and dust. Though Laplace thought the nebulae were merely gas clouds, others held that they were galaxies. This debate was settled in the 1920s, when observations confirmed that many nebulae were indeed separate galaxies.

As biological evolution gained prominence in the 19th century, especially through Charles Darwin's *Origin of Species* (1859) and *Descent of Man* (1871), the idea of a dynamic, evolving universe became dominant. Evolutionary thought extended beyond biology to encompass cosmology and society. A vision of continuous progress and upward development emerged. Though some Christians resisted this trend, many adapted their theology to fit the evolutionary paradigm.

Thus, a naturalistic, scientific model finally claimed to account for the formation of the entire universe, with all its contents. The static, finite, geocentric, and theistic clockwork mechanism of medieval man had been replaced by a dynamic, infinite, materialistic organism continually evolving upwards.

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Heat Death

The establishment of the evolutionary cosmos initially generated an optimistic view of the future. Defenders of evolution believed that the universe was steadily improving. Darwin himself concluded:

> *...as natural selection works solely by and for the good of each being, all corporeal and mental endowments will tend to progress towards perfection. (Darwin 1859:486)*

This optimistic spirit was soon to be severely jolted.

The challenge came from the new science of thermodynamics—the study of heat. The Industrial Revolution, which had gained momentum in the early 19th century, depended heavily on the development of efficient machinery. By 1850, studies of steam engines and other energy-exchange processes led to the discovery of two fundamental principles.

The **First Law of Thermodynamics** states that in any process, the final energy output cannot exceed the energy input. The **Second Law**, however, goes further: we cannot even break even. The usable energy generated by a machine is always less than the energy input. In short, perpetual motion machines are impossible. The Second Law is widely regarded as one of the most fundamental laws in all of science.

Physicist Rudolf Clausius introduced the concept of "entropy" as a measure of a system's disorder or randomness. The greater the disorder, the higher the entropy. For example, consider a room filled with air molecules. If all the molecules were somehow confined to one half of the room—a highly improbable state—this would represent high order and low entropy. If, instead, the molecules are evenly spread throughout the room, the system has lost its order and entropy is high.

According to Clausius, all systems naturally evolve toward "equilibrium", a state in which there is no net flow of energy. Systems tend to move from order to disorder, not the reverse. Left to itself, a sandcastle will collapse into a pile of sand; the reverse never happens. Real processes are typically "irreversible".

Applied to the universe, Clausius concluded that while the total energy remains constant, the universe's entropy is continually increasing. In 1854, the German physicist Hermann von Helmholtz arrived at a similar conclusion and drew significant implications. If the universe is running down into increasing disorder, it must have been *wound up* at some point in the past by a process that violated the Second Law. Moreover, at some future time, the universe will reach a state of total disorder—thermal equilibrium—where all regions are at the same temperature. At that point, no useful energy will remain, and all life must cease. This eventual fate has been called the *heat death* of the universe.

These thermodynamic laws imposed fundamental constraints on cosmological theorizing. The Second Law, with its bleak forecast of universal decline and the eventual extinction of life, extinguished the earlier optimism that the universe was evolving toward ever-greater perfection. In its place came a mood of *existential despair*—a growing sense that our universe is a mere statistical accident, lacking meanins, purpose, or hope.

4. Modern Cosmology

In 1848, Edgar Allan Poe—better known for his tales of mystery and the macabre—proposed a strikingly original cosmological theory in his little-known work *Eureka*. In it, Poe envisioned the origin of the universe as a vast explosion initiated by God. From an initial, primordial particle created out of nothing, matter burst outward in every direction. As the universe expanded, gravity began drawing atoms together to form stars and planets. Eventually, this expansion would slow, reverse, and collapse back into a single point, dissolving into nonexistence—only for God to initiate a new cosmic cycle. Poe imagined this as an eternal rhythm: universes expanding and contracting, one after another.

He also believed that our universe was finite, just one among infinitely many, each governed by its own deity. These universes, he suggested, were so distant from one another that they could never interact or communicate.

Poe's concept of an expanding and contracting cosmos bears a surprising resemblance to what we now call Big Bang cosmology—the subject of this chapter. Yet in Poe's time, his ideas found little traction in the scientific community. Most scientists continued to support the prevailing Newtonian view of an infinite, static universe.

Modern cosmology truly began in 1917, when Albert Einstein applied his newly developed theory of general relativity to the cosmos. In doing so, he laid the groundwork for many of the foundational assumptions that still underlie contemporary models of the universe.

Basic Cosmological Assumptions

All science, including cosmology, depends on observations. But since cosmology attempts to explain the origin and history of the entire physical universe—and since we can only observe a limited part of it in both space and time—cosmology must rest heavily on several assumptions about the universe as a whole.

Let's examine three key assumptions that underlie most current cosmological models.

1. Uniformity

The most basic assumption is that of *uniformity*—the idea that the laws of physics observed here and now apply equally everywhere and at all times throughout the cosmos.

This assumption is hard to justify in science generally. In cosmology, it is even more problematic, because cosmology deals with phenomena that are remote in both time and space, and mostly inaccessible to direct observation or experimentation. In big bang cosmology, this assumption is pushed further still, by claiming that the known laws of physics continue to hold under the extreme conditions believed to exist in the early universe—conditions of temperature, pressure, and density far beyond anything we can replicate or directly test.

Some alternative models relax this assumption by proposing that certain constants—like the speed of light or the gravitational constant—may have varied over time. Yet even these models maintain an underlying regularity: they postulate some higher, consistent law governing such changes. Thus, some form of uniformity remains essential.

2. General Relativity

Most modern cosmologies are built on Einstein's theory of general relativity. Classical physics, following Newton, was based on the concept of absolute space and time. Newton held that space and time were not independent entities, but aspects of God's omnipresence and eternality. In this view, there was a universal "now" that applied everywhere, and space provided a fixed background—a preferred frame of reference—in which motion and position could be objectively defined. This framework supported the idea of presentism, the view that only the present moment truly exists.

Newton's notion of absolute space was tied to what he called inertial frames—reference frames in which his laws of motion were valid. The earth's rotation and revolution, for example, were taken to represent absolute motion. But since we only ever observe relative motion, it was natural to ask whether other conceptions of absolute space—such as one with a stationary earth—might also work.

Einstein’s theory of special relativity took a different approach. It emphasized that all motion is relative, and that no observer or reference frame is privileged. It eliminated the idea of an absolute frame of reference and replaced Newton’s universal time with the idea that each observer has their own time. Events that are simultaneous for one observer may not be for another, depending on their relative motion. Absolute simultaneity was thus replaced with relative simultaneity.

General relativity extended special relativity to include gravity. In this theory, massive objects warp the geometry of space and time, creating curved space-time. It too eliminates any preferred frame or universal time. In the common interpretation, both special and general relativity lead to a “block universe” view of reality, where past, present, and future all co-exist. Time, in this view, does not flow—it just is. The apparent flow of time is seen as an illusion. This static view, or *eternalism*, directly contradicts the presentist view in which the present alone is real and time genuinely flows.

Still, relativity can be interpreted in a way that aligns with presentism—the view that only the present moment truly exists. One way to do this is by adopting a metaphysically preferred frame of reference—a specific point of view that defines what is truly simultaneous, even if no physical experiment can detect it. Such a frame could be chosen for philosophical or theological reasons.

For example, we might select a particular location in Greenwich, UK to serve as this preferred point. This location could define the center of an absolute reference frame, meaning that the absolute position of any other place in the universe would be measured relative to it. Likewise, other observers could synchronize their clocks to Greenwich time, which would establish a universal "now"—a single objective present across the cosmos.

Special and general relativity can even be rewritten in terms of absolute space and time. The so-called “Neo-Lorentzian” version of special relativity retains absolute space and time and is observationally indistinguishable from Einstein’s version. Similarly, J. Brian Pitts (2004) has shown that general relativity can be expressed using an alternative formulation that retains absolute time. These competing models make the same predictions but reflect different metaphysical commitments.

Quantum mechanics also raises questions about time. When two entangled particles are measured, the measurement on one instantly determines the state of the other, no matter how far apart they are. This suggests a kind of absolute simultaneity, regardless of the motion of the observers. Jeffrey Koperski (2015:122) notes that this supports an objective flow of time.

General relativity, which deals with the very large (*e.g.*, stars and galaxies), and quantum mechanics, which deals with the very small (*e.g.*, atoms), are two of the most successful theories in modern physics. Yet, they are very difficult to reconcile, suggesting that at least one of these theories is incomplete. Currently, there is no widely accepted theory of quantum gravity. One theory of quantum gravity proposed by Petr Horava keeps the notion of absolute time (Koperski 2015:134). There seems no reason to doubt that any future theory of quantum gravity could likewise be interpreted within a framework of absolute space and time.

Ultimately, since we can only measure relative motion and position, no scientific theory can rule out an absolute frame of reference. That choice, if made, must be based on metaphysical or theological grounds. So, for example, if one wished, one could always choose absolute space in terms of a stationary earth and absolute time in terms of earth time.

More generally, we must be careful about drawing metaphysical conclusions from physical theories. Often, such conclusions simply reflect the assumptions built into the theories from the outset.

Finally, it is worth remembering that scientific theories, no matter how comprehensive, deal only with the physical universe. They tell us nothing about the heavenly realm, which may operate under different principles altogether. Without divine revelation, human science remains incapable of discovering the full nature of time, space, or the cosmos as God sees it.

3. The Cosmological Principle

One of the most basic observational facts in cosmology is that, when viewed from Earth, the universe appears roughly the same in all directions. This large-scale uniformity, or *isotropy*, would be expected if Earth were near the center of a spherically symmetric universe.

Some models have been developed to explore this possibility. These are known as Lemaître–Tolman–Bondi (LTB) models, which describe a universe that is spherically symmetric and centered near the Earth. While mathematically sound, such models have generally been unpopular. The idea of a geocentric cosmos is considered distasteful to many scientists. Cosmologist George Ellis puts it plainly:

> *In ages by, the assumption that the earth was at the center of the universe was taken for granted. As we know, the pendulum has now swung to the opposite extreme; this is a concept that is anathema to almost all thinking men...It is due to the Copernican-Darwin revolution in our understanding of the nature of man and his position in the universe. He has been dethroned from the exalted position he was once considered to hold." (Ellis 1975:250)*

Most cosmologists reject Earth-centered models, based on the Copernican Principle, which asserts that the Earth does not occupy a privileged position in the cosmos. From this principle arises the Cosmological Principle, which holds that all observers, wherever located in the universe, would see the universe as roughly isotropic at a given cosmic time.

If isotropy is seen from every location, then the universe must also be *homogeneous*—that is, matter must be spread uniformly throughout space on large scales. Figure 4.1 illustrates the difference between homogeneous and inhomogeneous matter distributions.

Another consequence of the Cosmological Principle is that the universe cannot have an edge. If it did, an observer near the edge would see an uneven distribution of galaxies and hence would not observe isotropy. Therefore, the principle requires the universe to be filled with matter everywhere and to extend without boundary.

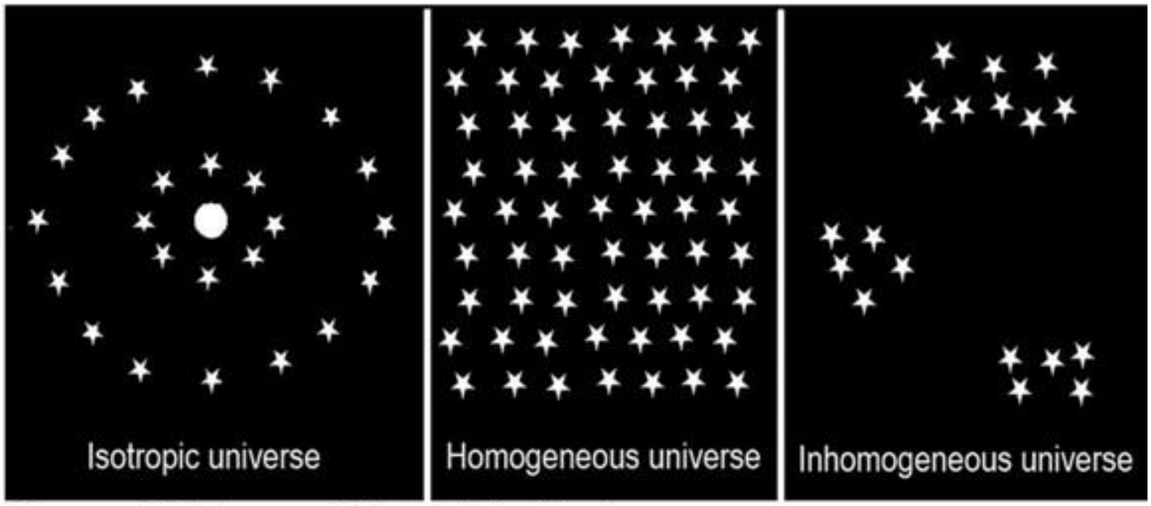

Figure 4.1. Types of Matter Distribution.

The Cosmological Principle is extremely useful in simplifying the mathematical description of the universe. It leads directly to the Friedmann equations, which govern the dynamics of the universe's expansion. Models based on these equations are called Friedmann–Lemaître–Robertson–Walker (FLRW) or Friedmann-Walker (FW) models.

But usefulness does not guarantee truth. Is the universe truly homogeneous and without edges? That remains an open question. After all, nearly every known physical object—stars, planets, galaxies, and clusters—has a boundary. Why should the universe as a whole be different?

A more modest alternative is what might be called the quasi-Cosmological Principle: the universe looks roughly the same from most places, except for regions near its edge. One could imagine a finite ball of matter surrounded by infinite empty space. If Earth were near the center of this sphere, the observed isotropy would follow naturally—just as in the LTB models.

If such a finite universe is assumed to be homogeneous within its boundary, then LTB models can reproduce the same observations as

FLRW models. However, LTB models do not require uniformity everywhere, giving them more flexibility than FLRW models.

Expanding Space or Exploding Matter?

A standard explanation in Big Bang cosmology is that galaxies are not moving through space, but rather space itself is expanding. Matter, space, and time are all said to have come into existence simultaneously at the Big Bang. In this view, there was no space or time prior to the universe's beginning, since they are properties of the physical cosmos itself.

This perspective arises naturally within FLRW models, where space is taken to be coextensive with matter. As the universe expands, space stretches along with it. There is no space "outside" or "before" the universe.

However, an alternative interpretation is equally valid. In the LTB framework, the universe may be treated as a finite ball of matter expanding into an already existing infinite space. The Big Bang would then represent an explosion of matter within pre-existing space and time. Galaxies would not be carried apart by expanding space but would move outward through a fixed background space.

Both views can account for the same observations, such as redshifts and the apparent recession of galaxies. As physicist Markus Pössel (2020) notes, the difference between expanding space and exploding matter lies not in the data, but in how we choose to interpret it. Observationally, the models are indistinguishable; the choice between them depends on philosophical preference rather than physical evidence.

A Brief History of the Big Bang

At the time, Poe's model of a primordial cosmic explosion gained little scientific interest. Most scientists still held to some version of an infinite, eternal, and static Newtonian universe. That began to change in 1917, when Albert Einstein applied his newly developed theory of general relativity to the entire cosmos. This marked the real beginning of modern cosmology.

Einstein assumed that the universe was homogeneous and that the cosmological principle applied. As we've seen, the cosmological principle implies that the universe must be the same in every direction and from every location—hence, it cannot have edges. In earlier models, the only way to achieve an edgeless universe was to make it infinite. But relativity introduced a new possibility: space could be curved.

Einstein's theory postulated that matter causes space to curve. If there were enough matter, the gravitational field would be strong enough to bend space back on itself, forming a finite yet edgeless universe—a "closed" universe. In such a cosmos, one could in principle travel in a straight line and eventually return to the starting point, without ever encountering a boundary.

On the other hand, if the universe contains too little matter to close in on itself, it remains "open." An open universe is spatially infinite, and in this case, the cosmological principle holds only if matter is uniformly distributed across that infinite expanse.

The various geometries of space—flat, closed, and open—are illustrated in Figure 4.2. In flat (Euclidean) space, the angles of a triangle always add up to 180 degrees. In closed (spherical) space, the sum exceeds 180 degrees. In open (hyperbolic) space, the angles add up to less than 180 degrees.

Visualizing a closed three-dimensional universe is difficult, since it involves four-dimensional geometry. But two-dimensional analogies can help. For instance, consider a one-dimensional wire segment lying on a table—it has two ends. Now bend it into a circle. It becomes a finite one-dimensional curve with no edges, embedded in two-dimensional space.

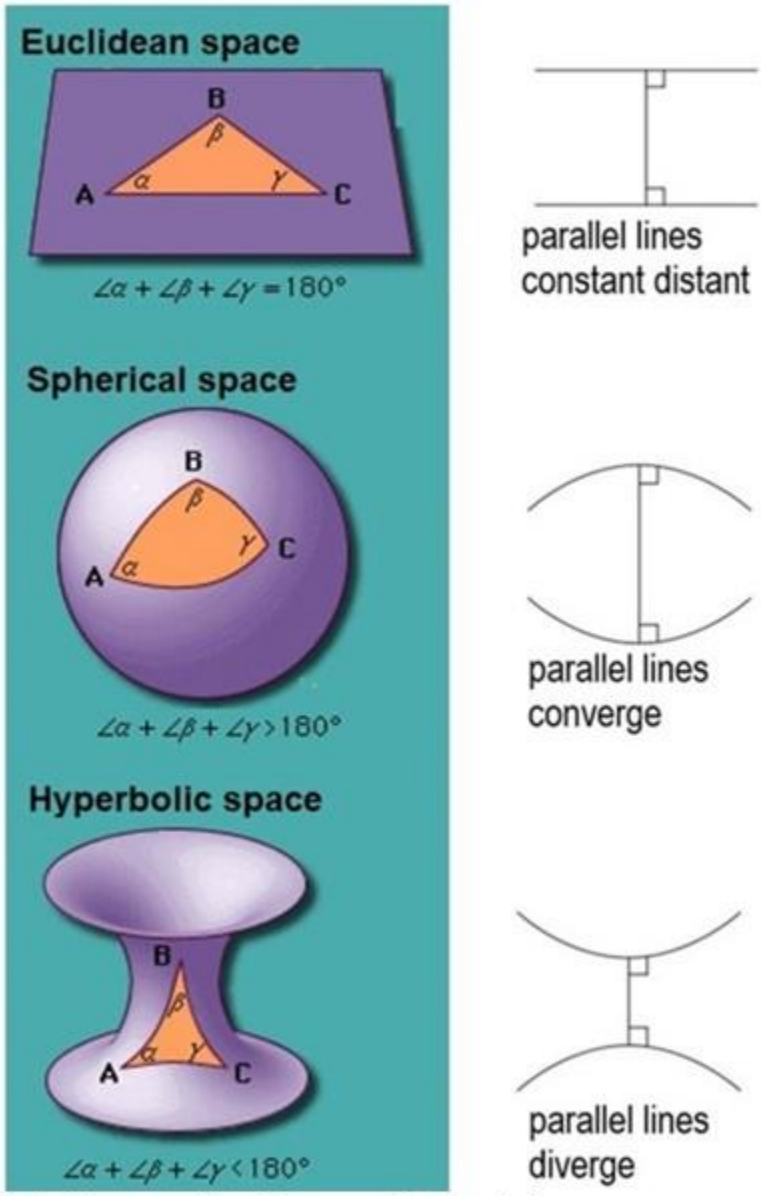

Figure 4.2. Comparing Space Geometries.

Or imagine a bug crawling over the surface of a soccer ball. The bug never encounters an edge and may eventually circle back to its starting point. The ball's surface is finite but edgeless. It is a two-dimensional space curved within a three-dimensional one.

By analogy, our three-dimensional universe could be like the surface of a higher-dimensional hypersphere—finite in extent, yet without boundary. With the introduction of general relativity, a return to a finite universe became compatible with the cosmological principle.

Present-day observations suggest that, if the universe is closed, its curvature is so slight that it would be at least 250 times wider than the observable universe, which is roughly 46 billion light-years across. This means that, regardless of how far we observe, we cannot verify whether the universe remains homogeneous beyond our cosmic horizon. In short, the cosmological principle remains a philosophical assumption—beyond empirical proof.

Einstein initially believed the universe must be static—unchanging over time. But his equations predicted that a universe filled with matter would naturally contract under its own gravity. To avoid this, Einstein introduced a repulsive force into his equations, known as the "cosmological constant" or "Lambda." This force would oppose gravity, acting more strongly over large distances, while remaining too small to detect locally. Only across vast cosmic scales would its effects become noticeable.

Modern Big Bang cosmology rests on three key observational pillars.

1. Galactic Redshifts

In the late 1920s, American astronomer Edwin Hubble discovered that light from distant galaxies is shifted toward the red, or lower frequency, end of the spectrum. This phenomenon is similar to the lowering of pitch you hear when a police siren passes by—an effect known as the Doppler effect. As the siren moves away, the sound waves are stretched, resulting in a lower pitch. In the same way, light waves from galaxies moving away from us are stretched, causing a redshift.

Hubble observed that the redshift is roughly proportional to a galaxy’s distance. This relationship, now known as Hubble’s Law, suggests that the galaxies were once much closer together.

This led, in 1929, to the resurrection of the Big Bang theory, in modern form, by the Belgian cosmologist and priest, Georges-Henri Lemaitre. Applying Einstein’s general relativity, Lemaitre conjectured that the universe began with an explosion from a "primeval atom," a dense concentration of matter.

In cosmology, the redshift (z) measures how much the wavelength of light has been stretched as it travels through space. According to the Big Bang model, this stretching is not due to galaxies moving through space, but rather to the expansion of space itself. As the universe expands, the fabric of space stretches, and light waves traveling through it are stretched as well.

This stretching means that light emitted long ago, when the universe was much smaller, appears redshifted by the time it reaches us. The higher the redshift, the more the universe has expanded since that light was emitted. Redshift is defined as the fractional increase in wavelength.

This relationship can be expressed mathematically: if a light source has redshift z, then the universe was $1 / (z + 1)$ times its current size when the light was emitted. For example, if $z = 10$, then the universe was one-eleventh (1/11) of its present size at that time. Assuming the expansion has been roughly uniform, this also means the universe was about one-eleventh of its current age when the light was emitted.

Interestingly, Edwin Hubble himself was cautious about interpreting redshifts strictly as evidence of motion or expansion. He remained open to the possibility of alternative explanations—a point we will explore later.

2. Abundances of Elements

Lemaître's model initially found few supporters. However, in 1946, physicist George Gamow gave the Big Bang theory new traction by proposing that a vast nuclear explosion in the early universe could explain the observed proportions of light elements—hydrogen, helium, and lithium. Soon afterward, astronomer Fred Hoyle demonstrated that heavier elements, in the observed proportions, could form through nuclear processes inside stars.

3. The Cosmic Microwave Background Radiation

Gamow also predicted that the Big Bang would have left behind a faint glow of residual radiation—an aftereffect of the initial fireball. He calculated that this leftover radiation should have cooled over time and now appear as a very low-temperature form of radio waves, with a temperature around 30 Kelvin.

Kelvin is a temperature scale commonly used in science. Unlike Celsius or Fahrenheit, it starts at absolute zero—the point at which all molecular motion stops. Zero Kelvin is equal to -273.15 degrees Celsius. So, when scientists say something is at 30 Kelvin, they mean it is just 30 degrees above absolute zero—extremely cold.

Gamow also predicted that this radiation would be isotropic, meaning it would appear nearly the same in all directions in the sky.

In 1965, this faint radiation was indeed discovered—though its temperature turned out to be even lower than expected, about 3 Kelvin. Its uniformity across the sky was taken as strong evidence that it was a relic of the early universe. Today, this radiation is known as the cosmic microwave background radiation (CMBR), sometimes referred to as the Big Bang's "afterglow" or "smoking gun." Its discovery was one of the key pieces of evidence that persuaded most cosmologists to accept the Big Bang theory.

Basic Big Bang Cosmology

The standard Big Bang model holds that the universe originated roughly 14 billion years ago from a singularity—an extremely hot, dense point of energy, smaller than a pinhead. The universe began with a rapid expansion, cooling as it grew. During the first few minutes, photons of energy produced pairs of matter and antimatter particles. While most annihilated each other, some stable particles—protons, neutrons, and electrons—remained.

Roughly 380,000 years later, the universe had cooled to about 3000 K. At that point, atomic nuclei formed, primarily hydrogen (75%) and helium (25%), along with trace amounts of lithium and beryllium. This era also marks the formation of the CMBR, which has since cooled to the 3 K temperature we observe today.

Over time, matter clumped together under gravity to form galaxies. Within galaxies, further condensation formed stars. As stars contracted, their core temperatures rose, igniting nuclear reactions that produced heavier elements like carbon and oxygen. Eventually, stars expelled enriched material into space, forming later generations of stars and planetary systems. On at least one planet—Earth—random molecular interactions eventually led to life, culminating in the appearance of humanity.

This is the creation story presented by standard cosmology. It offers a comprehensive explanation of the physical universe, tracing everything back to the initial singularity. It assumes a homogeneous and isotropic universe (the cosmological principle) governed by general relativity.

The Inflation Fix

Despite its initial success, the Big Bang model encountered major theoretical problems by 1980.

One major challenge was explaining how galaxies formed. The cosmic microwave background radiation (CMBR) suggested that the early universe was remarkably smooth, with matter and energy evenly distributed in all directions. But if everything started out so uniform, how did clumps of matter eventually form galaxies, stars, and other large structures?

To account for this, the model needed to include small irregularities—tiny differences in density from place to place. These slight variations would act as “seeds” that gravity could pull on, gradually drawing matter together to form the complex structures we see in the universe today.

Another problem is called the “horizon” problem. The CMBR has the same temperature in every direction, which suggests that very distant regions of the universe were once in contact and able to exchange energy. However, given that light travels at a finite speed, these regions are now too far apart to have ever exchanged information or energy. So why do they have the same temperature?

A third issue is the “flatness” problem. Observations indicate that the universe is flat, meaning its total density is exactly balanced between two extremes: one where the universe would expand forever (open), and one where it would eventually collapse (closed). This perfect balance requires incredibly precise initial conditions. As noted by physicist Jayant Narlikar in 1989, the universe's density at the very beginning could not have differed from this critical value by more than one part in 10^55—a staggering degree of fine-tuning.

To address these problems, Alan Guth proposed the concept of *inflation* in 1979. He suggested that, at extremely high temperatures (within 10^-35 seconds[1] of the Big Bang), gravity became repulsive, triggering a brief but immense expansion—many times faster than the speed of light.[2] During this inflationary period, a region initially smaller than an atom expanded rapidly to the size of a grapefruit, eventually becoming what we can observe as our universe. This idea also implies that our observable universe is just a small bubble within a vastly larger cosmos.

Inflation solves the galaxy formation problem by amplifying tiny quantum fluctuations—minute energy variations at the subatomic level—making them large enough to act as seeds for galaxies and stars.

It also resolves the horizon problem by proposing that before inflation, all parts of the observable universe were close enough to interact and even out their temperatures. Inflation then stretched these regions apart so quickly that they now appear distant, but remain uniform in temperature.

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[1] Recall that 10^x stands for 1 followed by x zeros, and that 10^-x is shorthand for 1 shifted x places to the right of the decimal point. Thus 10^-35 = .0000000000000000000000000000000001 (*i.e.*, 1 shifted 35 places to the right of the decimal point).

[2] Recall that special and general relativity do not forbid such high speeds; they just stipulates that any two objects passing each other must have a relative speed less than the speed of light.

Finally, inflation explains the flatness problem by smoothing out the geometry of space. Just as inflating a small beachball to a huge size makes its surface appear flat to an observer, the rapid expansion during inflation flattened the universe, bringing its density close to the critical value.

Because of these strengths, inflation quickly became a central part of Big Bang cosmology. However, it was not without controversy. Inflation relies on several speculative ideas—like repulsive gravity, faster-than-light expansion, and hypothetical particles called *inflatons*. Many scientists saw it as an *ad hoc* theory invented solely to fix problems in the Big Bang model rather than a fully proven mechanism.

The Dark Matter Fix

Inflation predicted that the initial density fluctuations, from which future galaxies would form, would leave subtle imprints on the cosmic microwave background radiation (CMBR). On April 23, 1992, scientists announced the detection of such temperature variations—interpreted as remnants of early cosmic structure. This discovery was hailed as strong confirmation of the Big Bang model.

Yet, challenges remained. The observed temperature variations were smaller than predicted (Rees 1992). The tiny fluctuations in matter density inferred from the CMBR were too small for gravity alone—acting on ordinary matter—to form galaxies within the universe's lifetime.

To explain how galaxies could arise from such small fluctuations, cosmologists proposed the existence of large amounts of unseen "dark matter." Dark matter is an invisible form of matter that does not interact with light, so it leaves no imprint on the CMBR. It could begin clumping together early in the universe, creating gravitational wells that attracted ordinary matter—protons, electrons, and atoms.

This additional gravity sped up galaxy formation by helping matter gather more quickly. Without dark matter, ordinary matter alone would not have clumped fast enough to form the galaxies and large-scale structures we observe today. It was proposed that every galaxy is centered on a massive halo of dark matter, far outweighing the visible matter.

Other evidence supported the presence of dark matter. For example, the high orbital speeds of stars around galaxies indicated that galaxies had far more mass than what was visible (Coles 1998). Moreover, inflation predicted that the universe's total density should be near the critical value, while observable matter accounts for only about 1% of it.

Therefore, most of the matter in the universe was postulated to be invisible dark matter.

But what exactly was this dark matter?

Initially, scientists thought dark matter might be ordinary, or "baryonic," matter in non-luminous forms such as dust, black holes, or comets. However, Big Bang element-formation models showed that baryonic matter cannot exceed about 10% of the critical density; otherwise, too much helium would have been produced (Horgan 1990). This meant most dark matter had to be non-baryonic.

A leading non-baryonic candidate was the fast-moving ("hot") neutrino. Although neutrinos are known particles that interact very weakly with normal matter, they have their own problems. Because they move so quickly, neutrinos would take too long to settle into galaxies and form structures.

As a result, theorists turned their attention to slowly moving ("cold"), hard-to-detect non-baryonic particles. This gave rise to the Cold Dark Matter (CDM) model, which has become the standard framework within Big Bang cosmology.

The Dark Energy Fix

As the universe expands, gravity should act like a brake, gradually slowing the expansion over time. Since the light we observe from distant galaxies comes from earlier stages in the universe's history, we would expect to see evidence of a faster expansion in the past, followed by slowing.

But in 1998, astronomers were surprised to discover the opposite: the universe's expansion is actually speeding up (Coles 1998).

To explain this unexpected acceleration, cosmologists revived the idea of a "cosmological constant," also known as Lambda (Λ). This represents a repulsive force that counteracts gravity. Today, it is more commonly referred to as *dark energy*.

Dark energy behaves like matter in some respects, but with very unusual properties. It contributes a uniform energy density to space, bending it as matter does. However, unlike gravity, it exerts a negative pressure, which pushes space apart and drives the acceleration of the universe. This energy is not produced by ordinary matter or radiation but is thought to arise from a mysterious property of empty space itself.

Since dark energy acts like matter, it adds to the total density of the universe. Many cosmologists prefer a model where the total density is precisely the critical value. This makes space flat, satisfying the prediction of inflation.

This framework has been formalized in what is now the standard cosmological model: the Lambda-Cold-Dark-Matter model (ΛCDM). Adopted by most cosmologists since 1998, the ΛCDM model assumes that:

- The universe is homogeneous and isotropic (the Cosmological Principle),
- General relativity governs large-scale dynamics (using the Robertson–Walker metric),
- Inflation occurred in the early universe,
- Both dark matter and dark energy exist.

It also assumes that the cosmic microwave background radiation (CMBR) is global in scope and originated when light first separated from matter. Tiny temperature variations in the CMBR are interpreted as evidence of initial density fluctuations that later developed into galaxies and cosmic structure. By analyzing these fluctuations across different scales, scientists can estimate key cosmological parameters with remarkable precision.

For example, data collected by the *Planck* satellite (2009–2013) yielded the following results:

- The Big Bang occurred 13.80 billion years ago,
- The CMBR formed about 380,000 years after that,
- The universe is flat, with a total density (Ω) of 1.00,
- The composition of the universe is approximately:
    - 4.8% baryonic matter (ordinary matter: stars, galaxies, gas),
    - 26.7% dark matter,
    - 68.5% dark energy (Turner 2018),
- The Hubble constant is estimated at 67.3 km/s per megaparsec (a megaparsec is roughly 3 million light-years).

Problems with the Standard Model

Despite its current popularity and the precision with which its parameters are given, the LCDM (Lambda Cold Dark Matter) standard model suffers from several significant observational and theoretical difficulties. These issues raise serious questions about the model's actual validity.

1. Hubble Trouble

How fast is the universe expanding? According to the CMBR data—analyzed under the assumptions of the standard model—the expansion rate (Hubble's constant, H) is 67.3 ± 0.7 km/sec per megaparsec.

However, when H is measured directly using nearby galaxies with known distances and redshifts, the result is about 75 km/sec per megaparsec (Schombart 2020). This faster rate implies a younger universe—about 12.6 billion years old, rather than the 13.8 billion years given by the standard model.

Both methods should agree. The persistent discrepancy suggests that something is fundamentally wrong—either with distance measurements, the interpretation of redshifts, or with the standard model itself.

2. Abundances of Elements

According to standard cosmology, the light elements—hydrogen, helium, and traces of deuterium, helium-3, lithium, and beryllium—were formed within the first few minutes after the Big Bang, during a brief period known as Big Bang nucleosynthesis. Heavier elements were produced later in stars. Today, the universe is about 75% hydrogen-1 and 25% helium-4 by mass, with trace amounts of heavier elements.

However, the predicted abundances of these light elements depend on uncertain parameters, such as the density of baryons and the photon-to-baryon ratio. These are often adjusted to match observed values for abundances, making them little more than tuning parameters.

To test these predictions, astronomers study very old, metal-poor stars, assuming their chemical composition closely reflects primordial conditions. But this is difficult. Over time, stars alter their composition through nuclear reactions and supernovae, contaminating surrounding gas. As a result, the elemental abundances we observe today in stars or gas clouds are often "contaminated" by these later processes. To determine the original, primordial abundances, astronomers must attempt to subtract or correct for these stellar contributions—an uncertain and complex process.

Ideally, one would like to observe pristine regions of the universe—clouds of gas that have remained chemically untouched since the early universe. These would provide a more direct measurement of the original elemental abundances. The best candidates for this are low-density gas clouds at very high redshifts, meaning they are seen as they were in the distant past. Because these clouds are far removed in both space and time, they are less likely to have been enriched by the debris of exploding stars and may still preserve the chemical fingerprints of the Big Bang. However, such regions are rare and difficult to observe, making precise determinations of primordial abundances a continuing challenge in cosmology.

Lithium, in particular, presents a major problem. The standard model predicts three to four times more lithium-7 than is observed in old stars. Lithium-6, on the other hand, appears in greater quantities than can be explained. A recent review concluded:

> *"The scientific community has a challenge that will require additional efforts to resolve... involving the fields of nuclear astrophysics, astronomical observations, non-standard cosmology, and even new physics beyond the Standard Model" (Damone 2018).*

Other anomalies exist. A metal-poor star was found to contain about 1,000 times more beryllium than Big Bang theory predicts (Gilmore 1991). High-redshift gas clouds ($z \approx 3$) show unexpectedly high levels of heavy elements (Shull 1999).

Quasars—extremely luminous, distant objects—pose another puzzle. Some, dating from when the universe was supposedly less than a billion years old, contain more iron than the Sun. But iron is typically produced in supernovae from binary star systems, which require at least a billion years to form (Hecht 1994). How did so much iron appear so early?

In short, the observed abundances of light and heavy elements frequently diverge from Big Bang predictions. Reconciling these discrepancies often requires special, ad hoc assumptions that undermine the model's explanatory power.

3. Cosmic Microwave Background Problems

Figure 4.4 shows a map of the cosmic microwave background radiation (CMBR), based on data collected by the Planck satellite in 2013. The map displays minute temperature variations across the sky: red indicates slightly warmer areas, and blue indicates slightly cooler ones. These temperature differences are incredibly small—only about one part in 100 million (10^-8) of a degree. This image is believed to represent the universe's earliest possible snapshot, roughly 380,000 years after the Big Bang, when light first separated from matter.

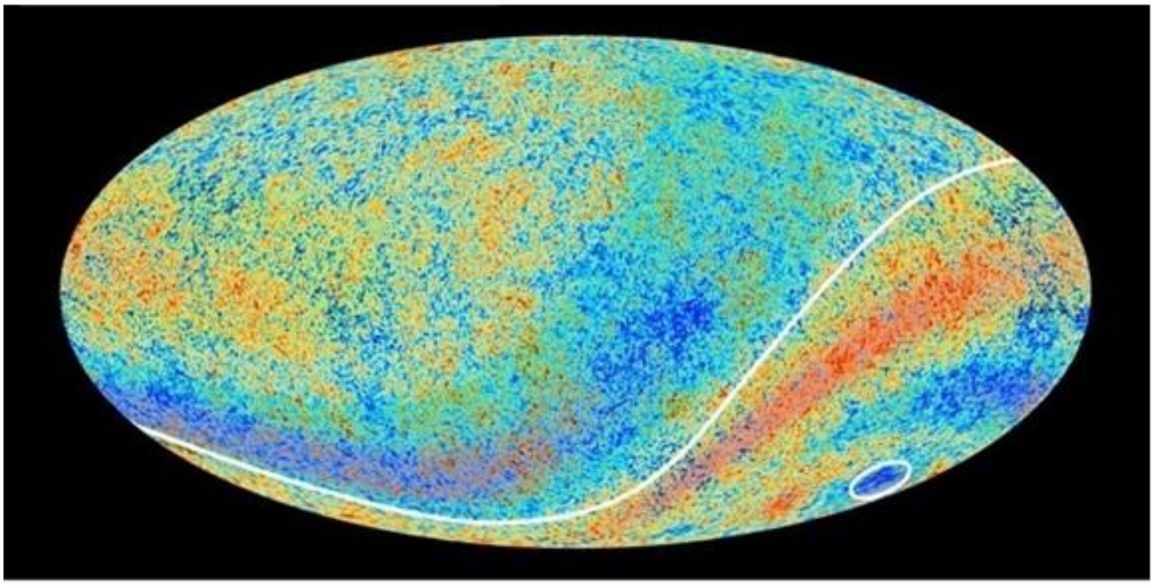
While much of the Planck CMBR data aligns with the predictions of the standard cosmological model, several puzzling anomalies remain. One of the most well-known is the so-called *"axis of evil."* Certain temperature features in the CMBR appear to be aligned with the plane of Earth's orbit around the sun (marked in the figure by a white line). The map shows a slight cooling (more blue) north of this line and slight warming (more red) to the south. This unexpected alignment suggests that local solar system effects might be influencing what should be a cosmic-scale signal.

Astronomer Lawrence Krauss remarks:

> *"But when you look at [the] CMB map, you also see that the structure that is observed is, in fact, in a weird way, correlated with the plane of the Earth around the Sun. Is this Copernicus coming back to haunt us? That's crazy. We're looking out at the whole universe. There's no way there should be a correlation of structure with our motion of the Earth around the Sun—the plane of the Earth around the Sun—the ecliptic. That would say we are truly the center of the universe." (Krauss 2006)*

A second anomaly is the so-called *Cold Spot* (highlighted inside the white circle). This is a large, unusually cold region that is far more extensive than would be expected by chance. It appears to coincide with a vast "super-void" in the constellation Eridanus—a region nearly half a billion light-years across, largely empty of galaxies, stars, and gas.

Cosmologist Laura Mersini-Houghton has speculated that this Cold Spot might even be evidence of another universe interacting with our own (Powell 2014).



Credit: European Space Agency Planck Collaboration

Figure 4.4. The Cosmic Microwave Background Radiation Map.

4. Homogeneity Problems

Regardless of the explanation, the presence of the large Cold Spot and its associated void suggests that the universe is not smoothly homogeneous on large scales, as commonly assumed, but rather exhibits significant clumpiness.

This challenge to homogeneity is reinforced by the discovery of immense cosmic structures—vast walls of galaxies and enormous voids—spanning distances greater than a billion light-years. Figure 4.5 displays data from the Sloan Digital Sky Survey, which by 2005 had mapped over 600,000 galaxies. One of the most striking discoveries, announced in June 2021, is the Giant Arc: a massive structure composed of galaxies, clusters, gas, and dust. It stretches across 3.3 billion light-years—roughly one-fifteenth the size of the observable universe (Lopez 2021).

Another anomaly involves the motion of the Sun relative to the CMBR. Planck satellite measurements indicate that the Sun is moving at 370 km/sec toward the constellation Crater (galactic longitude 264°, latitude 48°). Taking into account the movement of our Local Group of galaxies, this implies that the Local Group is traveling at 620 km/sec relative to the CMBR. However, on very large scales, one would expect the average motion of galaxies to align with the CMBR reference frame. The fact that this “bulk flow” persists beyond a billion light-years implies the presence of even larger inhomogeneities exerting gravitational influence.

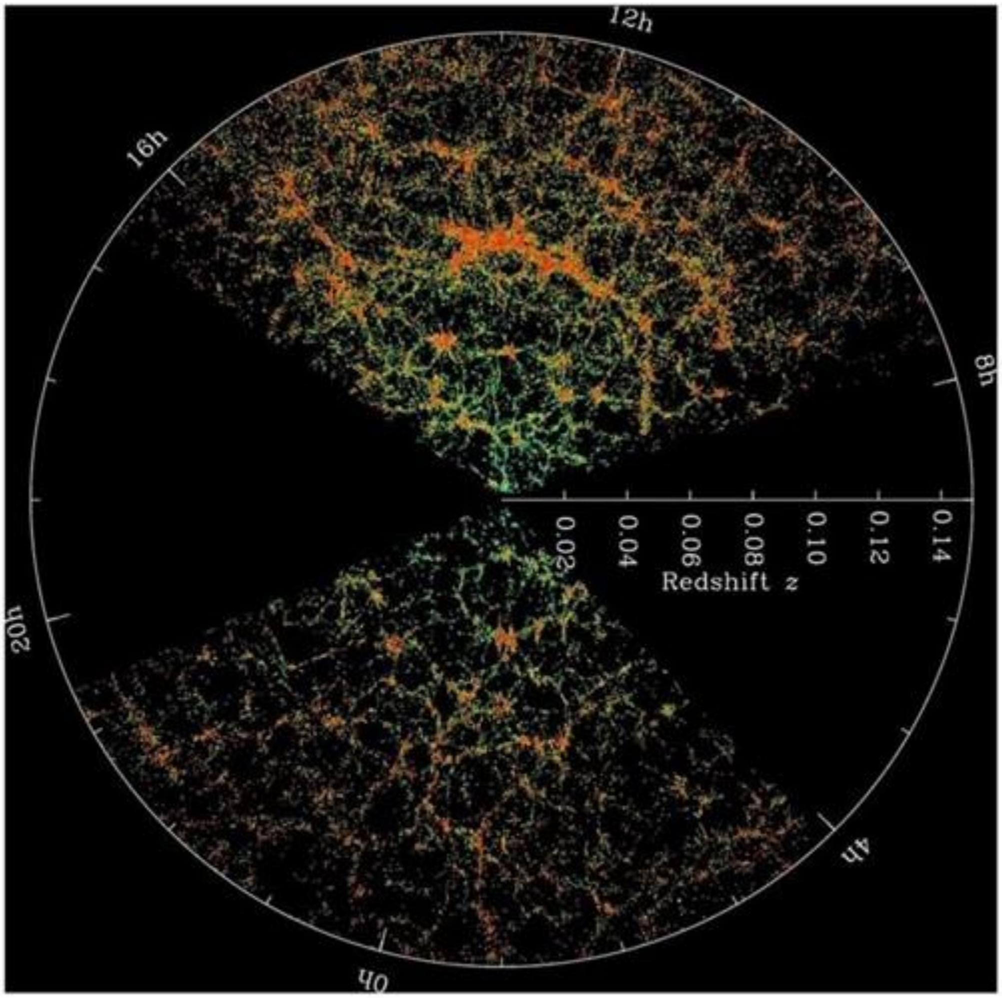
This raises questions about whether the CMBR truly provides a reliable cosmic rest frame. Cosmologist Subir Sarkar (2022) found that the rest frame of matter inferred from quasar distributions differs from that derived from the CMBR. He concludes that this discrepancy casts doubt on the standard model’s assumptions of large-scale homogeneity and the Cosmological Principle.

5. Inflation Problems

Although inflation has long been a central feature of the standard cosmological model, it soon became apparent that the theory faced significant challenges (Earman & Mosterín 1999). For instance, inflation predicts that the matter-energy density of the universe should be exactly at the critical value. Yet, observational data often suggest a much lower density, creating a tension between theory and measurement.

Moreover, inflation has proved to be highly flexible—perhaps too much so. A wide variety of inflationary models can be constructed, each tailored to fit emerging observational data. With so many adjustable parameters, inflation can be made to account for virtually any set of observations, raising concerns about its scientific testability. Compounding the problem is the concept of "eternal inflation," which implies a universe generating an infinite number of regions with varying properties. This leads to a situation where the theory makes no definitive, falsifiable predictions.

Even Paul Steinhardt (2011), one of the original architects of inflation theory, eventually grew skeptical of its validity. He argued that the type of inflation needed to produce a flat, uniform universe actually requires initial conditions that are even more fine-tuned and improbable than those the theory was meant to resolve.



A Slice of the universe. Each dot is a galaxy. Note the large-scale structure. The Earth is at the center and the outer circle at a distance of 2 billion light years.

Credit: M. Blanton and Sloan Digital Sky Survey, www.sdss.org

Figure 4.5. Map of Galaxies in the Universe.

6. What is Dark Matter?

Then there is the persistent problem of dark matter. Despite decades of searching, no stable cold dark matter particles have ever been detected. To account for its effects, physicists have proposed a range of exotic hypothetical particles—such as gravitons, photinos, axions, and WIMPs (Weakly Interacting Massive Particles). Yet none of these candidates have been confirmed. Even the most powerful particle accelerators have failed to detect any trace of them.

Cosmologist Joseph Silk acknowledges that cosmology is facing a critical impasse. He writes,

> *"If dark matter particles are still not detected within the next decade, we should be prepared for a serious re-evaluation of our options" (Silk 2018:1305).*

Further complicating the picture are observational results that challenge the dark matter model of galaxy formation. Large galaxies are thought to have formed through the merging of many smaller dwarf galaxies. According to theory, our own galaxy's dark matter halo should contain around 500 dwarf galaxies. Yet only 11 have been observed (Klypin 1999).

Even more troubling, a 2020 study (Guo et al.) found 19 dwarf galaxies that appear to contain no dark matter at all—despite the assumption that such galaxies should be dominated by it. These discrepancies raise serious questions about the role and nature of dark matter in the structure of the universe.

7. Acceleration – Dark Energy

Unfortunately, the required value of Lambda—the cosmological constant associated with dark energy—cannot be explained within the framework of current particle physics. Theoretical calculations of vacuum energy, generated as the universe cools, yield a value for Lambda that is about 10^120 times greater than what is needed by the standard cosmological model (Coles 1998). This staggering mismatch has been called one of the greatest failures in theoretical physics. As Nobel laureate Steven Weinberg remarked:

> *"This must be the worst failure of an order-of-magnitude estimate in the history of science" (Weinberg 1992:225).*

This discrepancy is a major source of concern for cosmologists. A recent reviewer observed:

> *This problem is widely regarded as one of the major obstacles to further progress in fundamental physics [...] Its importance has been emphasized by various authors from different aspects. For example, it has been described as a "veritable crisis" [...] and even "the mother of all physics problems" [...] While it might be possible that people working on a particular problem tend to emphasize or even exaggerate its importance, those authors all agree that this is a problem that needs to be solved, although there is little agreement on what is the right direction to find the solution (Wang 2017).*

8. Where Is All the Anti-matter?

All the familiar objects around us—stars, planets, people—are made of matter. Matter is composed of fundamental particles such as protons, electrons, and neutrinos. High-energy experiments have shown that every particle has a corresponding "anti-particle" with opposite charge. When particles are created from energy, as in particle accelerators or during the early universe, they always appear in particle–antiparticle pairs. When a particle meets its antiparticle, they annihilate each other in a burst of energy.

According to the Big Bang theory, during the first tiny fraction of a second, the universe was filled with intense radiation that continually produced these particle–antiparticle pairs. This process should have resulted in equal amounts of matter and antimatter. Yet, the universe we observe today is overwhelmingly composed of matter. So what happened to the antimatter?

This imbalance is one of the great unresolved problems in cosmology. Despite numerous proposed explanations, none has gained wide acceptance. As Canetti and Shaposhnikov (2012) put it: *"The origin of matter remains one of the great mysteries in physics."*

9. The First Stars and Galaxies Look Old

Where are the first stars?

The earliest stars—called *Population III stars*—are believed to have formed from the primordial material left over after the Big Bang, consisting almost entirely of hydrogen, helium, and a trace of lithium. These stars would have formed before any heavier elements (often called “metals” in astronomy) were produced. Since heavier elements are created in stellar interiors and spread through space by supernovae, the first stars should have had none in their outer layers. In theory, then, Population III stars would exhibit atmospheres free of any heavy elements.

Yet, to date, no such stars have been observed. Every star examined—including the oldest known—contains at least some heavy elements, suggesting that they are not first-generation stars. Even looking back as far as when the universe was supposedly only 500 million years old, a European team of astronomers found no evidence of Population III stars. All observed stars from that era already show traces of metal enrichment, indicating that they are at least second-generation. The researchers concluded:

> *“These results have profound astrophysical consequences as they show that galaxies must have formed much earlier than we thought.” (EVA/Hubble Information Centre 2020)*

This poses a serious challenge to current models of galaxy formation, which struggle to explain how an entire generation of stars could form, evolve, and die—enriching the universe with heavier elements—within just a few hundred million years.

Further difficulties arise from new observations. A massive, rotating disk galaxy has been detected just 1.5 billion years after the Big Bang—far earlier than such complex structures were expected to form (Neeleman 2020). Even more surprising, data from the James Webb Space Telescope recently revealed six massive, mature-looking galaxies from only 600 million years after the Big Bang (Labbe 2023), and possibly even older galaxies dating to just 300 million years after the Big Bang.

These findings suggest that stars and galaxies formed far more rapidly than standard cosmology can account for.

Assessing Big Bang Cosmology

Astrophysicist Michael J. Disney has sharply criticized the Big Bang model for relying on too many adjustable parameters—or “fudge factors.” With more free parameters than key observations, the model can always be tweaked to accommodate new data. Disney calls this flexibility "negative significance" and finds it deeply troubling. He writes:

> *In its original form, an expanding Einstein model had an attractive, economic elegance. Alas, it has since run into serious difficulties, which have been cured only by sticking on some ugly bandages: inflation to cover horizon and flatness problems; overwhelming amounts of dark matter to provide internal structure; and dark energy, whatever that might be, to explain the seemingly recent acceleration. A skeptic is entitled to feel that a negative significance, after so much time, effort, and trimming, is nothing more than one would expect of a folktale constantly re-edited to fit inconvenient new observations (Disney 2007:383).*

Is the Big Bang in crisis? That is the question raised by cosmologist Dan Hooper in a 2020 review. He reflects on the growing number of unresolved problems:

> *But lately, it seems the more we study the universe, the less we understand it. Despite decades of effort, the nature of dark matter remains unknown, and the problem of dark energy seems nearly intractable. We do not know how the particles that make up the atoms in our universe managed to survive the first moments of the Big Bang, and we still know little about cosmic inflation, how it played out, or how it came to an end — assuming that something like inflation happened at all.*
>
> *It is from this perspective that I sometimes find myself considering whether these mysteries might represent something greater than a few open and unrelated questions. Perhaps they are telling us that the earliest moments of our universe were far different from what we long imagined them to be. Perhaps these problems represent the beginning of a revolution for the science of cosmology (Hooper 2020)*

The Problem of Verification

As we have seen, many of the foundational assumptions in cosmology are inherently unverifiable. But the problem of testability extends beyond basic assumptions to more specific features of cosmological models.

Physicist Robert Oldershaw (1988) distinguishes two types of untestability:

1. **Untestability of the First Kind** refers to theories that cannot generate clear, testable predictions or whose predictions are impossible to test in principle. Such theories are inherently untestable, being beyond empirical science.

2. **Untestability of the Second Kind** involves theories so flexible—laden with adjustable parameters or subject to ad hoc modifications—that they can be made to fit virtually any observation. These are effectively untestable.

Many key components of the standard cosmological model fall into one or both categories. For example, the most critical events in Big Bang cosmology are said to have occurred within the first 10^-25 seconds. Yet direct observational evidence is unavailable for anything before the decoupling of matter and radiation, about 380,000 years after the Big Bang—when the cosmic microwave background radiation (CMBR) was formed. Everything prior to that is necessarily inferred, not observed.

Modern inflationary Big Bang models rely heavily on particle physics, which introduces further layers of theoretical abstraction. These often involve entities that go well beyond current empirical science. Many "new physics" theories, such as superstring models, require additional spatial dimensions—ranging from 5 to as many as 950 in some versions. Yet there is no known empirical method to detect even one of these extra dimensions.

Compounding the issue is that the extreme conditions of the early universe—temperatures and pressures vastly exceeding those in any lab—cannot be reproduced experimentally. This means that the physics invoked to explain the early universe remains essentially untestable. Astronomer Geoffrey Burbidge observed:

> *But since there is no way of testing the inflation hypothesis by direct observation, it has always seemed to me that it also is an idea with only a metaphysical basis (Burbidge 1988).*

Untestability of the second kind is also widespread. The standard model of particle physics contains more than twenty fundamental parameters—such as particle masses and force strengths—that cannot be derived from theory and must simply be chosen to match observations.

Similarly, proposed extensions of the model—such as supersymmetry or superstring theory—introduce many more adjustable elements. Often, when a theory encounters observational difficulties, solutions are patched together by inventing new particles or mechanisms: the Higgs field, “color” charge, renormalization, and more. As Oldershaw notes, this flexibility makes it difficult to falsify the theories in any meaningful way.

Cosmologist P.J.E. Peebles (1987) expressed his skepticism with characteristic wit:

> *The big news so far is that particle physicists seem to be able to provide initial conditions for cosmology that meet what astronomers generally think they want without undue forcing of the particle physicist's theory. Indeed, I sometimes have the feeling of taking part in a vaudeville skit: "you want a tuck in the waist? We'll take a tuck. You want a massive weakly interacting particle? We have a full rack...This is a lot of activity to be fed by the thin gruel of theory and negative observational results, with no prediction and experimental verification of the sort that, according to the usual rules of physics, would lead us to think that we are on the right track...*

More than thirty years later, Peebles’ critique remains remarkably relevant.

The same ad hoc reasoning is found throughout cosmology proper. For instance, at least three elaborate—and mutually incompatible—

theories have been proposed to explain the large-scale structure of the universe: superconducting cosmic strings, biased galaxy formation in a WIMP-dominated universe, and "double inflation." Likewise, many competing explanations have been proposed to account for the supposed "missing mass" of the universe. These include massive neutrinos, MACHOs, WIMPs, and other hypothetical constructs.

Such improvisations raise a legitimate question: Is the standard model being tested—or merely protected?

Alternative Cosmologies

Given the growing number of observational and theoretical challenges to the standard ΛCDM cosmology, one may ask: Are there viable alternatives? Indeed, numerous alternative cosmological models have been proposed and reviewed in recent years (e.g., López-Corredoira & Marmet 2022). Below we briefly survey several major categories of these alternatives.

Big Bang Variations

Some alternatives retain the basic Big Bang framework but modify particular features such as the nature of dark matter, dark energy, or inflation. Others introduce deeper changes while still preserving the major features of the standard model.

1. Inhomogeneous Models

The standard model assumes the Cosmological Principle—that the universe is homogeneous and isotropic on large scales. Yet, as we've seen, large-scale structures such as the Giant Arc and the cosmic Cold Spot suggest that the universe is not truly homogeneous. This raises the question: Why not drop the assumption of large-scale homogeneity?

A class of models known as Lemaître–Tolman–Bondi (LTB) models do just that. These models are spherically symmetric but allow for inhomogeneity in the radial direction. If we happen to be near the center of a large, under-dense region, this could account for the apparent acceleration of distant supernovae without invoking dark energy (Sarkar 2022). In fact, the inference of dark energy depends crucially on assuming the Cosmological Principle.

As philosopher Jeremy Butterfield (2014) observes:

> *"But now the cat is out of the bag! The point here is that the LCDM model being the best fit of the standard model does not imply, of course, that it is the unique best fit model. And there is considerable evidence that the observations we have made so far can be equally well fitted by Lemaitre–Tolman–Bondi [LTB] spherically symmetric inhomogeneous models—without, one might add, the all-too-conjectural dark energy of the ΛCDM model."*

2. Changing Physical Constants

Several astronomers, including Barrow (1999), Albrecht (1999), and Köhn (2017), have proposed that the speed of light was significantly higher in the early universe. This idea offers an alternative explanation for the observed apparent acceleration of distant supernovae, eliminating the need for dark energy. It also solves the horizon and flatness problems without appealing to inflation (Sanejouand 2009). In addition, some models suggest that not only the speed of light, but also the gravitational constant and cosmological constant, may vary over time. According to Gupta (2020), such models provide a better fit to the data than the standard cosmological model.

3. Modifying Gravity

Several alternative models of gravity have been proposed to address problems in cosmology without relying on dark matter. One of the most prominent is Modified Newtonian Dynamics (MOND), which alters Newton's law of motion at very low accelerations—far below those typically experienced in the solar system (see Merritt 2020). MOND was originally developed to explain the unexpectedly flat rotation curves of galaxies without invoking unseen mass. Over time, it has been extended to tackle larger cosmological issues, offering an alternative framework to both general relativity and the standard dark matter paradigm.

4. Cyclical Models

Several cyclical models have been proposed in which the universe undergoes repeated phases of expansion and contraction. One such model was developed by Paul Steinhardt (2008), a former advocate of inflation who later became one of its critics. In his version of cyclic cosmology, the smoothing of the universe occurs during the contraction phase, eliminating the need for inflation altogether.

Another approach, the Dynamic Universe model proposed by Suntola (2020), describes the cosmos as a closed, zero-energy system that has no beginning or end. Instead of starting with a singular Big Bang, the universe continuously evolves—contracting from an infinitely large past state and expanding again toward an infinitely large future. This model seeks to explain cosmic history without invoking dark energy, inflation, or other speculative components of the standard cosmological framework.

Steady-state Cosmologies

Steady-state cosmology, developed in 1948 by Fred Hoyle, Herman Bondi, and Thomas Gold, was based on the *perfect cosmological principle*—the idea that the universe is uniform not only in space but also in time. To maintain a constant density in an expanding universe, it proposed the continuous creation of matter.

While this model gained some support, especially among British astronomers, it began to lose ground after the 1965 discovery of the cosmic microwave background radiation (CMBR), which aligned naturally with Big Bang predictions but posed a challenge for steady-state theories.

In response, a revised “quasi-steady-state cosmology” was introduced. It dropped the perfect cosmological principle and described a universe undergoing endless oscillations between minimum and maximum sizes, without singularities.

Since it avoided the Big Bang singularity, it needed to explain the observed abundances of elements, as well as the cosmic background radiation (CMBR). George Burbidge & Fred Hoyle (1998) argued that the observed helium and light element abundances could be produced by nuclear processes in stars, and that the total starlight generated would match the energy density of the CMBR.

Jayant Narlikar (1989) further proposed that other astrophysical processes—such as cosmic rays, magnetic fields, and starlight modified by interstellar dust or microscopic particles—could account for the background CMBR's observed spectrum.

Plasma Cosmology

Plasma cosmology proposes that electromagnetic forces—rather than gravity alone—play a dominant role in shaping the universe. In this view, the universe is composed largely of plasma: a state of matter consisting of charged particles such as ions and free electrons. These electromagnetic interactions are thought to form filamentary structures in the plasma, from which stars and galaxies emerge.

The model assumes an eternal universe with no beginning or end, but one that is continuously evolving. Championed by Nobel laureate Hannes Alfvén, plasma cosmology offers an alternative to the standard Big Bang model. Eric Lerner (1988) further developed the theory by constructing scenarios in which the observed abundances of light elements are produced through nuclear reactions in cycles of stellar formation and explosion.

Although normal stars do not produce deuterium and lithium, Lerner suggested that these could be generated by the interaction of matter with cosmic rays. He also offered an alternative explanation for the cosmic microwave background radiation (CMBR), arguing that it results from starlight being scattered and thermalized by free electrons in space—a view similar to that held by steady-state cosmologists.

Initially, plasma cosmology explained the Hubble expansion as a repulsion between matter and antimatter. More recently, however, Lerner (2006) has argued that the universe is not expanding at all. Instead, he proposes that redshifts are caused by a “tired light” effect, where photons gradually lose energy through interactions with electrons in the cosmic plasma.

Static Models

Galactic redshifts are commonly interpreted as evidence that galaxies are moving away from us, implying an expanding universe. However, no galaxy has ever been directly observed to physically move away in real time. This raises the question: could the redshift have causes other than motion, suggesting the universe might actually be static?

Several alternative explanations for redshifts have been proposed. One popular idea is the “tired light” hypothesis, which suggests that light loses energy as it travels through some resisting medium, causing its wavelength to stretch. Another possibility is the “gravitational redshift,” where light loses energy while escaping from a strong gravitational field.

Based on these non-motion explanations of the redshift, several static-universe cosmologies have been developed, challenging the conventional expanding universe model.

1. Tired Light

The motion interpretation of galactic redshifts has been questioned almost since its inception. In 1929, astronomer Fritz Zwicky proposed that the redshift could instead be caused by the gradual loss of energy by light as it travels through space. One advantage of these “tired light” theories is that they naturally predict a redshift proportional to distance traveled, which aligns with Hubble’s law. Interestingly, Hubble himself favored the tired-light explanation over the expansion interpretation throughout his life, although he could not propose a convincing physical mechanism for how photons might lose energy in this way.

A key challenge for tired-light theories is explaining how photons could lose energy without significant scattering. If scattering were substantial, distant galaxies would appear blurred or fuzzier than they actually do. Most tired-light models propose that the lost photon energy is re-emitted at much lower energies, which could help explain the existence of the cosmic microwave background radiation.

Numerous tired-light mechanisms have been proposed over the years. Some suggest that light interacts with the intergalactic plasma (Kierein 1988), while others propose inelastic collisions between photons and molecules (Marmet & Reber 1989). Other ideas include photon energy loss to gravitational fields (Fischer 1993) or interaction with a hypothetical medium of gravitons traveling faster than light (Van Flandern 1993).

More recently, David Crawford (2006) developed a model in which redshift arises from photons interacting with curved spacetime itself. This leads to a static universe that is statistically uniform across all space and time, with no beginning or end. Crawford argues that his model, which does not require dark matter or dark energy, fits observations better than standard cosmology (Crawford 2011).

Similarly, Dean Mamas (2010) proposed a static universe model where photons, treated as electromagnetic waves, cause oscillations in free electrons scattered throughout deep space. These electrons then re-radiate some of the photon's energy, leading to a redshift effect without blurring the observed images.

2. Gravitational Redshift

G.F.R. Ellis (1978) demonstrated that the observed redshifts of galaxies and the cosmic microwave background radiation could, in principle, be explained by a static, spherically symmetric universe with two centers—our Milky Way galaxy located near one of them. In this model, the redshifts of galaxies are interpreted as cosmological gravitational redshifts rather than due to expansion, while the background radiation comes from hot gas surrounding a singularity at the other center. Ellis emphasized that, although he did not claim the universe actually matches this model, there is no strong evidence ruling it out.

More recently, Robin Booth (2024) revived a similar idea, proposing a static-universe model where redshift arises from atomic contraction in a strong gravitational field, attempting to replicate the Hubble law without expansion. Additionally, recent observational studies have measured small gravitational redshifts in galaxy clusters, finding them consistent with general relativity but insufficient to explain the full cosmological redshift without invoking expansion (Jimeno et al. 2023).

3. Changing Constants

A somewhat different class of static universe models involves time-varying physical constants. V.S. Troitskii (1987) suggested that redshift arises from a gradual decrease in the speed of light. This idea remains speculative, but more recent reviews (e.g., Bambi 2022) continue to explore the possibility of variable fundamental constants, motivated by attempts to unify gravity and quantum mechanics. Current observational limits on variations in the fine-structure constant and other parameters are extremely tight but do not entirely rule out small changes over cosmological timescales (Seto et al. 2023; Le 2025 2025).

Earlier, Fred Hoyle (1975) and Halton Arp (1998) proposed that the masses of elementary particles increase over time, which would lead to shrinking atoms and therefore apparent redshift without expansion. Although these ideas have not gained mainstream acceptance, they have inspired continued testing of the constancy of fundamental parameters in modern cosmology.

Summary

These are just a sample of alternative cosmological models that have been proposed to address perceived shortcomings in the standard model—particularly the *ad hoc* assumptions behind inflation, dark matter, and dark energy. However, while many such alternatives exist, each faces its own set of challenges and unresolved issues.

Jean-Marc Bonnet-Bidaud, after surveying several competing models for the origin of the cosmic microwave background radiation (CMBR), observes:

> *"…most of these works are currently too underdeveloped, particularly with regard to the details of small inhomogeneities of the background radiation. But they illustrate the fact that there are multiple paths that can be followed to interpret this mysterious 3K radiation." (Bonnet-Bidaud 2017)*

Likewise, most alternative explanations for galactic redshifts remain speculative and face significant challenges. Even so, these alternatives show that both redshifts and the cosmic microwave background radiation (CMBR) can be interpreted within a range of theoretical frameworks. Neither redshifts nor the CMBR, therefore, provide unambiguous support for Big Bang cosmology.

To date, no single cosmological model—standard or alternative—has succeeded in explaining all observed phenomena without relying on special pleading or dubious *ad hoc* assumptions.

Cosmology and Sociology

In his insightful paper *“Non-standard Models and the Sociology of Cosmology,”* astronomer Martin Lopez-Corredoira reviews various alternative cosmologies and offers a sharp critique of how the scientific community handles competing theories. He compares modern cosmology to the old Ptolemaic system, which added more and more epicycles to explain away inconvenient observations while clinging to its core assumptions. In a similar way, he argues, the Big Bang model has been repeatedly patched with *ad hoc* additions—like inflation, dark matter, and dark energy—to preserve its viability in the face of new data.

Lopez-Corredoira sees a double standard at work. The standard model is allowed to evolve by adding speculative features whenever problems arise, yet alternative models are often dismissed outright for similar difficulties. He questions why theories are judged by such unequal standards.

The root of the problem, he argues, lies in the structure of the scientific community. Most cosmologists today are deeply invested in the ΛCDM model and spend their careers refining it. As a result, alternative ideas are seldom developed or tested thoroughly. They are often ignored or rejected prematurely.

This is partly due to the way academic science works. Young scientists—who have often been the ones to spark major breakthroughs—are under strong pressure to conform. To secure a Ph.D., funding, academic positions, or access to major telescopes, they must choose research topics that align with the prevailing view.

The growing dominance of large research teams further discourages dissent and innovation, as conformity becomes a prerequisite for inclusion in major projects.

There's also a feedback loop. The more attention, funding, and effort go into the standard model, the better it becomes at explaining anomalies—simply by introducing new parameters when needed. This can create the illusion of success, even as the theory grows more elaborate and less falsifiable.

In the end, the dominance of the standard cosmology may reflect not only explanatory success but also the social dynamics and structural biases of contemporary scientific practice.

Summary

Several important conclusions can be drawn from our survey of modern cosmology.

1. Deficiencies in Big Bang Cosmology

Despite its widespread popularity and presentation as settled science, the Big Bang model is plagued by a host of observational and theoretical difficulties.

On the observational side, we have noted ongoing discrepancies in the value of the Hubble constant, challenges in accounting for observed elemental abundances, the discovery of vast cosmic structures that defy the assumption of large-scale homogeneity, unexplained bulk flows of galaxies relative to the CMBR, the apparent acceleration of the cosmic expansion, and the presence of mature galaxies far earlier than expected after the Big Bang.

The theoretical side fares no better. The inflationary hypothesis remains speculative and *ad hoc*. Dark matter, invoked to explain galactic dynamics and structure formation, consists of hypothetical particles that have never been detected. The cosmological constant problem remains unresolved. Many proposed theoretical explanations are inherently unverifiable. In short, many key features of the standard model lack empirical support or rest on highly contrived theoretical assumptions.

While it is possible to salvage the Big Bang model through *ad hoc* additions—such as inflation, dark matter, and dark energy—each new patch raises further questions. This strategy of adjusting the model to fit new data recalls the epicycles of Ptolemaic astronomy. A theory with enough free parameters can be made to fit any data, but at the cost of explanatory coherence. As in past scientific revolutions, a model may persist for some time despite serious flaws, especially in the absence of a compelling alternative.

At present, there is no obvious way to resolve all these problems within the standard Big Bang framework. Moreover, we have yet to address deeper issues related to the supposed initial singularity—a topic taken up in the next chapter.

In short, both observationally and theoretically, Big Bang cosmology remains a model with significant internal tensions and unresolved questions.

2. The Possibility of Alternative Cosmologies

This brings us to a second conclusion: the viability of alternative cosmologies. As we have seen, many observational features of the universe allow for more than one theoretical interpretation. This flexibility has given rise to a wide range of alternative cosmological models. In a later chapter, we will explore several examples of creationist cosmologies.

Our emphasis on the shortcomings of Big Bang cosmology is not intended to single it out unfairly but simply reflects its status as the dominant model. All current alternatives face serious challenges of their own. Many of the non-standard explanations for redshifts remain highly speculative, and most attempts to account for the observed elemental abundances or the cosmic microwave background involve just as much special pleading and theoretical patchwork as the Big Bang model.

Nevertheless, these alternative cosmologies should not be dismissed out of hand. They are, at the very least, reminders that cosmology is far from settled. It is entirely plausible that, if alternative models received the same level of attention, ingenuity, and funding as the standard model, they too could be refined and adapted to fit the data.

At present, no cosmological model—standard or otherwise—offers a simple, coherent explanation of all observations within the bounds of well-established physical laws. Thanks to major advances in telescopic technology, such as the Hubble Space Telescope and, more recently, the Webb Space Telescope launched in 2021, astronomy has entered a new era of data collection. This ongoing flood of high-resolution observations of deep space is already reshaping our understanding of the cosmos and will likely continue to do so.

It is reasonable to expect that, with new data, some current puzzles will be resolved, while new anomalies will emerge. As a result, future cosmological models may differ significantly from the Big Bang paradigm. We should therefore be cautious about equating any current model with the actual history of the universe.

Finally, it is important to recognize the inherent limitations of cosmology itself. The unavoidable gap between what we can observe and the theoretical models we construct to explain those observations ensures that multiple cosmological models will always coexist. Each will attempt to make sense of the cosmos, but none will offer the final word.

3. The Necessity of Presuppositions

How should we choose among competing cosmologies? Our third conclusion is that every cosmology, no matter how scientific it appears, rests on foundational assumptions that cannot be empirically verified. These basic presuppositions are shaped not by data alone but by deeper, extra-scientific commitments—philosophical, metaphysical, and often religious in nature. As noted in the first chapter, scientific theorizing is inevitably influenced by our prior worldview. This is especially true in cosmology, where we attempt to explain the entire universe. Inevitably, we construct models that reflect our most fundamental convictions about reality.

It is therefore essential to recognize and critically examine the philosophical assumptions that underlie the construction, evaluation, and acceptance of any cosmological model. Only by doing so can we properly assess the strengths and limitations of the cosmology we adopt.

5. Cosmology, Life, and the Future

What does modern cosmology tell us about the future? In the near term, one prominent hope of contemporary society is the possibility of contacting intelligent life beyond Earth. How likely is such a discovery, and what would its implications be? Looking further ahead, people wonder whether life—human or otherwise—can endure indefinitely. And beyond that lies the ultimate question: does science offer any hope for my personal immortality or life after death?

Life in the Universe

Many people believe that life is not unique to Earth but may be widespread throughout the universe. One of the most significant efforts to explore this possibility began in 1992 with the launch of SETI—the Search for Extra-Terrestrial Intelligence. This project used radio telescopes around the world to scan the skies for signals that might originate from intelligent civilizations.

Today, the search continues through the work of the SETI Institute with newer initiatives such as LaserSETI, which looks for laser pulses from space, and Breakthrough Listen, a $100 million, decade-long project that uses powerful new radio telescopes to listen for possible alien signals.

So far, these efforts have not yielded any confirmed signs of extraterrestrial intelligence. Still, the search presses on, fueled by rapid advances in telescope technology, data analysis, and artificial intelligence.

In the next sections, we will explore both the scientific and theological arguments for and against the existence of alien life—and consider what such discoveries might mean for our understanding of our place in the cosmos.

A Brief History of ETI

Speculation about the existence of extraterrestrial life (ETL) and intelligence (ETI) has a long and varied history. The idea can be traced back to the Greek philosopher Democritus (ca. 460–370 B.C.), who believed in an infinite number of worlds, each with a central, inhabited planet. He even thought the moon was populated. However, in both ancient and medieval times, belief in ETI was generally rare. The prevailing worldview during the Middle Ages was finite and hierarchical, with no place for other inhabited planets—though belief in vast numbers of angels and demons was common.

A major shift occurred with the Copernican revolution in the 16th century. Once Earth was no longer seen as the center of the universe but as just another planet, it seemed reasonable to assume that other planets might also be inhabited. Johannes Kepler, among others, speculated that the sun, moon, and planets teemed with life.

By the late 18th century, belief in ETI had become widespread in scientific circles. By then, it had been shown that the moon lacked an atmosphere, ruling out life there. Yet, interest simply moved to other planets. The German philosopher Immanuel Kant, for example, wrote in 1755 about various kinds of life supposedly dwelling on the planets of the solar system.

Mars soon became the main focus of interest. In the early 20th century, American businessman and amateur astronomer Percival Lowell claimed to see canals on Mars—structures he believed were built by intelligent beings. While professional astronomers quickly dismissed these claims, public fascination with Martian life endured.

With the failure to find life within our solar system, the search expanded to nearby stars. Today, many still hope that advanced alien civilizations will one day be detected, perhaps through radio signals captured by increasingly sensitive telescopes.

The Scientific Case for ETI

How strong is the scientific case for extraterrestrial intelligence (ETI)? Estimates vary widely, and in recent years there has been an active debate between scientists who believe ETI is likely to be common and those who consider it extremely rare—or even nonexistent.

Optimists argue that many stars have planetary systems, that a significant number of those planets are suitable for life, that life will emerge on a good share of habitable worlds, and that some of those will eventually give rise to intelligent civilizations. Even if the probability at each stage were as low as one percent, the sheer number of stars in our galaxy—about 400 billion—would still suggest the existence of thousands of intelligent societies in the Milky Way alone. Many of these civilizations, it is often assumed, would be far more technologically advanced than we are.

Pessimists, however, stress that each step in this chain is marked by deep uncertainty. Assigning numerical values to the probabilities often amounts to little more than speculation. Moreover, some argue that certain transitions—such as the leap from simple life to intelligent, technologically capable life—may be extraordinarily improbable, based on what we currently know.

Let's take a closer look at some of the most critical links in this chain.

1. Habitable Planets

Recent observations confirm that most stars are accompanied by planets. Planets outside our solar system are called exoplanets, and the number detected continues to grow rapidly. But how many of these planets could actually support life?

All known life requires liquid water. For this reason, a potentially habitable exoplanet must be rocky—like Earth or Mars—rather than gaseous, like Jupiter or Saturn. It must also lie within the so-called "habitable zone" of its star, where surface temperatures would allow water to remain liquid. According to a 2020 study by Kunimoto and Matthews, as many as 18 percent of Sun-like stars may have a rocky planet in this zone. Given that our Milky Way Galaxy contains around 400 billion stars, this would suggest the existence of roughly 6 billion habitable-zone rocky planets. Within just 100 light-years of Earth, we might expect to find about 170 of them.

However, having the right temperature and a solid surface is not nearly enough to sustain life. Other conditions are essential. For example, the planet must receive the right kind and amount of radiation from its star to support photosynthesis. A study by Giovanni Covone (2021) examined nearly 5,000 exoplanets and concluded that only one—Kepler-442b, located about 1,200 light-years away—came close to receiving enough sunlight to sustain a large biosphere. This suggests that very few planets in the galaxy have the right radiation conditions even for plant life, let alone intelligent life.

Even among planets that are rocky and well-positioned, the chances of actually having liquid water, a suitable atmosphere, and the necessary chemical ingredients for life are extremely small. The combination of all the conditions required for a stable, life-supporting environment may be uniquely found on Earth. Despite the billions of planets in our galaxy, Earth may still be the only one with all the right features for life as we know it.

2. Life by Chance

The jump from having a habitable planet with suitable conditions to the actual emergence of life is enormous. So far, no form of life has been detected by any space probes on the planets within our solar system.

For a long time, Mars was considered a promising candidate for hosting at least primitive life forms, if not advanced beings like the imagined canal-builders of the early 20th century. However, the Viking landers' experiments in 1976 found no conclusive evidence of life, though some scientists still debate these results. Similarly, moon rocks returned by Apollo missions showed no signs of life.

In 1996, excitement arose when NASA scientists reported possible evidence of primitive life on Mars. A meteorite found in Antarctica, believed to have originated from Mars, contained microscopic carbonate structures that resembled bacteria on Earth (MacKay 1996). It was hypothesized that asteroid impacts could eject material from Mars into space, some of which might land on Earth. However, further research suggested these structures likely formed through non-biological processes. Even if life had been confirmed in the meteorite, the question would remain whether that life originated independently on Mars, since the same asteroid mechanism could have transferred Earth life to Mars.

From an evolutionary naturalist perspective, how likely is life to emerge from non-life? Complex molecules such as water, methane, ammonia, alcohols, and formic acid have been found in interstellar space. Laboratory experiments show that exposing mixtures of water vapor, methane, and ammonia to ultraviolet light can produce some amino acids. Amino acids have also been found in meteorites, suggesting these building blocks of life are widespread in the universe.

Yet amino acids alone are only a tiny step toward the simplest living cell. Life as we know it requires two essential types of molecules: proteins, which form the structure and machinery of organisms, and nucleic acids like DNA (**D**eoxyribo**n**ucleic **a**cid), which store and transmit genetic information. Proteins are long chains of amino acids, while DNA consists of sequences of bases that encode information. Both are complex molecules composed mainly of carbon, hydrogen, oxygen, and nitrogen.

Even with abundant amino acids and bases, the chance of them assembling randomly into a functional living cell is astronomically small. The simplest cell requires hundreds of proteins, each made up of hundreds of amino acids linked in specific sequences. Estimates suggest the odds of randomly forming just one functional protein are less than 1 in 10^164, even if the universe filled with of amino acids.

Stephen Meyer (2009) calculates that the simplest cell needs at least 250 proteins averaging 150 amino acids each. The probability of assembling all these proteins by chance is about 1 in 10^41,000—a number so vast it defies comprehension.

Considering the entire universe, with its estimated 10^80 elementary particles interacting around 10^43 times per second over roughly 10^17 seconds (about 30 billion years), the total number of possible events since the universe began is about 10^140. Comparing this to the improbability of forming a cell by chance, Meyer concludes the likelihood of a functional cell spontaneously arising during the universe’s entire history is about 1 in 10^40,860.

To put this in perspective, this is roughly equivalent to tossing a fair coin and getting heads 135,000 times in a row. At such odds, even after 14 billion years, we would not expect another living cell to form anywhere in the observable universe.

3. Higher Forms of Life

The next major challenge is the transition from simple, single-celled organisms to more complex forms of life. According to Ian Crawford (1997:19), single-celled organisms appeared about one billion years after Earth’s formation. In contrast, multi-cellular animal life did not emerge until more than three billion years later. Remarkably, the evolution of multi-cellular animals from single-celled ancestors is believed to have occurred only once in Earth's history. Based on this, Crawford concludes that the evolution of complex life is an even greater hurdle than the initial emergence of life itself.

4. Civilization

Another concern raised by Ian Crawford is the emergence of intelligence. Despite the existence of thousands of species that have allegedly evolved over millions of years, only one—humankind—has developed the intelligence necessary for technology and culture. This suggests that even if multi-cellular life exists elsewhere, the evolutionary path to intelligent civilization is extremely unlikely.

Some remain optimistic. Biologist Jack Cohen and mathematician Ian Stewart (2002), for example, argue that life could take on forms far beyond anything we can currently imagine. While this is possible, such speculation does little to overcome the enormous odds against the random emergence of intelligent life. The probability remains vanishingly small.

Physicist Marcelo Gleiser (2023) goes further, arguing that we are likely the only intelligent beings not just in the Milky Way Galaxy, but perhaps in the entire universe. For this reason, he urges us to view Earth as a rare and sacred place, and to adopt a biocentric perspective that values and protects life as something uniquely precious. However, since Gleiser identifies as agnostic, his spirituality is rooted not in the supernatural but in reverence for nature itself. In effect, he advocates a naturalistic form of paganism.

5. Self-Organizing Matter

Such pessimistic estimates have been challenged by more optimistic thinkers, who argue that our current understanding of evolutionary mechanisms is still incomplete. They remain hopeful that future scientific developments will show that the emergence of life is far more probable than it now appears. After all, they ask, if life evolved here—on this relatively small and insignificant planet—why shouldn't it have evolved elsewhere as well?

Physicist Paul Davies (1995) contends that the origin of life was neither a miracle nor a wildly improbable accident. Instead, he suggests it was the natural result of certain "self-organizing" properties inherent in matter. According to Davies, both life and consciousness are fundamental "emergent" properties of nature—inevitable outcomes of the laws of physics once a physical system reaches a sufficient level of complexity. On this view, life should be widespread throughout the universe.

However, Davies offers no detailed explanation of how such complexity arises, what precise conditions are required for life and consciousness to "emerge," or which physical laws govern this alleged inevitability. Simply asserting that life must appear—without specifying the mechanisms—does little to address the deep difficulties involved in the origin-of-life problem.

A further weakness in Davies's position is the lack of experimental support. Despite many scientific attempts to synthesize life in the laboratory, none have uncovered the "self-organizing" properties he envisions. And if life truly emerges naturally from matter, why did it appear on Earth only once, according to the standard evolutionary narrative?

In the end, Davies's "emergent properties" appear more magical than scientific—mystical forces that supposedly operate without any guiding intelligence or divine intervention. It amounts to invoking a miracle, but without a miracle-worker. This is little more than philosophical wishful thinking dressed in scientific language.

6. Where Are They?

If intelligent life were common in our Milky Way Galaxy, it would be reasonable to expect that at least one advanced civilization would have, by now, explored or even colonized our entire Galaxy. Yet we see no evidence of such activity. We have not been visited by extraterrestrials, nor do we observe any clear signs of their presence. This absence suggests that extraterrestrial intelligence must be extremely rare. Few astronomers seriously believe that reported sightings of unidentified flying objects (UFO’s) represent actual spacecraft from alien civilizations.

Optimists offer various explanations. Perhaps alien civilizations have no interest in colonization. Or perhaps they are deliberately avoiding contact, treating Earth as a kind of nature preserve—what some have dubbed the "zoo hypothesis." But such ideas strike many as far-fetched. Pessimists argue that these scenarios are unlikely, and that the more reasonable conclusion is that we are, at least for now, alone.

Motivation For Belief in ETI

Given the lack of direct scientific evidence for extraterrestrial intelligence (ETI), belief in ETI rests largely on philosophical, cultural, or psychological motivations rather than empirical support. Physicist Frank Tipler argued decades ago that belief in ETI resembles belief in UFOs—both driven by a desire for salvation from outside us. Similar sentiments persist today.

Astrobiologist Paul Davies observes:

> *“SETI is not really a scientific research program at all, but rather a search for meaning in the cosmos… a search for a higher intelligence to give meaning to our insignificant lives on an insignificant planet” (Davies 2012, 203).*

Astronomer David Wilkinson makes a similar point:

> *"For some, the search for aliens provides a substitute for traditional religious belief—a hope that there is someone wiser and more powerful watching over us, guiding us, even offering salvation" (Wilkinson 2013, 81).*

Sociologist Peter Ward and astrobiologist Donald Brownlee note the cultural longing behind the search:

> *"In an increasingly secular world, the idea of benevolent, advanced aliens watching over us, perhaps ready to intervene, plays a similar psychological role to that of gods or angels in traditional religion" (Ward & Brownlee 2003, 284).*

Even prominent SETI researcher Jill Tarter has acknowledged the quasi-religious undertones of the enterprise:

> *"SETI is not about proving the existence of God… but it may satisfy the same deep need to feel connected to something larger than ourselves, something cosmic and meaningful" (quoted in Vakoch 2014, 27).*

These observations underscore the fact that belief in ETI often functions less as a scientific conclusion and more as a projection of human hopes and fears. It is ironic that man, having rejected belief in God in many quarters, still looks to the heavens in search of meaning, guidance, and salvation.

Theological Considerations

The arguments we have considered so far rest on the assumption that life, including intelligent life, arose through naturalistic evolutionary processes. But before Darwin, many proponents of extraterrestrial intelligence (ETI) were Christians. This raises an important question: *Should Christians expect aliens to exist?*

From a theological standpoint, it is certainly possible that God created intelligent beings on other planets. In the 17th century, the newly invented telescope revealed countless stars invisible to the naked eye.

These could hardly serve as light-bearers for humanity alone. So why had God created them?

Many Christian thinkers of the time argued that these stars might function as suns for other inhabited worlds. They reasoned that a wise and benevolent Creator would not waste such vast resources. If two inhabited worlds are better than one, then surely an infinite God would create as many as possible. To them, a universe teeming with life was more fitting for an all-powerful, all-good Creator than one centered on a single inhabited planet (Dick 2018).

Interestingly, one common objection to ETI—the absence of colonization or contact—no longer holds if we assume a young universe. If God created the cosmos recently, then any extraterrestrial civilizations would not have had enough time to develop the technology or means to explore and reach us.

1. The Absence of Biblical Evidence for ETI

One of the most common theological objections to ETI is this: if ETs exist, why are they not mentioned in Scripture? Philip Melanchthon (1497–1560) argued that after God created the earth, sun, moon, and stars—our entire cosmos—he rested and created nothing more, certainly not another inhabited world. In Scripture, the only extraterrestrial beings mentioned are angels.

This objection carries weight for those who believe the Bible gives a comprehensive account of all major aspects of creation. However, others respond that the Bible is primarily about God’s relationship with humanity. Its purpose is not to provide a full inventory of everything in the cosmos. If God created other intelligent beings, he may simply not have revealed their existence because it was not relevant to his redemptive plan for humankind (Corbally and Rappaport 2020, 65–68).

On this view, the silence of Scripture on ETI does not amount to a denial of its possibility—it may simply reflect the Bible’s human-centered focus (Haught 2015, 182–185). Such a discovery could even deepen our humility and awe at God’s vast and creative purposes.

2. Christ's Incarnation and ETI

The most serious theological objection to ETI concerns the uniqueness of Christ’s incarnation and sacrifice. This concern goes back at least to Augustine (354–430), who argued—based on biblical texts such as *“Christ also suffered once for sins”* (1 Peter 3:18) and *“Christ being raised from the dead will never die again… he died to sin, once for all”* (Romans 6:9–10)—that the entire process of creation, fall, and redemption happened once in history.

This argument was later extended by Albertus Magnus (1206–1280) and Philip Melanchthon, who rejected ETI on the grounds that Christ’s death was unique and that any extraterrestrial beings would still depend on knowledge of Christ for salvation.

More liberal theologians, however, have been less concerned with this uniqueness. Accepting evolution and rejecting the historicity of Adam and the fall opens the door to the possibility that human-like history might be repeated elsewhere. Paul Tillich and Anglican Dean William Inge both suggested that Christ’s incarnation might not be unique and could occur on other planets (Haught 2015).

E. A. Milne (1952) proposed resolving the paradox by suggesting that knowledge of Christ’s incarnation on Earth could be transmitted across the cosmos by radio signals. E. L. Mascall (1956) criticized this, arguing that salvation does not depend on our knowledge of Christ’s incarnation. Yet Mascall doubted that Christ’s earthly human nature could serve as a savior for extraterrestrials, suggesting instead that the incarnation might need to be repeated on other planets.

More recently, David Wilkinson (2013, 141–144) acknowledges this tension between Christ’s “once for all” sacrifice and the hypothetical need for redemption on other planets. He suggests, however, that God may have created intelligent beings who never fell and therefore do not require salvation at all.

Similarly, John Davis has argued that Christ’s reconciliation of all things to Himself (Col. 1:15–20) is broad enough to include the redemption of fallen beings anywhere in the universe, without additional incarnations. Referring to the Westminster Confession of Faith (1647, Ch. 8: v–vi), which states that Christ's redemptive benefits are not limited by time but apply to the elect of all ages, Davis writes:

> *"If the atonement can be understood as not being limited in time, it can just as readily be understood as not limited by space or distance. Christ assumed in the incarnation a true and complete human nature that he might represent man as the covenant head of a redeemed people. By extension, it could be postulated that the human nature of Homo sapiens could be designated by God to represent the nature of all sentient, embodied beings" (Davis 1997, 43).*

However, there is a crucial distinction between an atonement unlimited in time (for the descendants of Adam) and one unlimited in space (for beings unrelated to Adam). Scripture emphasizes the intimate connection between the first Adam and the second Adam, Christ. For Christ's sacrifice to apply to humans, he had to assume a human nature:

> *"Since therefore the children share in flesh and blood, he himself likewise partook of the same things… For surely it is not angels that he helps, but he helps the offspring of Abraham. Therefore, he had to be made like his brothers in every respect, so that he might become a merciful and faithful high priest in the service of God, to make propitiation for the sins of the people" (Hebrews 2:14–17).*

Since extraterrestrial beings, like angels, are not descendants of Adam and do not share his nature or guilt, Christ's sacrifice does not apply to them. Thus, the uniqueness of Christ's incarnation implies the uniqueness of humanity as the only creatures saved from sin through that incarnation.

The notion of unredeemed species is not without precedent. Angels, the only other known intelligent beings, have no redemption if they fall. Even for humans, redemption is effective only for the elect minority. Why, then, should ETs necessarily be redeemed? Colossians 1:15–20 should be understood not as universal redemption but as Christ's victory over sin and Satan, bringing all creation under his dominion and purification (Wilkinson 2013; Corbally and Rappaport 2020).

3. The Uniqueness of Man

Even if Davis's argument were correct, it would still imply that man occupies a special relationship to God, since Christ chose to take on human form. Genesis 1 affirms that man alone was created in the image of God and appointed to have dominion over creation. Even the stars were created to serve humanity. At the end of time, Christ returns to Earth to judge the living and the dead; man is to judge the angels (1 Cor. 6:3). The New Jerusalem descends to Earth. All this underscores humanity's unique role in creation.

Therefore, in the unlikely event that intelligent life exists elsewhere, Scripture suggests two possibilities: either such beings never fell into sin, or—like the fallen angels—there is no redemption available to them (Wilkinson 2013; Haught 2015).

4. Extra-terrestrial Life

What about more primitive extraterrestrial life (ETL)? The amazing complexity of even the simplest life shows the need of a direct creative act to get it started. God could certainly have miraculously created simple life elsewhere. But to what end?

On Earth, plants were created to provide food for humans and animals, and animals were created to serve mankind (Genesis 1:26–30), who in turn was made to serve God. What purpose, then, would extraterrestrial plants or animals serve in the absence of intelligent beings? Since Scripture is silent on this question, we can only speculate.

Stephen Dick (2018, 292–293) notes that even the discovery of microbial life would challenge our theological assumptions by showing that life is not unique to Earth. He calls for a robust doctrine of creation that can acknowledge such possibilities while preserving human uniqueness in God's plan.

Detecting simple ETL is far more difficult than detecting intelligent life. The most promising locations—Mars or the moons of Jupiter and Saturn—have already been partially explored, with no confirmed results. The James Webb Space Telescope now allows scientists to study distant exoplanet atmospheres for signs of life. For example, exoplanet K2-18b, about 120 light-years away, appears to have water vapor, carbon dioxide, methane, and possibly dimethyl sulfide—a compound on Earth produced only by living organisms. While intriguing, the presence of dimethyl sulfide remains unconfirmed, and abiotic explanations have not been ruled out.

If simple life were ever discovered beyond Earth, it would strengthen the naturalistic argument that life is common and increase the perceived likelihood of intelligent life. However, from a theological standpoint, the existence of simple extraterrestrial life would not present a serious problem. It would remain a matter of curiosity, not contradiction (Haught 2015).

Conclusions

Currently, there is no scientific evidence for extraterrestrial intelligence. Decades of searching for signals through projects like SETI have yielded no results. These searches effectively rule out the presence of advanced civilizations within about 100 light-years. Communication with such civilizations remains, for now, a practical impossibility.

From a naturalistic and evolutionary standpoint, the odds against life arising spontaneously—especially intelligent life—are staggering. From a theological standpoint, arguments drawn from Scripture strongly weigh against the existence of ETI, although not decisively. A young universe would also make it unlikely that we could detect ETI anytime soon.

The case against simpler extraterrestrial is weaker. While its absence from the biblical account and its unclear purpose may raise questions, these concerns do not amount to a clear refutation. The existence of primitive life beyond Earth remains possible—but still without empirical support.

The Future of Life in the Universe

What lies ahead for the universe? Most cosmologists are optimistic about the near future—that is, the next few billion years. If man and society have developed purely through evolution, then further evolutionary progress seems plausible.

From this perspective, the current human species is just an early stage in a much longer story. By modern cosmological timelines, humans have emerged very early in the universe's history. Thus, it is often assumed that we will eventually be replaced by more advanced life forms. A few million years from now, intelligent beings may be as far beyond us as we are from the apes.

Physicist Frank Tipler sees this as having serious implications for religion. He writes:

> *"Traditional religion must come to grips with the fleeting existence of our species in universal history. It is our relative insignificance in time, not space, which is the real challenge posed by modern cosmology for traditional religion." (Tipler 1988:313)*

Tipler notes that the universe is expected to continue for at least five billion more years and criticizes Christian theology for failing to adopt this long-term view:

> *"Almost all Christian theologians adopt a much shorter temporal perspective. This is as great an error—and as great a misunderstanding of mankind's place in nature—as believing that the universe was created a few thousand years ago." (Tipler 1988:316)*

Presumably, Tipler believes that Christianity will be irrelevant to future, more advanced species. Yet this overlooks a fundamental point: higher intelligence and greater technology do not eliminate man's central problem—a sinful heart. No matter how advanced future beings may become, their need for redemption remains. Still, Tipler is correct in observing that the projected future of the universe according to Big Bang cosmology is as incompatible with the biblical view as its account of origins.

Looking beyond this near future, however, the prospects for life grow increasingly grim. In about five billion years, the Sun will swell into a red giant, likely engulfing the Earth and rendering it uninhabitable. Humanity or its successors may need to have relocated to other star systems to survive. Beyond this, standard Big Bang cosmology predicts eventual extinction of life on a cosmic scale. If the universe's total density exceeds a critical threshold, the expansion would reverse, culminating in a "Big Crunch"—a collapse to a hot, dense state obliterating all life. Alternatively, if the density is below this critical value, the universe will expand forever, leading to a gradual "heat death," where available energy dwindles, temperature approaches absolute zero, and physical processes—including life—cease (Carroll 2010).

Another endgame scenario is the "Big Rip," wherein dark energy's repulsive force strengthens over time, eventually tearing apart galaxies, stars, planets, and finally even atoms themselves (Mack 2020). Astrophysicist Katie Mack (2020) surveys multiple such speculative scenarios, nearly all concluding with the eventual destruction of all life.

Reflecting on these bleak outcomes, Nobel laureate Steven Weinberg (1979:144) famously remarked that "the more the universe seems comprehensible, the more it also appears pointless," though he found some consolation in the human endeavor to understand it.

Today, most cosmologists share a pessimistic outlook for the long-term survival of life. Yet some thinkers offer alternative, more hopeful visions.

Future Life in a Closed Universe

Among Big Bang cosmologists, Frank Tipler and Freeman Dyson offer contrasting, optimistic scenarios. Tipler (1994) argues that only a closed universe—one whose expansion eventually reverses into a contraction—can support infinite life.

Tipler defines life broadly as any system that processes, stores, and transmits information. Humans are purely physical entities—biological computers whose minds function like software running on the brain. Under this definition, even machines such as cars or computers could qualify as forms of life. Because humans appeared relatively early in cosmic history, Tipler predicts they will eventually be replaced by more advanced, machine-like intelligences optimized for ever more efficient information processing.

According to Tipler, as the universe contracts toward a Big Crunch, its temperature would rise, providing energy for infinite information processing. He envisions this culminating in the “Omega Point”: a final state of infinite computational capacity, which he equates with God. Tipler posits that accelerating metabolism under rising temperatures would allow infinite subjective experience within a finite physical time, thereby securing immortality.

Despite its imaginative appeal, this scenario faces strong criticism. Ellis and Goswami (2014) challenge Tipler’s assumptions about universal geometry and physical constants, both contradicted by modern observations. Moreover, the Tipler predicts the universe to be closed, whereas current date indicate it is open. It is also expanding much faster than Tipler’s predicted limit. Further, they argue that Tipler’s definition of life oversimplifies biological complexity, and that extreme cosmic conditions near the Big Crunch would destroy any known life or computing system long before the end.

In short, while Tipler offers an imaginative and philosophically provocative vision of the universe’s future, his scenario lacks both empirical support and scientific credibility.

Future Life in an Open Universe

Freeman Dyson (1979) offers a different vision, grounded in an eternally expanding, cooling universe. He argues that life can survive indefinitely by adapting to cold conditions, slowing its processes and conserving energy. Like Tipler, Dyson focuses on life as organizational structure rather than material substance, suggesting life could persist as superconducting circuits or distributed networks.

Dyson notes that as the universe cools, background noise diminishes, enhancing the signal-to-noise ratio critical for information processing. Life would slow but need not cease. He further speculates that the Sun’s remaining energy alone could sustain an immensely complex society indefinitely. Although particle physics predicts matter instability over ~10^33 years—when atomic nuclei decay—Dyson remains optimistic life could evolve new adaptations.

Nonetheless, Dyson himself acknowledges the speculative nature of this scenario, reliant more on imaginative extrapolation than empirical certainty.

Future Life in a Plasma Cosmology

Eric Lerner (1991) rejects the Big Bang and thermodynamic constraints in favor of plasma cosmology, positing an infinite universe both spatially and temporally. He envisions ever-increasing complexity fueled by rising energy flows and advancing technology, allowing life and progress to continue indefinitely. Lerner critiques the Big Bang model for fostering cultural pessimism and diminishing faith in progress, while his eternal cosmos offers a hopeful outlook on humanity’s enduring significance.

However, plasma cosmology conflicts with well-established thermodynamic laws and observational data, limiting its acceptance among scientists.

Conclusions

In summary, while some physicists and philosophers hold out hope for life’s indefinite survival through radical adaptation or exploitation of cosmic endpoints, the prevailing scientific evidence points toward a universe headed for heat death or eventual dispersal of matter and energy to such low densities that life becomes impossible. As things stand, modern cosmology offers little real hope for the distant future: not for individuals, not for humanity, and not even for life itself.

6. Cosmology and God's Existence

Can we learn anything about God by studying the cosmos? Is it possible to prove that the universe was created—or that it was designed? And if Big Bang cosmology were true, would it necessarily point to the existence of a divine Creator?

Modern cosmology has prompted a number of theological reflections, chief among them being arguments for the existence of God. Rational arguments for God's existence date back at least to the time of Plato, and over the centuries they have been refined and debated by many of the world's major philosophers. These arguments typically fall into four main categories:

1. **The ontological argument** (from *ontos*, Greek for "being") reasons that the very idea of a perfect being implies its existence.

2. **The moral argument** asserts that the existence of a moral law presupposes a moral Lawgiver.

3. **The cosmological argument** (from *cosmos*, Greek for "world") claims that the existence of the universe requires a prior, uncaused Cause.

4. **The teleological argument** (from *telos*, Greek for "end" or "purpose") contends that the apparent design in the universe points to an intelligent Designer.

While each of these arguments involves philosophical nuance, our focus here will be limited to the cosmological and teleological arguments—those most directly tied to insights from modern science. Specifically, we will explore how the observed beginning of the universe and the evidence of design within it may point toward the existence of God.

The Cosmological Argument

The cosmological argument is one of the most widely discussed and influential arguments for the existence of God. Over time, many versions of the cosmological argument have been proposed. Our focus here will be on the Kalam Cosmological Argument, which seeks to show that the universe had a beginning and was created a finite time ago by a personal Creator.

This argument is grounded in the claim that an actual infinite series of past events is logically impossible. Objections to an infinite past can be traced back to Aristotle, but the Christian philosopher John Philoponus was the first to apply these objections to cosmology. His arguments were later adopted and expanded by Islamic philosophers of the Kalam school in the 9th and 10th centuries, giving the argument its name.

In modern times, the Kalam argument has been revived and defended by several Christian apologists, particularly William Lane Craig (2008) *Reasonable Faith: Christian Truth and Apologetics.* It is typically framed as follows:

1. Whatever begins to exist has a cause for its existence.
2. The universe began to exist.
3. Therefore, the universe has a cause for its existence.
4. That cause must be personal.

In short, if the universe has a finite past, then it must have been created out of nothing by a personal Creator.

The key premise is the second: that the universe began to exist. While Scripture clearly affirms this, such a claim is meaningful only to those who already accept biblical authority. The real challenge is whether the universe's beginning can be established by reason and evidence alone, without appealing to Scripture.

The Big Bang Singularity

Earlier, when discussing the concept of boundless time, we noted that there are no decisive logical or mathematical proofs ruling out an infinite past. This raises the question: can modern cosmology provide evidence that the universe had a finite beginning? The most widely cited scientific claim in support of a cosmic beginning is the Big Bang theory, which proposes that time itself began at a singularity—an initial moment (t = 0) where the universe's density is thought to be infinite. This singularity is often interpreted as the absolute origin of the universe.

Since the mid-20th century, many Christian thinkers have embraced the Big Bang theory as scientific confirmation of a finite beginning, reinforcing the theological claim of a Creator. This interpretation remains influential in contemporary Christian apologetics.

Interestingly, even some scientists who reject theism have acknowledged the philosophical or theological implications of the Big Bang singularity. For example, physicist Hannes Alfvén, while criticizing the Big Bang on scientific grounds, observed that the presence of a singularity "necessarily presupposes a divine creation" (as noted in recent scholarly discussions). Similarly, astronomer Fred Hoyle, a staunch opponent of the Big Bang, supported the steady-state model partly because it aligned better with his naturalistic worldview.

In the Soviet Union, cosmologists rejected the idea of a universe with a definite beginning because it conflicted with the Marxist-Leninist materialist philosophy, which maintained an eternal, self-sustaining cosmos (Kragh 2013). These historical and philosophical tensions illustrate how cosmological theories often reflect and interact with broader metaphysical and ideological commitments beyond the scientific data alone.

Yet not everyone agrees that Big Bang cosmology carries theological implications. Many cosmologists—and theologians—insist that the Big Bang theory does not necessarily imply creation by a divine being. This raises key questions: How solid is the evidence for a cosmic beginning? And if the universe did indeed have a beginning, does this fact alone point to the existence of God?

1. The Accuracy of the Big Bang Model

Earlier, we observed that the standard Big Bang model, though widely accepted in the scientific community, suffers from notable observational and theoretical shortcomings. Many of its key assumptions are inherently unverifiable, and the observational data it explains could potentially be accounted for by alternative models that do not require a past singularity.

For the singularity argument to succeed, it must first demonstrate that the Big Bang model is clearly superior to its competitors. This requires establishing appropriate criteria for evaluating cosmological theories and showing that Big Bang cosmology best satisfies those standards.

Proponents of the Big Bang often downplay its unresolved issues while emphasizing the shortcomings of rival theories. Conversely, critics highlight its weaknesses and promote alternatives. The evaluation of cosmological models thus tends to be shaped by underlying philosophical commitments and can be highly subjective.

Even so, the majority of cosmologists today support some version of the Big Bang theory. While this does not guarantee its truth, it has strongly influenced public opinion and may suffice, for many, as a reasonable starting point for a theistic argument based on the universe's apparent beginning.

2. Limits of the Big Bang Model

The standard LDCM Big Bang model concerns only what happened *after* the first fraction of a second. Going back in time, as one approaches the singularity, things become ever more uncertain. The pressure and temperature were then much greater than what can be generated in any laboratory. Whether current physical theories remain valid under such extreme conditions is highly speculative and unverifiable.

a. Singularity Proofs

Despite these uncertainties, several theorems have been proposed to demonstrate the necessity of a past singularity—that is, a definitive beginning to the universe. However, these proofs all depend on simplifying assumptions that limit their applicability.

The most powerful and widely cited is the Borde–Guth–Vilenkin (BGV) theorem, proven in 2003. It shows that any universe that has been, on average, expanding over time cannot be extended indefinitely into the past and must have a beginning. This theorem is often taken to imply that inflationary cosmologies, including our own, require an initial boundary.

However, Alexander Vilenkin—one of the theorem’s authors—has emphasized in his more recent work that the BGV theorem applies specifically to classical spacetimes with average expansion and assumes classical notions of space and time. Vilenkin clarifies that the theorem does not apply to non-classical (quantum gravity) regimes or to hypothetical contracting phases that precede expansion. In other words, while inflationary space-times may require a beginning, the universe itself could still have emerged from a more fundamental quantum state—beyond the reach of classical physics or the BGV framework (Vilenkin 2015).

Vilenkin concludes that the universe likely did have a beginning, but he does not believe it was caused in any traditional or divine sense. Rather, he proposes that the universe spontaneously emerged from a “quantum nothing”—a state with no space, time, or matter—without any external cause. From his atheist perspective, this origin was not a created event but a quantum transition, beyond classical causality.

Thus, while the BGV theorem remains a compelling argument for a cosmic beginning under general conditions, it does not rule out speculative models in which the universe arises from a timeless or pre-spacetime domain. Nor does it prove that such a beginning must be caused by a divine agent. It remains a powerful yet limited tool in the broader discussion.

Though elegant and suggestive, the BGV theorem does not exclude all beginningless models. For example, some propose a universe that initially contracted over infinite time before bouncing into its current expansion phase. Others speculate about quantum gravitational regimes where space and time emerge from more fundamental entities, potentially avoiding any classical "beginning."

Hence, singularity theorems like BGV fall short of conclusively proving a finite past for the universe. They establish constraints within certain models, but the question of cosmic origins ultimately reaches beyond current physics.

b. Unknown Physics

As we approach the Planck time (approximately 10^-43 seconds after the Big Bang), the universe's density and energy would have been so extreme that quantum effects dominate, and classical general relativity breaks down. Beyond this point, current physics cannot reliably describe conditions without a successful theory of quantum gravity. The nature of the universe prior to the Planck time remains unknown and speculative.

Two leading candidates for quantum gravity—string theory and loop quantum gravity (LQG)—both propose mechanisms that avoid a singularity and allow for a pre-Big Bang phase. String theory envisions all matter as composed of tiny vibrating strings, which cannot be compressed beyond the Planck length (~10^-35 meters). This sets a limit on maximum energy density and avoids singularities, implying the Big Bang may have been a bounce from an earlier contracting phase (Gasperini & Veneziano 2015).

LQG, by contrast, models space and time as composed of discrete loops, like a granular fabric. These loops also impose a minimum scale, preventing infinite curvature or density. Applied to cosmology, LQG suggests the universe contracted to a minimum volume before rebounding into expansion—a "Big Bounce" rather than a singular beginning (Wilson-Ewing 2013).

Albert Einstein himself expressed skepticism about the singularity concept. Near the end of his life, he reflected that general relativity might break down at extreme densities, stating:

> *"It may be plausible that the theory is... inadequate for a very high density of matter... One may not therefore assume the validity of the field equations near the singularity… It may just mean that the equations cannot be continued over such regions."*
> *(Einstein 1956:124, 129)*

In short, the Big Bang singularity may not represent the absolute beginning of the universe, but rather the limit of classical physics. The question of an ultimate beginning arises precisely where our current scientific models become speculative. As we near the supposed origin, consensus fades and conjecture takes over—making theological interpretation both more difficult and, in a sense, more necessary.

c. The Beginning of Time and Space

In the standard Big Bang model, the universe is assumed to be homogeneous—meaning that matter is evenly distributed throughout space. As we go backward in time, this model envisions all matter compressing into an increasingly dense point. Ultimately, as this point approaches zero volume, space itself disappears. And since, in general relativity, space and time are inseparably linked as space-time, the vanishing of space also implies the vanishing of time. Thus, the origin of matter and energy in the Big Bang is accompanied by the simultaneous origin of space and time.

This poses a challenge to the Kalam Cosmological Argument, whose first premise states that whatever begins to exist must have a cause. This premise aligns with our everyday experience—things do not simply pop into existence without explanation. God, being eternal, requires no cause. But for something to begin to exist, there must be a time when it did not exist.

Herein lies the problem: if time itself began with the universe, then there was never a time when the universe did not exist. If there was no time before the universe, it’s unclear how the universe could have *begun* in the ordinary sense. In that case, the usual cause-and-effect logic, which depends on one thing happening *before* another, doesn’t straightforwardly apply.

This creates a challenge for the Kalam argument: it tries to apply temporal reasoning (about causes happening before effects) to a situation where time itself doesn't have a “before.” The question becomes whether it even makes sense to ask for a cause of the universe if there was no time in which that cause could operate.

3. Beginningless Big Bang Possibilities

Not all cosmologists agree that time began with the Big Bang. Many have raised objections to the idea that the universe has existed for only a finite amount of time. As we saw earlier, several steady-state or static cosmological models were developed specifically to avoid a cosmic beginning.

Yet, even within the Big Bang framework, one can avoid a temporal beginning. The singularity can be replaced with a bounce, a quantum phase, or an eternal inflationary background. In these models, the universe—or at least some precursor to it—could have existed eternally, without a definite starting point.

Cyclic and Oscillating Models

Cyclic models propose that the universe undergoes eternal cycles of expansion and contraction, potentially avoiding a temporal beginning. However, the classical versions of these models face serious difficulties. The second law of thermodynamics predicts that entropy would accumulate from cycle to cycle, making it unlikely that an infinite number of past cycles could have occurred.

Recent variations attempt to address these issues. For example, Penrose’s Conformal Cyclic Cosmology (CCC) posits that each cosmic cycle ends in a smooth, low-entropy radiation-dominated phase that becomes conformally equivalent to the Big Bang of the next cycle. This elegant idea attempts to reset entropy without requiring a contraction phase (Penrose 2018). However, CCC remains speculative and lacks strong empirical confirmation. Claims of observational evidence, such as concentric circles in the cosmic microwave background, remain controversial.

Another approach is the Ekpyrotic/Cyclic model, originally developed within string-theoretic frameworks. It envisions a 4D universe as a brane moving through a higher-dimensional space, periodically colliding with another brane to produce Big Bang-like events (Ijjas & Steinhardt 2019). This model attempts to avoid entropy buildup by proposing mechanisms for entropy dilution between cycles. However, many questions about its internal consistency and compatibility with observational data remain.

Quantum Vacuum Fluctuation and Creation Models

In these models, the universe originates not from a classical singularity but from a quantum process—often a fluctuation in a pre-existing vacuum or “nothingness.” A widely cited proponent, Lawrence Krauss (2012), argues that quantum field theory allows for the spontaneous emergence of a universe from a quantum vacuum, provided the net energy remains zero. However, critics note that the “vacuum” in these models is not truly “nothing,” but rather a structured quantum field governed by physical laws and a spacetime backdrop—raising metaphysical concerns.

These proposals frequently predict a closed universe, while current observations favor a spatially flat or open geometry.

Eternal Inflation and Multiverse Models

Within the framework of inflationary Big Bang cosmology, it does not seem unreasonable to suggest that, if a universe can emerge from a quantum fluctuation in empty space, then new universes might also arise within the energy-filled space of a previously existing one.

Eternal inflation posits that our observable universe is just one of many “bubble universes” produced in an eternally inflating background space. In this scenario, inflation never ends globally but stops only locally, giving rise to isolated universes through quantum tunneling events (Guth 2007). This framework allows for an eternal past in the inflationary background, even if each bubble universe (like ours) has a finite temporal origin.

However, the BGV theorem remains a major hurdle. It applies to any spacetime with an average expansion rate greater than zero—thus encompassing many eternal inflation scenarios. While eternal inflation is popular in theoretical cosmology, it suffers from lack of observational testability.

A Bouncing Universe

An open universe allows for another possibility for evading a beginning in time. George Gamow (1954) proposed an open-universe model where the Big Bang was preceded by an eternal phase of contraction.

The universe existed from eternity, in a state that was extremely sparse and diffuse. Over time, it gradually collapsed, growing denser until it reached the extreme conditions of the Big Bang. At that point, instead of ending in a singularity, the universe rebounded—the contraction phase gave way to the current expansion.

Unlike oscillating models that involve repeated cycles, Gamow’s model includes only a single transition from contraction to expansion. This avoids the usual problems of growing entropy and radiation buildup across multiple cycles. The "bounce" itself could be explained by the conservation of energy and momentum, making it a natural shift rather than a miraculous one.

In conclusion, although Big Bang cosmology is often taken to imply that the physical universe had a definite beginning, a closer look reveals a much more ambiguous picture. The argument for a finite past rests on one preferred interpretation of an extrapolation beyond currently known physics—an interpretation that excludes several plausible models with no beginning at all. In short, even within the context of Big Bang cosmology, an eternal universe cannot be conclusively ruled out.

The Second Law of Thermodynamics

The second law of thermodynamics states that, in a closed system, disorder—or entropy—always increases over time, accompanied by a corresponding loss of usable energy. Applied to the universe, this law predicts a future “heat death,” where all energy is evenly distributed and no work can be done. Life, which depends on energy flows, would eventually die out. The law also implies that the universe must have started in a more ordered, lower-entropy state.

Many theists have taken this as evidence for a divine beginning to the universe. If the past were infinite, they argue, the universe should have already reached a state of maximum entropy. Yet we observe a cosmos full of structured systems, usable energy, and low entropy—

suggesting it hasn't existed forever. They also argue that God is needed to account for the universe's initial order.

Compared to arguments based on speculative cosmological models, the second law of thermodynamics is on firmer ground. It is one of the most universally accepted principles in all of science.

Still, some scientists and philosophers have questioned whether the second law applies to the universe as a whole. For instance, in an expanding universe, energy spreads out into ever-larger volumes of space. This has led some to suggest that the universe behaves more like an open system, in which entropy might disperse rather than accumulate in the usual way (Carroll 2016). However, even in an expanding cosmos, entropy increases within any given region. Expansion doesn't halt disorder; it simply spreads it more widely.

A more radical critique comes from proponents of nonequilibrium thermodynamics, who argue that far-from-equilibrium systems can generate localized order through instabilities. For example, heating water produces organized convection currents—a localized decrease in entropy within the system, although the total entropy of the water, pot, and heat source still increases. Jeremy England (2015) has suggested that such dissipative structures may even play a role in the origin of life, showing that local increases in order can emerge naturally in systems driven by energy flows. Nevertheless, this does not violate the second law at the universal level, because the overall entropy of the system still increases.

Some contemporary cosmologists, such as Sean Carroll, have revisited Ludwig Boltzmann's idea that our observed low-entropy universe might be a rare fluctuation within a much larger equilibrium system. Carroll and Chen (2004) proposed that entropy could increase in both temporal directions away from a low-entropy "middle" state, allowing observers like us to arise without requiring an absolute beginning.

However, such models face significant challenges. They require a vastly larger, highly disordered background universe and raise the well-known "Boltzmann brain" problem: if low-entropy fluctuations are possible, then it should be far more probable to observe a small, minimal fluctuation—just enough to create a conscious observer—than the vast, structured universe we actually see.

More fundamentally, significant entropy fluctuations are extremely unlikely in systems with more than just a handful of particles. Yet the visible universe contains vast amounts of matter and structure, all exhibiting low entropy. To treat this entire region as a random fluctuation would require the broader universe to be far larger and more disordered than what we observe—implying a cosmos that is radically non-uniform. That conflicts with the standard assumption of large-scale uniformity in cosmology and undermines the simplicity that makes the Boltzmann hypothesis attractive in the first place.

In short, while Boltzmann's idea offers a possible way around a cosmic beginning, it raises more problems than it solves.

More recently, cyclic and bouncing cosmologies have attempted to avoid heat death or a finite beginning by proposing mechanisms to reset entropy between cycles or to explain how the universe emerged from a pre-existing high-entropy state (Ijjas & Steinhardt 2019). While promising in some respects, these models remain speculative and unproven.

In summary, the second law of thermodynamics continues to strongly suggest that the universe began in a low-entropy state and has been running down ever since. Alternatives—such as entropy dispersion through expansion, rare fluctuations, or cyclic resets—are intriguing but remain highly speculative and lack broad empirical support.

Still, a low-entropy beginning does not necessarily mean the universe had a beginning in time. In principle, entropy could have increased steadily from a minimum value in the infinite past, as in contraction-expansion models like that of George Gamow. Such views keep the door open to an eternal cosmos, even if it is still governed by the second law.

Thus, while the evidence strongly supports a universe that is running down from an ordered beginning, it doesn't decisively prove that this beginning happened a finite time ago. That debate remains open.

Conclusion

The scientific case for a beginning to the universe is far from conclusive. The argument from the supposed Big Bang singularity relies heavily on a particular cosmological model and on speculative extrapolations that extend beyond the model's reliable domain. The thermodynamic argument, though less speculative, also falls short of decisively proving that the universe began a finite time ago.

This is not to deny that the cosmological evidence for a beginning appears plausible. But plausibility is not proof. As we have seen, those who wish to deny a beginning can construct beginningless models based on the very same observational data.

Up to this point, we have considered a universe governed by natural causes and the assumption of uniform physical laws. Yet Scripture teaches that God is not bound by such constraints. He could have added energy, preserved order, or even altered the laws of nature from eternity. For example, as noted earlier, the second law of thermodynamics may not have applied before the Fall or may cease to apply after the eschaton. Therefore, we can be certain the universe had a finite beginning only because God has revealed it in Scripture.

The Argument from Design

Although the second law of thermodynamics may not prove that the universe began a finite time ago, it still raises an important question: if the universe has been steadily unwinding, who wound it up to begin with? Where did the initial order come from? Such questions naturally lead us to a second traditional argument for God's existence—the argument from design.

This argument was famously advanced by William Paley in his 1802 book *Natural Theology*. Paley reasoned that just as the intricate mechanism of a watch implies a watchmaker, so the ordered complexity of the world points to an intelligent Creator.

But does the complexity we observe in the universe truly require a designer? Or could it be the product of natural processes?

The intricate design of biological organisms and ecosystems has often been taken as strong evidence of a Creator. However, this view was significantly challenged by Charles Darwin in *The Origin of Species* (1859), where he proposed that biological diversity could arise through random variation and natural selection—without the need for divine intervention.

A Fine-Tuned Universe

Design seems evident not only in biology but also in cosmology. From a range of physical and cosmological considerations, the universe appears to be remarkably fine-tuned. If the physical laws or initial conditions had differed even slightly, the universe—as we know it—could not have supported life. This striking level of precision points to what many see as evidence of intentional design. Let's consider a few of the key factors that make life possible.

1. Entropy

If entropy—the universe's measure of disorder—is always increasing, it follows that the universe must have begun in an exceptionally ordered state. Sean Carroll (2010) highlights just how improbable such order is if the Big Bang were a random event:

> *"The kind of low-entropy initial conditions required for our universe are extraordinarily special—so special that invoking chance alone strains credibility" (Carroll, 2010: 121)*

Building on this, Roger Penrose (2016) has recently reiterated that the odds of our universe's initial low entropy arising by chance are astronomically small—on the order of one in 10^(10^123)—a figure so huge that it defies practical comprehension.

These insights suggest that the precise initial conditions necessary for a life-permitting universe are unlikely to be the result of mere chance, prompting further consideration of whether they may reflect deeper physical principles—or, as some argue, a purposeful “selection.”

2. The Expansion Rate

In the standard Big Bang model, the universe’s expansion rate is extraordinarily finely balanced. If it had been just a tiny bit slower, the universe would have re-collapsed within seconds; if slightly faster, galaxies could never have formed. Tegmark (2014, 137–40) emphasizes that this fine-tuning requires the expansion rate during the earliest moments to be adjusted with incredible precision—on the order of 1 part in 10^55 or smaller. Similarly, Davies (2007, 151–53) argues that even an unimaginably small change—on the order of 1 part in 10^100—in the strength of fundamental forces like gravity or the weak nuclear force would render the universe lifeless. Despite significant progress in cosmology, the underlying reason for these delicate balances remains an open question, central to ongoing discussions of fine-tuning and the anthropic principle (Ellis 2014, 94–95).

3. The Elements

Hydrogen and carbon are essential for life as we know it. If the nuclear weak force had been slightly stronger, the Big Bang would have converted virtually all hydrogen into helium; if slightly weaker, neutrons would not have decayed into protons, leaving no hydrogen to form water or organic molecules. Furthermore, the strong nuclear force must be fine-tuned to within about one percent of its current value for stars to synthesize enough carbon, a key element for life (Davies 2007, 156).

4. Life

Fine-tuning is required not only in the universe’s initial conditions and physical forces but also in the emergence of complexity—especially life. As discussed earlier, the chance assembly of even a simple cell is incredibly unlikely, even if all necessary materials and conditions were present.

Astronomer Guillermo Gonzalez and philosopher Jay Richards (2004) emphasize Earth's unique and finely balanced features that not only support intelligent life but also enable scientific discovery, underscoring what they call the "privileged planet" phenomenon.

Many Christian thinkers, including John Leslie (2001), Richard Swinburne (2004), appeal to cosmological fine-tuning as evidence for God's existence. This perspective is echoed by numerous scientists regardless of religious belief. For instance, Stephen Hawking (2010, 182) acknowledged the profound improbability of a universe like ours arising from the Big Bang and noted the "clearly religious implications."

Similarly, Paul Davies comments on the sensitivity of the universe's structure, stating that the fine balance "gives the impression of design that is hard to resist" (Davies 2007, 185). He concludes that this "impression of design is overwhelming" (Davies 2012, 198).

Alternatives to Design

Yet these conclusions are far from unanimous. Several alternative explanations for this apparent fine-tuning have been proposed. Let's take a closer look at some of these alternatives.

The Multiverse

Are there other physical universes beyond our observable world? Many scientists think so. They speculate that countless other universes may exist alongside ours—a vast "multiverse."

From a naturalistic perspective, the idea of parallel universes seems plausible. If our universe originated from a quantum fluctuation that grew into a Big Bang, why shouldn't similar processes produce other universes?

The multiverse hypothesis also offers a naturalistic explanation for why our universe appears so remarkably fine-tuned for life. If there are infinitely many universes, then life will inevitably emerge in some of them, no matter how improbable. Naturally, we find ourselves in one of the rare universes where intelligent life is possible.

Physicist Max Tegmark (2014) distinguishes four types of multiverse:

Level 1: Distant regions of space. In an infinite universe, there are regions so far away that we can never see them. These regions may have different arrangements of matter but share the same physical laws and constants.

Level 2: Universes with different physical constants. In the eternal inflation model, some parts of space stop inflating and form "bubbles," each becoming a Level 1 universe with its own physical properties and constants.

Level 3: Parallel quantum worlds. According to the Many-Worlds Interpretation of quantum mechanics, every possible outcome of a quantum event occurs in a separate, non-communicating branch of reality.

Level 4: All possible mathematical structures. Every mathematically consistent structure corresponds to a real, existing universe.

Because these other universes do not interact with ours, their existence cannot be tested directly. Many cosmologists consider Level 1 plausible because it follows from standard cosmology, but Levels 2, 3, and 4 are much more speculative.

Some claim the multiverse explains the apparent design of our universe by chance. But even if true, it does not remove deeper questions: Did the multiverse always exist? Why does it have the properties it does? Is its existence necessary, accidental, or purposeful? The question of design is merely pushed to a higher level.

Critics argue that the multiverse hypothesis goes against good scientific reasoning. Richard Swinburne (2004) notes that science assumes the laws of physics are uniform across space and time—an assumption supported by extensive evidence, including the observed isotropy of the universe. Postulating infinitely many universes that we can never observe seems unnecessarily extravagant.

According to Swinburne,

> *"it is a crucial tenet of the scientific method that entities are not to be postulated beyond necessity… to postulate infinitely many*

worlds in order to save a preferred interpretation of a formula… seems crazy" (2004, 171).

He concludes that the simplest explanation for our finely tuned, life-permitting universe is a single, purposeful Creator.

Similarly, John Polkinghorne finds theism a more elegant explanation:

"A possible explanation of equal intellectual respectability — and to my mind greater economy and elegance — would be that this one world is the way it is because it is the creation of the will of a Creator who purposes that it should be so" (Polkinghorne 1998, 80).

John Leslie also argues that the God hypothesis is simpler and more plausible than multiverse scenarios, which he sees as artificial and unsupported by independent evidence.

On the other hand, Willem B. Drees (1996) questions whether simplicity really favors theism over a multiverse. He suggests that simplicity concerns the structure of a theory rather than the number of entities it proposes.

Baptizing the Multiverse

Some Christians have supported the idea of a multiverse, suggesting it need not conflict with faith. For example, Ian Barbour argued that the multiverse could be seen as part of God's creative purpose. God and chance need not be mutually exclusive. He writes:

God created many universes in order that life and thought would occur in this one. Admittedly, this gives chance an inordinately large role, and it involves a colossal waste and inefficiency if there are many lifeless universes. But then again, one might reply that for God neither space nor time is in short supply, so that efficiency is a dubious criterion (Barbour 1990:138).

However, one might respond that an omniscient God has no need of chance. In fact, for God there is no true "chance," since he knows exactly which initial conditions will generate the universe he intends. Why, then, would God need to create countless universes just to produce ours?

Evangelical cosmologist Don Page (2008) offers a different theological justification for a multiverse, specifically a Level 3 (Many-Worlds Interpretation) multiverse. Page suggests that God values the elegance of physical laws and prefers not to violate them, even to prevent human suffering. Although our world seems to contain much unnecessary evil, Page argues that the multiverse as a whole is the best possible total reality that God could create.

In a Level 3 multiverse, every quantum event causes the world to branch into many parallel worlds — one for each possible outcome. Each branch continues independently, splitting further with every subsequent quantum event. Thus, there are many versions of each person in different worlds, each believing he is the real "me."

Page even proposes that on certain pivotal occasions — such as the Resurrection of Jesus — God intervenes to ensure only one outcome, overriding the usual branching process.

But does this idea of a theistic multiverse make sense? There are several serious problems with it:

1. It depends on a controversial interpretation of quantum mechanics. Other interpretations of quantum theory fit the data equally well without requiring parallel worlds.

2. It assumes reductive materialism. Page's proposal presumes that everything — including the mind and soul — is fully reducible to material and quantum processes. This leaves no room for immaterial realities like human consciousness, the soul, angels, or demons, which are affirmed in Scripture.

3. It implies multiple incarnations of Christ. Christian faith teaches that Christ is fully God and fully man in one unique incarnation. If there are countless worlds with countless versions of Jesus, it becomes hard to square with the biblical teaching that his incarnation, death, and resurrection are singular and cosmic in scope (Colossians 1:19–20). Heaven is not governed by quantum mechanics and does not split; Scripture speaks of one throne and one Lamb (Revelation 20–21).

4. It contradicts the biblical account of creation. The Bible teaches that God created one world according to one sovereign plan (Ephesians 1:10–11), not innumerable worlds covering all possibilities.

In short, Page’s theistic Level 3 multiverse is theologically problematic and unnecessary from a Christian perspective.

What about the other proposed levels of the multiverse? Naturalists find these appealing because they offer a way to explain the origin and apparent fine-tuning of our universe without invoking God. But for Christians, who already believe that God created this universe purposefully and supernaturally, there is little reason to postulate other universes.

Finally, even if parallel universes did exist, they would not interact with ours. We could never observe or confirm them, making their existence not just scientifically untestable but largely irrelevant. As such, the question of a multiverse remains speculative and outside the domain of science.

Anthropic Principles

Naturalistic explanations of fine-tuning often rely not only on a multiplicity of universes (a multiverse) but also on a selection effect: why do we find ourselves in a universe that supports life? A common answer is that, if the universe were different, we would not be here to observe it. Thus, what we observe is necessarily compatible with our existence. As Barrow and Tipler (1986, 2) put it:

> *…any observed properties of the universe that may initially appear astonishingly improbable, can only be seen in their true perspective after we have accounted for the fact that certain properties of the universe are necessary prerequisites for the evolution and existence of observers at all.*

This idea is known as the *anthropic principle*, which comes in several forms.

The Weak Anthropic Principle (WAP)

The weakest and least controversial form, WAP simply observes that our measurements of the universe are necessarily conditioned on the fact that we exist. Barrow and Tipler (1986, 16) define it as:

> *The observed values of all physical constants… take on values restricted by the requirement that there exist sites where carbon-based life can evolve and by the requirement that the universe be old enough for it to have already done so.*

In other words, our observations are biased toward scenarios in which our existence is possible.

The Strong Anthropic Principle (SAP)

A more speculative version, SAP claims that the universe *must* have properties that allow life to develop at some point. According to Barrow and Tipler (1986, 21):

> *The universe must have those properties which allow life to develop within it at some stage in its history.*

This idea is often associated with the multiverse hypothesis — the idea that all possible configurations of physical constants exist in different universes, some of which inevitably produce life.

Whereas the weak form states that the universe to be such that life *can* occur, the strong form specifies that life *must* occur. Swinburne (2004, 172) points out that WAP is essentially a trivial truth: any viable theory of the universe must be compatible with the observations we make. However, WAP does not provide a causal explanation for fine-tuning. Rather, it simply acknowledges that our existence depends on the observed conditions. The SAP, meanwhile, suggests that life necessarily arises somewhere, which lacks empirical support — indeed, as Swinburne and others note, the universe seems vastly more likely not to produce life.

More recently, Barnes & Lewis (2016) have critically assessed the anthropic principle. While they acknowledge that WAP is logically correct, they argue that it does little to explain why the universe is so precisely tuned — far more than is minimally necessary for life.

Critics of the anthropic principle argue that it is *ad hoc* and unscientific. Carroll (2016) warns that appealing to the anthropic principle prematurely risks abandoning the search for deeper, law-based explanations of the universe's initial conditions. Until we better understand the origin of the cosmos, invoking a selection effect remains speculative.

Pagels (1985, 175) similarly observed that the anthropic principle competes directly with a theistic explanation: the idea that the universe appears fine-tuned for our existence because it was fine-tuned by a Creator. He criticized proponents of the anthropic principle as unwilling to accept a theological explanation yet equally unwilling to leave the mystery unexplained, calling the anthropic principle "the closest that some atheists can get to God."

Even if WAP is combined with a multiverse hypothesis, it still does not fully explain why this universe has precisely the features it does — features that seem more finely tuned than strictly necessary for life. If the universe's sole purpose were to support life, its properties could have been far less exacting.

The Theory of Everything

Some have proposed a third possibility for the apparent fine-tuning of physical constants: that these constants are not arbitrary but are instead dictated by deeper fundamental laws. In this view, a more complete and unified physical theory might show that the values of these constants must be exactly what they are, turning what appear to be coincidences into necessities.

In recent decades, significant efforts have aimed to develop a Grand Unified Theory that would unify the nuclear and electromagnetic forces, and to reconcile general relativity with quantum mechanics in a theory of quantum gravity. Modern approaches, such as superstring theory and related frameworks, attempt to unify all fundamental forces into a single "Theory of Everything" (TOE). This theory aspires to logically deduce all physical phenomena from fundamental principles.

At first glance, such a TOE might seem to undermine arguments for design based on fine-tuning. However, theologians and philosophers like Julian Barbour have noted that a TOE would be welcomed by theists as part of God's design. Even if such a theory shows that only one universe with fixed properties is logically possible, it does not explain why that particular universe actually exists (Barbour 2012).

Moreover, a TOE alone cannot fully explain fine-tuning, because in addition to universal laws, the specific boundary conditions of the universe must be accounted for. Barbour (2012) emphasizes that "evolution must be described by a historical account of events and not by predictive laws alone." Thus, the question remains why the boundary conditions are what they are.

A further challenge is that a TOE sufficient to describe every detail, including the properties of every particle and organism, would require knowledge of boundary conditions far beyond human capacity.

Physicist Stephen Hawking also considered the implications of a TOE, cautioning that even if such a theory were found, fundamental questions would remain:

> *"Even if there is only one possible unified theory, it is just a set of rules and equations. What is it that breathes fire into the equations and makes a universe for them to describe? … The usual approach of science of constructing a mathematical model cannot answer the questions of why there should be a universe for the model to describe" (Hawking 2018, 174).*

Hawking expressed optimism that a complete theory would eventually be understandable to all and allow us to participate in the ultimate questions of existence, calling this "the ultimate triumph of human reason" (Hawking 2018, 175). Yet such optimism arguably underestimates the depth of divine wisdom and purpose.

In summary, even with a TOE, the question of design remains open. The existence of the TOE itself, the particular boundary conditions, and why the universe exists at all are questions beyond what physical laws alone can explain. Furthermore, allowances for spiritual realities and miracles further reduce the explanatory scope of a purely physical TOE.

A Naturally Selected Universe

Highly intelligent beings could then create new universes that would be hospitable for intelligent life. Only universes having intelligent beings are likely to reproduce.

The American astronomer Edward Harrison (1995) proposed that our universe was created by highly intelligent beings living in another universe and that its fine-tuning has been “naturally selected.”

Harrison suggested it may be possible for advanced civilizations to create new universes in laboratory conditions, perhaps by producing a small black hole from high-energy particles. The physical constants of the offspring universe would likely resemble those of its parent. Universes that support intelligent beings capable of reproducing universes would, in turn, dominate the population of universes through natural selection (Harrison 1995).

In this scenario, the process begins with a set of universes having random fundamental constants. In at least one of them, intelligent life arises. Those beings then create more universes hospitable to life. Over time, universes most suited to life and intelligence become more common—selected by their ability to reproduce.

Harrison argued that belief in a supernatural Creator discourages scientific inquiry, while anthropic explanations entail a vast wasteland of mostly barren universes. His proposal, by contrast, envisions life itself taking over the creative role—shifting the question from theology to science.

However, this idea has several weaknesses. First, it remains highly speculative, based on untested physics and unverifiable assumptions. If the parent universes are not causally connected to our own, the hypothesis cannot be confirmed.

Second, biological natural selection is often invoked to explain increasing complexity as arising from simpler beginnings. Harrison’s proposal turns this on its head: it explains the existence of a universe with humans by presupposing a universe already inhabited by superior intelligent beings. This merely replaces one mystery with an even greater one—like finding a watch and inferring not a watchmaker, but an advanced watch-making machine. The question of what produced the first universe with intelligent beings remains unanswered, and the explanation risks collapsing into a multiverse or simply restating the anthropic principle.

In short, the idea that our universe was created by intelligent beings in a parent universe remains highly speculative, unverifiable, and arguably less plausible than more straightforward explanations. It does little to resolve the question of ultimate origins.

In conclusion, the observed fine-tuning of our universe is more plausibly explained as the product of divine design than by these elaborate, speculative theories of multiverse natural selection. Nevertheless, it must be acknowledged that judgments about plausibility often depend on deeper philosophical and theological commitments.

Design and Evolution

If the universe indeed had just the right parameters to evolve into its present state, with its detailed structure and diversity of life, one might see this as strong evidence for evolution. After all, in a universe created instantaneously and in mature form, the critical cosmological parameters — such as the density and expansion rate — could conceivably have been quite different. From a creationist perspective, this fine-tuning might appear merely coincidental.

In response, however, we can note two points. First, much of the fine-tuning allegedly required for life to evolve is also necessary simply to sustain life. Life as we know it critically depends on the unique properties of elements like carbon, nitrogen, hydrogen, and oxygen. These life-sustaining properties would not exist if, for example, the nuclear or electromagnetic forces were even slightly different, or if the relative masses of electrons and neutrons were slightly altered. Even a recently created universe would still require significant fine-tuning of physical constants and laws to support life.

Second, many of the so-called anthropic coincidences are based more on theoretical speculation than on observational fact. For example, consider the supposed extreme precision required in the early expansion rate of the universe. Such precision is certainly not observed, since the current expansion rate is only known to within a few percent. Rather, the claim of fine-tuning arises entirely from theoretical calculations. In this light, the hypothetical fine-tuning could be interpreted not as support for evolution, but as a measure of the implausibility of Big Bang cosmology itself — a model that can account for the present universe only by postulating an exceedingly improbable early expansion rate.

Conclusions

Winding up our discussion of the proofs for the existence of God, I stress the following points:

1. Limitations of the Proofs

Although cosmological evidence suggests that the universe likely began at a finite point in the past, this conclusion is far from certain. The limited nature of the data and the speculative character of the theories leave open the possibility of a universe without a beginning. Likewise, much of the seemingly striking evidence of design might conceivably be explained without invoking a Designer.

Nevertheless, while these arguments are not logically compelling, they do have real persuasive force. Indeed, several astronomers have drawn theistic implications from Big Bang cosmology. Some have even rejected the Big Bang partly because of these implications, while others have accepted the idea of a Creator or Designer on this basis.

Few, however, seem to have thereby been converted to orthodox Christianity. Why is this the case? Possibly because the cosmological argument leads to only a prime mover, an eternal being who starts the universe. The teleological argument gets us little further. John Leslie (2001), an advocate of the argument from design, contends that God need not be a person at all, but merely a "creatively effective ethical requirement for the existence of a (good) universe or universes". These gods, as impersonal abstractions, are hardly objects inspiring or requiring our worship. At most this brings us to only a deistic God: the plausibility of providence, supernatural revelation and miracles must still be shown. Clearly, a huge step is still needed to move beyond the Prime Mover or Designer to the living God of the Bible.

2. Commitment to the Big Bang

Another problem with arguing from the Big Bang to the biblical God is its commitment to Big Bang cosmology. Linking theism too closely to a particular scientific model risks theological disaster if that model is eventually abandoned.

More importantly, the biblical view of reality differs fundamentally from Big Bang cosmology — not just regarding origins and eschatology, but also concerning the present structure of the universe. For instance, Big Bang cosmology leaves no room for a transcendent God, for supernatural causes, or for an immortal soul.

Thus, in constructing a Christian view of reality, Big Bang cosmology must ultimately be replaced by cosmological concepts that are more in accord with biblical givens. It follows that the argumentation of such apologists as William Craig and Hugh Ross has limited value to bolster the faith of Christians. Indeed, their endorsement of Big Bang cosmology ushers in a new epistemology that gives too much weight to speculative theorizing, under the guise of general revelation. This will inevitably have grave implications for biblical authority and hermeneutics.

Once we acknowledge the possibility of a supernatural Creator, the necessity of a Big Bang singularity weakens considerably, since other plausible options come into view. If God could create the universe *ex nihilo* at the singularity, he could just as easily have created it from an earlier universe or created it *ex nihilo* more recently. At that point, the question becomes theological and can only be answered by what God has revealed in his written Word.

3. God Revealed Through Nature

To what extent can we construct a natural theology—relying only on reason and observation—from the evidence of the cosmos? The Bible affirms that nature reveals God:

> *The heavens declare the glory of God… (Psalm 19:1)*
>
> *For his invisible attributes, namely, his eternal power and divine nature, have been clearly perceived, ever since the creation of the world, in the things that have been made. So they are without excuse. (Romans 1:20)*

These verses show that some of God's attributes — his glory, eternal power, and deity — are clearly evident in the created world.

God reveals himself through nature in such a way that all people are fully aware of his existence. This knowledge does not depend on logical proofs or scientific arguments; it is much more immediate and intuitive. We see the majesty, beauty, goodness, and order of the world — in the stars above, in a field of flowers, in the vastness of the cosmos — and we recognize the handiwork of a great Creator. Even pre-scientific people perceived the order, beauty, and harmony of creation as evidence of a divine origin.

As creatures made in God's image, humans naturally perceive the world as God's work. John Calvin (1559) described this innate awareness of God as the *sensus divinitatis*. God has created us with the ability to see his fingerprints in nature.

This insight is reflected in the so-called "nature psalms" (e.g., Psalms 8, 19, 29, 65, 104), which express faith's response to the wonders of creation. These psalms focus not on abstract scientific facts, but on everyday experiences of nature, seen through the eyes of faith and within the context of God's covenant people. As Stephen Spencer (1988) points out, the nature psalms offer not so much a natural theology — independent reasoning about God — as a theology of nature: an interpretation of the natural world shaped by God's Word. Nature must be viewed through the lens of faith, informed by Scripture.

Nevertheless, while God's existence is clearly revealed through nature, fallen humanity suppresses and distorts this knowledge, rejecting God and turning to idols. As Paul explains in Romans 1:18, 21–32, people exchange the truth about God for lies, and their minds become darkened and futile in their thinking.

It is only through the Gospel and the work of the Holy Spirit that we come to a proper knowledge of God. Fallen humanity needs Scripture to interpret nature rightly. Calvin compared nature to a book written in God's hand, but argued that fallen humans cannot read it properly without the "spectacles" of Scripture, which clarify and correct our distorted understanding of God.

What God reveals through nature concerns only certain attributes — his power, majesty, and deity — and is grasped through faith, not through scientific inquiry. God's general revelation does not include speculative theories like Big Bang cosmology, which is neither revealed truth nor necessary for knowing God. Rather, the experience of nature already leaves man "without excuse."

In short, cosmology reveals very little about God himself. Studying the structure and properties of the universe can deepen our appreciation of his handiwork but tells us little about the Creator's character or purposes. The scope of natural theology — the study of God through nature and reason, apart from revelation — is extremely limited.

What, then, is the value of theistic proofs? Although they fall short of proving the existence of the biblical God, they do help to expose the inadequacy of naturalism. The naturalistic assumptions of modern science fail to provide satisfying explanations for the full richness of reality, and they leave the deepest questions — of origin, purpose, and destiny — unanswered. When pressed to its limits, naturalism ultimately undermines itself.

7. Gods of the Evolving Cosmos

Two of humanity's deepest questions are: *What is God like?* and *What happens after we die?* Throughout history, these questions have shaped religious thought, moral values, and the hope of redemption. Christianity answers them with a personal, transcendent Creator who made the universe *ex nihilo*, sustains it by His power, governs it in righteousness, and promises bodily resurrection and eternal life for those who belong to Him.

Yet in our scientific age, many thinkers have sought to imagine gods that fit within — rather than above — the cosmos. The remarkable fine-tuning of the universe, the emergence of life, and the evolution of consciousness seem to suggest some kind of purposiveness, but modern naturalistic assumptions make it difficult to affirm the God of Scripture. Consequently, scientists, philosophers, and theologians have proposed alternative "gods" who arise from within the evolving cosmos: finite, immanent, and subject to natural law.

In an earlier chapter we saw that cosmology, at best, points only to a Prime Mover or Designer, not the sovereign, personal God of the Bible. Here we survey the more specific gods constructed within modern cosmologies. We evaluate their claims and ask: How do these compare with the biblical God? And what hope do they offer for immortality and salvation?

The Evolving God of Natural Theology

The idea of an evolving God can be traced to the German idealist Friedrich Schelling (1775–1854), who introduced a radical evolutionism into metaphysics. He depicted God as subject to suffering and change, becoming perfect only at the completion of the world. On this view, God is identified with the evolutionary process itself or with its not-yet-realized culmination, rather than being eternal and immutable.

Henri Bergson (1859–1941) developed similar ideas in *Creative Evolution* (1907), arguing that becoming is more fundamental than being. Evolution, he argued, is driven by an impersonal, creative Life

Force whose ultimate goals remain unknown to us — more a mysterious process than a personal Creator.

Samuel Alexander (1859–1938), in *Space, Time, and Deity* (1920), proposed that the fundamental reality of space-time gives rise to matter, life, mind, and, finally, deity. God does not yet exist but is the goal of cosmic evolution, a future reality that will emerge only as the universe matures.

These early visions all conceive of God as incomplete and deeply immanent — evolving along with the cosmos, not existing eternally or sovereignly outside it. Unsurprisingly, they offer no meaningful hope for immortality. Since God Himself is still in the making, we cannot expect personal survival beyond death — at most, our contribution to the collective future.

Scientific Gods

Several modern scientists and scholars have proposed their own visions of an evolving god — attempts to account for the order, complexity, and apparent purpose of the universe without affirming a supernatural Creator. We begin with those who ground divinity in natural science.

Paul Davies: Order Without Personhood

Paul Davies (2007) acknowledges the universe's remarkable fine-tuning and its suitability for life, suggesting that life and consciousness are somehow written into its fabric. Yet Davies denies a personal God. Instead, he imagines the universe itself as embodying self-organizing principles — an emergent creative order rather than a Creator. For him, the divine is merely the intelligibility and purposiveness of the cosmos itself, inspiring awe but remaining impersonal.

Davies's god is thus nothing more than a poetic way of speaking about nature — the laws of physics and the emergent properties of matter. It inspires wonder but offers no moral authority, no relational love, and no hope beyond the grave.

Freeman Dyson: Immortality Through Technology

Freeman Dyson (1988) speculated that future technological advances might enable intelligent beings to preserve life indefinitely, reconstruct past humans, and even read and replay memory traces from their brains. He envisioned a future where our descendants could engineer a kind of resurrection — at least for those whose DNA and historical data remain intact.

But this vision faces insurmountable difficulties. First, it could benefit only those for whom DNA samples and memory traces have been preserved — leaving countless billions excluded. Second, even if technology could someday produce exact copies of past humans, these would not be the same conscious individuals but merely replicas. Furthermore, such technology would lie far in the future, long after our minds and bodies have perished. Dyson's god is simply human ingenuity projected into the future — finite, impersonal, and inadequate to save us.

Fred Hoyle: The God of Backward Causation

Fred Hoyle (1983) was deeply impressed by the apparent fine-tuning of the cosmos and the improbability of life arising spontaneously on Earth. He rejected random Darwinian evolution and argued instead that the universe is influenced by an intelligence at the end of time that works backward to organize the present and ensure its own existence. He proposed that this future intelligence subtly steers quantum events throughout history, directing evolution toward greater complexity.

This "god" is not supernatural but emerges from the future as the product of biological and cosmic evolution — a kind of feedback loop where the future perfects the present to bring itself about. But if this god only comes into existence in the distant future, it cannot explain the fine-tuning evident at the beginning of the cosmos. Moreover, backward causation conflicts with our experience of time and causality. And like Dyson's, Hoyle's god offers no individual immortality — only the preservation of life collectively.

Frank Tipler: The Omega Point

Frank Tipler (1994, 2007) developed Hoyle's idea into a far more ambitious scheme. According to Tipler, as intelligent life spreads through the universe, it will gain mastery over matter and energy, eventually collapsing the universe into a final singularity — which he calls the Omega Point. At that point, the laws of physics will allow infinite computational capacity, enabling the Omega Point to reconstruct the entire history of the universe, including perfect simulations of every human being who ever lived.

Tipler explicitly identifies the Omega Point with God and argues that it satisfies all the attributes of divinity: omniscience, omnipotence, and omnipresence — but only at the end of time. He even maps the Christian Trinity onto his cosmological model: the Big Bang as the Holy Spirit, the Omega Point as God the Father, and the "All Presents Singularity" as the Son (Tipler 2007). In Tipler's vision, our future resurrected selves will live in perfected bodies within these simulations — what he calls our "spiritual bodies," achieved by physical, not supernatural, means.

Yet Tipler's theory rests on highly speculative assumptions: that the universe is closed, that life can control its ultimate fate, and that infinite computation is physically possible. None of these are supported by current observations. Furthermore, even if such simulations could occur, they would create only copies of past individuals, lacking conscious continuity with the originals. Like Hoyle's, Tipler's god is emergent rather than eternal, dependent on the universe rather than its Creator. His "resurrection" is more like a sophisticated computer program than the bodily resurrection taught in Scripture.

Steven J. Dick: The God of Cosmic Evolutionary Intelligence

Another imaginative proposal comes from the historian of science Steven J. Dick, who calls his view a *bio-cosmological perspective* (Dick 2020, 2023). For Dick, the universe's most remarkable feature is its capacity to generate life and intelligence — not as an accident, but as an emergent, driving principle of evolution. Rather than pointing to a transcendent Creator, he sees the universe itself, through its life-producing properties, as manifesting what might be called divinity.

In this view, the unfolding of intelligence — perhaps culminating in a superintelligent, galactic civilization — gives existence its ultimate meaning. This intelligence does not pre-exist the universe but arises immanently as evolution advances. Like Tipler, Dick speculates that such a vast intelligence could eventually master its environment, direct cosmic destiny, and preserve itself indefinitely. He calls this vision *cosmotheology*: the worship of the creative, life-producing cosmos and the intelligence it brings forth.

For Dick, morality and meaning are not grounded in divine commands but in the flourishing of life and intelligence. The highest good becomes the enhancement of intelligence across the cosmos — what he terms *postbiological evolution*. As humans transcend biological limits through technology, they may merge into an unimaginably powerful collective consciousness — a god-like intelligence birthed by the universe itself.

Dick's god resembles those of Hoyle and Tipler in its futurity and dependence on evolution but is even more explicitly naturalistic and secular. It is not a personal Creator, moral lawgiver, or transcendent Being. At best, it offers symbolic survival: our genes, thoughts, and contributions may endure in future cosmic intelligence, but personal continuity beyond death is lost.

From a Christian perspective, Dick's god falls far short of the biblical God. It has no personal will, no holiness, no power to forgive or raise the dead. Like the other modern gods, it offers no assurance of individual immortality — only the faint hope that some trace of us remains in the future intelligence of the cosmos. Inspiring perhaps, but ultimately an impersonal and inadequate substitute for the living God.

These scientific gods share key features: they are wholly natural, immanent within the universe, emergent products of evolution, and constrained by physical law. While they occasionally borrow language from theology, they remain fundamentally impersonal and speculative.

Theological-Ecological Gods

In contrast to the speculative naturalistic gods of Hoyle, Tipler, and Dyson, some theologians and philosophers have proposed conceptions of God that retain spiritual and moral dimensions, while still being informed by evolutionary and ecological thought.

Teilhard's Omega Point: Christ of Evolution

Pierre Teilhard de Chardin (1959) envisioned the cosmos as an evolutionary drama, an unfolding unity that advances toward ever-greater complexity, consciousness, and spiritualization. This trajectory, he argued, would ultimately culminate in the Omega Point, a state of maximum unification and self-awareness, which he explicitly identified with Christ. In this vision, God is not a distant, transcendent Creator but is deeply immersed in creation, present in its "within," guiding and energizing its evolutionary ascent from matter to mind to spirit.

Teilhard saw Christ not so much as the savior of individual souls but more as the final goal toward which the entire universe is drawn — the organizing center of creation's convergence. Yet, in his system, this Christ is not omnipotent in the traditional Christian sense. Rather, he is vulnerable and dependent on human cooperation for the fulfillment of the evolutionary project. Humanity, as the current leading edge of consciousness, bears responsibility for carrying the process forward toward its completion.

However, Teilhard's vision offers little assurance of personal immortality. He regarded the soul as inseparably bound to the body and thus subject to the same evolutionary and thermodynamic limits as matter. At death, individual consciousness dissolves into the collective consciousness of the Omega Point, contributing to the whole but losing personal distinctness. The ultimate destiny he proposed is not a personal, eternal fellowship with God, as in biblical Christianity, but a kind of mystical absorption into the cosmic Christ — a synthesis of all consciousness into a single divine reality.

In short, while Teilhard's Christ of evolution inspired a grand, cosmic hope and provided a theological narrative to accompany modern science, it diverged sharply from the biblical portrait of a sovereign, transcendent God who redeems and sustains each person in eternal relationship with himself.

The God of Process Theology: An Evolving Companion

Process theology, rooted in the metaphysics of Alfred North Whitehead (*Process and Reality*, 1929) and developed further by Charles Hartshorne (1962), John Cobb (1965), and Schubert Ogden (1975), offers a vision of God very different from the classical Christian view. Dissatisfied with the notion of an immutable, transcendent deity, process theologians depict God as a dynamic, evolving companion — intimately involved in the world's joys and sorrows.

In this view, God is *dipolar*: his primordial nature is the eternal source of possibility, order, and potential, while his consequent nature is the responsive, evolving realization of the world's actual history. He is deeply immanent, with the world as his body and its creatures as cells within him. God lures creation toward harmony and beauty, not by sovereign command but by persuasion — offering possibilities, inspiring love, and evoking creativity. His power is not coercive but persuasive, and his knowledge does not extend to the future, which remains genuinely open.

This God suffers with the world, grows through its history, and depends on its responses for his own fulfillment. He is not omnipotent or omniscient in the biblical sense. He does not create ex nihilo but works with pre-existing material. Neither miracles nor ultimate sovereignty are attributed to him; he is the "great companion" and "fellow sufferer who understands" (Whitehead 1929:532).

On human destiny, process theology denies traditional heaven, hell, or bodily resurrection. It allows only for *objective immortality*: our experiences remain preserved in God's memory, enriching his being, but our individual, conscious existence ends at death. We live on only through our contribution to God's ongoing life.

While this vision is appealing to some for its emphasis on love, relationality, and ecological care, it falls far short of the biblical God. It diminishes his holiness and sovereignty, reducing him to a participant in the evolutionary drama rather than its Creator and Lord. As Ronald Nash (1983) observes, it often accommodates Scripture only when convenient, and rejects fundamental doctrines such as the deity of Christ, as well as his Incarnation, Resurrection, and Atonement.

In the end, the God of process theology is a sympathetic companion but an impotent savior — a fellow traveler in a story without a guaranteed conclusion.

Brian Swimme: Creative Energy

Brian Swimme (1996) envisions God as the creative energy pervading the universe — not a personal being but the dynamic principle animating matter and mind. For Swimme, the story of the cosmos itself is sacred, and our proper response is awe, wonder, and creative participation. Worship, in this view, becomes the celebration of the universe itself, rather than communion with a personal Creator.

Swimme speaks of the universe as an unfolding adventure of creativity, in which we play our part in the great narrative of evolution but have no personal survival.

Sallie McFague: The World as God's Body

Sallie McFague (*The Body of God*, 1993) proposes an ecological metaphor: the earth as God's body. This metaphor emphasizes the sacredness of the planet and calls us to care for creation as an expression of divine presence. God is no longer seen as transcendent but as intimately connected to the physical and biological world.

McFague's god is not a sovereign Person but a metaphor for the interdependence of all life. Her aim is not doctrinal precision but moral motivation — to inspire environmental responsibility by portraying the world as sacred and divine.

She rejects a traditional, personal afterlife in favor of a "collective immortality" grounded in the resurrection and renewal of the whole created order. Individual human lives find their ultimate meaning and continuation not in isolated survival but in the flourishing of God's ecological body.

Catherine Keller: The Depth of Becoming

Catherine Keller (2015) portrays God as the mysterious, relational depth of reality — neither a distant sovereign nor merely a metaphor, but an inexhaustible, creative presence entangled within and beyond the evolutionary and ecological web of life. Drawing on process theology, she depicts God as vulnerable, co-suffering, and luring creation toward greater complexity, beauty, and justice without coercion.

Evolution itself is seen as an open-ended, creative process marked by struggle and emergence, through which God's relational creativity unfolds. Keller rejects traditional notions of personal immortality, instead emphasizing an "objective immortality" in which our lives endure in God's memory and within the ongoing fabric of creation, calling us to embrace our mortality and deepen our care for this fragile, interconnected world.

Philip Clayton: Emergent Spirit

Clayton (2008) also draws from process theology and evolutionary thought. He advocates a form of panentheism compatible with evolution: God as the Spirit who emerges with the cosmos yet also transcends it. God works through natural processes, including evolution, guiding creation toward increasing complexity and meaning. Clayton explicitly defends the idea that God has purposes for creation and interacts with it within the constraints of natural laws.

While critical of simplistic views of heaven and hell, Clayton is more open to the idea of individual survival. He explores whether personal continuity after death could be compatible with evolutionary and scientific understanding, suggesting that God could preserve the pattern of the person in a future divine reality, though he acknowledges this is speculative.

These proposals agree in stressing God's immanence in creation but diverge sharply in how they conceive of God's nature: Swimme reduces God to an impersonal creative force; McFague to a metaphor of intimate presence.

Conclusions

All these modern gods—whether naturalistic or theological—share fatal weaknesses: they are immanent rather than transcendent, natural rather than supernatural, finite rather than infinite, and emergent rather than eternal. They are products of the cosmos, not its Creator. Though they may inspire fleeting awe or moral sentiment, they lack true holiness, sovereignty, and the power to redeem.

Their promises of immortality are equally hollow:

- **Scientific gods** (Davies, Dyson, Hoyle, Tipler, Dick) offer at best technological or symbolic survival—copies, simulations, memory traces, or assimilation into some future intelligence—but none assure real personal continuity.
- **Natural-theology gods** offer nothing beyond contributing to a still-unfinished cosmic process.
- **Theological-ecological gods** (Teilhard, process theology, Swimme, McFague, Keller) speak at best of "objective immortality," where our lives persist as memories in God or as threads in the cosmic fabric, while our personal consciousness perishes at death.

Modern cosmology cannot sustain the two most essential pillars of true religion: a supernatural God and subjective, personal immortality. If the soul is merely an aspect of bodily processes, governed entirely by physical law, then when the body dies the soul must also cease. If the soul is tied to the body, then a universe with a beginning and an eventual heat death leaves no room for enduring consciousness or eternal life. Such a view banishes the Spirit of God and strips humanity of hope.

Clearly, to preserve these vital truths there must exist a reality richer and deeper than the observable, physical universe — a spiritual realm in which God and the soul truly dwell. That transcendent reality is necessarily beyond the reach of scientific scrutiny. Those who desire to retain the core of true religion must face the stark inadequacy of modern cosmology, both in its vision of the future and its understanding of the present.

In contrast, biblical Christianity proclaims a personal, sovereign, transcendent God who created the universe *ex nihilo*, sustains it by His power, and redeems His people through Christ's death and resurrection. It promises not merely symbolic survival but real, bodily resurrection and eternal life in fellowship with God. The Christian hope is grounded not in human speculation or technology, nor in an evolving cosmos, but in the unchanging character and promises of the living God.

Thus, those who seek true answers to humanity's deepest questions — *What is God like? What happens after we die?* — must look beyond the inadequate and speculative gods of modern thought. They must lift their eyes to the eternal Creator, who alone can save, forgive, and raise His people to everlasting life.

8. Christianity and the Big Bang

In an earlier chapter we noted how cosmological theories rest on subjective assumptions, discussed several weaknesses of Big Bang cosmology (BBC), and even sketched alternative models. We cautioned against treating BBC as though it were incontrovertible truth.

Yet some Christian apologists—William Craig and Stephen Meyer chief among them—see BBC not as a threat but as compelling evidence of creatio ex nihilo and a valuable step toward proving the existence of a transcendent God. Meyer, for example, writes:

> *"Taken jointly, general relativity and the Big Bang theory provide a scientific description of what Christian theologians have long described in doctrinal terms as creatio ex nihilo—creation out of nothing (again, nothing physical). These theories place a heavy demand on any proposed causal explanation of the universe, since the cause of the beginning of the universe must transcend time, space, matter, and energy." (Meyer 1999: 8)*

Gregory Koukl goes even further:

> *"I know the Big Bang idea is controversial with some Christians, but I think that's because they haven't realized how well it fits the Story [the Christian worldview laid out in the Bible], which basically says the same thing." (Koukl 2017: 51)*

Because BBC so strongly undergirds the naturalistic worldview, many Christians feel compelled to "baptize" it—insisting that BBC simply describes the method by which the sovereign biblical God brought the cosmos into being, while occasional miracles remain possible. A "baptized" BBC, however, remains identical in every factual detail to its secular counterpart once one moves past the initial singularity.

So the question remains: How well does BBC really fit the Christian story? Are there truly no conflicts? What theological costs might we incur by embracing modern cosmology? To answer these questions, we must now compare how BBC and Scripture portray the universe's past, present, and future.

Conflicts About Origins

1. Astronomical evolution

Big Bang cosmology and Genesis agree on a few points: the universe began a finite time ago, light was among the first creations, and humans arrived last.

Yet they diverge sharply on timescale (billions of years vs. thousands), sequence (Sun → Earth → vegetation vs. Earth → vegetation → Sun), and method (gradual, law-governed processes vs. instantaneous divine fiat). Further, BBC assumes natural laws have never changed while, according to the Bible, rebellion against God subjected the entire creation, including astronomical objects, to distortion and decay, effecting even natural laws.

To harmonize the Bible with BBC one could simply re-interpret Genesis 1, treating the creation days as merely a literary device (*e.g.*, the framework hypothesis or analogical days) conveying theological rather than historical truths, and re-interpret those biblical texts speaking of the universal effect of sin.

That may seem a modest concession, but it establishes the hermeneutical principle that scientific consensus can shape our reading of Scripture. Once that's granted, it's hard to limit.

2. Geological evolution

One could stop here, adopting an old universe/young earth stance. But this is rare: if we trust mainstream astronomy, why not mainstream geology? If the mainstream history of stars is trusted, why not also the scientific mainstream history of planet Earth? Both are based on the same naturalist presuppositions. Most Christians who accept BBC also embrace geological time.

Yet this deeper commitment carries a heavier theological cost. According to mainstream geology, geological strata attest to death, disease, and predation long before humans appear. If those sufferings predate Adam's Fall, then natural evil belongs to God's "very good" creation.

Mainstream geology, for example, dates fossil evidence for pain, suffering, predation, disease, earthquakes, and the like, millions of years before man appears. If natural evil predates Adam's Fall it must belong to God's initial "very good" creation.

Much else in Genesis becomes open to challenge. William Craig (2021a:101, 105) labels Genesis 1-11 as "mytho-history" rife with "fantastic elements" that are "palpably false": six-day creation, vegetarian first humans, a talking serpent, cherubim with flaming swords, a global flood, a young Earth, and more.

The most acute tension, however, is mainstream geology's dating of primitive human-like cave-dwellers more than a million years ago. This is hard to square with the biblical Adam.

3. Biological Evolution

Having accepted mainstream astronomy and geology, why not also mainstream biology? If mainstream science is reliable about the chronology of life, why should it not also be trusted about its the evolutionary origins?

Most Christian biologists affirm evolution as fact. So does theologian Bruce Waltke, who warns,

> *"If the data is overwhelmingly in favor of evolution, to deny that reality will make us a cult…some odd group that is not really interacting with the world. To deny scientific reality would be to deny the truth of God in the world. For us as Christians, this would serve as our spiritual death because we would not be loving God with all of our minds. It would also be our spiritual death in witness to the world because we would not be seen as credible…" (quoted in Morris 2010: 4–5).*

But where does that leave Adam? Suggestions range from a Neolithic farmer or tribal chieftain to the first Homo sapien—or even an earlier hominid—viewed variously as fully created, as biologically evolved with a specially created soul, or as fully evolved. William Craig goes so far as to identify Adam and Eve with two members of Homo heidelbergensis, in whom God implanted rational souls at least 750,000 years ago (Craig 2021b: 47–48).

Other theologians, such as Peter Enns (2012) and John Schneider (2010), treat Adam entirely as a literary figure. Schneider even denies that humans were ever upright, argues that death is not a consequence of sin, and rejects Christ's atonement as payment for human sin. In his view, evolution (and thus God's own creative activity) accounts for our selfishness and sinfulness, leading him to a universalism in which all will ultimately be saved.

Few Christians are willing to go that far. Yet once we begin reshaping Scripture to accommodate modern science, where do we draw the line?

The Big Bang and Heaven

The Bible portrays heaven as a realm created directly by God—a real place, within time and space, populated by angels, God's throne, Christ in His resurrected body, and the souls of the redeemed. Though normally invisible, heaven appears to occupy its own three-dimensional subspace, embedded alongside our physical cosmos and perhaps governed by its own natural laws. Yet it remains intimately connected to earth, sending angels to act in the world.

Modern cosmology, by contrast, treats the observable universe as a closed system with no "extra" space or time beyond the Big Bang's origin. There is simply no framework in which to locate a distinct heavenly domain—one cannot point to a region outside the cosmic horizon or imagine it expanding alongside our universe. And because heaven, biblically, interacts with creation, it cannot be dismissed as mere metaphor without undermining Scripture's account of angelic activity and Christ's ascension.

Christians who embrace Big Bang cosmology seldom address these tensions. When they do, they often redefine heaven as a wholly spiritual realm rather than a created, spatial domain. William Craig, for instance, argues that heaven lies "beyond space-time" and is inhabited only by non-physical beings—so that even the ascended Christ lacks a physical body (Craig 2021c).

The Big Bang and the Future

The contrast between Big Bang cosmology and Christian hope is most stark in their visions of the future. Modern cosmology predicts the eventual extinction of all life—whether by cosmic heat death, runaway expansion ("Big Rip"), or collapse—and biology insists that death is final. By contrast, Christianity's central hope is the return of Christ, the resurrection of the dead, the Last Judgment, and eternal life in a new heaven and a new earth. These convictions are non-negotiable for any orthodox believer.

Many Christians who accept mainstream science for the past nevertheless reject its eschatological extrapolations. William Craig (2006), John Polkinghorne (2002), and Robert Russell (2008) all insist that our hope for personal and cosmic resurrection rests on God's mercy and sovereign power, not on scientific predictions. They argue that God can—and will—override uniform natural laws to bring about His promised renewal.

That "Bible-first" epistemology is admirable—but it sits uneasily alongside a willingness to relegate Genesis 1–11 to myth. If we trust Scripture over science for the future, consistency demands we do so for the past as well. If God's mighty acts can overturn scientific forecasts of what will happen, why could they not equally override scientific reconstructions of what happened?

The cosmic reconciliation will involve much *continuity,* in that the earth and heavenly bodies will not be destroyed but only renewed. But also, there will be also d*iscontinuity*, the renewed cosmos shall not be subject to physical decay.

Robert Russell envisions, at Christ's return, changed physical laws. Thermodynamics will be preserved insofar as it promotes good, but no longer driving entropy and death (Russell 2008:307–10). This mirrors some creationist suggestions that the original creation, before sin's curse, operated under modified thermodynamical laws.

Ultimately, the Christian must choose: surrender the hope of resurrection and a redeemed cosmos to scientific eschatology, or uphold Scripture’s promise that God—transcending time, space, and natural law—will bring about a future far more glorious than any natural extrapolation could ever envisage.

Conclusion

To sum up, Christians should be wary of embracing Big Bang cosmology. What may seem a modest adjustment to Scripture in fact introduces a science-first hermeneutic, one that quickly paves the way for geological and biological evolution, the loss of a historical Adam, and a host of theological difficulties.

Modern cosmology also offers no coherent place for heaven as a real, physical realm that interacts with our universe.

Most critically, the predictive framework of Big Bang eschatology—ice-cold heat death, endless expansion, or cosmic collapse—flatly contradicts the Christian hope of a renewed creation and our own bodily resurrection.

9. Biblical Cosmologies

In this chapter we examine more closely the task of Christians working in cosmology, particularly the challenge of constructing models that respect biblical givens.

The first goal of cosmology is to describe the large-scale structure of the universe: observing stars, nebulae, galaxies, and their patterns, and discovering the laws that govern them.

While the Bible says little about the physical structure of the heavens, it does proclaim that *"the heavens declare the glory of God"* (Ps. 19:1). Careful study of the sky deepens our awe of the beauty, order, power, and immensity of God's creation. This, in turn, should lead us—and all people (Rom. 1:20)—to glorify God.

Difficulties arise, however, when we interpret the data. The same observations can support a variety of cosmological models. Our assessment and choice of models depend heavily on our prior philosophical and religious commitments. A Christian approach should insist that scientific theories be consistent with *all* the data—including biblical data. Scripture informs cosmology chiefly in three areas: the heavenly realm, the origins of the cosmos, and its future.

Cosmology, as a science, studies only the physical aspects of the universe, in terms of known physical causes. It necessarily ignores the unseen heavenly realm, angelic or demonic forces, and miraculous events. Hence, any cosmological model will be spatially incomplete (since it says nothing about heaven) and causally incomplete (since it excludes spiritual causes).

Regarding the future, heaven and earth will be renewed supernaturally when Christ returns. There will be only limited natural continuity between this age and the next. Hence, it is impossible to construct an adequate cosmological model for the distant future after the eschaton—even of the physical universe. At best, any model of the present universe can remain valid only for a limited time.

A major challenge for biblical cosmology is to explain the observed features of the universe in terms of the Genesis creation account, where the earth is created before the stars, and all in less than ten thousand years. How could stars and galaxies form in a day? How could light from galaxies billions of light-years away reach us in only a few thousand years?

The Size of the Observable Universe

Let us first consider the size of the stellar universe. Some creationists have suggested that the farthest galaxies are much closer than commonly thought — perhaps less than twenty light-years away.

How are astronomical distances determined? For objects within the solar system, distances can be measured directly using radar or radio signals. The Astronomical Unit (AU) — the earth–sun distance — is about 93 million miles, or roughly 8 light-minutes.

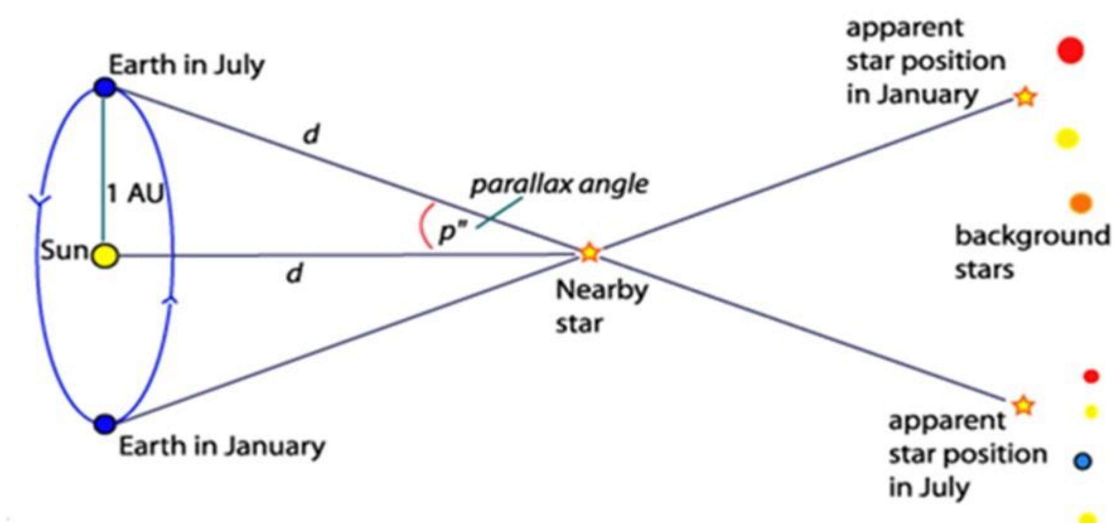


Figure 9.1. The Parallax of a Nearby Star.

For nearby stars, we use the earth's annual motion around the sun: a nearby star, as seen from the earth, appears to shift slightly against the background of more distant stars over the course of a year. From the maximum parallax angle (see Figure 9.1), the distance can be calculated using trigonometry and the known AU. Using this method, the nearest star, Proxima Centauri, is about 4.2 light-years away. Distances determined in this way are called parallax distances.

Parallax distances are reliable up to about 10,000 light-years. From these measurements it was discovered that certain types of stars — such as Cepheid variables and supernovae — have an intrinsic brightness that correlates with their period or other observable properties. Distances determined to such stars, by comparing their intrinsic and apparent brightness (via the inverse-square law), are called luminosity distances. Luminosity distances can be found for many distant stars—and the galaxies in which they reside-- up to about a billion light-years.

For nearby galaxies, it was found that their luminosity distances also correlate with their redshifts. Distances to still more remote galaxies are estimated using this redshift–distance relation.

How reliable are these distances? Could the stars and galaxies actually be much closer?

The critical assumption is that space is flat — Euclidean — where the angles of a triangle sum to 180 degrees. But if space is curved, the angles sum to more or less than 180 degrees, and distance calculations would change accordingly. As discussed in Chapter 4, curved space can be either *spherical* or *hyperbolic* (Figure 4.2).

In spherical space, triangle angles sum to more than 180 degrees, making distant objects appear closer than they really are. In hyperbolic space, triangle angles sum to less than 180 degrees, making nearby objects appear farther away than they are. In Figure 9.2, the rays from the yellow galaxy show the true paths of light; the curves from the red galaxy illustrate the apparent paths, assuming light travels in straight lines.

Some time ago, Parry Moon & Domina Spencer (1953) proposed a curved-space model where the light-travel time to distant objects is at most 15.7 years. Some creationists have cited this model, but it has serious problems. First, it assumes that space is curved only for light, while material objects behave as if space were flat — a strange and arbitrary assumption. Second, it does not solve the starlight problem because the curvature is of the wrong type (Figure 9.2).

Moon and Spencer assumed a spherical universe, which would make the universe seem smaller — not larger — than it really is. To make the universe appear larger, we must assume hyperbolic space. In such a space, light paths bend outward, making nearby objects appear distant. By choosing a sufficiently large negative curvature, it is possible to fit the entire observable universe — apparently billions of light-years in size — into a sphere only, say, 10,000 light-years across (see Byl 1988).

However, this has an implausible consequence: galaxies would appear drastically flattened along the line of sight from Earth. Yet, by selecting a large enough curvature, light from even the most distant galaxies could reach Earth within less than 10,000 years, while distances to nearby stars would remain nearly the same as in flat space.

There are observational ways to test whether space is curved. For example, at great distances there should be measurable discrepancies between parallax distances (from angular motion) and luminosity distances (from brightness).

Over the past few decades, improved observations have found no such discrepancies at the needed scale. Space appears to be flat, or very nearly so. This suggests that the calculated distances to stars and galaxies are reliable: about 4 light-years to Proxima Centauri (the nearest star), about 30,000 light-years to the center of our Milky Way, and billions of light-years to the most distant galaxies.

Explaining the Structure of the Physical Universe

Most creationist cosmologies accept the immense size of the celestial universe. A secondary goal of such cosmologies is to explain why the stellar sky has the features we observe. James Upton (2011) notes that little progress has been made on this front. In a useful recent review of the state of creationist astronomy, Danny Faulkner (2018) attributes this to the paucity of biblical specifics, which consist primarily of the creation of the earth on Day 1, the creation of the expanse on Day 2, the creation of the stars on Day 4, and the Fall shortly thereafter.

Taking the details of Genesis 1 into account, most creationist models posit a finite universe, often envisioned as a sphere centered roughly on the earth or our local galaxy. This arrangement would explain the isotropy of the universe (the fact that it appears the same in all directions) without appealing to the cosmological principle.

Most creationists consider the “expanse” to refer to outer space. Some also identify the “waters above the expanse” (Genesis 1:7) with a layer of water at the spherical edge of the (roughly earth-centered) universe (see Figure 9.3). Faulkner (2016) has suggested that this water layer might explain the cosmic microwave background (CMB) radiation, though he does not show that it accounts for the finer observed details of the CMB.

The central challenge for creationist cosmology remains explaining the observed structure and features of the universe within a timeline of only a few thousand years. Even in mainstream cosmology, the natural formation of stars and galaxies is not fully understood. Perhaps no natural explanation exists; perhaps a miracle is required. What is clear is that all naturalistic models — to the limited extent they succeed — require vast spans of time. For example, the gravitational collapse of gas clouds into stars like the Sun is thought to take millions of years, while the formation of galaxies is estimated to take hundreds of millions, even when theoretical factors like dark matter are included to accelerate the process.

One possible creationist response is to propose that stars and galaxies were created instantaneously in a fully mature state. However, this approach raises difficulties. Astronomical observations provide strong evidence of dynamic past events — galactic collisions (Carey 2005), supernova remnants, and massive jets of matter expelled from galaxies — all of which appear to have occurred millions of years ago, based on the light and structural evidence we now observe. If these objects were created in mature form, why do they exhibit the physical signatures of a history that never actually happened?

The mature creation approach, though preserving a young universe, offers little explanatory power for such specific and complex features. The response “this is simply how God made them” does not engage meaningfully with the detailed astronomical data.

A more scientifically responsive alternative might be to suggest that stars and galaxies formed through processes that were vastly accelerated, operating at rates far beyond anything currently observed or understood in conventional physics. While still speculative, this approach at least attempts to propose a mechanism rather than relying entirely on fiat creation.

Creationist Cosmologies

A major challenge for creationist cosmology, beyond explaining the origin of stars and galaxies, is the *distant starlight problem*: if the universe is less than ten thousand years old, how can we see galaxies apparently billions of light-years away? Shouldn't their light have taken billions of years to reach us? Moreover, the stars were created to serve as signs and lights for the earth. Adam likely saw the beauty of the night sky already on the first night after his creation on Day 6. Yet the nearest star, Proxima Centauri, is more than four light-years away. Are we to suppose that Adam saw no stars until years after his Fall?

At the end of this age, the heavens will be transformed by a cosmic cleansing from the effects of sin. This seems to occur almost instantaneously: the apostle John describes the renewed heavens as already visible before the new Jerusalem descends to earth (Rev. 21:1–2). This suggests that the first stellar heaven was distorted by sin shortly after its creation. Thus, we face a threefold distant starlight problem:

1. How could Adam see the initial, unfallen stars on Day 6?
2. How could Adam see the fallen stars shortly thereafter?
3. How will we see the renewed stars shortly after Christ's return?

Creationist literature generally addresses only the first of these. Let us consider the main models that have been proposed.

1. A Variable Speed of Light

Barry Setterfield (1981) proposed that the speed of light, *c*, was virtually infinite at creation, then decayed exponentially to its present value—a theory known as *c-decay*. In this model, light from distant galaxies, traveling at immense speeds, could have reached earth within days.

The observed constancy of the hydrogen spectrum from distant stars, and the need to preserve the stability of atoms, entail that a change in the speed of light c requires corresponding changes also in some other fundamental physical "constants", such as Planck’s constant *h* and the electron mass *m*. This, in turn, implies that the decay rates of radioactive substances were much higher in the past, suggesting that radiometric dates for rocks are greatly overestimated. This would be of great geological significance.

A related idea, though not committed to a young universe, was proposed by V. S. Troitskii (1987), who also linked redshifts to a decreasing speed of light rather than cosmic expansion. Setterfield suggests the universe is currently contracting; Troitskii argued for a static universe. Setterfield (2009) later incorporated quantum zero-point energy and plasma physics to explain rapid star and galaxy formation, suggesting that stars formed within seconds and galaxies in less than two days. His model also accounts for some of the observed features of the background radiation.

Is there evidence for *c*-decay? Historical measurements over the last two centuries show small variations in *c*, *h*, and *m*, but these may merely reflect experimental error. Modern, more precise measurements show no such change.

The binary pulsar PSR 1913+16, about 21,000 light-years away, provides strong evidence that *c* has not varied significantly for at least 21,000 years: its orbital decay closely matches general relativity’s predictions, which depend on the present value of *c*. To reconcile this with *c*-decay would require rejecting general relativity and devising an alternative theory of gravity—a task not yet accomplished.

Other variations on the *c*-decay theme have been proposed. For example, Bryan Johnson (2018) suggested that *c* varies with position, being much greater in regions of low gravitational potential. However, near our solar system the gravitational potential is dominated by the Milky Way Galaxy. In Johnson’s model, it would still take light about

8000 years to reach us from the galactic center, and even longer from more distant galaxies. Moreover, *c* would not vary significantly between earth and the nearest stars. Thus, Proxima Centauri would not have been visible to Adam until about four years after his creation. If stars were to be visible on Day 6, this model falls short.

Johnson also explored the possibility that *c* might increase in regions of very low particle density. The interstellar medium is much less dense than even the best laboratory vacuum, yet the observed difference in *c* between air and laboratory vacuum is negligible. It is therefore highly doubtful that *c* would differ meaningfully in a perfect vacuum.

One could, in principle, construct a *c*-decay model that produces short light-travel times for distant starlight while still matching observational constraints. But without any compelling physical mechanism for such a variation in *c*, these proposals remain contrived.

Of course, *ad hoc* theories are not unique to creationist cosmology; as noted earlier, such theorizing is common in cosmology in general. Indeed, the idea of a time-varying *c* has been used in Big Bang cosmology as well. To resolve several problems in standard cosmology, Köhn (2017) and others have proposed that *c* was virtually infinite at the Big Bang singularity. In this respect, creationist cosmology is no worse off than the Big Bang.

Nevertheless, most *c*-decay models still require the mature creation of stars and galaxies.

2. Time Dilation – Slow Earth Clocks

In general relativity, the rate at which a clock ticks depends on its speed and its local gravitational field. It might thus be possible to construct a cosmological model where, in the distant past, Earth clocks ticked much slower than those on distant galaxies. In such a scenario, light could travel billions of light-years at its normal speed, while only a few thousand years passed on Earth.

Russell Humphreys (2008) proposed such a model, placing the earth near the center of a spherical universe surrounded by an invisible shell (the “waters above the heavens”) with mass far exceeding that of all the galaxies (Figure 9.3). The rapid expansion of this shell, accompanied by the creation of galaxies, supposedly generated a moving zone of “timelessness,” allowing the earth to experience only a few days while billions of years passed elsewhere.

An alternative by John Hartnett (2007) extended general relativity using Moshe Carmeli’s five-dimensional cosmology. In his model, too, the earth is near the center of a rapidly expanding spherical universe, producing the desired slowing of Earth’s clock during the creation week.

How well do these models succeed? Both are highly speculative, relying on novel physics and peculiar mass distributions. Both face significant theoretical difficulties, such as achieving sufficient time dilation at Earth and reproducing the observed redshift-distance relation. Furthermore, the required special conditions—such as sudden acceleration and later deceleration—appear to demand additional supernatural intervention.

Humphreys’ model has faced devastating criticism, exposing mathematical errors and misapplications of general relativity (see Dennis 2020). Humphreys himself abandoned the model in 2022 in favor of a different approach, discussed later.

Hartnett’s model also remains incomplete. Carmeli, who has since died, never fully developed his five-dimensional framework. Hartnett (2015) seems to have abandoned his model as well, favoring Jason Lisle’s Anisotropic Synchrony Convention (ASC), to be discussed below.

It seems fair to conclude that no viable creationist time-dilation cosmologies currently exist.

Moreover, all such models still require some form of mature creation. While time dilation could, in theory, provide enough time for distant stars and galaxies to develop naturally, it cannot explain the Sun and nearby stars. These lie in a similar gravitational potential as Earth and therefore share its clock rate. They would still need to have been created in a mature state.

Finally, since time dilation does not significantly alter the apparent ages of nearby stars, it fails to resolve the problem of Adam seeing the stars on Day 6.

3. The Anisotropic Synchrony Convention

Jason Lisle's (2010) *Anisotropic Synchrony Convention* (ASC) assumes that light travels infinitely fast when moving toward the earth, and at speed *c*/2 when moving away from the earth, with an average round-trip speed of *c* (about 300,000 km/s). This solves the distant starlight problem by making light from even the most distant galaxies reach the earth virtually instantaneously. According to Lisle, the stars and galaxies were created in mature form about 6,000 years ago, much as we see them today.

This solution has become quite popular among creationists over the last decade. It is grounded in Special Relativity, which holds that spatial position, time, and motion have no absolute values but are all relative to the observer.

The key point is that the one-way speed of light — say, from observer A to observer B — cannot be measured directly because this would require two perfectly synchronized clocks, one at each end. Observer A can only measure the speed of light by sending a signal to B and then reflecting it back with a mirror, timing the whole round-trip with his own clock. This measurement yields only the *two-way* average speed of light — the universally observed *c*.

In standard physics, the speed of light is assumed to be isotropic, the same in all directions. But this is merely a convention. As long as the two-way average equals *c*, one can choose the one-way speed arbitrarily — making it, for example, infinitely fast in one direction and slower in the opposite direction. Lisle's ASC model exploits this freedom, reformulating the equations of Special Relativity accordingly, but without contradicting any observable facts. Therefore, ASC is empirically indistinguishable from the standard model and cannot be falsified experimentally.

Does Light Have a One-way Speed?

Does ASC mean that light really travels infinitely fast toward the earth? Not exactly. According to Lisle, the one-way speed of light is not a real property of the universe at all. He explains:

> *Those unfamiliar with Relativistic physics are deeply inclined to believe in absolute time and space. And therefore, it will seem intuitive to them that the one-way speed of light should be an objective, invariant, and measurable quantity. But the universe is not constructed that way… God has constructed the universe in such a way that length, duration, and synchronization are relative to a given observer. Our inability to measure the one-way speed of light is not due to a lack of creativity on our part… Rather it is due to the way God has constructed spacetime. (Lisle 2010:203)*

Thus, whether we set the incoming speed of light at *c*/2, infinity, or anything in between, this is just a human convention — much like choosing to measure distances in meters or yards — and has no physical effect.

It follows that Lisle's model is mathematically equivalent to God creating the universe 14 billion years ago, starting at the furthest galaxies and working inward, such that the first light from all galaxies reaches earth simultaneously on Day 4, 6,000 years ago.

Yet, if the one-way speed of light is not a property of the universe, then it is not meaningful to ask how long starlight *really* took to reach earth. Lisle's approach does not so much solve the distant starlight problem as dismiss it the question as meaningless.

Relativity: Einstein Versus Lorentz

Lisle's position aligns with Einstein's positivist interpretation of Special Relativity, which limits reality to what observers can measure. In Einstein's view, Special Relativity implies a "block universe" — a four-dimensional spacetime in which past, present, and future are equally real, and the flow of time is just an illusion. This is known as static time, eternalism, or the B-theory of time.

This perspective clashes with the common-sense view of time as dynamic — where only the present exists, the past has happened, and the future does not yet exist — known as presentism, or the A-theory of time (as discussed in Chapter 2). Presentism posits a universal “now,” which presupposes absolute time, space, and simultaneity.

Special Relativity can in fact be interpreted this way, as Hendrik Lorentz proposed. Lorentzian Relativity maintains that there is a universal reference frame in which light travels at speed *c* in all directions. Observers moving relative to this frame see their rods contract and clocks slow, so that light still appears to travel at *c*. Lorentz’s view preserves absolute space and time and treats the one-way speed of light as physically meaningful. Lorentzian Relativity is empirically equivalent to Special Relativity, but it takes the one-way speed of light to be physically meaningful, having speed c.

Surely, an omnipresent and omniscient God can assign a universal “now” for the universe at each instant of time. Such a “God’s view” of things would define absolute time, space, motion, and simultaneity. It seems incoherent to suppose that the Creator of the universe could not know how long starlight takes to reach the earth — even if this remains unknowable to human observers. From this perspective, presentism, the A-theory of time, and the Lorentzian approach to relativity appear more consistent with biblical theism than Einstein’s eternalist view.

The ASC and the Bible

If it is not physically meaningful to ask how long it took light from a celestial event to reach us, such events can be timed only according to when they are observed on earth. John Hartnett illustrates this with sunlight:

> *Based on the distance to the sun and the canonical speed of light, c, the light travel time from the sun to Earth is about 8.3 minutes. But, and here’s the problem, it has been suggested that light from the core of the sun takes about 170,000 years to reach the surface. This is because gamma photons, generated in the thermonuclear fusion reaction at the sun center, undergo a random walk as they are absorbed and re-emitted by nuclei on their way to the surface...*

> *There is only one biblical creationist cosmogony that I know which can explain it, and it does it easily. It is Jason Lisle's ASC model. That ASC model says that the physics of Einstein allows us to time events such as in the Days of Creation, 1, 2, 3, 4, 5, etc. And we time those events by when an Earth observer could see the events happening. Thus when the light from the sun first arrived at the Earth it was Day 4.* ***It does not matter, it is even irrelevant, how long the light took to travel...***
>
> *This is the language of the Bible. Events occur when they are observed. The sun was first seen by Earth observers on Day 4 and that defines when the sun was created. That event occurred 3 days after God created the Earth on Day 1 about 6 thousand years ago (Hartnett 2019).*

Yet the random walk of photons bouncing about inside the sun is largely governed by two-way light speeds and thus still implies a substantial timescale. Even under ASC, the 170,000-year timespan for light to reach the sun's surface would remain. Hartnett appears to accept this, which suggests he also accepts a much older age for the sun than the earth.

Hartnett also views ASC as primarily a clock convention: events are dated according to when they become visible on earth, rather than when they actually occurred. In his view, Genesis 1 uses phenomenal language, recording creation from the perspective of an earth-bound observer.

But this interpretation seems problematic. Genesis 1 is written from God's perspective, not man's. The text says, "*God made the two great lights… and the stars… and set them in the expanse… And God saw that it was good*" (Gen 1:16–18). Since God is omniscient and omnipresent, the events described in Genesis must correspond to real, objective events, not merely to human perception.

Furthermore, the expanse (heaven) was created on Day 2; there was nowhere for the sun and stars to exist before then. Also, if the stars only became visible on Day 4, why does the text not say they "appeared," as it does of dry land on Day 3? Finally, Exodus 20:11

explicitly states that God made everything in heaven and earth in six days — not that everything became visible to man in six days.

Summary

Thus, the Anisotropic Synchrony Convention does not truly solve the distant starlight problem. Instead of offering a solution, it merely dismisses the problem as meaningless — rooted in a positivist interpretation of Special Relativity and leading to a phenomenalist reading of Genesis 1 that conflicts with the plain meaning of the text.

We might rescue the model by supposing that light actually does travel infinitely fast toward the earth and at $c/2$ away from it, treating this not as a mere convention but as a physical property of the universe. This would require adopting an absolute reference frame with the earth at the center and a presentist view of time. This model might perhaps be better termed a *Geocentric Lightspeed Model*.

Such a model seems counterintuitive and ad hoc. Why should the speed of light depend so radically on its direction? And why should earth have this unique status? Nonetheless, if only the two-way speed of light is measurable, there is no empirical way to disprove it.

Absent a compelling physical rationale, such a model can only be justified on theological grounds — namely, its ability to resolve the problem of seeing distant stars in a young universe. Indeed, as we have seen, biblical cosmology accords a special status to the earth.

Finally, it is worth noting that both ASC and the Geocentric Lightspeed Model still require some hypothesis about the rapid formation of stars and galaxies. Lisle himself posits that they were created in mature form.

4. Mature Creation

Virtually all creationist cosmologies must incorporate some degree of mature creation. This naturally raises the question: if mature creation is necessary anyway, why not simply propose that God created the entire stellar heaven — including stars, galaxies, and their light already in transit — instantaneously on Day 4?

The concept of mature creation is most commonly associated with Philip Gosse (1857). More recently, it has been developed by P. G. Nelson (2013) and applied to astronomy by Donald DeYoung (2010).

The Mature Creation model requires no speculative physics or exotic conditions, at least beyond Day 4. It depends solely on a miraculous act of creation on Day 4.

Since mature creation concerns the past, no present or future observation or experiment can disprove it. Nor is it illogical; there is nothing inherently inconsistent about such an origin of the cosmos. As cosmologist George Ellis notes:

> *A modern cosmologist who was also a theologian with strict fundamentalist views could construct a universe model which began 6000 years ago in time and whose edge was at a distance of 6000 light-years from the solar system. A benevolent God could easily arrange the creation of the universe...so that suitable radiation was travelling toward us from the edge of the universe to give the illusion of a vastly older and larger expanding universe. It would be impossible for any other scientist on the earth to refute this world picture experimentally or observationally; all that he could do would be to disagree with the author's cosmological premises.(Ellis 1975:246).*

Similarly, physicist Herbert Dingle (1960:166) writes of mature creation:

> *There is no question that the theory is free from self-contradiction and is consistent with all the facts of experience we have to explain; it certainly does not multiply hypotheses beyond necessity since it invokes only one; and it is evidently beyond future refutation. If, then, we are to ask of our concepts nothing more than that they shall correlate our present experience economically, we must accept it in preference to any other. Nevertheless, it is doubtful if a single person does so.*

Despite these apparent advantages, many creationists have rejected the idea of full-fledged mature creation.

Why? Let us consider the most common objections.

a. Divine Deception

The main objection to mature creation is that it seems to imply deception on God's part (Hartnett 2015:14). If the stellar light Adam saw was created en route and never actually emitted by the star, then it might appear that God constructed an illusory history.

Moreover, much of the observed starlight appears to record specific events — such as a supernova, first seen in 1987, which seems to have occurred 170,000 years ago. If such events never really happened, does this not make them mere fictions — a kind of cosmic hoax?

Even many creationists find this troubling. For example, Jonathan Sarfati (2015:172–3) argues that while God created Adam, trees, and stars fully formed, this conferred only *functional maturity*. According to Sarfati, deception arises only if creation included unnecessary features that implied a fictitious history. He concludes that Adam had no navel, the original trees had no growth rings, and starlight was not created in transit.

But how valid is this charge of deception?

i. Inevitable Apparent History

Any form of mature creation — even if limited to "functional" maturity — is vulnerable to the same charge of deception. For example, we observe what appears to be evidence of past collisions of galaxies (Carey 2005), supernova explosions, and vast expulsions of matter. According to John Hartnett, light emitted from the Sun's surface seems to have left its core about 170,000 years earlier. Even Adam's newly created hair would have borne apparent evidence of prior growth. Any mature created structure, examined under the assumption of uniform natural laws, will exhibit signs of earlier stages and specific events that never actually occurred.

Nelson (2013) suggests that God created not merely a mature universe but a *coherently* mature one — such that all indicators of age align consistently.

A star created as a functioning whole, for example, would necessarily display an internal structure and emit light consistent with its present state, as if the light had emerged from deep within its core.

Similarly, a galaxy would necessarily include not only its stars and gas but also the gravitational fields and radiation needed to make it dynamically stable. Its light and gravity were created in place yet appear to originate from earlier events. This principle scales up: clusters of galaxies, superclusters, and the entire cosmos could likewise have been created fully formed, complete with their apparent histories.

In short, any created entity, if examined under the naturalistic assumption of continuous physical laws, will inevitably appear to have a history. Since the same laws that predict future states can also be applied retroactively, the apparent past will resemble the expected future. If the cosmos is destined to produce supernovae and galactic collisions, it is unsurprising that the apparent past seems to include such events as well.

ii. God, Deception, and Judgment

An object's apparent age or history is not an intrinsic property but an inference drawn from a theoretical framework. When we assume uniform natural laws and exclude miracles, we inevitably infer a past that may conflict with Scripture. Yet with different assumptions, it is always possible to construct a history consistent with biblical revelation.

God cannot rightly be accused of deception for creating a world that appears mature or for exercising his creative power in ways beyond natural explanation. As Edgar Andrews (1985:164) observes, God has plainly disclosed his creative acts in Scripture. If people choose to ignore this revelation and instead rely on their own assumptions, the fault lies not with God but with their rejection of his testimony.

Nevertheless, Scripture also teaches that God uses deception—in judgment—against those who reject his word. It affirms that *“God never lies”* (Titus 1:2) and that *“it is impossible for God to lie”* (Hebrews 6:18), but these assurances refer to his covenantal faithfulness to his people, not to his dealings with rebels. Indeed, the Bible shows that God may send delusions as a form of judgment:

> *“And if a prophet is deceived and speaks a word, I, the Lord, have deceived that prophet… and they shall bear their punishment… that the house of Israel may no more go astray from me…” (Ezek. 14:9–11).*
>
> *“Therefore God sends them a strong delusion, so that they may believe what is false, in order that all may be condemned who did not believe the truth…” (2 Thess. 2:11–12).*

In sum, God does use deception—in response to our rejection of his word. This often occurs through secondary means, not least of which is our fallen human proclivity for self-deception.

b. A 5-minute Old Universe?

A common objection to the idea of mature creation is the so-called “last Thursdayism” argument—that one could just as well claim the entire universe, along with our memories and records of an apparent past, was created only five minutes ago. If such reasoning is accepted, it seems we have no reliable guarantee that any part of our history is real or truly existed.

Empirically, of course, we have no way to disprove such a hypothesis. Yet although a five-minute-old world might be logically possible, there are no compelling grounds for believing it to be true.

However, the sheer implausibility of this scenario does not mean that all miraculous or mature histories should be dismissed. In particular, the case for a young universe is not a mere philosophical possibility or speculative idea—it is grounded upon the explicit testimony of its Creator, as revealed in Scripture. Thus, the biblical account provides a firm foundation for trusting the reality of the created past, even if its appearance is mature.

c. It Is Unfalsifiable

Finally, it is sometimes charged that the theory of mature creation is not scientific because it is not falsifiable. We cannot go back into the past to disprove mature creation; and after the creation event, the universe appears observationally identical to one with a long history.

However, this objection cuts both ways. If mature creation is unfalsifiable, then so is its logical opposite. Any naturalistic theory of origins that denies mature creation is equally unfalsifiable. For example, the notion that Big Bang cosmology describes real past events is likewise unfalsifiable and, by that standard, non-scientific.

On the other hand, mature creation is based on biblical evidence. The Bible also speaks of future events that will ultimately confirm its truthfulness. For example, it predicts the momentous return of Christ, his judgment of all humanity, and the renewal of the cosmos. The Bible further teaches that, at death, each person will experience an appropriate afterlife.

Thus, while the biblical worldview may be deeply falsifiable in principle, the proof often comes too late to convince us in this life, where we are called to live by faith.

5. A Rapidly Matured Creation

The mature creation model can readily incorporate miraculous processes. Variations of this theme have been proposed by Edgar Andrews (1985:65), creationist astronomer Danny Faulkner (2013), and Russell Humphreys (2022).

In the Genesis creation account, the universe was not created instantaneously but formed in stages over six days. Some aspects of creation clearly involved process. For example, on Day 3, “the earth brought forth vegetation” (Gen. 1:12), and on Day 6, “let the earth bring forth living creatures” (Gen. 1:24). Adam, trees, beasts, and birds are all formed “out of the ground” by God (Gen. 2), suggesting the use of process—albeit rapid and miraculous. It is thus plausible that God used similarly rapid processes in forming the sun, moon, and stars.

Consider Jonah's shade tree, "*which came into being in a night*" (Jonah 4). Everything else around Jonah continued normally, but God miraculously accelerated the plant's growth so that a year's growth took place in just a few hours. Likewise, Aaron's staff sprouted, budded, blossomed, and bore ripe almonds overnight (Num. 17:8). These miracles resemble the earth "*sprouting vegetation*" on Day 3.

Creation geologist Ken Coulson (2020) postulates that during Creation Week, God used supernatural formative processes in which all natural processes were accelerated at the same relative rate. Creation would mature much like it would naturally but at an accelerated pace—like a time-lapse video. All rhythms speed up by the same factor, except the rhythm of day and night. What normally takes millions of years occurs within a single day.

This is equivalent to the rhythms staying the same, except for a slowing of the day-night cycle. Another way to view this is that a creation day might have lasted billions of years. However, since the day is the basic unit of biblical time, it is preferable to see the day length as fixed and other natural rhythms as accelerated.

However, these supernatural formative processes were not merely highly accelerated natural processes. How could plants grow on Day 3 in the absence of the sun and moon with their daily, monthly, and seasonal cycles? This requires further miraculous properties. Jonah's tree and Aaron's almonds grew overnight, despite the absence of sunlight, water, and nutrients. Similarly, the plants on Day 3 grew miraculously as though all necessary natural conditions were present.

This model may help explain many pre-Cambrian geological structures formed before animal fossils appear. However, on Day 4, when the sun, moon, and stars were created, this approach raises questions. If all natural processes accelerated equally, then the 14 billion years of celestial activity imply another 14 billion years of geological activity after Day 3. Since this is not feasible, the model must be adjusted.

One can conjecture that normal providence governed the earth, while God worked miraculously to form the celestial bodies. Celestial processes—gravity, nuclear reactions, radiation—may have been highly accelerated (at the same relative rate), while earthly processes operated normally. Watching the creation of the stellar sky on Day 4 might resemble watching a video in fast motion. What normally takes billions of years happens in just a few hours, including star formation, galaxy collisions, and the transmission of their light to earth.

For example, Humphreys (2022) postulates that on Day 1 God created a ball of water about one light-year in radius. On Day 2, God separated the inner part, which became the earth, from the outer part, the expanse. The expanse expanded to about 15 billion light-years by Day 4, when stars and galaxies were miraculously formed from water within the expanse. The “waters above the expanse” were ice particles just beyond the universe’s edge. On Day 4, the speed of light and all physical processes were trillions of times faster than on earth, so billions of years of activity were compressed into one earth day. Later that day, the speed of light and physical processes in the expanse slowed to normal.

One might ask: if the energy received on earth from the sun, moon, and stars—seemingly accumulated over billions of years—were compressed into one day, would this huge burst of energy destroy the vegetation created on Day 3? Not necessarily. Physical laws may have been changed or superseded during the miraculous formation of celestial bodies on Day 4. For example, the earth could have been miraculously shielded from any harmful effects.

Earlier, we saw that at the eschaton, the cosmos may be renewed rapidly in a process resembling the original creation. In the new heaven, we may again observe galaxies billions of light-years away, raising the same distant starlight problem. Will anyone then argue that those galaxies were renewed billions of years earlier?

Having considered how God may have rapidly matured the universe, we now turn to summarize the various creationist cosmologies that have been proposed to account for both the biblical testimony and the observed universe.

Summary

To sum up, many of the creationist cosmologies discussed have serious—if not fatal—shortcomings, at least in their present forms.

The curved-space model can be ruled out on observational grounds; hence the large distances assigned to stars and galaxies are probably reliable. The decaying speed of light (c-decay) model lacks compelling physical rationale or observational support, and it is challenged by the orbital decay rate of the Hulse-Taylor pulsar. There is currently no workable time-dilation model that could account for Adam seeing stars already on Day 6.

The Anisotropic Synchrony Convention model does not really solve the problem, but merely dismisses it as physically meaningless. It relies on a positivist interpretation of special relativity, leading to a phenomenalist reading of Genesis 1 that contradicts the plain sense of the biblical text. The Geocentric Lightspeed Model avoids these shortcomings and is likewise impossible to disprove empirically. However, it seems rather *ad hoc*, offering no physical justification for why light should travel in such a profoundly geocentric manner.

All these models, except for that of Setterfield, must ultimately appeal to mature creation for the origin of stars and galaxies. Hence, it is simplest and more consistent to appeal to the mature creation of the entire universe. The objection that this entails a fictitious history applies equally to any miracle when examined through naturalistic assumptions. If valid, this objection would rule out any non-naturalistic theory of origins.

The most general and plausible form of mature creation is the concept of a rapidly matured creation that allows for miraculous processes during the creation week. This allows for the possibility that the starlight we see was not created en route but actually originated from the stars where it appears to come from.

This model resembles c-decay theories in that it suggests light traveled faster in the past. However, unlike those theories, it limits this to the creation week (and perhaps shortly afterward, at the time of Adam's fall) and does not propose any precise physical formulas or mathematical rules.

Indeed, the rapidly matured creation model avoids speculative physical conjectures about what happened during creation and refrains from going beyond what Scripture reveals.

The choice is generally between (1) fully mature (or rapidly matured) creation, and (2) limited mature creation combined with hypothetical new physics, unusual time conventions, ad hoc scenarios, and the like. In many current creationist models, the latter options often seem implausible, unlikely to persuade opponents, and potentially open to disproof.

Fully mature creation—perhaps rapidly matured—remains the simplest and most coherent solution to the distant starlight problem.

This conclusion should not be seen as closing the door to further investigation, but as a reminder that all true understanding of the cosmos begins with the Word of its Creator. Future research may refine these models, but Scripture remains the foundation on which every faithful cosmology must rest.

A Many-Models Approach

Requiring scientific models to align with Scripture introduces additional constraints and data that any viable cosmology must account for. This necessarily rules out secular cosmologies but still allows for a variety of biblical possibilities. As noted earlier, many models can be constructed to fit a given set of data—at least in principle.

This leads to a key question: how do we identify the true biblical cosmology? The problem lies in defining and justifying appropriate criteria for theory selection. Even after applying all relevant scriptural principles, multiple theoretical options remain.

Cosmologies that contradict Scripture are certainly false, but those that go significantly beyond what Scripture teaches are likely in error as well. The inherently speculative nature of scientific modeling warns against placing too much confidence in any single proposed solution. For that reason, biblical cosmologies should be presented not as definitive answers, but as hypothetical possibilities.

Given this, it may be better to outline several plausible models rather than stake too much on one detailed theory. This "multiple-models" approach has several advantages. It cautions against accepting any model as final truth. It increases the likelihood of identifying fruitful possibilities, highlights the interpretive flexibility of observational data, and reinforces the subjective, conjectural nature of theoretical cosmology. It also reminds us that the gap between empirical observations and the theories proposed to explain them remains vast.

For instance, consider the light travel time problem. Several possible solutions have been proposed: perhaps light was created already in transit, or perhaps the speed of light varies depending on direction, time, or location. It’s also possible that extraordinarily rapid processes occurred during the creation week. Which explanation is correct? Ultimately, only God knows. Beyond what he has chosen to reveal—whether through direct observation or through his Word—we can do no more than offer informed speculation.

Various biblical cosmologies aim to explain astronomical observations using biblical givens, especially concerning the universe’s origin. The goal is to show that what we observe can indeed be harmonized with what Scripture teaches. While Big Bang cosmology—despite its metaphysical shortcomings—is currently more advanced in explaining a broad range of phenomena, that may reflect the vastly greater amount of research funding and institutional support it has received. It is entirely plausible that, given comparable resources, creationist cosmology could see significant refinement.

Yet our aim in constructing cosmological models is not merely to produce something with broad (and possibly illusory) explanatory power. Rather, a biblical cosmology should reflect true features of the universe as revealed by God. Despite their limitations, creationist models are more faithful to divinely revealed truths than Big Bang cosmology.

Evidence for a Young Universe

A central feature of any biblical cosmology is the affirmation that the visible universe was created by God less than ten thousand years ago. Does contemporary astronomy support this claim? Creationist physicist Jake Hebert (2019) has argued for several deep-space indicators consistent with a young universe, such as the winding of spiral galaxies, the presence of hot blue stars, and an unexpectedly high number of neutron stars in globular clusters.

Yet these indicators remain debatable. Astronomer Danny Faulkner (2019a,b) critically reviews nearly fifty astronomical arguments for a young universe. He concludes that most traditional young-universe claims—including the faint young Sun paradox, galaxy winding, and redshift anomalies—are either scientifically outdated or weakly supported. For instance, current simulations indicate that spiral arms can persist for billions of years through density wave mechanisms (D'Onghia 2013).

That said, Faulkner deems a few arguments worthy of further study: the continued presence of short-period comets despite rapid disintegration; the relative scarcity of ancient supernova remnants; the current rate of lunar recession; and the accelerated orbital decay observed in some eclipsing binary stars. These phenomena challenge standard cosmology and are more naturally explained within a young-earth framework.

However, even these surviving arguments for a youthful universe are of limited value. First, the shortened timescales implied by these features often still reach into the millions of years—far exceeding biblical chronology. Second, while these anomalies may challenge current standard cosmology, naturalist scientists continue to propose possible, though speculative, solutions they expect future research to refine. Third, and most importantly, the large-scale structure and apparent age of the universe, when interpreted by current physical laws and uniformitarian assumptions, continue to indicate vast ages.

To convincingly counter this narrative, creationists would need to propose a comprehensive, scientifically coherent cosmology—one that explains the formation of stars, galaxies, and cosmic background radiation within a few thousand years, without invoking ad hoc miracles or the concept of mature creation. This appears extremely difficult, if not impossible.

It is also worth noting that if past processes were supernaturally accelerated—as some suggest—then, when interpreted using today's normal physical rates, we would not expect to find any physical evidence indicating a recent creation.

The Ambiguity of Nature

Kurt Wise (2002) and Ken Coulson (2020) argue that God designed nature to reveal his eternal power and divine nature (Romans 1:20), while remaining intentionally ambiguous about the specific historical details of creation. This ambiguity preserves human freedom—belief is not coerced—and directs faith toward God’s written Word rather than empirical observation.

Nature is not self-interpreting. It must be understood through the lens of Scripture. Without this foundation, even the clearest evidence can be misread, as fallen man actively suppresses the truth (Romans 1:18). As Hebrews 11:3 affirms:

> *"By faith we understand that the universe was formed at God's command, so that what is seen was not made out of what was visible."*

Creation cannot be fully comprehended through observation alone; it must be received by faith in God's revealed Word. Similarly, 2 Peter 3:3–7 warns that scoffers will deliberately overlook the evidence for creation and the Flood. The core issue is not a lack of evidence but willful unbelief.

While the natural world does point to the Creator, saving faith comes only through the hearing of God's Word (Romans 10:17). The so-called “foolishness” of faith (1 Corinthians 1:18–25) reflects not irrationality, but a right acknowledgment of the limits of fallen human reason. Any truly Christian view of the cosmos must begin with God's revelation and interpret nature in its light—not the other way around.

This echoes earlier points about general revelation: it is only through the Gospel and the Holy Spirit that anyone can rightly know God. Thus, Scripture is essential for a correct interpretation of nature.

Cosmology and Apologetics

Some Christians hope that a robust biblical cosmology could be shown to be superior to standard Big Bang cosmology and thereby validate Scripture in the eyes of skeptics. While understandable, this goal is problematic.

Although biblical cosmology is important for Christians, it is unlikely to persuade unbelievers. First, key elements such as Heaven, angels, and demons are invisible and inaccessible to scientific measurement. Second, naturalistic cosmology, despite its philosophical weaknesses, often offers more detailed mechanisms for the development of stars and galaxies. Creationists, by contrast, generally lack comparably detailed alternatives.

Explanations that appeal to miracles—such as mature creation—are unlikely to satisfy naturalistic standards. Similarly, attempts to solve the distant starlight problem through speculative physics or miraculous events are generally unconvincing to skeptics.

To be persuasive, a model must make specific, testable predictions—such as, for example, a theory involving variable light speed. But such models remain scientifically problematic and face serious theoretical hurdles.

There are deeper risks as well. The more elaborate a model becomes, the more vulnerable it is to falsification. Should it collapse under scrutiny, some may wrongly conclude that the Bible, which the model tried to uphold, itself has been discredited.

We must be careful not to fall into the trap of trying to justify biblical faith by providing scientific explanations for every event recorded in Scripture. History offers a cautionary tale. In *The Legend of Noah* (1963), D.C. Allen describes how, in the 17th century, theologians faced increasing pressure to respond to scientific challenges regarding the biblical account of the Flood. Most Roman Catholic scholars, acknowledging that its mechanics could not be fully explained, accepted the Flood as a miraculous event. In contrast, many Protestant theologians, eager to show that Scripture conformed to human reason, tried to construct detailed scientific explanations. However, when these efforts failed to satisfy their critics, the biblical account of Noah's Flood was gradually dismissed as myth—even by many Christians. This episode highlights the danger of making the credibility of Scripture dependent on the shifting standards of scientific plausibility.

Moreover, any biblical cosmological model will only be accepted by an unbeliever if it meets *his* criteria—criteria which are inevitably grounded in unbiblical assumptions. As philosopher Michael Ruse notes:

> *“The major reason why Creation-science is not genuine science is that its supporters have to believe, without question or dispute, in the literal truth of Genesis.” (Ruse 1988:393)*

The real conflict, then, is not scientific but theological—it stems from incompatible presuppositions. If we allow the standards of secular science to dictate which biblical claims are acceptable, we implicitly surrender the authority of Scripture.

The unbeliever’s ultimate need is not to be persuaded by scientific models, but to be confronted with God’s Word and the call to repentance. Seeking to validate Scripture through science risks implying that belief is justified only when the Bible conforms to human standards of plausibility. But the proper approach is the opposite: Scripture must be our starting point—non-negotiable and supreme. The burden of proof lies with those who reject its claims. If a scientific model fails to account for a biblical event, the shortcoming lies with the model, not with God's Word.

What, then, is the proper function of biblical cosmology? It is not to deliver a fully comprehensive scientific system, but to construct models that reflect the truths of Scripture and explore their possible harmony with observational data. These models can illustrate the consistency between God’s Word and the created order—but they do not, and cannot, serve as final proof of the Bible’s truth. As such, they serve more to bolster the faith of believers than to convince skeptics.

To defend the faith, Christians need not demonstrate that the Bible aligns with ever-shifting scientific theories. Rather, we should critique the foundational assumptions of secular science—especially naturalism—and expose its philosophical fragility. Naturalism, like all man-centered worldviews, ultimately undermines itself.

The scientific community must be challenged to recognize the deeply subjective nature of theory formation, the influence of philosophical presuppositions, and the inherent limitations of human knowledge—

especially concerning the origin and destiny of the universe. The real strength of a biblical worldview lies in its coherence, its theological depth, and its ability to explain the world in light of divine revelation.

Our hope is not grounded in our ability to explain every detail of cosmology. Our ultimate hope is the *bodily resurrection*, and a *renewed earth*—a redeemed cosmos in which we will glorify Christ our Lord. That future reality will be the final, irrefutable demonstration of the truth of biblical cosmology.

10. Conclusions

We have now reached the end of our exploration into the relationship between cosmology and theology. In this concluding chapter, we draw together the main insights from our study and reflect on their broader implications. Our concern has been to evaluate how human attempts to understand the universe align—or conflict—with the revealed truths of Scripture.

The Nature and Limits of Cosmology

Cosmology, by its very nature, is both significant and speculative. It seeks to describe the universe as a whole—its origin, structure, and destiny. Yet our actual access to the cosmos is extremely limited. We can observe only a small portion of space and only across a brief window of time. Most of our data come from radiation currently collected by telescopes here on earth.

But raw data are not self-interpreting. The transformation of starlight into information about distant galaxies depends on prior assumptions—about the speed of light, distances, and physical laws. To move from what we see to theories about the entire cosmos involves massive generalizations. These are guided not just by observation, but largely by worldview commitments.

Thus, cosmology is deeply shaped by untestable philosophical and theological assumptions. What is often presented as objective scientific fact is, in reality, heavily filtered through human reasoning and belief. If “facts” are limited to repeated, confirmed observations, then much of modern cosmology consists not of fact, but of conjecture.

The Failure of Naturalist Cosmology

Mainstream cosmology today, particularly the Big Bang theory, is built on naturalist foundations. It assumes that nature is all there is—that the universe arose from nothing and evolves purely according to impersonal laws. Big Bang cosmology functions as the creation myth of naturalism.

Yet this naturalist model is riddled with problems. It depends on theoretical constructs—such as inflation, dark matter, and dark energy—that have never been directly observed. Many of its explanations are circular or *ad hoc*, and alternative models, built on different assumptions, are equally consistent with the data. The Big Bang model can never be proven true.

Moreover, it cannot explain why the universe exists, why the laws of physics are so finely tuned, or how consciousness and moral values arose. Naturalism offers no hope. It portrays a universe hurtling toward extinction, where life ends in cold death and human meaning dissolves into nothingness, with no place for soul, spirit, morality, or purpose. It has no place for soul, spirit, morality, or purpose. It excludes God, heaven, and the afterlife. It is a worldview that reduces love and justice to chemical illusions and exiles man to cosmic insignificance.

Some Christians have attempted to adapt Big Bang cosmology into a defense of creation—pointing to a universe with a beginning and apparent design. But these arguments, while rhetorically appealing, rest on shifting scientific theories and lead to problematic theology. They often require a re-reading of Genesis that distorts or discards its plain meaning, and open the door to evolutionary interpretations of life, humanity, and sin. In so doing, they risk undermining the authority of Scripture and compromising the heart of the gospel.

Big Bang cosmology is, at root, a rival worldview. To combine it with biblical Christianity is to attempt to yoke together two opposing systems—an effort that will ultimately fail, to the detriment of Christian faith.

A Biblical Cosmology

In contrast to the speculative, man-made cosmologies of the world, biblical cosmology begins with the Word of God. Scripture provides the only reliable account of the universe's origin, structure, and purpose, because it comes from the Creator Himself.

According to the Bible, God is eternal, all-powerful, and sovereign. He spoke the universe into existence by His Word. He governs it moment by moment by His will. Creation is not limited to what we see. It includes heavenly realms and spiritual realities, all orchestrated for the glory of God.

At the centre of all things stands the throne of God. From Him, and through Him, and to Him are all things. The goal of creation is the glory of the Creator; the destiny of the redeemed is to live with Him in a new heavens and new earth. The cosmos is not a closed physical system—it is open to the action, providence, and presence of its Maker.

Biblical models of the cosmos may vary in detail, but they are united in these essential truths. They affirm a recent, purposeful creation, a fallen world in need of redemption, and a future restoration when Christ returns. While such models may not persuade the naturalist, they provide deep encouragement for believers. Their purpose is not to impress the world with scientific cleverness, but to stand firm on the unchanging foundation of divine revelation.

Yet even here, humility is needed. We must not rest our faith on speculative harmonizations or scientific models, no matter how well-intentioned. The truths of Scripture are not dependent on our ability to map them onto current theories. Biblical cosmology must be rooted in the Word of God, not in the fluctuating fashions of science.

Final Reflections

Let us now turn to some final reflections that follow from our study.

The Limits of Human Knowledge

Human knowledge, particularly in the realm of origins and cosmology, is severely limited. Much that passes for science rests on presuppositions and untested theories. We must distinguish between what can be known with confidence and what belongs to the realm of speculation. Christians are called to be discerning, not dazzled.

The central thesis of this study is the severe limitation of human reason, particularly in cosmology. Only direct, confirmed observations can be regarded as genuine facts. Most cosmological speculation, including big bang cosmology, goes far beyond this boundary.

Some may consider this skepticism excessive. But if scientific theories are to be equated with truth, on what basis? What criteria justify such elevation? These foundational issues remain unresolved.

The Supremacy of God’s Word

God’s Word stands above all human theorizing. It is not to be judged by science, but to judge it.

Today many Christian scholars, overly confident in speculative science, have accepted such naturalist conclusions as vast ages, big bang cosmology, and human evolution. This elevates conjecture to truth and results in forced reinterpretations of the biblical text.

When Christians reinterpret the Bible to fit speculative science, they apply flawed hermeneutic based on a hostile epistemology. The result is often a compromised faith, a watered-down gospel, and a church conformed to the world.

We must recover the conviction that Scripture is sufficient, authoritative, and true in all that it teaches. We must resist the temptation to surrender its clarity in the face of worldly wisdom.

A Choice of Worldviews

Our understanding of the universe depends on where we place our trust. Ultimately, we are faced with a stark choice between two starting points: the mind of man or the Word of God.

The naturalist assumes that the material universe is all there is. This leads to a world without God, without spirit, without meaning. Consciousness is reduced to illusion, and human existence ends in cosmic futility. The naturalist’s world, even if he could fully explain it, is shallow and bleak. Naturalism begins with blind matter and ends in despair.

The Christian, by contrast, begins with the triune God and ends in glory. He views the physical world as part of a broader spiritual reality, upheld by divine power and imbued with meaning. In this universe miracles pose no problem and creation by divine fiat is perfectly coherent. Revelation provides true knowledge that surpasses our senses. The Christian's world is deeper, brighter, and filled with hope—because it is filled with God.

These worldviews cannot be reconciled. Either the Bible is true, and naturalism is false, or the reverse. There can be no synthesis.

A Plea for Consistency

We cannot serve two masters. If we confess Christ as Lord, we must allow His Word to shape every area of thought—including our understanding of the cosmos. Christians in science must resist the pull of secular acclaim and remain faithful to Scripture. Christian scholars must critically examine the assumptions and methods of their disciplines and rebuild them on biblical foundations.

The wisdom of God has always been folly to the world. If we must choose between being wise in the eyes of men or faithful in the eyes of God, let us gladly choose the latter. Christians certainly must profess such essentials as the return of Christ and our life hereafter. If such faith already makes us fools in the eyes of the world, let us then be consistent fools—fools for Christ.

A Final Meditation

As we conclude this study, let our minds be humbled and our hearts lifted. Our knowledge is limited, our science is provisional, and our reasoning is flawed. But God's Word stands firm, his purposes do not waver, and his promises do not fail.

We strive to look beyond the stars and galaxies, which declare God's glory, to behold God's royal throne. Our Lord reigns, ensuring that his grand plan fully unfolds. Let us confess with the Apostle Paul:

> *"Oh, the depth of the riches and wisdom and knowledge of God! How unsearchable are his judgments and how inscrutable his ways!*

> *'For who has known the mind of the Lord, or who has been his counsellor?' 'Or who has given a gift to him that he might be repaid?'*
>
> *For from him and through him and to him are all things. To him be glory for ever. Amen." (Romans 11:33–36)*

And with the apostle John, we look forward to the final unveiling of God's cosmic purpose—not the extinction of life, but the renewal of all things:

> *"Then I saw a new heaven and a new earth, for the first heaven and the first earth had passed away, and the sea was no more. And I saw the holy city, new Jerusalem, coming down out of heaven from God, prepared as a bride adorned for her husband. And I heard a loud voice from the throne saying,*
>
> *'Behold, the dwelling place of God is with man. He will dwell with them, and they will be his people, and God himself will be with them as their God. He will wipe away every tear from their eyes, and death shall be no more, neither shall there be mourning, nor crying, nor pain any more, for the former things have passed away.'" (Revelation 21:1–4)*

This is the true end of history—the goal toward which all creation moves. Not collapse, but consummation. Not darkness, but light. Not silence, but song. Not a meaningless death, but eternal communion with the living God. A renewed heaven and earth where righteousness dwells. That is final hope of biblical cosmology, and the destiny of all who trust in Christ

Soli Deo Gloria.

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