How Did the Universe Begin?

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Introduction

The origin of the universe is one of the important and perplexing subjects known to mankind. The subject is important because of its implications for mankind’s place in the universe, and it is perplexing because of the vastness and complexity of everything in the universe, from the distant galaxies to the virtual particles of the quantum vacuum.

Two basic questions about the origin of the universe must be addressed. First is the question, “Did the universe have a beginning?” which can be answered by utilizing three sources of information: philosophy, science, and theology. The second question is, “How did the universe begin?” For Christians today, there are two competing models: young-earth creationism and old-earth creationism. Although the majority of Christian scholars today favor old-earth creationism, the big bang theory is fraught with problems.

Therefore, this paper will demonstrate that there are strong arguments for the beginning of the universe, with the implication that God created the universe ex nihilo as the Bible teaches, and that there are insurmountable problems working against the big bang theory, with the implication that Christians should avoid using cosmic evolution in their interpretation of the Bible and in their apologetics.

Did the Universe have a Beginning?

Before turning to the question of how the universe began, one must first answer the question of whether or not the universe in fact began to exist. If the universe is eternal, then either matter is all that exists (materialism), which entails that God does not exist if God is thought to exist immaterially, or the universe is eternal, in which case

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1 The question, “How did the universe begin?” comes from the first chapter in Keith Ward, The Big Questions in Science and Religion (West Conshohocken, PA: Templeton Press, 2008), though the approach to answering this question here differs from Ward’s.
matter and God coexist in a dualistic sense. Either scenario is contrary to the Christian doctrine of God, so it important for Christians to determine whether or not the universe began to exist. The beginning of the universe is supported by philosophical arguments, scientific evidence, and the revelation in the Bible.

Philosophical Arguments for the Beginning of the Universe

In the history of philosophy, Aristotle was well known for his belief that the universe is eternal. In his view, every object comes into existence from a substratum of matter (e.g., fruit comes from seeds). No one ever encounters something which did not come from some other form of matter, so matter must be eternal. Thus, the universe must be eternal. This idea was challenged by the medieval Muslim philosopher al-Ghazali. He reasoned that the universe cannot be eternal in the past because when today arrived, the series of past events came to an end. But an infinite series cannot come to an end, so the past cannot be infinite. Another way to state the point is that if the universe were eternal in the past, then today would never have arrived. This would be like trying to count down from negative infinity to zero. A second argument from al-Ghazali is that an infinite past would lead to absurdities. For example, if two planets, which orbit at different speeds, have been orbiting forever, then the number of orbits each has completed will be the same number (infinity) even though the planets orbit at different speeds. Even stronger is

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philosopher William Lane Craig’s contention that infinity does not exist in reality. While
infinity exists as a concept in mathematics, such absurdities as the orbiting planets or the
infamous Hilbert’s Hotel would obtain if infinity existed in the reality. In summary, the
universe must have begun to exist because it is impossible to traverse a past infinite series
of events and because an infinite past requires an infinite number of things (days or
events), which cannot exist in the real world.

Scientific Arguments for the Beginning of the Universe

In addition to philosophical arguments for the beginning of the universe, there are
two evidences from modern science which point to the beginning of the universe: the
expansion of the universe and the Second Law of Thermodynamics. From Newton to
Einstein, the standard belief in cosmology was that the universe is infinite and static.
Newton’s argument for the static universe was based on his belief that the effects of
gravity are universal. If gravity were universal, and if the universe were finite, then the
gravitational attraction among the stars would have caused them to collapse upon one
another at the center of the finite universe. Since this has not happened, then the universe
must be eternal and infinite. When Einstein developed his general theory of gravity, he

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5 See ibid., 116-20. One common objection is known as “Zeno’s paradox.” Zeno stated that before
Achilles could cross from one side of the stadium to the other, he would have to pass through an infinite
number of subdivided distances. Before he could cross halfway, he would have to cross one quarter of the
way. Before he could cross one quarter of the way, he would have to cross one eighth of the way, and so on
to infinity. Since Achilles can obviously cross from one side to the other, then Zeno thought it possible to
traverse an actual infinite. This objection does not work for two reasons, though. First, the subdivision of
distances still amounts to a potential infinite; no one will ever finish subdividing to infinity. Second, the
paradox is not analogous to the past eternal universe. The distance that Achilles would have to traverse is
finite, but the universe would be beginningless and endless (ibid., 121-23).

6 For more details and for answers to other objections, see William Lane Craig and James D.
realized that the gravitational force of objects in space precluded the idea of a static universe for the same reasons. He even added a repelling force to his equation in the form of a cosmological constant to keep the universe static. When the expansion of the universe was confirmed by Hubble’s observations of redshifted galaxies in 1929, Einstein recognized his addition of the cosmological constant as the biggest blunder of his career.\(^7\) Today, most scientists accept the expansion of the universe based on the Doppler interpretation of redshift in distant galaxies.\(^8\) What this means in terms of cosmic history is that the universe must have had a beginning, for it could not have been in a state of expansion forever.

The second scientific principle to consider is the Second Law of Thermodynamics which states that the energy of the universe is constant and that the entropy of the universe tends to a maximum.\(^9\) In a closed system, the useable energy in the universe will eventually dissipate until the universe reaches equilibrium in a “heat death” (or “Big Chill”). If the universe were a closed system, which scientists assume, then the universe would have reached a state of equilibrium by now if it were eternal. Since the universe has not reached equilibrium, then it cannot be eternal.\(^10\) In other words, the universe could...

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\(^11\) Physicist Ludwig Boltzman thought that the universe is in a state of equilibrium and that the universe just appears to be old, but this hypothesis failed to gain a following in the scientific community (see Craig, *Reasonable Faith*, 141-42).
not have been running out of useable energy forever. This means that the universe must have had a beginning a finite time ago.¹²

**Universes with No Beginning**¹³

The expansion of the universe and the Second Law of Thermodynamics today are accepted by nearly all in the scientific community.¹⁴ When one extrapolates back in time, space and time are contracted to a point called a singularity about 14 billion years ago. As Barrow and Tipler state, “At this singularity, space and time came into existence; literally nothing existed before the singularity, so, if the Universe originated at such a singularity, we would truly have a creation ex nihilo.”¹⁵ If the universe, including all matter, space, energy and time, had a beginning at the big bang, then either the universe created itself out of nothing, which is absurd,¹⁶ or else the universe was created by someone or something which exists outside of space and time. The traditional definition of God as a being who exists outside of space and time fits the bill,¹⁷ but because of the theistic implications of the Standard Model, some scientists have created alternative explanations to the absolute beginning at the big bang. These will be examined and critiqued next.

¹² Ibid., 141.

¹³ This section follows the overview and critiques from Craig, *Reasonable Faith*, 128-50. For a more technical discussion, see Craig and Sinclair, “The Kalam Cosmological Argument,” 125-82.

¹⁴ The expansion of the universe is still doubted by some dissenters to the Standard Model (e.g., Hilton Ratcliffe, *The Static Universe: Exploding the Myth of Cosmic Expansion* [Montreal: C. Roy Keys Inc., 2010]).


¹⁶ Atheist philosopher Daniel Dennett suggests that the universe may have created itself ex nihilo in what he calls “the ultimate bootstrapping trick” (Daniel C. Dennett, *Breaking the Spell: Religion as a Natural Phenomenon* [New York: Penguin Group, 2006], 244). This, however, seems absurd. In order to exercise creative powers, the universe would have to exist prior to its own creation.

Steady State Model

In 1948, Hermann Bondi, Tommy Gold, and Fred Hoyle proposed the Steady State Model. Based on their Perfect Cosmological Principle, which assumes that the universe looks the same in all places at all times, these scientists believed that as the universe expands, new matter is produced to counterbalance the dilution in density due to the expansion. Although this sounds far-fetched, the steady-state theorists believed their hypothesis to be no less fantastic than a universe miraculously appearing from nothing as in the Standard Model. One problem with the Steady State Model is that the continual creation of matter was said to be too small to detect. In addition, the Steady State Model could not adequately explain some of the data from astronomy such as the differences in radio wave emissions in the past universe and the presence of quasars which appeared to have formed only during one particular interval of cosmic history. After some fierce debates in the 1950s between Fred Hoyle and big-bang proponent Martin Ryle, the Steady State Model was largely abandoned with the discovery of the cosmic microwave background radiation (CMBR) in 1964, one of the successful predictions of the Standard Model.\(^\text{18}\) In 2000, Hoyle and others proposed the Quasi-Steady State Theory which could now account for the CMBR and even explain some of the evidence better than the big bang, but it was too late to sway big-bang advocates.\(^\text{19}\)


\(^{19}\) For an overview of the Quasi-Steady State Model, see Williams and Hartnett, *Dismantling the Big Bang*, 283-85.
Oscillating Models

In the 1960s and 1970s, some scientists proposed oscillating models of the universe whereby the universe expands and contracts in an infinite number of cycles. Even though the universe is currently in a state of expansion, the force of gravity will eventually cause the universe to contract into a “Big Crunch.” If matter were distributed unevenly, then the contraction would avoid a singularity, and the universe would bounce back into a new expansion phase. The universe would thus be beginningless and endless. This would also explain why the universe has not reached a state of equilibrium as the Second Law of Thermodynamics demands. There are several problems with the oscillating models. 1) Hawking and Penrose demonstrated that a singularity cannot be avoided even if the matter density of the universe were unevenly distributed.20 2) There is no known mechanism to cause the universe to bounce back from a state of contraction.21 3) There does not appear to be enough mass density to reverse the cosmic expansion.22 4) The redshift of supernovae suggest that the expansion rate of the universe is increasing, not slowing down.23 5) Entropy would be conserved in each cycle such that the expansions would get bigger and bigger in each cycle. As one extrapolates back in time, the cycles would be smaller and smaller to the point that there would be an absolute


23 See Craig, *Reasonable Faith*, 130. There are other interpretations of the redshift besides acceleration (see Williams and Hartnett, *Dismantling the Big Bang*, 273-94).
beginning about 100 cycles ago.\textsuperscript{24} 6) The radiation from star formation in previous cycles would still be leftover. Since we can detect a certain amount of blackbody radiation in our present universe, then the number of cycles must be finite in a closed system.\textsuperscript{25} 7) An oscillating universe would require unimaginable fine-tuning.\textsuperscript{26} In summary, the oscillating models are littered with problems, and they do not avoid the absolute beginning of the universe.

Vacuum Fluctuation Models

In 1973, physicist Edward Tryon proposed the idea that our universe is the result of a fluctuation in the eternally existing quantum vacuum. His assumptions were that the universe is a closed system with a zero net value for all conserved quantities (such as energy) and that according to quantum field theory, every quantum fluctuation could happen on a statistically random basis. In response to the question of why our universe appeared, Tryon states that “our Universe is simply one of those things which happen from time to time,” even though our universe is quite rare.\textsuperscript{27} Physicist Alan Guth picked up the theory in 1978 and has since developed the idea, adding his theory of cosmic inflation of a factor of at least $10^{26}$ at $10^{-30}$ seconds after the big bang to solve some of the problems in the initial proposal from Tryon and for the Standard Model in general (discussed below).\textsuperscript{28} According to Guth, everything was created from nothing so that “the


\textsuperscript{25} Silk, \textit{The Big Bang}, 380.

\textsuperscript{26} Craig, \textit{Reasonable Faith}, 145.


\textsuperscript{28} Guth, \textit{The Inflationary Universe}, 14.
universe is the ultimate free lunch.”29 This idea has also been recently defended by physicist Lawrence Krauss.30 In addition, it is believed that there would be an infinite number of fluctuations of true vacuum in the primordial false vacuum with the result that we actually live in a multiverse.31 Postulating an infinite number of universes takes care of any fine-tuning improbabilities that may exist about our particular universe.

As interesting as vacuum-fluctuation models are, there are several problems which undermine the efforts of Krauss and others to avoid the absolute beginning of the universe. 1) It is disingenuous to speak of creation ex nihilo when “nothing” really means “something” – namely, the quantum vacuum.32 Krauss admits as much in his book: “By nothing, I do not mean nothing, but rather nothing – in this case, the nothingness we normally call empty space.”33 The quantum vacuum is actually a sea of virtual (unobservable) particles, which is not nothing.34 The existence of the eternal quantum vacuum and the laws of physics are left unexplained.35 2) In order for virtual particles to pop into existence in the quantum vacuum, space itself would have to exist as the place

29 Ibid., 15.

30 Krauss, A Universe from Nothing, 99.


33 Krauss, A Universe from Nothing, 58 (emphasis original).

34 Silk, The Big Bang, 387.

where the virtual particles appear.\textsuperscript{36} 3) According to the Heisenberg Uncertainty Principle, the larger the energy in the fluctuation, the shorter the time that it will last. A universe such as ours with a large quantity of energy would vanish immediately. The solution to this problem is the assertion that the total energy of the universe is exactly zero as the Standard Model and inflationary theory predict, but this is merely an assumption, not an observation. No one is able to definitively calculate the total energy of the universe.\textsuperscript{37} 4) If our universe were one of an infinite number of universes bubbling out of the quantum vacuum, then the expanding universes would have eventually coalesced in an infinite universe. If this were the case, then we should be observing an infinitely old universe, but this is not what we observe. One way to avoid this problem would be to supposed that the false vacuum itself is expanding, but this would lead right back to the beginning of the expansion of the vacuum.\textsuperscript{38} Thus, the vacuum-fluctuation models do not avoid the absolute beginning of the universe.

Chaotic Inflationary Model

Another alternative, known as the Chaotic Inflationary Model, was proposed by Russian cosmologist Andrei Linde in 1980s.\textsuperscript{39} In this model, cosmic inflation will eventually produce other domains which recede from one another as the wider universe continues to expand indefinitely. In other words, the expanding universe will produce other universes forever. Linde took this model of the future and projected it onto the past.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{chaotic_inflationary_model.png}
\caption{Chaotic Inflationary Model}
\end{figure}


\textsuperscript{37} Ibid.

\textsuperscript{38} Craig, \textit{Reasonable Faith}, 132.

\textsuperscript{39} For a summary of the model, see ibid., 132-34.
to avoid the singularity of the Standard Model. Similar to the vacuum-fluctuation models, he believed that our own universe is just a bubble in the larger multiverse. The problem with this model was pointed out in 1994 by Arvind Borde and Alexander Vilenkin who stated that any inflationary universe could be infinite in the future but could not be infinite in the past. The 2003 Borde-Guth-Vilenkin theorem further strengthened the conclusion that an inflating universe cannot be past eternal.

Quantum Gravity Models

Another model of the universe which attempts to avoid the beginning of the universe is Stephen Hawking’s “no boundary” model which eliminates the singularity by using imaginary numbers for the time variable in Einstein’s gravitational equations to describe the state before Planck time. In this scenario, the universe would have no edge as one goes back in time. Instead the universe would be rounded off like the surface of the earth so that “the universe would be completely self-contained and not affected by anything outside itself. It would neither be created nor destroyed. It would just BE.” The question of what happened before the big bang would be meaningless. One problem with this scenario is that it does really not avoid the singularity. According to Barrow, “This type of quantum universe has not always existed; it comes into being just as the


41 Cited in Craig, Reasonable Faith, 134. There are some exceptions to this theorem, though. See Craig and Sinclair, “The Kalam Cosmological Argument,” 141-ff.

42 See Hawking, The Illustrated A Brief History of Time, 172-81;


classical cosmologies could, but it does not start at a Big Bang where physical quantities are infinite and where further initial conditions need not be specified.” It’s just that there is no definite point of creation. Another problem with the model is Hawking’s use of imaginary time. While this may be a “computational convenience” for scientific theories, the idea of “imaginary seconds” or “imaginary minutes” in the physical world is meaningless and distorts the distinction between time and space. Hawking himself realizes this difficulty and admits, “When one goes back to the real time in which we live, however, there will still appear to be singularities.” Therefore, the no-boundary model does not avoid the absolute beginning of the universe.

**String Theory Scenarios**

String theory (or superstring theory) is the idea that the fundamental building blocks of matter, quarks, are themselves composed of tiny, one-dimensional vibrating strings that may exist in as many as six or seven dimensions in addition to our normal four-dimensional space-time. The strings are too tiny to observe, and the extra dimensions are curled up so small that we do not detect them. While several string scenarios have been proposed, one string scenario offered by physicists Paul Steinhardt and Neil Turok avers that our universe is a brane world which occasionally collides with...

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48 Hawking, *The Illustrated A Brief History of Time*, 179.


a parallel brane world to produce the cosmic expansion we observe. Thus, the universe is in an eternal cycle of expansion and contraction with no absolute beginning, like the oscillating models.\textsuperscript{51} The main problem with such scenarios, besides those already mentioned for the oscillating models, is actually a problem with string theory in general, namely that string theory is highly speculative and has no experimental support. As Lincoln states, “…the failure of superstring theory to make experimentally verifiable predictions relegates it to the ‘interesting idea’ bin for the foreseeable future.”\textsuperscript{52} In addition, Craig points out that the Borde-Guth-Vilenkin theorem would still apply to string scenarios so that an absolute beginning is unavoidable.\textsuperscript{53}

**Summary**

Cosmologists in the past sixty years have spilled much ink to avoid the beginning of the universe because of the theistic implications of the absolute beginning of space and time in the Standard Model. The Steady State Theory is the one model which does not assume an initial singularity, but each of the other models tries to explain what happened \textit{before} the big bang. The oscillating models and string scenarios project an endless cycle of expansion and contraction. The chaotic inflationary model assumes that our universe is a bubble off of another universe with “turtles all the way down.” The vacuum fluctuation models assume the existence of an eternal quantum vacuum which birthed our universe (and others). The quantum gravity model of Stephen Hawking assumes that there is no edge or boundary (point of beginning) to space-time. Each of these models, however,


\textsuperscript{52} Lincoln, \textit{Understanding the Universe}, 442; cf. Hawking and Mlodinow, \textit{The Grand Design}, 140.

\textsuperscript{53} Craig, \textit{Reasonable Faith}, 138-39
faces internal problems, and each is subject to the Borde-Guth-Vilenkin theorem which states that any universe which is in a state of expansion cannot be past eternal. Thus, the expansion of the universe and the Second Law of Thermodynamics confirm that the universe had a beginning.

Biblical Arguments for the Beginning of the Universe

It will come as no surprise to most readers that the Bible teaches in both the Old Testament and in the New Testament that the universe had a beginning. The first line of the Bible reads, “In the beginning God created the heavens and the earth” (Gen 1:1). This verse implies God’s existence at the beginning of creation as well as the fact that the universe itself had a beginning. Other Old Testament texts which teach that God created the world and everything in it include Exodus 20:11, Psalm 90:2, Proverbs 8:22-26, and Isaiah 44:24. Since God created the universe itself, then creation cannot exist coeternally with God. Hence, there must have been a beginning to creation. The New Testament also states in several places that God created everything, implying a beginning to the universe (John 1:3; Acts 4:24; Rom 11:36; 1 Cor 8:6; Col 1:16). There is even an explicit statement that creation was ex nihilo in Hebrews 11:3: “By faith we understand that the universe was formed at God’s command, so that what is seen was not made out of what

54 Most modern translations take Genesis 1:1 as an absolute clause as opposed to a construct clause such as “In the beginning when God created….” The construct clause would imply that there was no beginning to creation, at least not in Genesis 1:1. For a discussion and defense of the absolute translation, see Copan and Craig, Creation out of Nothing, 36-49.

was visible."

Jesus Himself also affirmed in many places that the world had a beginning (Matt 19:4; 24:21; Mark 10:6; 13:19; Luke 11:50; John 17:5; cf. Rev 1:8; 21:6; 22:13). In summary, the Bible teaches the eternality of God, the beginning of the world, and the creation of all things by God from no preexisting material.

Conclusions

The beginning of the universe has been deduced philosophically long before the discoveries of modern cosmology, and the expansion of the universe and the Second Law of Thermodynamics provide inductive evidence that the universe is not eternal. The efforts of some physicists and cosmologists to devise scenarios of the history of the universe to avoid the absolute beginning have failed. Not only are such models highly speculative, but also there are internal problems with each model as noted above. There are two implications for the beginning of the universe. The first is the implication that the universe must have had a Beginner who exists outside of space-time. As Craig has argued, everything which begins to exist must have a cause for its existence. Since philosophical and scientific arguments support the contention that the universe began to exist, then it follows that the universe had a cause for its existence. This cause fits the traditional, theistic concept of God – an extremely powerful and wise personal being who exists apart from the world of matter, space, energy and time. The idea that no gods were required for the universe to begin leaves the universe as a brute fact without

56 Copan and Craig, *Creation out of Nothing*, 78-83. The doctrine of creation *ex nihilo* is also found in ancient Jewish literature as well as in many of the early Christian writings (see ibid., 93-145).


58 Ibid., 152-56.
explanation in light of the evidence.\textsuperscript{59} Thus, the beginning of the universe is powerful evidence for God’s existence. The second implication is that the Bible is in agreement with the philosophical and scientific evidence for the beginning of the universe. The fact that the Bible has taught the absolute beginning of the universe for thousands of years before philosophy and modern science arose bolsters the credibility of the Bible, at least on this matter.

**How Did the Universe Begin?**

Now that it has been established that the universe had a beginning, the question of how the universe began must be decided next. At present, there are two competing models. Young-earth creationism takes Genesis 1-11 as straightforward, literal history. The universe was created in six, literal, twenty-four-hour days about six thousand years ago, and the fossil record resulted from the global Flood in the days of Noah. Creationist scientists and theologians from organizations such as Answers in Genesis (AiG), The Institute for Creation Research (ICR), and Creation Ministries International (CMI) have produced many excellent papers and books defending the young-earth view both scientifically and biblically.\textsuperscript{60} Old-earth creationism takes Genesis 1-11 in a non-literal manner, either in part or in whole, and adopts the Standard Model of cosmic evolution. This model includes theistic evolution,\textsuperscript{61} progressive creationism,\textsuperscript{62} and other non-literal

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\textsuperscript{60} See the articles and resources at the ministry websites: www.answersingenesis.org; www.icr.org; www.creation.com.
interpretations of Genesis 1-11, and it appears to be the majority view among evangelical scholars today. In addition, many Christian apologists use big bang cosmology in their arguments for God’s existence. But should Christian scholars and apologists align their biblical interpretation and argumentation with the Standard Model? The following discussion will critique the big bang theory and demonstrate why Christians should be skeptical of the secular account of cosmic evolution.

Critiquing the Big Bang Theory

Evidence for the Big Bang

The popular assumption is that the big bang enjoys overwhelming scientific evidence, but the big bang theory is based on only three lines of evidence: the observed Hubble expansion, the cosmic microwave background radiation, and the abundance of light elements (hydrogen, helium, and lithium) in the universe which fit what is thought to have happened in the big bang. How strong is this evidence for the big bang? It


65 Krauss, A Universe from Nothing, 108.
should be noted that none of the three lines of evidence was predicted by the Standard Model. The expansion of the universe was the observational evidence upon which the model was founded. The CMBR was predicted to be anywhere from 5 K to 50 K in temperature, but when it was discovered in 1964, it was measured to be 2.7 K. Therefore, the CMBR was not a clean prediction of the Standard Model. The abundance of light elements is explanatory rather than predictive. This information was put into the model when it was formed. Therefore, none of the three lines of evidence was directly predicted by the model. The reason why so many scientists adopted the Standard Model is because the discovery of the CMBR seemed to contradict the Steady State Theory and was taken as direct evidence of the big bang. Since the Steady State Theory could not account for the CMBR, then the big bang was thought to be correct. But this reasoning commits the juggernaut fallacy because it assumes that there are only two competing models. The expansion, CMBR, and abundance of light elements can be explained by several different models such that the big bang is not demanded by any of the evidence.

**Problems with the Big Bang Theory**

The big bang theory faces difficulties at nearly every turn. Perhaps this is simply the result of trying to study the vast cosmos, or perhaps this reflects the limitation of

66 Williams and Hartnett, *Dismantling the Big Bang*, 127.


68 Williams and Hartnett, *Dismantling the Big Bang*, 53-55.

historical science or the limitation of our current knowledge. Whatever the case may be, Christians should be informed that the Standard Model must make many ad hoc assumptions to explain cosmic evolution from the singularity to the formation of earth.

The Singularity

When one rewinds the cosmic expansion, the universe would have been contracted into a singularity of infinite density. A singularity is thought to be like a black hole in that matter is so compact and the force of gravity so strong that nothing can escape. The difference is that a black hole has an event horizon, but a singularity does not. Once matter has reached the state of a singularity, it cannot return to other states of matter. The singularity represents a thermodynamic dead-end. How, then, did the universe begin from such an initial state? To date, cosmologists have no explanation for why the big bang began at all. Carl Sagan called this “the greatest mystery we know.”

Part of the problem is that scientists do not currently possess a quantum theory of gravity, which unites general relativity with quantum theory, to understand what happened at the start of the big bang. Perhaps scientists will one day derive a quantum theory of gravity, but until they do, the explanation of how the universe was able to escape the singularity remains a mystery. Invoking string theory and brane worlds will not help either. This

70 Williams and Hartnett, *Dismantling the Big Bang*, 96-102.


simply amounts to using one unknown to explain another unknown. The expansion of the singularity is assumed in the model, but it is inexplicable.

The Inflation of the Universe

In order to avoid recollapsing back into a singularity, the universe is thought to have undergone an instantaneous inflation at $10^{-36}$ seconds after the big bang. During the inflation, it is believed that the universe doubled in size about 100 times in a fraction of a second. After the inflation, the universe would be about $10^{30}$ times its original size.

Inflation is needed to solve several problems within the Standard Model – namely, the Flatness Problem, the Horizon Problem, and the Monopole Problem. The Flatness Problem refers to the fact that the geometry of space appears to have zero curvature. If there had been any density fluctuations in the early expansion just after the big bang, gravity would have caused the universe to recollapse into a singularity. The inflation of the universe would have been so large that it would have ironed out any fluctuations and would have produced a flat universe. This eliminates any fine-tuning difficulties with the big bang and explains the flat universe we observe today.

The Horizon Problem pertains to the fact that the CMBR appears to be the same temperature in all directions. How did the CMBR attain such homogeneity? The mixing

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73 Williams and Hartnett, *Dismantling the Big Bang*, 104-105.

74 Ibid., 121.


77 Williams and Hartnett, *Dismantling the Big Bang*, 121-22.

must have taken place very early in the universe when light could have traveled to all parts of the tiny universe in a short period time. Once the radiation was homogenized, inflation caused the CMBR to expand to its present state. Thus, inflationary theory is invoked to solve the problem. The Monopole Problem describes the situation in the early universe when it is believed that the four fundamental forces of nature were not yet operable. The magnetic force would not have been combined with the electric force, so there would have been separate negatively- and positively-charged particles (electrons and protons) as well as separate “north” and “south” magnetic monopoles. Why do not encounter such monopoles today if they were everywhere present in the early universe? Inflationary theory suggests that the rapid inflation diluted the universe so much that encountering magnetic monopoles would be quite rare.

Although inflationary theory solves some problems with the Standard Model, it faces its own difficulties. 1) Inflation solves the fine-tuning difficulties of the Flatness Problem, but it requires fine-tuning for the inflation itself. If the inflation had been smaller by only one part in a hundred thousand million million, the universe would have recollapsed into a singularity. If the inflation were too great, then the universe would have blown apart and resulted in a Big Chill with no production of matter or galaxies. 2) Regarding the Monopole Problem, the dilution would also apply to other elementary particles in the universe which we regularly encounter, so it must be assumed that the

79 Ibid., 180-86.
80 Hawking, The Illustrated A Brief History of Time, 156.
81 Williams and Hartnett, Dismantling the Big Bang, 108-110.
elementary particles were produced after the monopoles were dispersed. ³² 3) There is no known cause for the inflation or for how to stop the inflation. ³³ According to Kaku, there have been over fifty proposals to explain what caused the inflation and what eventually terminated it, but there is no consensus among scientists. ³⁴ 4) There are no direct observational tests for inflation. According to Faulkner, the appeal of inflationary theory is “a result of its ability to solve some cosmological problems.” ³⁵ Therefore, inflationary theory, though widely accepted today, appears to be an ad hoc assumption needed to solve some of the problems in the Standard Model. ³⁶

Missing Antimatter

During the third epoch of the Standard Model, hydrogen, helium, lithium, and deuterium nuclei formed, but no complete atoms would have formed since the intense radiation would have stripped away any electrons from the nuclei. ³⁷ Quantum pair production would have taken place at this time as well. In the laboratory, scientists have discovered that when energy is converted to matter, an equal amount of antimatter is produced. Quantum pairs include electrons and anti-electrons (positrons), protons and anti-protons, and so on. When the pairs meet, the matter and antimatter annihilate each other and convert back to energy. With an assumption of zero net energy, as in the

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³² Ibid., 123.
³⁴ Kaku, Parallel Worlds, 14.
³⁵ Faulkner, Universe by Design, 43.
³⁶ Williams and Hartnett, Dismantling the Big Bang, 124.
³⁷ Ibid., 117.
Standard Model, there would be an equal amount of matter and antimatter in the universe. The problem is that our universe consists almost entirely of matter with only traces of antimatter. The implication is that the universe was not produced by quantum pair production. One possible solution to this problem is that there may be entire antimatter galaxies which have not yet been observed, but such galaxies would collide with matter and would give off high-energy radiation which we do not observe. A more popular solution is that the vast amount of antimatter was annihilated in the very early universe. Hawking suggests that a grand unified theory which unites the fundamental forces of nature may one day explain this phenomenon, but the annihilation of antimatter at present is another ad hoc assumption of the Standard Model.

Star and Galaxy Formation

During the third epoch of the big bang – from about 300,000 year onward – the universe would have been a mass of expanding gas. Around one billion years after the big bang came the epoch when stars and galaxies were supposed to have formed. Unanswered questions here abound. First, one has to explain how an expanding mass of gas, which has been homogenized by inflation, will stop expanding and contract to form local stars and galaxies. The second question is how to prevent the contracting gas from collapsing into a singularity again. In 1996, Hawking put galaxy formation at the

88 Ibid., 126.
89 Hawking, The Illustrated A Brief History of Time, 101-103.
90 Williams and Hartnett, Dismantling the Big Bang, 126. For other theories, see Silk, The Big Bang, 393-ff.
91 Williams and Hartnett, Dismantling the Big Bang, 128.
bottom of his list of unsolved problems. In 2001, he suggested that galaxies may have formed from the influence of dark matter on a parallel brane world. In his 2002 lectures, galaxy formation is still among his unsolved problems. In 2010, Hawking and Mlodinow suggest that the tiny fluctuations in the CMBR also reflect tiny fluctuations in density that are needed for stars and galaxies to form. During the inflationary era, the tiny fluctuations expanded to become galaxy-sized objects. Even if this were the case, the problem of collapsing into stars and galaxies without becoming black holes persists. It must be assumed that gas clouds fragmented in spiral galaxies and merged in elliptical galaxies. These constitute further ad hoc assumptions for the Standard Model.

Solar System, Planets, and Moons

From about five billion years ago onward, the universe is thought to have developed solar systems, planets, and moons. In the Standard Model, the initial generation of stars, known as Population III stars, contained only hydrogen, helium, lithium, and deuterium. Eventually, these stars exploded, and Population II stars formed shortly thereafter. Nuclear fusion took place in the explosion of the first generation of stars so that the second generation would contain heavier elements. Finally, the third generation of stars formed – Population I stars, which include our sun and most of the stars we observe. The difficulty in this scenario is explaining how one generation of stars

92 Hawking, The Illustrated A Brief History of Time, 156.
96 Williams and Hartnett, Dismantling the Big Bang, 131-32.
produces another generation of stars which eventually results in our sun. Gravity would cause the collapse of a gas cloud after a supernova, but the kinetic energy of the gas molecules is greater than the gravitational attraction alone; another force is needed. It is assumed that there were density fluctuations which compressed the gas cloud as a whole to cause it to collapse into a star again. The force of the fluctuation would have to be extremely precise, though, to overcome the kinetic energy without producing a black hole. The source of the density fluctuations remains a mystery. The source cannot be supernovae because that would present a chicken-and-egg problem. The density fluctuations amount to another ad hoc assumption. 97 In addition, Population III stars have never been observed even though they would stand out quite distinctly from Population I and II stars. 98 It must be assumed that Population III stars formed first.

The formation of planets and moons within a solar system such as our own is also plagued with uncertainties. One has to explain how rocky, gaseous, and icy planets such as those in our solar system formed from a cloud of gas. The Standard Model has planets evolving from the stardust of supernova explosions. The rocky planets (Mercury, Venus, Earth, Mars) evolved by the accretion of dust granules which first formed “planetesimals” (like meteorites) before they had enough gravity to attract more material. The major problem with this theory is that there is no known mechanism which would cause the dust granules to stick together to form objects the size of planetesimals. The same sticking problem applies to the formation of the gas giants (Jupiter and Saturn) and

97 Ibid., 143-47.

ice planets (Uranus, Neptune, and Pluto).\textsuperscript{99} It must be assumed that these planets formed by some sticking process. Several theories of lunar formation have been offered over the years, but none has solved all of the problems for the formation of earth’s moon, let alone the other moons in our solar system.\textsuperscript{100}

Summary

In summary, then, it must be stated that the Standard Model is based on evidence which can be explained by other models and faces problems for every epoch of cosmic evolution. There is no explanation for why the singularity began to expand, and an even greater expansion is required in the form of inflation to overcome the gravitational force which would cause the big bang to recollapse into a singularity and to solve the Flatness Problem, the Horizon Problem, and the Monopole Problem. Again, inflationary theory is an \textit{assumption} built into the model, not a direct observation. Cosmologists must make other assumptions about the annihilation of antimatter and about how stars, galaxies, solar systems, planets, and moons formed. The bottom line is that most of these assumptions are ad hoc – that is, made for this purpose.

Conclusions

\textsuperscript{99} Williams and Hartnett, \textit{Dismantling the Big Bang}, 151-57.

\textsuperscript{100} One early theory was that the earth spun so fast that a chunk of rock flew off and eventually evolved into the moon, but this theory has been rejected. Another theory is that the gravitational force of the earth captured the moon, but this would have produced a slingshot effect rather than truly capturing the moon into orbit. A third theory is that the earth and the moon were formed from the same planetesimal. One problem with this theory is that the moon has a low iron content compared to the earth. The theory which has gained the most supporters today is that a protoplanet the size of Mars struck the early earth about 4.5 billion years ago, and the chunk which broke off of the earth evolved into the moon. One problem with this theory is that the geochemical data does not support it. See Michael Oard, “Problems with ‘giant impact’ origin of moon,” \textit{Journal of Creation} 14, no. 1 (April 2000): 6-7, accessed December 1, 2013, http://creation.com/images/pdfs/jc/jc14_1/jc14_1_06-07.pdf; Brian Thomas, “Impact Theory of Moon’s Origin Fails,” accessed December 1, 2013, http://www.icr.org/article/7736/.
In conclusion, this paper has demonstrated that there are convincing arguments for the beginning of the universe from philosophy, science, and theology. The implication is that the universe had a transcendent Cause which most people call “God.” Since the Standard Model posits a beginning to matter, energy, space, and time, it may be useful in apologetics to appeal to the big bang to argue for the existence of God. For example, Christian apologist William Lane Craig uses big bang cosmology in his *kalam* cosmological argument and in his teleological argument from the fine-tuning of the universe. But should Christians follow Craig’s example and adopt the big bang theory wholesale? This author thinks not for three reasons. 1) The big bang theory contradicts the teaching of Scripture about creation. This point cannot be explored in great depth here, but the trend among evangelical scholars to regard Genesis 1-11 as merely theological and not historical seems to underline this point. The two accounts cannot be fit together without serious exegetical gymnastics. 2) The nature of science is that theories and models are continuously revised or discarded when new evidence comes in. In fact, Faulkner has compared the big bang models of 1984 with the models in use 25 years later, and he states that the earlier model bears almost no resemblance to the big

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101 Craig is certainly not alone here. In addition to scholars and apologists mentioned in notes 63 and 64 above, Hugh Ross’ ministry, Reasons to Believe, fully endorses cosmic evolution (see www.reasons.org).


104 Hugh Ross is one who tries to fit the big bang with the Bible, but not without great difficulty. See the extensive critique of his exegesis in Jonathan Sarfati, *Refuting Compromise: A Biblical and Scientific Refutation of “Progressive Creationism” (Billions of Years) As Popularized by Astronomer Hugh Ross* (Green Forest, AR: 2004).
bang models of today. It seems unwise to align one’s biblical interpretation or apologetics with such an elastic theory. Someone may respond that while the details of cosmic history are debated, the big bang event itself is an established fact of science. This raises the next point.

3) There are many scientific problems with the Standard Model which call into question its legitimacy as a scientific theory. Some of these problems have been delineated in this paper. Perhaps these problems are evidence of design (God of the gaps), or perhaps these problems will be solved by scientists in the future. However, the problem solving in the Standard Model so far has amounted to storytelling and ad hoc assumptions. There is another possibility: the big bang never happened. This is the conclusion of a large number of scientists who published an open letter to the scientific community in *New Scientist* in 2004. In the letter, the original signers stated that the fudge factors of the Standard Model like inflation, dark energy, and dark matter are merely “hypothetical entities” used to bridge the gap between theory and observation (see Appendix 1). Since its publication, over 500 scientists and independent researchers from around the world have voiced their disapproval of the big bang theory by adding their

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105 For example, models of the past did not take into account the concept of inflation, a concept which is indispensable to the big bang model today. The estimates for the age of the universe and the rate of expansion are also different today than in the past. On the one hand, this may reflect the self-correcting discipline of science. On the other hand, cosmologists in the 1980s had complete confidence in their models even though the same cosmologists have changed their models considerably over the years. Faulkner summarizes as follows:

The [big-bang] model has become very plastic. That is, any unexpected new observation or problem can be solved by the appropriate addition of some new effect or some new field…it, too, can endure modification *ad infinitum*. At some point we must question whether the big-bang model really is a good theory in the sense that it could be falsified by some new hypothetical result.

signatures to the letter.\textsuperscript{106} Why is it, then, that so many scientists still accept the Standard Model? According to big-bang critic Hilton Ratcliffe, undergraduate students largely accept the Standard Model without question, and graduate students are too busy trying to finish their degrees to question the paradigm in which they are operating.\textsuperscript{107} If the open letter is an indication of the future of cosmology, then biblical interpretations and apologetics which incorporate the big bang may soon become obsolete.

In conclusion, Christians should avoid using the big bang in their biblical interpretation and apologetics once they learn to question the assumptions built into the secular theories of cosmic evolution. The world needs a revolution for cosmic evolution like the Intelligent Design movement has pioneered for biological evolution, and there is no need for Christians to discard a literal reading of Genesis 1-11 because of the big bang theory. The same can be said for the challenges to the young-earth model from radiometric dating (see Appendix 2) and the observation of distant starlight in our universe (see Appendix 3). Each of these issues can be adequately explained in a young-earth creation model. In fact, there are many evidences from cosmology which fit much better in a young-earth model, such as the presence of comets in the solar system, the moon recession, the Faint Young Sun Paradox, earth’s magnetic field decay, and the observation of spiral galaxies.\textsuperscript{108} The answer to the question, “How did the universe

\textsuperscript{106} “An Open Letter to the Scientific Community,” accessed November 1, 2013, \url{http://www.cosmologystatement.org}. Of course, the vast majority of the signers are not favoring biblical creation, but their skepticism towards the big bang is warranted nonetheless.

\textsuperscript{107} Ratcliffe, \textit{The Static Universe}, 20.

begin?” is found in the pages of the Bible. God created the world in six literal days about six thousand years ago. This author hopes that Christian scholars and apologists will return to this historic position when they come to grips with the insurmountable problems with the Standard Model.

Appendix 1: An Open Letter to the Scientific Community
Published in New Scientist, May 22, 2004
www.cosmologystatement.org

The big bang today relies on a growing number of hypothetical entities, things that we have never observed -- inflation, dark matter and dark energy are the most prominent examples. Without them, there would be a fatal contradiction between the observations made by astronomers and the predictions of the big bang theory. In no other field of physics would this continual recourse to new hypothetical objects be accepted as a way of bridging the gap between theory and observation. It would, at the least, raise serious questions about the validity of the underlying theory.

But the big bang theory can't survive without these fudge factors. Without the hypothetical inflation field, the big bang does not predict the smooth, isotropic cosmic background radiation that is observed, because there would be no way for parts of the universe that are now more than a few degrees away in the sky to come to the same temperature and thus emit the same amount of microwave radiation.

Without some kind of dark matter, unlike any that we have observed on Earth despite 20 years of experiments, big-bang theory makes contradictory predictions for the density of matter in the universe. Inflation requires a density 20 times larger than that implied by big bang nucleosynthesis, the theory's explanation of the origin of the light elements. And without dark energy, the theory predicts that the universe is only about 8 billion years old, which is billions of years younger than the age of many stars in our galaxy.

What is more, the big bang theory can boast of no quantitative predictions that have subsequently been validated by observation. The successes claimed by the theory's supporters consist of its ability to retrospectively fit observations with a steadily increasing array of adjustable parameters, just as the old Earth-centered cosmology of Ptolemy needed layer upon layer of epicycles.

Yet the big bang is not the only framework available for understanding the history of the universe. Plasma cosmology and the steady-state model both hypothesize an evolving universe without beginning or end. These and other alternative approaches can also explain the basic phenomena of the cosmos, including the abundances of light elements, the generation of large-scale structure, the cosmic background radiation, and how the redshift of far-away galaxies increases with distance. They have even predicted new phenomena that were subsequently observed, something the big bang has failed to do.

Supporters of the big bang theory may retort that these theories do not explain every cosmological observation. But that is scarcely surprising, as their development has been severely hampered by a complete lack of funding. Indeed, such questions and alternatives cannot even now be freely discussed and examined. An open exchange of ideas is lacking in most mainstream conferences. Whereas Richard Feynman could say that "science is the culture of doubt", in cosmology today doubt and dissent are not tolerated, and young scientists learn to remain silent if they have something negative to say about the standard
big bang model. Those who doubt the big bang fear that saying so will cost them their funding.

Even observations are now interpreted through this biased filter, judged right or wrong depending on whether or not they support the big bang. So discordant data on red shifts, lithium and helium abundances, and galaxy distribution, among other topics, are ignored or ridiculed. This reflects a growing dogmatic mindset that is alien to the spirit of free scientific inquiry.

Today, virtually all financial and experimental resources in cosmology are devoted to big bang studies. Funding comes from only a few sources, and all the peer-review committees that control them are dominated by supporters of the big bang. As a result, the dominance of the big bang within the field has become self-sustaining, irrespective of the scientific validity of the theory.

Giving support only to projects within the big bang framework undermines a fundamental element of the scientific method -- the constant testing of theory against observation. Such a restriction makes unbiased discussion and research impossible. To redress this, we urge those agencies that fund work in cosmology to set aside a significant fraction of their funding for investigations into alternative theories and observational contradictions of the big bang. To avoid bias, the peer review committee that allocates such funds could be composed of astronomers and physicists from outside the field of cosmology.

Allocating funding to investigations into the big bang's validity, and its alternatives, would allow the scientific process to determine our most accurate model of the history of the universe.

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Appendix 2: Radiometric Dating

The evolutionary conclusions from the results of radiometric dating on rock layers and fossils have convinced many Christian scholars that the earth must be much older than six to ten thousand years.\(^{109}\) The pronouncements from scientists that rocks are millions or billions of years old seems foolproof when it is backed by the scientific measurements of isotopes within the rock samples. While the scope of this appendix does not include a lengthy discussion of radiometric dating beyond a brief summary, creationists have written many popular-level articles\(^{110}\) as well as semi-technical\(^{111}\) and technical books\(^ {112}\) on the subjects of radiometric dating, fossilization, and the global

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Flood. In summary, creationists make several arguments against the evolutionary dates assigned to rocks and fossils.

1) Creationists believe that measuring decay rates of radioactive isotopes in the present is good science, but extrapolating back to the past requires many assumptions. What are measurable today are the amounts of parent and daughter isotopes (and ratio between them) and the present rate of decay from the parent element to the daughter element. Scientists must assume what the initial amounts of parent and daughter isotopes were when the decay began, and they must assume that the system was closed (no addition or subtraction of parent or daughter) and that the decay rate was the same in the past as it is today.¹¹³

2) Radiometric dating is fallible. The fact that evolutionists apply multiple tests to the same sample indicates that a single test in itself is not completely reliable. For example, if the argon-argon test is trustworthy, then why compare it with a potassium-argon test for the same rock? Scientists would not need the additional test if the first were infallible. Creationists claim that dates which do not fit the model are discarded because of “contamination.” This happens when scientists state that a certain date or measurement does not fit the known age of the sample. But the question remains as to how the evolutionists know what the correct age is in the first place. If they knew the correct age,

¹¹² See Larry Vardiman, Andrew A. Snelling, and Eugene F. Chaffin, eds., Radioisotopes and the Age of the Earth: A Young-Earth Creationist Research Initiative (El Cajon, CA: Institute for Creation Research, 2000); idem., Radioisotopes and the Age of the Earth, Volume II (Dallas, TX: Institute for Creation Research, 2005); Andrew A. Snelling, Earth’s Catastrophic Past: Geology, Creation & the Flood, Volume 1 (Dallas, TX: Institute for Creation Research, 2009); idem., Earth’s Catastrophic Past: Geology, Creation & the Flood, Volume 2 (Dallas, TX: Institute for Creation Research, 2009).

then why use radiometric dating? The correct age is the one already decided by the model before a single test is performed. In addition, creationists point out that rock samples of known ages from volcanoes, for example, often yield dates of millions of years even though the rocks were formed right before the scientists’ eyes. Clearly, something is flawed in the dating method or assumptions.

3) Creationists point to examples which seem to disprove the old-age assumptions of evolutionists. For example, creation scientists have sent diamonds to be tested for carbon-14. Evolutionary scientists never bothered to test diamonds for carbon-14 because the half-life of carbon-14 is so short that all the carbon-14 would have disappeared if the diamonds really took millions of years to form. The fact that diamonds have carbon-14 seems to indicate that they cannot be millions of years old.114 The same can be said for carbon-14 recently found in dinosaur bones.115 These examples (and others) should at least make the evolutionists question their assumptions, but the discordant data is either discarded or explained away in order to preserve the evolutionary framework.

In summary, the nature of historical science demands that assumptions are made since no one was around millions or billions of years ago to observe and record the necessary data. Both creationists and evolutionists must make assumptions when trying to determine what happened in the past, but creationists have demonstrated that the young-earth model is just as useful in explaining the data from geology. In some cases, as with the carbon-14 in diamonds, the young-earth model better explains the data.


Appendix 3: The Distant Starlight Problem

Besides radiometric dating, the distant starlight problem is the other main obstacle for some in believing in a recent creation. What scientists observe in the universe is that many stars and galaxies are great distances away from earth, demonstrating that the universe is billions of light years across. The problem is that it takes light a certain amount of time to travel to earth so that we can see it. If stars are billions of light years away from earth, then it is assumed that it took billions of years for the light to travel to earth. Thus, the universe is either older than six to ten thousand years, or else there must be another explanation for why we observe distant starlight in a young universe.

Some creationists of the past have answered this question by stating that during the creation week light was created in transit in a mature, fully functioning creation. This seems to make sense since the stars were supposed to serve a functional role in creation (Gen 1:14-17). Adam would not have to wait millions of years to see the stars; they would have been visible since Day 4 of creation. The reason why many creationists reject this explanation today is because it would make some objects such as supernovae out to be mere illusions. It seems like deception to say that stars never exploded and that the light was simply made that way. For this reason, creationists have sought other explanations.

When it comes to measuring distant starlight, there are three variables: velocity (speed), distance, and time (v = d/t). Creationists do not typically question measurements

\[116\] A light year is the distance that light travels in a year. It is a measure of distance, not time.


of distance,\textsuperscript{119} so they question either the assumption of speed or time. In 1987, creationists Barry Setterfield and Trevor Norman published a technical paper arguing that the speed of light was enormously faster in the past.\textsuperscript{120} In their view, the distant light traveled to earth very quickly in only a short period of earth’s history. At first, many creationists were excited about the idea, but it has since been largely abandoned because of evidence that the speed of light has been the same in the past three centuries\textsuperscript{121} and because changing the speed of light would drastically alter some of the other constants of the universe.\textsuperscript{122}

The models from Humphreys\textsuperscript{123} and Hartnett\textsuperscript{124} use time dilation to explain how distant starlight is visible in a young universe.\textsuperscript{125} In Humphrey’s model, the universe was created from a white hole with matter flying out as space was stretched out during the creation week. According to general relativity, when space is stretched out, time


\textsuperscript{123} D. R. Humphreys, *Starlight and Time: Solving the Puzzle of Distant Starlight in a Young Universe* (Colorado Springs, CO: Master Books, 1994).


\textsuperscript{125} See the helpful summaries in Faulkner, “What about Distant Starlight Models?” 260-61.
progresses at different rates depending on one’s location. Since the earth was near the center of the white hole, then time passed on earth much slower than time near the boundary of the white hole. Hartnett’s model uses Carmelian physics (named after Moshe Carmeli, a Jewish physicist) which adds a fifth dimension of velocity (or redshift) to the universe. On creation Day 4, when the fabric of space was being stretched out, the clocks on earth were running normally, but the clocks in the cosmos were running extremely fast. The universe is no longer expanding in such a rapid manner, but we still see the effects of that initial expansion. Thus, Humphreys and Hartnett have the same result with different explanations. Both of these models are still being developed, and perhaps in the future cosmologists will give more credence to Carmeli’s model of the universe which does not need the hypothetical entities of dark matter or dark energy.

Another explanation, known as the Anisotropic Synchrony Convention, is offered by creationist astronomer Jason Lisle. This method uses position-based physics instead of the common velocity-based physics. Most physicists have used the latter convention even though Einstein left both options available. The basic ideas are that the speed of light travels at different speeds in different directions (anisotropic) and that the speed of light in one direction cannot be measured because time goes to zero at the speed of light. Thus, it would take no time at all for light to travel from the stars to earth on Day 4 of creation in a one-way direction. The function of stars to “give light on the earth” (Gen 1:15) would have begun on the very day the stars were created. In this model, the light from supernova 1987a reached earth instantaneously as the star exploded. Perhaps this is the

solution to the distant-starlight problem. However, Faulkner points out that one problem with this model is that it is untestable.

One other explanation offered by creationist astronomer Danny Faulkner is the *Dasha* Solution derived from the Hebrew ἀράμ, “to sprout,” in Genesis 1:11. In Genesis 1:11-12, the Bible records God’s command to the land to produce vegetation. The text says, “and it was so,” implying that the vegetation sprouted immediately from the ground. What would have normally been a process of growth over some period of time happened miraculously and instantaneously on creation Day 3 so that animals and man would have food to eat on Days 5 and 6 (cf. Gen 1:29-30). Faulkner’s suggestion is that just as the plant growth was miraculously expedited, so the normal travel of starlight may have been sped up on Day 4. This may be likened to the stretching out of the heavens (e.g., Isa 45:12). Faulkner points out that time dilation or some other physical process may be able to account for the starlight, but it cannot account for the rapid growth of plants. Therefore, if the creation of starlight were like the *dasha* creation of plants, then no physical mechanism is needed as an explanation. Admittedly, this solution is outside the realm of testability since it was a miraculous creation.

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129 Ibid.
In summary, the distant starlight problem is one which creationists have been working on for decades. Perhaps the solution is to be found in time dilation or c-decay, or perhaps the creation of starlight was miraculous as in the Dashe Solution. Distant starlight should not be a stumbling block for believing in the biblical account of a recent creation when viable scientific explanations are available.
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