The Big Bang Standard Model and Bahá'í Cosmology: Resolving a Present Disparity Through Science and Religion[1]

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Abstract

The Big Bang Theory is currently the most widely accepted Standard Model of cosmology. The Big Bang Theory is, however, at odds with Bahá'í scripture on three key points: a beginning, an end, creation from "nothing." The Bahá'í sacred writings maintain instead continuous creation: the universe has no beginning; it will have no end; it did not arise from nothing. This article addresses the mainline interpretation of the Big Bang as the beginning of spacetime. The theory that the universe began from a very hot, dense singularity, smaller than an atom is supported by strong, empirical evidence. According to the mainline interpretation, spacetime came into existence at the Big Bang, an estimated 13.8 billion years ago. According to the theory there was no "before." (early Hawking)

Some cosmologists have also proposed that the universe arose spontaneously from "nothing," viz. quantum fluctuations in a vacuum. (Krauss) Although some cosmologists have theorized that the universe will eventually destroy itself, Bahá'u'lláh has declared that the universe is eternal, notwithstanding cycles of destruction and recreation. As explicitly interpreted by some cosmologists (Hawking, Krauss), the Big Bang Theory dispenses with belief in the Creator.

Based on the Bahá'í principle of the harmony of science and religion, this article attempts to resolve the apparent discrepancy between the Big Bang Theory and Bahá'í scripture. It proposes that cyclic models that posit a universe before the Big Bang are more coherent in their basic outline with the Bahá'í sacred writings. The cyclic models posit a dynamic eternal pattern of expansion and contraction, endless cycles of entropy leading to destruction followed by recreation.

It should be noted in passing that although this paper concentrates mainly on cyclic theories, Cosmic Inflation Theory (Guth, Linde, Starobinsky) is another alternative to the Big Bang. The CIT considers that a universe existed prior to the Big Bang. This article will also examine the Steady State Theory, the prevalent theory before it was displaced by the Big Bang. Finally, certain parallels are drawn between the steady state and modern cyclic cosmological models and ancient Greek, Jewish and Hindu cosmology to demonstrate a certain compatibility between science and religion on the origins of the universe.

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[1] This article deals with highly complex scientific issues that have been simplified to make them accessible to the general reader. Considerations of space have made it necessary to make certain omissions. The author would be grateful if any errors were brought to his attention. In the following paper, Common Era dating is used, and the King James Version of the Bible is used for all biblical translations.

Introduction and Disclaimer

At the time this article was completed (2025), astronomers and other cosmologists were evaluating the remarkable results that were being gathered from the James Webb Space Telescope launched on December 25, 2021. According to the preliminary reactions from scientists, the present understanding of the Big Bang Standard Model may have to be revised. This article does not evaluate what the revisions of the Standard Model might be since it will take time for cosmologists to analyze the results from the JWST and to formulate any new theories that might be widely accepted by the scientific community. The observations made below are based on the Standard Model.

THE RELIGION-SCIENCE INTERFACE

"From the Beginning that hath no Beginning until the End that Hath No End"[2]

Since time immemorial, humans have gazed at the heavens and wondered at the stars and the origin of the visible universe. Among the myriad complex questions that are treated in the Bahá'í sacred writings, the origin of the cosmos has been addressed. 'Abdu'l-Bahá (1844-1921), the third of "Three Central Figures"[3] of the Bahá'í Faith, answered one of the questions of His interlocutor, Laura Dreyfus-Barney (1879-1974)[4] on the origin of the universe as follows: "Know that it is one of the most abstruse questions of divinity [theology] that the world of existence–that is, this endless universe–has no beginning." These perplexing words of 'Abdu'l-Bahá are quoted at the beginning of chapter 47 of *Some Answered Questions*, in the talk titled "The Origin of the Universe and the Evolution of Man."[5]

'Abdu'l-Bahá's view of the eternal universe is virtually identical to Avicenna/Ibn Sina (980-1037 CE), the influential medieval Muslim philosopher and physician, who amplified and modified Aristotle's view of the eternity of the universe. Juan Ricardo Cole in a groundbreaking study pointed out that in the Tablet of Wisdom (*Lawh-i-hikmat*), Bahá'u'lláh approved of Avicenna's idea that the universe was co-eternal with God and shared with Him a temporal pre-existence.[6] Interestingly, Avicenna is not named in the tablet, but the idea of an eternal creation is mentioned. In his *Book of Salvation*, Book 2, Chapter 12 of the Theology (*Ilahiyyat*) section, Avicenna rejects an infinite regress of

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[2] *The Summons of the Lord of Hosts,* p. 39. The above phrase is used with some slight variations in numerous passages in the Bahá'í sacred writings.

[3] Shoghi Effendi's convenient phrase has become integral to Bahá'í parlance. See *The World Order of Baha'u'llah*, p. 131

[4] In 1967 the author was fortunate enough to have had a remarkable interview with the compiler of *Some Answered Questions* at her home in Paris, when he was a student at the Sorbonne. An account of the interview may be read at my website www.jack-mclean.com under the tab Laura Dreyfus Barney. The interview took place in fact when Madame Dreyfus-Barney was reclining in bed, while I sat on a chair at the foot of the bed.

[5] See p. 207.

[6] Juan Ricardo Cole, *The Concept of Manifestation in the Bahá'í Writings*, The Association for Bahá'í Studies (Ottawa), no. 9, 1982, p. 6.

causes, which produces his conclusion of an eternal universe. In the Theology section of his encyclopedic *Book of Healing*, he also presents his argument for an eternal universe.

'Abdu'l-Bahá's stark affirmation contains a few important theological and scientific implications. It follows that if there is no cosmological beginning, *ergo* time must be eliminated as a factor in the creation of the universe. Beginnings and endings are measured by time, whether the measurement be historical chronology, scientific or mathematical calculation, or the clock. But if the universe has no beginning, it exists out of time. The cosmos, consequently, must be regarded as an eternal entity.

'Abdu'l-Bahá's statement is abstruse because everything that can be imagined has been created in time. Even if the beginning of any object is unknown, its existence points to creation in time. It is also normally assumed that the object will in time change, and eventually be transformed or disappear. In the same chapter, 'Abdu'l-Bahá repeats the idea of timelessness and cosmological infinity: "Thus, as that Essence of Oneness, or divine Being, is eternal and everlasting–that is, as it has neither beginning nor end–it follows that the world of existence, this endless universe, likewise has no beginning."[7]

'Abdu'l-Bahá's justification for the existence of an eternal universe is the theological axiom that the names and attributes of God require the existence of creatures; the existence of a Creator requires the existence of a creation: "We have already explained that the very names and attributes of Divinity require the existence of created things."..... "a creator without a creation is impossible."[8] Since the Creator is eternal, it follows that His creation is likewise eternal. This does not mean, however, that creation shares in God's "essential pre-existence." 'Abdu'l-Bahá has explained that "The world of existence in relation to its Creator is intrinsically originated." [9]

Both the Báb and Bahá'u'lláh repeated the idea of a beginningless beginning. The Báb, for example, revealed: "This is in truth [belief in the Báb] far more advantageous unto thee than all the acts of worship thou hast performed for thy Lord during all thy life, nay, from the beginning that hath no beginning."[10] In the *Dala'il Sab'ih* (The Seven Proofs) the Báb also taught the co-eternity of the universe with God.[11] Bahá'u'lláh's oft-repeated paradoxical formula was "from the beginning that hath no beginning."[12] Bahá'u'lláh further revealed in a statement that accords with the observations of 'Abdu'l-Bahá:

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[7] *Some Answered Questions,* pp. 207, 208.

[8] *Some Answered Questions,* p. 207.

[9] "Pre-Existence and Origination," *Some Answered Question*s, p. 323.

[10] The Báb, *Selections from the Writings of the Báb*, p. 29. This phrase is contained in His epistle to the Sheriff of Mecca.

[11] Cole, *The Concept of Manifestation*, n. 16, p. 7. See *Selections from the Writings of the Báb*, p.125 and 89 taken from *Dala'il Sab'ih* (The Seven Proofs).

[12] This phrase is used in numerous passages in the Bahá'í sacred writings. It is sometimes accompanied by the phrase "till the end that hath no end." See for example Bahá'u'lláh, *Gleanings from the Writings of Bahá'u'lláh* p.108.

> As to thy question concerning the origin of creation. Know assuredly that God's creation hath existed from eternity, and will continue to exist forever. Its beginning hath had no beginning, and its end knoweth no end. His name, the Creator, presupposeth a creation, even as His title, the Lord of Men, must involve the existence of a servant.[13]

The End of the Universe?

As seen above, Bahá'u'lláh revealed that the universe had no beginning and would have no end. Now theoretical physicist and cosmologist Stephen Hawking (d. 2018) theorized that "dark energy," which cosmologists think drives the accelerated expansion of the universe, might eventually produce a "Big Chill"; with continued expansion the universe could eventually become cold and dark.[14] As for Albert Einstein, he did not explicitly state that the universe would come to an end, although his general theory of relativity provided for the possibility of either an expanding or contracting universe. A contracting universe would result in a collapse or "Big Crunch," one possible scenario of the end of the universe.

Einstein once posited a static universe, the prevailing theory at the time, which theorized the existence of an eternal, unchanging universe without beginning or end.[15] In 1917 he applied his General Theory of Relativity to cosmology. But he later abandoned the idea of a "cosmological constant" when Edwin Hubble discovered in 1929 that the universe is expanding. Russian-American physicist George Gamow claimed he heard Einstein say that his cosmological constant, a theory necessary to maintain the constant balance of mass-energy in the universe, was "my greatest blunder."[16] In 1948, Fred Hoyle, Hermann Bodi and Thomas Gold posited a variation on the static theory of the universe with the "steady state universe." However, the cosmological constant did not turn out to be mistaken. In the late 1990's two teams of astronomers[17] revived the cosmological constant differently to explain how the existence of dark energy causes the universe's accelerated expansion. Although Einstein's assumption of a static universe proved to be incorrect, his idea of the cosmological constant turned out to be a crucial concept in modern cosmology.

It would be difficult to reconcile these two statements: the end of the universe predicted by some cosmologists and no end of the universe, as revealed by Bahá'u'lláh.

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[13] Bahá'u'lláh, *Gleanings from the Writings of Bahá'u'lláh*, p. 150.

[14] Eric Betz in his article "The Big Freeze: How the universe will die" (September 5, 2023) summarizes Hawking's idea as "The cosmos will settle at its final resting temperature, just above absolute zero, the coldest temperature possible." https://www.astronomy.com/science/the-big-freeze-how-the-universe-will-die/ Accessed 8 December, 2024.

[15] https://www.academia.edu/12095029/Einstein_s_steady_state_theory_an_abandoned_model_of_the_cosmos. Accessed 8 December, 2024.

[16] George Gamow, in his article "The Evolutionary Universe" published in *The Scientific American* (1956) claimed that "Einstein remarked to me many years ago that the cosmic repulsion idea was the biggest blunder he made in his entire life." Cosmic repulsion as understood by Einstein was directly related to the cosmological constant. Others have dismissed the statement as embellishment on Gamow's part since Einstein never used the phrase in his writings, but it is quite plausible that the same idea was expressed in different words by Einstein. Even if the quote is not 100% accurate, it represents the gist of what Einstein meant.

[17] These were the Supernova Cosmology Project and the High-Z Supernova Search Team, co-led by Brian Schmidt and Adam Riess.

They cannot both be correct, unless one were to define “end” as the end of one thing and the beginning of another. As we shall see below, Sir Roger Penrose’s version of cyclic cosmology proposes that what the Big Bang posits as the beginning of the universe is only the end or far future of one cycle of entropy, leaving only radiation and dark energy, that opens onto a new cycle of creation. Neil Turok and Paul Steinhardt also postulate a cyclic model of the universe. The cyclic models do propose various “ends” to the universe, but these are not *absolute* ends because they result in palingenesis, i.e. rebirth or recreation of the cosmos in the next cycle.

Theoretical astrophysicist Katie Mack (b. 1981), who in 2024 is professor at North Carolina State University, has succinctly summarized four possible ends to the universe in her book, *The End of Everything (Astrophysically Speaking*).[18] At the beginning of chapter 2, she states her departure-point by quoting science fiction writer Ann Leckie’s debut novel, *Ancillary Justice* (2013): “Beginnings imply and require endings.” This observation seems logical enough, but as we shall see below, the cyclic cosmologists bypass the necessity of an original singularity and an absolute beginning of time, to posit instead infinite cycles of expansion and contraction. In this view the universe is eternal, i.e. there is no end.

Mack’s scenario of possible endings to the universe is fourfold: 1. The Big Crunch/Collapse. 2. Big Chill/Heat Death 3. Big Rip/Disintegration 4. Sudden Destruction/Vacuum Decay. Vacuum Decay is highly speculative and the least likely of all scenarios to occur. Mack devotes chapters 3-6 to an in depth explanation of each possible end, but she is not rigid in her stance. Since Mack believes that science is always a work-in-progress, in chapter 7 she presents “Bounce,” an alternative theory developed by Neil Turok and Paul Steinhardt in their book *Endless Universe: Beyond the Big Bang* (2007), a theory that will be outlined further below. Mack also acknowledges, following the principle of scientific caution, that an endless cyclic universe is also possible.

Numerical and Spatial Infinity in God’s Creation

In the Bahá’í sacred writings, infinity is both numerical, as it is in mathematical sets and calculus, but it also refers to spatial infinity. In His tablet to Muḥammad Ḥusayn, one of the early believers in Shíráz, surnamed by Him Vafá, Bahá’u’lláh referred to the infinity of God’s creation: “As to thy question concerning the worlds of God. Know thou of a truth that the worlds of God are countless in their number and infinite in their range. None can reckon or comprehend them except God, the All-Knowing, the All-Wise.”[19] From the passages that have already been quoted, we can affirm that eternity and infinity are both axiomatic to Bahá’í cosmology.

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[18] Dr. Katie Mack, *The End of Everthing (Astrophysically Speaking)* (New York, NY: Scribner Publisher, 2020).
[19] *The Tablets of Bahá’u’lláh*, p. 187.

‘Abdu’l-Bahá makes numerical infinity in creation explicit in His *Lawh-i-Aflákiyyih* (Tablet of the Universe). This tablet is remarkable because about 40 years in advance of the emergence of quantum mechanics, He introduced some basic principles of the science. The notes to the provisional translation mention that “This tablet was written at the request of Bahá’u’lláh sometime between 1876 and 1883.” Quantum mechanics was born in the 1920’s through the contributions of Louis de Broglie, Max Born, Werner Heisenberg, Pascual Jordan, Erwin Schrödinger, and Wolfgang Pauli. The phrase was first used in Born’s 1925 paper in German *Zur Quantenmechanik*. (On Quantum Mechanics). This tablet address not only some basic principles of the microcosmic quantum world but also the macrocosmic astrophysical universe. His comment on numerical infinity reads:

> Know thou that the all-embracing framework that governs existence includes within its compass every existent being–particular or universal–whether outwardly or inwardly, secretly or openly. Just as particulars are infinite in number, so also the vast universals and the great realities of the universe are without number and beyond computation.[20]

The Strange World of Quantum Randomness and Probability

Before proceeding further with our argument, we shall segue into the sometimes counterintuitive paradoxical principles of quantum mechanics. These principles challenge the classical physical understanding of causality and the possibility of something coming from nothing. While quantum mechanics does not completely discard causality, it seriously challenges it by introducing randomness or probability. In classical physics, any effect must be preceded by a cause. The effect can be traced through a sequence of steps, by which the outcome can be accurately predicted. It should be noted that Bohmian mechanics (Broglie-Bohm Theory), alternately known as “Pilot Wave Theory,” differs markedly from the more prevalent Copenhagen interpretation of probability. Bohmian mechanics posits a more deterministic and realist microworld, where particles have definite trajectories guided by a wave function. It does not invoke wave function collapse. It is rejected by the majority of physicists mainly because it cannot be reconciled with special relativity.[21]

Unlike classical mechanics, causality in the quantum world allows for events with no definite causal order. Paradoxically, and even stranger still, an effect can even occur before a cause, or the causal order can be so indefinite and the events ambiguous, a situation which makes prediction, the darling of the scientific method, uncertain. This principle has been shown in experiments in quantum information theory performed circa

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[20] *Tablet of the Universe*, (*Lawh-i-Aflákiyyih*), provisional translation by anonymous translator, with the assistance of Ahang Rabbani. *Makátib-i-’Abdu’l-Bahá*, vol. 1, pp. 13-32.

[21] For a fuller explanation see https://plato.stanford.edu/entries/qm-bohm/ Accessed 31 December, 2024.

2008 by the Italian quantum physicist Giulio Chiribella and three colleagues with what they called “quantum switches,” i.e. what kinds of computations are possible.[22]

Another example from the quantum world is that the exact moment when a radioactive atom decays cannot be accurately predicted. Ernest Rutherford (d. 1937) “the father of nuclear physics” and his colleague Frederick Soddy (d. 1956) demonstrated in experiments at McGill University in Montreal that radioactivity results from atomic decay or “atomic disintegration.” Their experiments laid the groundwork for the development of nuclear energy. Among other important results, they showed that it is impossible to predict with accuracy when a particular atom will decay; the moment of decay is inherently probabilistic.[23]

Another example is provided by “wave function collapse.”[24] In wave function collapse, no outcome is possible until a measurement of the particle or system of particles is made. According to the von Neumann-Wigner interpretation, when the measurement is made, wave function collapses, i.e. it is reduced to a single result. This interpretation suggests that consciousness is necessary for the collapse of the wave function.[25] By contrast, in classical mechanics only one outcome is possible, one that can be accurately predicted on repetition. It should be noted that the theory is controversial. Some physicists believe that the theory is ad hoc and lacks any physical basis.[26]

Quantum entanglement provides another example. It posits that particles share properties despite separation by any distance. One qubit (quantum bit) when measured instantly affects the state of another. A phrase of Einstein’s has famously come to describe QE as “spooky action at a distance,” although in context he was not exactly referring to what is called QE today.[27] This phenomenon has also been observed with photons, which are unlike other particles, because they are both wave-like and particle-like. QE challenges classical physics that causality depends on locality in spacetime.[28] The principle derives from Bell’s Theorem (1964) on non-locality. Based on

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[22]Here is a brief explanation of the quantum switch: “This new function — what they called the quantum switch — is a superposition of two options. In one branch of the superposition, the function’s input passes through A, then B. In the other, it passes through B, then A.” The Italian researchers hoped that the quantum switch could be the basis of a new model of computation. It results in the paradoxical notion that the effect can precede the cause. See https://www.wired.com/story/quantum-mischief-rewrites-the-laws-of-cause-and-effect/ Accessed 19 December, 2024.

[23] https://definingmomentscanada.ca/nobelcanadian/rutherford-and-soddy/ Accessed 20 December, 2024

[24] Wave function refers not to a wave like a sound wave, but to the mathematical probabilities of a quantum system’s state.

[25] https://quantumphysicslady.org/glossary/collapse-of-the-wave-function/. Accessed 20 December, 2024.

[26] https://physics.stackexchange.com/questions/10068/on-the-nature-of-the-collapse-of-the-wave-function. Accessed 30 December, 2024.

[27] Einstein used this phrase in a letter to Max Born dated 3 March, 1947. The original German reads “*spukhafte Fernwirkung*” and the translation is accurate. It is important to note in context that Einstein was not referring to quantum entanglement *per se* but rather to the statistical approach to quantum mechanics. However, the phrase has come to be associated with QE. Einstein was originally opposed to the theory because it seemed to violate his theory of relativity, but experiments have since proven it to be accurate.

[28] https://www.perplexity.ai/search/what-is-quantum-entanglement-xfmRyuijTy2Hthmr7CnaVw. Accessed 21 December, 2022

physical tests conducted within a mathematical framework, one of the leading physicists of the 20th century, the Irishman John Stewart Bell (d.1990), posited that quantum outcomes might not be governed by local deterministic causes and that no local hidden variables can reproduce all the predictions of quantum mechanics. In short, the theorem proves that the instant connection of quanta is real. His theorem also reveals a mystery: we do not yet understand how particles can influence one another over vast distances without violating Einstein's theory that information cannot travel faster than the speed of light.[29]

In mid-20th century John Wheeler (d. 2008) even introduced the seemingly paradoxical idea of retrocausality: future events can influence past ones, effectively reversing the traditional flow of causality.[30] Retrocausality raises profound metaphysical questions; it suggests cyclic time rather than linear time, which is the norm in classical physics. Modern cosmology with its cyclic theories of the universe suggests cyclic time, which is more like a boomerang rather than the linear "arrow of time." Another factor is quantum indeterminacy, as expressed in Heisenberg's well-known Uncertainty Principle, in which the position and velocity of a particle cannot be precisely determined at the same time.[31] In sum, quantum mechanics introduces randomness and probability instead of strict causal order and predictability and the possibility of cyclic instead of linear time.

Stephen Hawking's Earlier and Later Views: The Beginning of Time, the Singularity, No Boundary Proposal and the Multiverse

Stephen's Hawking's views on the Big Bang Model evolved during his career, right up until the time of his death on March 14, 2018. Following the Hawking-Penrose Singularity Theorem (1965), Stephen Hawking and Roger Penrose[32] originally concluded that spacetime began from a hot, dense singularity, according to general relativity and quantum gravity effects. These effects began to operate within the Planck Epoch/Era, microseconds after the Big Bang.

In the Standard Model, time began with the Big Bang, some 13.8 billion years ago, as determined by Planck Satellite Data in 2013. It was Stephen Hawking's view that prior to the Big Bang there was no "before." Space and time began at the Big

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[29] https://brilliant.org/wiki/bells-theorem/. See this article for a basic introduction to the topic. Accessed 21 December, 2024.

[30] https://quantumzeitgeist.com/what-is-retro-causality/#google_vignette. "The concept of retro-causality was first proposed by physicist John Wheeler in 1978. Wheeler suggested that quantum mechanics might allow for the existence of closed timeline curves, which would enable information to travel backward in time. However, his proposal was met with skepticism and criticism from other physicists." Wheeler's delayed choice experiment suggests that future decisions can influence past events. Accessed 25 December, 2024.

[31] https://www.britannica.com/science/uncertainty-principle. Accessed 22 December, 2024.

[32] Roger Penrose later came up with his cyclic theory of the universe, i.e. that something existed before the Big Bang. This model will be examined further below along with the cyclic theory of Paul Steinhardt and Neil Turok.

Bang.[33] This idea was expressed by Hawking during a 2018 interview with astrophysicist and science commentator, Neil deGrasse Tyson, “There is nothing south of the South Pole, so there was nothing around before the Big Bang."[34]

It would be helpful to consider the role of time in the earliest microseconds of the universe. Planck Time is the shortest measurable unit of time that occurred microseconds before the Planck Epoch/Era, the latter being the earliest period of the formation of the universe.[35] Conditions were so extreme during the first few seconds of the universe that general relativity and quantum mechanics are inadequate to explain what occurred. At Planck Time the universe expanded much faster than the speed of light, a calculation made by Alan Guth, the founder of cosmic inflation theory in 1979, at a speed that our current physical laws cannot explain. This theory does not violate the laws of relativity because it was space itself that was expanding, rather than objects moving through space. However, shortly after the Big Bang the laws of gravity, as described by general relativity and quantum mechanics are believed to have operated, but they become incompatible at such a scale.

Hawking’s earlier view was skeptical of the possibility of the multiverse concept because it was difficult to test scientifically and lacked empirical evidence. The idea of the multiverse depends variously on the idea of inflation, String Theory and the Weak and Strong Anthropic Principle.[36] But Hawking eventually came to accept the idea of the multiverse, or multiple universes, resulting in a vast, possibly infinite multiverse. He concluded that several reasonable models of the Big Bang led to a multiverse, making it hard to avoid.

In 1983 Hawking collaborated with James Hartle to formulate the No Boundary Proposal. Unlike his earlier work with Roger Penrose, by which he was convinced that the universe had a beginning, the NBP suggested that the universe did not begin with a singularity or other boundaries, but rather with a smoother transition from a quantum mechanical and gravitational “ground state.” This ground state was calculated geometrically by which spacetime behaves according to four dimensions–three spatial and one time dimension. In the NBP spacetime is finite but without boundaries, like an endless walk around the earth; one would never come to a boundary.

To formulate this theory, Hartle and Hawking conceived of “imaginary time,” meaning they treated time mathematically as if it were a spatial dimension. This smooths out the beginning of the universe and avoids the singularity posited by the Standard Model. The concept of imaginary time was intended to circumvent the

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[33] https://www.sciencefocus.com/space/what-was-before-the-big-bang-everything-you-need-to-know. Accessed 24 December, 2024.

[34] The interview took place on 9 March, 2018. http://www.xinhuanet.com/english/2018-03/05/c_137017609.htm. Accessed 23 December, 2024.

[35] Planck time is approximately 10^{-43} seconds, representing the smallest measurable unit of time. The Planck era/epoch, is the earliest period in the history of the universe, lasting from the beginning of time (t=0) to approximately one Planck time after the Big Bang.

[36] https://www.britannica.com/science/multiverse. Accessed 24 December, 2024.

breakdown of physical laws at the time of the Big Bang, which otherwise cannot be explained.[37]

In his last paper, co-authored with Thomas Hertog shortly before his death, "A Smooth Exit from Eternal Inflation," Hawking continued to revise his earlier views. The paper was published in April, 2018, only a month following his death. Although earlier Hawking came to accept the idea of a multiverse arising from the Big Bang, he later argued that the Standard Model with eternal inflation was too vast and speculative, not empirically testable or predictive enough. Hawking and Hertog modified the theory to propose instead a new approach using String Theory and holographic principles to limit the possible types of universes that could emerge from inflation. In other words, they reduced the multiverse to a smaller range of possible universes. In his later view, he rejected the idea of random outcomes, and while attempting to combine quantum mechanics with general relativity, he posited removing the Big Bang singularity to suggest that the universe is governed by more structured, predictable laws that operate in a more finite universe best explained by a simpler model.[38]

Lawrence Krauss: Creation From Nothing

In his book *A Universe from Nothing: Why There Is Something Rather than Nothing* (2012) theoretical physicist Lawrence Krauss (b. 1954) summarizes a number of cosmological theories to substantiate his thesis, not all of which can be considered here. Basically, he theorizes that creation can arise from "nothing" by positing that empty space is a vacuum–virtually nothing–but which is not truly empty. It is filled instead with quantum fluctuations, a dynamic motion of particles, by which particles and anti-particles eliminate one another, spontaneously popping in and out of existence. He theorizes that the universe could have arisen from these quantum fluctuations, which are not nothing, it should be noted, in the absolute metaphysical sense. These quantum fluctuations are relatively speaking nothing, compared to the idea of mass-energy in the classical physics of celestial bodies. Krauss's theory, like that of Hawking and Hartle, eliminates the need of a Creator or any external cause.

For Krauss, spacetime, matter and energy could have spontaneously arisen through quantum processes, like "zero net energy," which posits that the universe arose from a state with no net energy. This state implies that the universe did not require an external cause (like God) or any other input of energy. In his view, gravity's negative energy, an attractive force, balances out the positive energy from matter and radiation, allowing the universe to arise from nothing, that is from quantum fluctuations in a vacuum. Critics of Krauss's theory say that his explanation relies on preexisting laws of

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[37] A simplified verson of this complex theory can be found at https://science.howstuffworks.com/dictionary/famous-scientists/physicists/stephen-hawking3.htm. Accessed 1 January 2025.

[38] https://www.astronomy.com/science/what-stephen-hawkings-final-paper-says-and-doesnt-say/ Accessed 1 January, 2025.

physics that themselves require explanation. Fluctuations of the quantum vacuum implies the existence of spacetime and dynamic motion, i.e. contradicting the idea of true nothing.[39]

Dispensing with God: The Universe that Arose from Nothing

Consequential metaphysical or theological implications follow from the above views. These negative theological judgements were made explicit by both Hawking and Krauss. Since spacetime did not exist before the Big Bang, Hawking and Krauss held that according to the laws of science, the universe's origin from "nothing" eliminates the need for a Creator. Hawking concluded that God did not exist because there was no time for God to exist in, a questionable notion that ignores the persistent belief over millennia that the existence of God depends on neither time nor space.

This view has survived philosophically at least since the time of Stoicism (c. 300 BCE), Pythagoras (c. 570-495 BCE), Plato (428/427-348/347 BCE) and Aristotle (384-322 BCE), and the Neoplatonism of Plotinus (c. 204/205-270). Even the materialistic atomist Epicurus (341-270 BCE), who had little use for religion, believed the gods existed beyond time and space. Belief in the eternal Deity has also been supported *inter alia* by all the Abrahamic religions, including the Bahá'í Faith, Kabbalah and Sufi mysticism, the Vedas, the Upanishads and the Baghavad Gita in Hinduism, and in the sacred scriptures of Sikhism.

Hawking and Krauss both had in mind to eliminate the idea of a Creator in cosmology, a belief that they viewed to be both redundant and unscientific, to posit instead a self-generating universe governed by self-contained scientific laws, roughly akin to the same argument as the evolutionary biologist Richard Dawkins' proposal of the personified "selfish gene."[40] Stephen Hawking's and James Hartle's self-contained universe that purportedly arose from nothing, would seem to possess what would otherwise be viewed by theists as the divine attribute of self-subsistence. If one denies the existence of Spirit, matter perforce takes on absolute qualities; materialism becomes the only possible philosophy. Hawking's philosophical stance at the time of his death was to continue to reject any need for a Creator, a view that he aired publicly. He held that scientists rather than philosophers and theologians were the only fully qualified specialists to comment on the origin of the universe, making physical science the only legitimate discipline that should pronounce on the origin of the universe.[41]

The Bahá'í revelation and the other revealed world religions would necessarily be excluded from such a view, since atheism denies divine revelation as a valid source of

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[39] https://www.equip.org/articles/the-new-nothingness-a-look-at-lawrence-krausss-a-universe-from-nothing/ Accessed 2 January, 2025.

[40] In his book *The Selfish Gene* (1976) Dawkins did not exactly say that genes possessed human characteristics such as motives or intelligence. He meant, rather, that genes adopt traits beneficial to their own survival through replication. We should take the selfish gene as a sort of metaphor, but his metaphor confuses by its apparent attribution of a human characteristic to the non-human basic units of heredity composed of DNA.

[41] See further below the section "'Abdu'l-Baha on Atheism" for Hawking's comments.

knowledge. It follows that for “scientific atheists,” divine revelation would be pious imagination, and its holy books reduced to the stature at best of poetry and metaphor, devoid of divine inspiration. These holy books have been subjected to prejudiced and reductionistic critiques and branded as sources of obscurantism and evil by leading figures among the so-called “new atheists.”

The New Atheists’ Attack on Religion: Sam Harris’s Strange View of Buddhism: Dr. Jordan Peterson’s Defence of Biblical Narratives

This one-sided negative view of religion has been promoted by the vanguard of the “new atheists,” including Christopher Hitchens (d. 2011), Daniel Dennett (d. 2024),[42] who held the most positive view of religion among them, author and neuroscientist Sam Harris (b. 1967) and evolutionary biologist Richard Dawkins (b.1941). In a strange twist, Sam Harris has advoated for spirituality without religion in his book *Waking Up: A Guide to Spirituality Without Religion* (2014), along the lines of Dennett’s naturalistic, rationalist explanations of religion. His book is a continuation of his doctoral research in neuroscience which focused on the neural basis of belief, disbelief and uncertainty, using functional magnetic resonance imaging (MRI).

Harris borroweded the Buddhist concepts of meditation and mindfulness, but he excised “right mindfulness” (*sati*) and “right concentration” (*samadhi*) from their original doctrinal/scriptural sources relating to Enlightenment on the Noble Eightfold Path. He makes no reference in his book to the *Satipatthana Sutta* and the *Anapanasati Sutta*, the origin of these two Buddhist teachings. Although Harris openly rejects the metaphysical claims of Buddhism, nontheless he accepts the Buddhist view of self as an illusion and validates Buddhist teaching by relying on neuroscience and psychology. The teaching of the illusion of self is found mainly in the *Anattalakkhana Sutta* (22:59), which forms the basis of the Buddhist doctrine of *anatta* (no self). Harris affirms self-transcendence through the practices of meditation and mindfulness that empower the individual to experience profound peace and insight. Although self-transcendence is not exclusively a religious concept, and although it can be applied to aesthetic experience and the philosophy of mind, Harris’s approach to self-transcendence, it is deeply embedded in religious thought. Meditation and mindfulness are religious practices that are intrinsic not only to Buddhism but to all the world religions, which teach various approaches to meditation based on each religion’s belief system. One has

[42] Although Daniel Dennett was an atheist and argued that religion could be explained by purely rational, natural, social evolutionary factors, without invoking God, he did acknowledge the moral value for secular society of such spiritual values as love, hope and joy, moral teamwork and justice, community building networks and rituals that bind communities. These views are explained mainly in his book *Breaking the Spell: Religion as a Natural Phenomenon* (2008). He argued that it was crucial to understand religion scientifically to address issues like fanaticism and terrorism.

to ask, consequently, how can one promote spirituality without religion, when religion lies at the origin of what Harris is suggesting?[43]

In marked contrast to Harris's belief that would divorce religion from spirituality, from the Bahá'í point of view, the origin of spirituality is to be found especially in religion, despite the popular saying of the so-called SBNR's, "I'm spiritual but not religious." The close link between religion and spirituality was implicit to my treatment of spirituality in my book *Dimensions in Spirituality: Reflections on Spiritual Life and Transformation in Light of the Bahá'í Faith*.[44] The modern tendency to divorce religion from spirituality is a case of the tail wagging the dog. It yields the paradoxical and nonsensical notion of religionless religion.

Controversial Canadian public intellectual and best-selling author, Jordan Peterson[45] (b. 1962), is one of the few modern thinkers combatting the contemporary atheistic trend. One of Peterson's more recent specifically religious contributions has been to argue in favour of the cultural, moral, psychological and spiritual value of biblical narratives. He describes Bible stories largely as Jungian archetypes that provide insights into human behaviour and the structure of cultural, psychological, and spiritual reality. For Peterson, biblical narratives have enduring moral and existential meaning, but he is cautious about saying that they are literal truth. He declared in a 2022 YouTube interview with popular American podcaster Joe Rogan that the Bible is "way more true than just true." Peterson went on to explain that he considers the holy book to be the prerequisite for the manifestation of truth; that it remains the bedrock of western civilization, which provides society with a shared framework of cultural and spiritual values without which western civilization would dissolve.[46]

Peterson was not alone in this view. The Canadian Northrop Frye (d. 1991), widely acknowledged as one of the pre-eminent literary critics of the 20th century, in his book *The Great Code: The Bible and Literature* (1981) described the Bible as a rich repository of much of the western world's cultural mythology. Frye cogently expatiated on the influence of the Bible on the literature of western civilization, viz. how the Bible was instrumental in creating the imaginative, mythological elements and recurring archetypes in great literary works.[47]

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[43]This reviewer also expresses similar critical ideas on Harris's approach that attempts to divest mindfulness and meditation from its Buddhist origins. https://secularbuddhistnetwork.org/waking-up-by-sam-harris-a-review/

[44] Oxford: George Ronald Publisher,1994.

[45] Peterson's books have sold millions of copies worldwide. His ethical prescription, *Twelve Rules for Life: An Antidote to Chaos* (2018), has alone sold over 10 million copies to date. His other books include *Beyond Order: Twelve More Rules for Life* (2021). An earlier work, *Maps of Meaning:The Architecture of Belief* (1999), took a more academic approach, based on his psychological and philosophical research. His latest book, *We Who Wrestle With God*: *Perceptions of the Divine* (2024), analyzes the collective value of biblical narratives from both a cultural and psychological viewpoint. His analysis addresses such universal existential themes as rebellion, sacrifice, suffering and triumph. He argues that these sacred narratives give us hope and unite us culturally, psychologically and spiritually.

[46] https://cbn.com/news/news/famed-psychologist-jordan-peterson-tells-joe-rogan-why-bible-way-more-true-just-true. "The Joe Rogan Experience," Podcast Episode #1769, 25 January, 2022.

[47] See this review by Steven A. Dehart in *The Dialogue Journal*, https://www.dialoguejournal.com/articles/the-great-code-revealed-bible-and-literature-by-northrop-frye/

Although he was once agnostic and used to avoid the question, Peterson has since declared himself to be a theist. In 2022 he defined himself as “a pragmatic Christian,”[48] although his views on religion and Christianity are complex, nuanced and evolving. Although the psychologist prays and observes certain religious practices, Peterson is not a Christian in the orthodox sense of the word. He is a free-thinking intellectual, who is nonetheless very committed to his faith and ideas. His wife Tammy Peterson’s conversion to Catholic Christianity in 2019, after her remarkable recovery from a Bellini tumour, a rare form of kidney cancer that is usually 100% fatal, had a profound impact on Peterson. It strengthened their shared commitment to “truth” which they acknowledged publicly was the cornerstone of their marriage from the beginning.[49]

‘Abdu’l-Bahá on Something Coming From Nothing: *Ex Nihilo Nihil Fit*

‘Abdu'l-Bahá rejected the idea of something arising from nothing as being erroneous: “Apart from this, absolute non-existence lacks the capacity to attain existence. If the universe were pure nothingness, existence could not have been realized.”[50] His stance aligned with the position of several ancient Greek philosophers.[51] ‘Abdu'l-Bahá did not mean “nothing” in a relative sense; He meant *absolutely nothing* in the metaphysical sense, a concept that has a centuries’ old history in philosophy and religion.[52] ‘Abdu'l-Bahá also pointed to the relativity of existence and non-existence:

> The second consideration is that existence and non-existence are both relative. If it be said that a certain thing was brought forth from non-existence, the intent is not absolute non-existence; rather, it is meant that the former condition was non-existence in relation to the present one. For absolute non-existence cannot become existence, as it lacks the very capacity to exist.[53]

Accessed 6 January, 2025. I was fortunate enough to have had Northrop Frye as my professor for the course “Symbolism in the Bible” at Victoria College, the University of Toronto, circa 1970. I later recognized that much of the material that Frye used in his lectures was found in his book *The Great Code*. In my considered opinion, Frye was without a doubt a true genius.

[48] This means that Peterson is an adherent of Christ’s moral teachings without necessarily accepting all the church’s traditional dogmas. The interview took place on 20 July, 2022 with Jon McCray, host of the YouTube channel’s “Whaddo You Meme”? The show focuses om Christianity and culture.

[49] Tammy Peterson was advised by her doctors that she had 10 months to live. She attributed her recovery to the radically carnivore “Lion Diet,” consisting of only meat and water and eliminating diary and gluten, but especially to the power of prayer and to saying novenas, nine days of prayer with a specific intention, and the rosary on a daily basis with her friend Queenie Yu, who was also a convert to Catholicism. Jordan Peterson described his wife’s recovery as “miraculous.”

[50] “The Origin of the Universe and the Evolution of Man,” *Some Answered Questions*, p. 207.

[51] Further to this point see the section below “Selected Ancient Greek Philosophers: The Cyclic Eternal Universe.”

[52] Parmenides in the 5th century BCE denied its existence. Atomists like Leucippius viewed it as a void between atoms. Aristotle rejected the concept. He viewed space as a receptacle where matter exists and moves. Buddhism emphasizes “shunyata” or emptiness which superficially resembles nothingness, but instead of being nihilisitic, the concept is better described as the absence of independent existence in all phenomena. Shunyata represents infinite potentiality and interconnectedness. Christianity has its *Creatio Ex Nihilo* which is generally accepted in both Judaism and Islam. In his philosophy of *Dasein*, the modern philosopher Heidegger linked nothingness to being in the sense that the two are intertwined. Beings arise from nothingness. Logical positivists such as Carnap dismissed the idea as nonsensical.

[53] See “Pre-Existence and Origination” in *Some Answered Questions*, p. 324

We have alluded above to Hawking's and Krauss's view of the universe arising from nothing. Stephen Hawking and Leonard Mlodinow argued these ideas in more detail in chapter 6 of their book *The Grand Design: New Answers to the Ultimate Questions of Life* (2010). It was gravity, they claimed, that created the universe from nothing. One critic of Hawking's central role of gravity, for which he was a recognized world expert,[54] described the God-like creative force he assigned to gravity as the "Gravity God."[55]

Hawking's claim for gravity as the major creative force in the universe begs the question of the origin of gravity itself. Unlike Hawking and Mlodinow, Sir Isaac Newton's understanding of gravity was deeply intertwined with his belief in God. In his *Opticks* (1706), Newton suggested that infinite space acted as the "sensorium of God," the medium through God perceives and governs the universe.[56] In Query #37 of the Third Book of his *Opticks,* Newton described God as "the intelligent Agent" who initiated and maintained the continuous and orderly motion of celestial bodies through the imposition of His will. He rejected the idea of a purely self-sufficient, mechanistic universe. Newton could be considered as an early pioneer of Intelligent Design, but unlike the proponents of modern ID, who argue based on empirical evidence–although their critics accuse them of pseudo-science–Newton integrated his theological beliefs directly into his scientific framework. This suggests that he believed in the complimentary roles of science and religion, rather than seeing them as antagonists.[57]

It follows from Hawking's and Mlodinow's conclusion, somewhat like Dawkins' "selfish gene" mentioned above, that the material universe and its laws must assume what theists otherwise view as divine attributes properly belonging to God alone–attributes such as self-subsistence and creative self-generation. Such a materialistic worldview, science-based though it may be, cannot help but to contribute to a pervasive materialism: that all life and its processes can be fully explained by reductive material causes with no need for Divine Agency or the moral and spiritual values that must accompany such a belief.

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[54] Hawking collaborated with Sir Roger Penrose on gravity singularity theorems in the framework of general relativity. His theory that black holes emitted radiation, later called "Hawking Radiation," was at first controversial and rejected, but by the late 1970's it was widely accepted as a major breakthrough in theoretical physics. He was the first to propose a theory of cosmology that combined general relativity with quantum mechanics.

[55] In an article published on 3 April, 2022 entitled "Stephen Hawking and the 'Gravity God,'" Deacon Frederick Bartels critiqued Hawking's notion that gravity could have been the ultimate cause of the existence of the universe because gravity would have to be self-caused. Bartels contended that gravity is a "second-order cause" and that Hawking's claim does not account for a "first-order" origin of gravity. Bartels argued that if any law of physics existed prior to the universe, it requires an explanation for its existence. Bartels' original article is dated 16 November, 2017. https://joyintruth.com/steven-hawking-and-the-gravity-god/ Accessed 4 January, 2025.

[56] https://www.cambridge.org/core/journals/science-in-context/article/abs/newton-the-sensorium-of-god-and-the-cause-of-gravity/B291C61C50623FEC5F4100CA69C0CBD2 Accessed 5 January, 2025

[57] https://uncommondescent.com/intelligent-design/newton-on-intelligent-design/ Accessed 6 January, 2025.

Despite the provocative title of his book, *A Universe From Nothing*, Lawrence Krauss's quantum fluctuations in a vacuum are clearly something; quantum fluctuations in a vacuum still exist in a state of minimum energy. Quantum fluctuations are "nothing" only in a relative, not an absolute sense. Neither are they proof of *creatio ex nihilo.* The laws of physics still determine, as 'Abdu'l-Bahá observed, that something can arise only from a pre-existent state. The quantum fluctuations in a vacuum that produce particles and antiparticles that did not exist before, i e. "nothing" represent a dynamic state that has the potential for existence. Krauss's meaning of nothing remains relative.

Edward Tryon and Quantum Vacuum Fluctuations: The Origin of the Idea of the Universe from Nothing

Krauss and Hawking are in good company. Almost 40 years before Krauss wrote his book, in a 1973 paper titled "Is the Universe a Vacuum Fluctuation?" physicist Edward Tryon (d. 2019) proposed that the universe arose from a quantum fluctuation of the vacuum, suggesting that the universe was created from nothing. Although Tryon's thesis was at first met with skepticism, even incredulity, it has since gained traction. Tryon argued that the universe's net energy is zero, an idea that Krauss repeated, because positive energy from mass cancels out negative gravitational energy, allowing the universe to appear from "nothing" without violating the laws of conservation. Tryon's thesis dispensed with the Big Bang Theory that required an initial singularity that produced cosmic inflation. Although Tryon's thesis has since gained some acceptance–Krauss's book is evidence of that–he has also been criticized for not explaining in the first place what laws of physics would allow such fluctuations to occur, much like Hawking's inability to account for the origin of gravity.

'Abdu'l-Bahá elsewhere emphatically made the point in His *Tablet of the Universe* that there was no such thing as an absolute void, "...a void is impossible and inconceivable."[58] He regarded this idea as being outmoded. In His critique of the philosophers of old 'Abdu'l-Bahá wrote:

> …for they [the philosophers] wished to confine the worlds of God within the smallest compass and narrowest limit and were quite unable to conceive what lay beyond; even claiming that there was neither void nor matter, but merely nothingness. This view is at variance with and contrary to all the divine truths and heavenly secrets. Indeed, if thou dost compare the ideal world to human world and apply spiritual principles to heavenly matters, thou wilt discover that this view is flimsier than a spider's web, because, just as the luminous spiritual worlds are sanctified above computation and limitation, so too are the physical worlds in this vast immensity of space. [59]

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[58] *Tablet of the Universe*, (*Lawh-i-Aflákiyyih*) bahai-library.com/abdulbaha_lawh_aflakiyyih. Accessed 2 January, 2025. The provisional translation by anonymous is dated 1997. The original tablet was revealed in Arabic and published in *Makátib-i-'Abdu'l-Bahá*, vol. 1, pp. 13-32.

[59] bahai-library.com/abdulbaha_lawh_aflakiyyih. Accessed 2 January, 2025.

‘Abdu'l-Bahá on Atheism

In His denial of the possibility of creation from nothing, ‘Abdu’l-Bahá alluded in rather strong words to those philosophers who deny God. He regarded atheism not only as ignorance but also as a moral failure:

> This view [the void or nothingness] is at variance with and contrary to all the divine truths and heavenly secrets…This is a secret of which God hath apprised His servants through His grace and mercy in order to demonstrate the idleness of the fancies of those who disbelieve in God, and to expose the baselessness of the arguments of those who are wandering blindly in their heedlessness, that the edifice they have built out of their vain imaginings may crumble and their profitless pursuits be discredited and fall into disrepute. For their eyes have been blinded from beholding the worlds of God and their minds have fallen short of comprehending the mysteries of the Kingdom in this resplendent Vision.[60]

To be intellectually consistent, atheists like Stephen Hawking, Lawrence Krauss or Sir Fred Hoyle, would have to believe in spontaneous creation in the absence of God. Although it is not clear what Tryon’s views were on God, he did propose that the universe has no purpose or cause. Stephen Hawking has further declared that “philosophy is dead,” and that scientists have the right to replace philosophers as the the [sole?] torchbearers in the search for knowledge:

> These are questions for philosophy, but philosophy is dead. Philosophy has not kept up with modern developments in science, particularly physics. Scientists have become the bearers of the torch of discovery in our quest for knowledge.[61]

We can certainly agree with Stephen Hawking that philosophy should include the contributions of physics, but one has to wonder how scientists are particularly qualified to replace philosophers to be “the bearers of the torch of discovery in our quest for knowledge”? Further, when physicists or biologists publically proclaim that God does not exist, strictly speaking the existence or non-existence of God is a metaphysical question that lies beyond the scope of empirical science. The declarations of atheism by scientists, consequently, should carry no more weight than the personal beliefs of anyone else. Although the exact sciences do not operate on the basis on appealing to divine intervention, they cannot prove or disprove the existence of God. The latest attempt to prove the existence of God using science is “the fine-tuning argument” which critics reject on the basis of the multiverse hypothesis or anthropic principles without invoking a deity.[62]

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[60] Ibid.

[61] Stephen Hawking and Leonard Mlodinow, *The Grand Design* (New York: Bantam Books, 2010), p. 180.

[62] Stephen C. Meyer’s *Return of the God Hypothesis*: *Three Scientifc Discoveries That Reveal the Mind Behind the Universe* (HarperOne, 2021) presents what some consider the most plausible arguments for Intelligent Design. The

Philosophical theology has also been enriched by attempts to understand the Big Bang in light of the Genesis creation story, as seen for example in William P. Brown's T*he Seven Pillars of Creation: The Bible, Science and the Ecology of Wonde*r (2010), and in the work of theistic philosophers of science, J.P. Moreland, and Stephen C. Meyer, who are proponents of a scientific view of intelligent design. In philosophy, Alvin Plantinga is notable for his work in the philosophy of religion and epistemology.

Other notable philosophers of science include Philip Kitcher, Daniel Dennett (d. 2024), David Chalmers, Sally Haslanger[63] and Jürgen Habermas. We note that Kitcher, Dennett and Chalmers identify/identified as atheists. Sally Haslanger was raised as a Christian Scientist, a religion she subsequently abandoned in her teenage years, but her current spiritual self-identification is not clear. Habermas refers to himself as a "methodological atheist," but before and especially after his debate with Pope Benedict XVI in Munich (2004), he recognized the importance of including the religious perspective in public discourse because of its capital role in the shaping of moral intuitions and democratic processes.

The Existence of God Transcends Spacetime: Stephen Hawking's Declaration of Atheism

As we have noted above, Stephen Hawking declared that before the Big Bang God could not have existed because there was no time for God to exist in. However, in Book XII (Lambda) of his *Metaphysics*, Aristotle held that God as pure actuality (*actus purus*) exists out of spacetime as the Uncaused Cause or Prime Mover. This concept was basic to his explanation of how motion and change could have arisen in the universe, a process which he concluded could not have been subject to an infinite regress. 'Abdu'l-Bahá has asserted a correlative idea that "Essential pre-existence is an existence which is not preceded by cause;"[64] The existence of an Uncaused Cause necessarily exists outside of space-time. Essential pre-existence is a metaphysical term for the Divinity. (It has nothing to do with the pre-existence of the soul).

Bahá'u'lláh's statement quoted above, referring to the creation of the universe and the worlds of God, "None can reckon or comprehend them except God, the All-Knowing, the All-Wise."[65] also underscores the human inability to fully understand God's creation, be it the universe in its plenitude or in the infinitude of its myriad creatures. Despite the rational faculty's demonstrated ability to explain mysteries, the human mind remains incapable of comprehending the full magnitude of God's creation. Bahá'u'lláh has elsewhere revealed the same idea referring to the mystery of the origins of creation:

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main critics of Meyer's arguments are Australian philosopher and professor of philosophy, Mark Colyvan and the Dutch mathematical physicist Klaas Landsman.

[63] Included in Sally Haslanger's work on the intersection of religion and science is also the study of how gender and race influence philosophical discourse on topics like science and religion.

[64] *Some Answered Questions*, p.323

[65] *Tablets*, p. 187

> None can grasp the reality of the origin of creation save God, exalted be His glory, Whose knowledge embraced all things both before and after they come into being. Creation hath neither beginning nor end, and none hath ever unravelled its mystery. Its knowledge hath ever been, and shall remain, hidden and preserved with those Who are the Repositories of divine knowledge.[66]

Although the remarkable advances of science are highly praised in the Bahá'í writings, Stephen Hawking demonstrated either hubris or great confidence in the ability of science, depending on one's point of view, when he claimed that "If we find an answer to that [Grand Unified Theory], it would be the ultimate triumph of human reason − for then we would know the mind of God." [67] Since Hawking eventually declared himself to be an atheist, we can understand his reference to "the mind of God" in a metaphorical sense, meaning all the known laws of the physical universe.

Hawking made several statements about his atheism. In an interview with the Spanish daily, *El Mundo*, (2014), he indicated that belief in the Creator is belief in what has been called a "God of the gaps." Ironically enough, this latter phrase was meant as a warning to Christians in Scottish theologian Henry Drummond's Lowell Lectures, *The Ascent of Man* (1893). Drummond was clearly aware of the problem. He cautioned his Christian readers not to invoke divine intervention in every instance where science was as yet unable to explain any given phenomenon.[68] Hawking, however, regarded physics as providing a more convincing and sufficient explanation of the origin of the universe:

> Before we understand science, it is natural to believe that God created the universe. But now science offers a more convincing explanation. What I meant by 'we would know the mind of God' is, we would know everything that God would know, if there were a God, which there isn't. I'm an atheist.[69]

A theology based on divine omniscience would posit that the mind of God can never be fully known. If the creatures were able to fully fathom the mind of God, God would cease to be God. Humans would become instead the ultimate creators. If humans were able to understand everything that is known to God, such a realisation

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[66] *The Tabernacle of Unity*, p.47.

[67] The Grand Unified Theory (GUT) would unite three forces: the strong nuclear force, the weak nuclear force, the electromagnetic force. If gravity were included, it would be a more comprehensive "Theory of Everything." Hawking made this ambitious statement at the end of *A Brief History of Time: From the Big Bang to Black Holes* (1988) (p. 175).

[68] Henry Drummond is best remembered for his masterful little work on love, *The Greatest Thing in the World*, his reflection in the form of a long sermon on 1 Corinthians 13. Since its publication in 1880, it has sold an estimated 12 million copies, making it one of the most popular Christian devotional works of all time.

[69] In Chapter 2 of *The Grand Design* (2010) titled "The Rule of Law," Stephen Hawking and Leonard Mlodinow explained that as science has advanced, belief in deities has decreased. Their thesis is that the universe operates according to well-defined laws, which can be understood through scientific inquiry, without invoking any supernatural explanation. God is ruled out.

would undermine belief in the unknowability of the Divine Essence, which remains a fundamental axiom of Bahá'í theology, as revealed by Bahá'u'lláh.

> Ten thousand Prophets, each a Moses, are thunderstruck upon the Sinai of their search at His forbidding voice, "Thou shalt never behold Me!"; whilst a myriad Messengers, each as great as Jesus, stand dismayed upon their heavenly thrones by the interdiction, "Mine Essence thou shalt never apprehend!" From time immemorial He hath been veiled in the ineffable sanctity of His exalted Self, and will everlastingly continue to be wrapt in the impenetrable mystery of His unknowable Essence. Every attempt to attain to an understanding of His inaccessible Reality hath ended in complete bewilderment, and every effort to approach His exalted Self and envisage His Essence hath resulted in hopelessness and failure.[70]

Cosmic Inflation then Expansion: Nucleosynthesis or Nuclear Fusion in the Early Universe

In light of Bahá'u'lláh's affirmation that the true origins of creation will remain known to God alone, it is no wonder that contemporary cosmologists continue to advance a plethora of competing theories about the origins of the universe. This observation is not meant to belittle the remarkable work of the distinguished astronomers and physicists who are patiently penetrating the challenging mysteries of creation. Yet, despite the fact that the Big Bang is currently the accepted Standard Model, with strong empirical evidence to support it, the theory continues to be questioned for gaps and unresolved issues.

For example, as we currently understand them, the laws of physics do not apply at the initial moment of the Big Bang, at Planck Time, when the temperature and density of the singularity were infinitely hot and high.[71] Put crudely, we do not know why the Big Bang banged. The laws of the infinitely small world of quantum mechanics, and Einstein's General Theory of Relativity (1915), which has it that gravity curves the fabric of spacetime, do not apply at the moment of the Big Bang, although they do apply within seconds of the cosmic inflation.

The distinguished cosmologist Alan Guth (b. 1947) is the leading exponent of Cosmic inflation Theory, an alternate theory to the Big Bang. Guth's famous 1981 paper "Inflationary universe: A possible solution to the horizon and flatness problems" has been cited approximately 13,000 times. Guth posited that the velocity of the inflation of the singularity, in the first microsecond, occurred faster than the speed of light, a theory which cannot be accounted for in our current understanding of physics.[72] What time means, however, at the instant of the Big Bang explosion is complex and not fully

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[70] Bahá'u'lláh, *Gleanings from the Writings of Baha'u'llah*, p. 62.
[71] https://astronomy.swin.edu.au/cosmos/*/Planck+Time This article gives a brief, technical explanation of why the laws of physics do not apply in the earliest microseconds of the universe.
[72] https://www.symmetrymagazine.org/article/the-problem-solver-cosmic-inflation?language_content_entity=und. Accessed 8 January, 2025.

understood. Gravity, a normally strong attractive force, was initially completely overcome by the more powerful repulsive force of cosmic inflation driven by dark energy.[73] Once instantaneous inflation ended, and the expansion phase began, gravity began to behave in a more usual way, pulling matter together and eventually forming stars, galaxies and other cosmic structures.

These observations of inflation and expansion are based on the theory that dark energy is a constant, but a more recent alternate theory is being advanced. Physicists Paul Steinhardt and Joshua Friedman, currently (2024) at the universities of Princeton and Chicago respectively, suggest that dark energy may fluctuate. This theory proposes that the "scalar field," which consists of non-constant, scalable energy densities, varies in spacetime. Aligned to the theory is "Quintessence," an alternate hypothesis that dark energy, which comprises 68-70% of all cosmic energy, is part of the dynamic, variable scalar field. Quintessence contrasts with the generally accepted theory that dark energy is constant across spacetime. Since dark energy was first discovered in 1998, cosmologists had concluded that it was constant.

After the very short inflationary moment occurred–rapid inflation was followed by slower expansion–the expansion phase continued to accelerate, driven by dark energy, although at a slower speed than inflation. Most physicists posit that dark energy continues to drive expansion today, although some physicists are now questioning the idea of dark energy itself and are proposing an alternate theory.[74]

Nucleosynthesis, the formation of matter, began to occur within three minutes, as space cooled down: first quarks, electrons, neutrinos, then protons and neutrons, then light chemical elements like hydrogen and helium.These latter phenomena, unlike the speed of the initial inflation, can be explained in terms of current scientific knowledge. Stellar nucleosynthesis, as differentiated from nucleosynthesis, began about 100 million years after the Big Bang and continues to exist in stars today. Except for hydrogen, stars produce in their core many of the elements heavier than hydrogen necessary for life to exist in the universe. Instead of producing hydrogen, stars consume it to produce helium.[75]

The Paradox: Eternal Creation and Creation from Nothing

It bears mentioning that Bahá'u'lláh was not as categorical as 'Abdu'l-Bahá on the idea of creation from nothing. But His meaning remains open to interpretation. The following passage alludes to it:

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73 https://spacemesmerise.com/en-ca/blogs/astronomy/unlocking-the-enigma-of-the-cosmic-inflation-with-dark-energy. Accessed 8 January, 2025.

74 Mordehai Milgrom proposed Modified Newtonian Dynamics (MOND) in the early 1980's as an alternative to dark energy. Jacob Bekenstein has also contributed to the development of MOND related theories. The theory basically proposes that MOND can explain gravity rotation curves without invoking dark energy.

75 https://www.scientificamerican.com/article/the-first-molecule-in-the-universe/ Accessed 13 January, 2025.

> As regards thine assertions about the beginning of creation, this is a matter on which conceptions vary by reason of the divergence of men's thoughts and opinions. Wert thou to assert that it hath ever existed and shall continue to exist, it would be true; or wert thou to affirm the same concept as is mentioned in the sacred Scriptures, no doubt would there be about it, for it hath been revealed by God, the Lord of the worlds. Indeed He was a hidden treasure. This is a station that can never be described nor even alluded to.[76]

With "the same concept as is mentioned in the sacred Scriptures," Bahá'u'lláh appears to be alluding to two different things. The first would be the famous hadith qudsi,[77] which is particularly beloved by Sufis: "I was a Hidden Treasure. I wished to be made known, and thus I called creation into being in order that I might be known."[78] We may suppose that what Bahá'u'lláh intended was that no one ever existed who was/is able to understand the Divine Essence. In that sense, "creation" did not exist, until the creatures came to know and love God, since knowing and loving God are the two primary purposes of creation:

> Having created the world and all that liveth and moveth therein, He, through the direct operation of His unconstrained and sovereign Will, chose to confer upon man the unique distinction and capacity to know Him and to love Him -- a capacity that must needs be regarded as the generating impulse and the primary purpose underlying the whole of creation....[79]

The second interpretation of Bahá'u'lláh's mention of "the same concept as is mentioned in the sacred Scriptures" might be the commonly held Judeo-Christian-Islamic view of creation out of nothing. Here we recall that "nothing" has a relative value, as 'Abdu'l-Bahá explains above.

'Abdu'l-Bahá's Challenge to Islamic, Christian and Jewish Cosmology

The idea that the universe has no beginning challenges Islamic, Christian and Jewish cosmology. Muslims generally believe that Allah created the universe *ex nihilo*. In the Surah *Al-Baqarah* (the Cow), for example, the second of the surahs and the longest surah in the Qur'án (286 ayahs/verses), we find the famous *Kun fayakun* verse. "Be and it is." "Verily, when He intends a thing, His Command is, 'Be', and it is!"(36:82)

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[76] *Tablets of Bahá'u'lláh*, p. 139.

[77] The number of the so-called Ahadith Qudsi or holy hadiths are estimated by scholars between 40-110. They are not all considered to be authentic, but this one must be since it has been validated by Bahá'u'lláh. The distinction between the holy hadiths and the quranic verses is a subtle one. The quranic verses are considered to be the very words of Allah, dictated by the Angel Gabriel. The words of the holy hadiths have God's meaning but are expressed in the Prophet's words. They may be viewed as a middle tier between the regular Ahadith and the Qur'an, but they are not considered to be as authentic as the words of the Qur'an.

[78] This is the translation used in the *Kitáb-i-Aqdas*, p. 174.

[79] Bahá'u'lláh, *Gleanings from the Writings of Bahá'u'lláh*, p. 64.

This verse is generally interpreted by Muslims to mean that God has willed creation into being out of nothing: that before He willed it into existence, creation did not exist.

St. Paul in Hebrews 11:3,[80] provides the Gospel text for the idea of *creatio ex nihilo*: "By faith we understand that the worlds were framed by the word of God, so that things which are seen were not made of things which do appear." We should mention in passing that aside from *creatio ex nihilo*, the assertion that the Word of God framed the worlds is perfectly consistent with Bahá'í belief. Bahá'u'lláh revealed:

> Such as communicate the generating influence and such as receive its impact are indeed created through the irresistible Word of God which is the Cause of the entire creation, while all else besides His Word are but the creatures and the effects thereof. Verily thy Lord is the Expounder, the All-Wise.[81]

The framers of the Nicene Creed in the year 325 CE, and before them those who formulated the other creeds of the early church, and the early church fathers Tertullian (c. 155-240 CE), Origen (c. 184-253 CE) and St. Augustine of Hippo (354-430 CE),[82] and later St. Thomas Aquinas[83] (1225-1274 CE), all believed that God created the world from nothing. For them the material world was not eternal; it began on a specific point in time. They also found support for this doctrine in Genesis 1:1: "In the beginning God created the heaven and the earth." A beginning is usually understood as a definite point in time, although it should be noted that Genesis gives no mention of when the beginning might have occurred.

Early rabbinic Midrash[84] as found in the oral commentaries of the Jewish sages, the Tannaim, and in Genesis Rabbah/Bereshit Rabbah, it was debated whether or not God created the universe from pre-existing matter or *ex nihilo*.[85] The Hebrew text of Genesis 1:2 mentions that the earth was "without form and void." (*Tohu va bohu*). This subtle phrase suggests that God shaped or gave form to what was already pre-existent, for the same verse says "And the Spirit of God moved upon the face of the waters." Water is identified there as a pre-existent substance, a point that was noted by the

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[80] Most contemporary scholars agree that the Epistle to the Hebrews was written in St. Paul's name, but not by the apostle himself.

[81] Bahá'u'lláh, *Tablets of Bahá'u'lláh*, p. 140.

[82] In his *Confessions* and *The City of God*.

[83] St. Thomas Aquinas was, however, also open to the possibility of the eternity of the world without contradicting *creatio ex nihilo.* He argued that reason alone could not determine whether or not the universe had a temporal beginning, but as a matter of faith he accepted that it did have a temporal beginning. For him, whether the universe had a temporal beginning or not, the important point was the metaphysical dependence of all creation on God. Creation for him was defined in terms of dependence on God rather than a beginning in time.

[84] Midrash refers to rabbinical exegesis, an originally oral tradition that interprets and elaborates biblical texts. In time these commentaries came to be written down. *Midrash Rabbah* (Great Midrash) is a large compilation that contains both halakhic (legal) and aggadic (narrative, non-legal) interpretations of the Hebrew Bible. This great commentary was composed over a long period from the 3rd century to as late as the 12th century CE. The *Genesis Rabbah* (Great Genesis) contains the earliest commentaries on the first book of the Hebrew Bible.

[85] It was probably composed during the 5th century CE in Palestine, but it contains material from an earlier time.

influential medieval Jewish exegete Rashi (1040-1105),[86] although he did not suggest that the universe was eternal.

A Bahá'í interpretation of Genesis 1 would certainly lend itself to Elohim being the Fashioner of pre-existent matter. Shoghi Effendi, for example, in his translations of Bahá'u'lláh's verses repeatedly uses the noun "Fashioner" and the verb forms of "to fashion" to refer to the actions of the Creator: "Through Him Thou didst adorn the preamble of the book of Thy creation, O Thou Who art the Ruler of the universe Thou hast fashioned!"[87] A Fashioner suggests that the Creator is a supreme artisan who moulded pre-existing matter.

Later authoritative Jewish interpretations, such as those of Maimonides/*Rambam*[88] (1138-1204 CE), promoted the idea of *creatio ex nihilo*, primarily in reaction to Aristotelian philosophy that the universe was eternal, just as Aristotle had taught in his *Physics.*[89] Maimonides believed that creation from nothing was the most consistent view with the cosmology of Genesis. In contemporary Jewish theology, creation from nothing is still orthodox doctrine.The Jewish physicist and biblical commentator Gerald Schroeder[90] attempts to align Genesis 1 with the Big Bang Theory, by suggesting a non-literal interpretation of the creation story and by proposing time spans of billions of years for the "days" of creation. Schroeder also uses "time dilation," based on Einstein's Special Theory of Relativity (1905), to posit the observer perceives time differently, depending on his or her frame of reference.[91]

Ordained Presbyterian minister, Dr. William P. Brown, scholar of the Hebrew Bible, takes a different approach, by examining seven different biblical creation narratives. He reinterprets them in light of modern scientific theories and finds "virtual parallels" between modern science and biblical cosmology. He emphasizes dialogue between the biblical narratives and scientific theories, without proposing a grand theory that harmonizes modern science with the biblical accounts of creation.[92]

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[86] See a further reference to Rashi below.

[87] Bahá'u'lláh, *Prayers and Meditations*, p. 49.

[88] Rambam is an acronym of his full name, Rabbi Moshe ben Maimon. In Judaism revered scholars are referred to by abbreviating their names. His most famous work *The Guide for the Perplexed* (1186-1190 CE) explores the relationship between philosophy, science and religion. It was written in the Judeo-Arabic dialect in Fustat, a district of old Cairo, after Maimonides fled persecution in Spain and Morocco and settled in Egypt.

[89] In Book VIII, Chapter 1-8 of his *Physics*, Aristotle's argument for the eternity of the cosmos is based on his idea that motion is eternal and has no beginning or end. For him the heavenly bodies were in constant motion.This was a key idea in his work "On the Heavens," his main cosmological treatise written in 350 BCE. In it he mistakenly proposed a geocentric model, just as he taught the existence of an imperishable substance called aether which moves in perfect circular motion.

[90] His books on creation, the Bible and modern cosmology are *Genesis and the Big Bang: The Discovery of Harmony Between Modern Science and the Bible* (Bantam Books, 1990), *The Science of God* (1994), *The Hidden Face of God*, (2001) and *God According to God* (2009). Gerald Schroeder is an orthodox Jewish physicist, author and lecturer who attempts to reconcile science with spirituality and science with the creation story in Genesis.

[91] https://www.scientificamerican.com/article/einsteins-time-dilation-prediction-verified/ Accessed 13 January, 2025.

[92] See Brown's T*he Seven Pillars of Creation: The Bible, Science and the Ecology of Wonde*r (Oxford University Press, 2010). The expression "virtual parallels" is found on p. 10. His doctoral thesis was titled "The Ethos of the Cosmos:The Genesis of Moral Imagination in the Bible."

Genesis: Creation *Ex Nihilo* or Fashioning Preexistent Matter?

Viewed globally over the centuries, Midrash commentators have favoured the idea that God created the universe from nothing. Maimonides/*Rambam* and the Jewish Kabbalists[93] held to creation from nothing, but a close reading of Gen.1:1-5, may incline to the view that the universe was pre-existent and that Elohim gave form to formless matter. The text begins with the famous words "In the beginning God created the heaven and the earth." Normally one thinks of a beginning as a beginning in time, but one of the most influential Jewish medieval commentators, Rabbi Shlomo Yitzchaki (1040-1105 CE), better known as Rashi, read the text as a process. He challenged the traditional view by arguing that the Hebrew word transliterated as "Bereshit," and normally translated as "In the beginning," was more properly translated as "When God began to create."[94] In other words, Bereshit on this reading would be translated as a clause rather than by the noun "beginning." The debate continues to this day among scholars.

Rashi noted that the sacred text does not specify the [scientific] order of creation, but Genesis mentions the following creation events: Day 1, light. Day 2, sky/firmament/heaven. Day 3, land, seas and vegetation. Day 4, sun, moon and stars. Day 5, sea creatures and birds. Day 6, land animals and humans. Day 7, Elohim rested. Rest on Day 7 became the basis for the Sabbath ordained as one of the Ten Commandments in Exodus 20:8-11. Rashi meant that the order of the days of creation in Genesis is not scientifically exact in its chronology. Cosmology, biology and geology all confirm Rashi's interpretation because the order of the days of creation is scientifically inaccurate.

To cite just one example among several, the mention of light on Day 1 (Gen. 1: 3-5) is incorrect because light cannot exist without sources such as the sun and other stars, which according to Genesis were created on Day 4. Consequently, there could not have been light on Day 1. However, Genesis is scientifically correct about the formation of the universe, when it mentions that darkness came first followed by light: "And the earth was without form, and void, and darkness was on the face of the deep...And God said, Let there be light: and there was light." (Gen. 1:2-3) Cosmologists have determined that in the formation of the universe, darkness prevailed until about 380,000 years after the Big Bang, during the Era of Recombination.

Scientific accuracy in Genesis is beside the point, however, because the sacred text is meant primarily to underscore the sovereignty of Elohim over all creation. It

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[93] According to the *Zohar*, the Book of Splendor, the Kabbalists held that only God existed as the *Ein Sof* (the Infinite). In Lurianic Kabbalah, God withdrew His infinite presence to create vacant space for the universe to exist. This action of contraction was referred to as the Zim Zum/Tzimtzum/, a wide-ranging influential idea in Judaism touching on cosmology, theology and ethics. It also influenced the philosophical ideas of Hegel and Sir Isaac Newton's ideas about creation and existence.

[94] https://www.hebrewversity.com/god-order-creation-deeper-hebrew-meaning-first-verse-bible/ Accessed 13 January, 2025.

establishes the existence of the one, unique Creator God. It was not meant, in the days prior to the development of the modern sciences, to give a scientifically accurate account of the stages in the creation of the earth and its creatures.

Rashi also correctly observed that water, as depicted in the text, existed before the creation of heaven and earth. This contradicts the stricter, more traditional view that Gen. 1:1 indicates an absolute beginning. His interpretation of pre-existent water suggests a formless, chaotic universe when God began creating. Rabbi Abahu (c. 279-320 CE), a prominent Palestinian commentator, in his Midrash of Gen. 1 argued that multiple worlds were created and destroyed before our current one. Although Rabbi Abahu did not specifically suggest that the universe was eternal, his insightful interpretation of the creation account clearly anticipates modern cyclic cosmological theories.

Now according to some cosmologists, the earliest estimate for the creation of water in the universe is about 12 billion years ago. Scientists have discovered that on earth some water is older than the sun, with the latter estimated to be about 4.603 billion years old.[95] Water and earth are the two elements first mentioned in the Genesis creation story. The mention of water “in the beginning” has scientific accuracy. Water is almost as old as the Big Bang itself. It was present about 1.6 billion years after the Big Bang which is estimated to have taken place 13.8 billion years ago. This estimation comes from the discovery of a massive cloud of water vapour surrounding a quasar (an extremely bright quasi-stellar object), located 12 billion light years from earth. This suggests that the presence of water occurred very early on in the life of the universe.

Comparing and Contrasting Genesis and Polytheistic Creation Myths

In the Genesis creation story, water is a symbol of chaos and disorder: “And the earth was without form, and void and darkness was upon the face of the deep. And the Spirit of God moved upon the face of the waters.” (Gen. 1: 2) In the Hebrew creation story, the Spirit of the one, omnipotent God, Elohim, is understood to order creation by an act of the divine Will, through the power of His Word. The biblical creation myth establishes Elohim as the one true God who rules alone, with none to rival His power.

This account contrasts with other creation myths, like the Egyptian Ennead (9 deities) creation myth[96] or the Mesopotamian/Babylonian *Enuma Elish* (“When on High”). The Hebrew account was probably based on the Babylonian myth, but more importantly, it was transformed into an apology for monotheism. In Gen. 1:7, the dividing of the waters both above and below the earth is a close parallel to the Babylonian epic,

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[95] https://www.discovermagazine.com/the-sciences/earths-water-is-older-than-the-sun. Accessed 14 January, 2025

[96]The nine deities of the Ennead of Heliopolis (Atum, Shu, Tefnut, Geb, Nut, Osiris, Isis, Seth and Nephthys) represent such cosmic elements as earth, air, light, sky and moisture. The self-created chief god Atum emerged from the primordial waters (Nun), which represented chaos. He stood on the “benben mound,” the primeval mound that emerged from the chaotic waters. He in turn created the other deities which represent the interconnectedness of the cosmic elements, establishing order from chaos, a common theme in Hebrew, Mespotomian and Egyptian creation myths.

in which the god Marduk split the goddess Tiamat's body to create a separation between the waters above and below the earth.

This Babylonian influence is found in the Genesis account which similarly reads: "And God made the firmament, and divided the waters which were under the firmament from the waters which were above the firmament and it was so." (Gen. 1:7) This typology reflects an ancient view that the firmament, or the heavens, was a solid dome holding back cosmic waters. A simpler interpretation would be that the waters above refer to rain. Despite the similarity of shared motifs in the two creation stories, the Hebrew myth establishes Elohim's singular divine power. Elohim rules alone: He has no rivals. Creation submits to His command. The process is dynamic but orderly. Creation is not based on strife, as in the polytheistic myths, but on divine command. In Genesis 2, beginning at verse 4, the Hebrew uses YHWH Elohim, "the Lord God," to introduce the personal as well as the cosmological aspect of the Divinity. YHWH is the God of Israel, i.e. YHWH belongs to the people of Israel in a personal way, while Elohim rules the entire universe. The plural form of Elohim designates not polytheism but "the plural of majesty," the multiplication of God's powers while adhering strictly to a monotheistic concept of God.

By contrast, in the Babylonian myth, creation is the result of bloody conflict between multiple gods. In the *Enuma Elish*, the world is created from the body of the slain Tiamat, who is a personification of the primordial sea from which the gods first emerged. In like manner, just as the waters represent chaos in the Hebrew creation story, Tiamat represents chaos in the formlessness of water.

Tiamat is slain by the god Marduk, the supreme god of creation, who uses her body to form the heavens and the Earth, thus establishing order in the cosmos. Just as in the Hebrew cosmology, the Babylonian myth also had strong political, legal, moral and ritual significance. The story was recited during the religious rites of Akitu, the New Year's festival in Babylon, typically held around the spring equinox. During Akitu, Marduk was celebrated as the supreme god of the pantheon and to establish Babylon's dominance over other city-states.

THE STORY OF THE BIG BANG AND THE STEADY STATE THEORY

The Originator of the Big Bang Theory: Father Georges Lemaître (1894-1966)

The Big Bang Theory was first proposed in 1927 by the Belgian priest and brilliant mathematician, Father Georges Lemaître. Lemaître's theory, although it was based on slim empirical data, was mathematically sound and based on Einstein's gravitational General Theory of Relativity (1915). Lemaître built on the work of Einstein by providing solutions to Einstein's as yet unsolved field equations.[97] Lemaître

[97] The German physicist Karl Schwarzschild provided the first solution to Einstein's field equations as early as 1916. His solution helped us to better understand that not even light could escape the gravity of a black hole. John Michell, an ingenious English country parson and Rector (Priest) of St. Botolph's Church, Cambridge, who taught Hebrew,

concluded that if time were reversed, the universe must have been infinitely smaller. At a 1933 meeting of the American Philosophical Society, Einstein remarked that Lemaître's mathematics was perfect, although during their first meeting in Brussels in 1927, at the fifth Solvay Conference, Einstein reportedly said to the priest that his physics was "abominable."[98]

Lemaître's theory was not known then as the Big Bang. Ironically, the phrase "Big Bang" was coined pejoratively by physicist Sir Fred Hoyle during a 1949 BBC radio lecture on the origins of the universe, during which he rejected the Big Bang in favour of his own steady state, non-dynamic theory. Since then Lemaître's original theory has been elaborated and confirmed by a congery of astronomers, cosmologists, physicists and mathematicians, including *inter alios* Edwin Hubble, George Gamow, Ralph Alpher, Robert Herman and more recently by Stephen Hawking (d. 2018) and Alan Guth. Despite his initial resistance, Einstein eventually accepted the theory. By 1933 Einstein and Willem de Sitter had proposed a model of an expanding universe that was an important precursor of the Big Bang Theory.

Today's Big Bang Theory, which is based on the Lambda Λ[99] CDM/Cold Dark Matter model, includes a cosmological constant, associated with dark energy (expansive/repulsive force) and cold dark matter (gravity/attractive force) and ordinary matter. Dark energy (68%) and dark matter (26-27%) constitute an estimated 95 percent of the universe's total mass and energy. Dark matter and dark energy are called "dark" primarily because they can be neither directly detected nor observed using the standard methods employing electromagnetic radiation. Their existence is inferred indirectly from various sources based on their gravitational effects and their influence on the structure and evolution of the universe.[100] Dark matter and dark energy work against one another in the dynamics of the universe. Dark matter exerts a gravitational or attractive force, which slows down the inflation rate, while dark energy is a repulsive force that accelerates expansion.

Lemaître is remembered not only for his theory but also for proving Einstein wrong. Prior to Friedmann's and Lemaître's work, the static, non-dynamic universe, was held by Einstein. In 1948 it was revived in a different form by physicists Sir Fred Hoyle, Hermann Bondi and Thomas Gold, but it was later abandoned.

Greek, mathematics and geology, first conceived of the idea of black holes in 1783. He is a largely unacknowledged great scientist.

[98] https://bigthink.com/13-8/lemaitre-priest-proved-einstein-wrong/ Accessed 15 January, 2025.

[99] In physics the Lambada with its corresponding symbol of the inverted V is the 11th letter of the Greek alphabet. It represents the cosmological constant associated with dark energy.

[100] https://magazine.caltech.edu/post/where-is-dark-matter-hiding.Whitney Calvin, "Where is Dark Matter Hiding?" October 23, 2020. In 1933 the American-Swiss astronomer, Fritz Zwicky (d.1974) postulated the existence of *dunkle Materie* (dark matter). The reference is often cited as the first use of "dark matter" in the context of missing mass in astronomical systems. Zwicky contributed to the scientific understanding of supernovas, stars that are far brighter than normal for a short time.

Lemaître's Singularity: The "Primeval Atom" or "Cosmic Egg" and What Happened Next

Lemaître's article "The Beginning of the World from the Point of View of Quantum Theory" (1931) was published in the journal *Nature*. Despite the mention of "the World" in the title, his theory applied to the whole universe. It was an elaboration of his earlier work from 1927. The Belgian priest proposed that the universe began from a "primeval atom" or "cosmic egg" whose size he did not define. He proposed the exploding[101] a primeval atom contained the universe within it, creating cosmic inflation. It seems likely that Lemaître was influenced by Christianity's theological doctrine of creation out of nothing. Following Christian cosmology, the date of creation ostensibly could be calculated since it marked the beginning of time. This calculation was made in fact by the Planck Space Observatory in 2013 as 13.8 billion years ago. In 2020 combined observations from the PSO and the Atacama Cosmology Telescope confirmed the age as being accurate.

The Big Bang Theory had wide appeal among the general public, even if the technical scientific explanations are poorly understood, probably because it satisfies the common sense reaction that everything, including the universe itself, must have a beginning. For those from a Judeo-Christian background, the Big Bang Theory also seems coherent with the biblical phrase in Genesis 1, "In the beginning…" The beginning would have been the primeval atom or the cosmic egg. The Big Bang Model also explains how order overcame chaos over millions of years to produce the ordered universe governed by universal law we see today. This explanation is also basically consistent with the Genesis account in which water, like some creation myths of the ancient Near East, represents disorder or formlessness, a disorder that became ordered over six days by the commanding Word of Elohim.

Lemaître's theory was initially received with skepticism, including Einstein's. It was based largely on mathematical equations and theoretical logical deductions. Although initially there was limited empirical data to support it, it was eventually confirmed by other cosmologists. In 1964 Penzias and Wilson made the crucial discovery of Cosmic Microwave Background (CMB), the glowing residual radiation from the Big Bang, the oldest visible light in the universe. Among other factors, CMB confirmed the theory. In the decades between the 1920's and 1970's, physicists *inter alios* such as Sir Arthur Eddington, Robert Wagoner, William Fowler, Hans Bethe, George Gamow, Ralph Alpher, Robert Herman, and especially Fred Hoyle developed Big Bang Nucleosynthesis/Nuclear Fusion.

The process of nuclear fusion or nucleosynthesis refers to the creation of the nuclei responsible for the formation of such light chemical elements essential for life, such as hydrogen, helium, lithium, helium-3, deuterium and lithium-7. These elements

[101] Cosmic inflation was not an explosion in the literal sense of the word. It was, rather, the instantaneous expansion of space itself. Inflation was the initial phase which then morphed into the much longer phase of expansion that extended over billions of years.

were formed within 10 seconds to 20 minutes after the Big Bang. After 20 minutes nucleosynthesis/nuclear fusion was complete, setting the stage for the formation of celestial bodies. During the period called Recombination, which occurred about 380,000 years after the Big Bang, the cooling of the universe and the dispersion of dense fluid plasma allowed light to travel freely, making the universe transparent for the first time. The Cosmic Microwave Background provides evidence of the transition from darkness to light. About a billion years after the Big Bang, any remaining haze in space was cleared, and the universe became fully transparent to starlight.

After the initial inflation, cooling and nucleosynthesis processes were complete, the universe entered what might be called its Formative Epoch. This took place over an estimated several billion years producing the universe that we observe today. The astronomical bodies of our observable universe include: stars, star clusters, moons, asteroids, black holes, quasars, comets, planets, nebulae, galaxies, galaxy clusters, super clusters, cosmic voids and exoplanets. These cosmic structures are separated by enormous stretches of spacetime, unimaginable light years away from one another. In stars, nucleosynthesis is produced through the combined opposing action of nuclear fusion and fission. Along with Cosmic Microwave Background, the age of the oldest stars, and cosmic inflation, nucleosynthesis provides the fourth major pillar to support the Big Bang model.

The Declaration of Pope Pius XII and Le Maître's Response

The priest's theory caused Pope Pius XII to proclaim in a speech before the Pontifical Academy of Sciences (1951) that the Big Bang Theory of *creatio ex nihilo* was compatible with Christian beliefs about God and creation as contained in the Book of Genesis. During the speech, the Pope emphasized that science and faith could co-exist and that scientific progress could lead to a greater understanding of the workings of God within the universe. Although Lemaître was himself a priest, he was somewhat alarmed by the Pope's remarks. Although the Pope suggested a "concordist" view of science and religion, the priest-physicist believed in the separate *magisteria* of theology and science, two domains that should not be mixed. He believed that they are different and parallel interpretations of the world. His solution to any conflict between religion and science was to keep them separate because they address different questions and domains. He went on record, cautiously limiting his remarks to a statement that was intended to satisfy both atheistic materialists and theistic believers. He feared that if his theory remained associated with religious doctrine, it would not be accepted by scientists. In 1958 at a physics conference, Lemaître gave a further clarification of his views, hoping to undo some of the misunderstanding that the Pope's remarks made have caused in the physics community:

> As far as I can see, such a theory [the Big Bang] remains entirely outside any metaphysical or religious question. It leaves the materialist free to deny any

> transcendent Being…For the believer, it removes any attempt at familiarity with God…It is consonant with Isaiah speaking of the hidden God, hidden even in the beginning of universe.[102]

Although this statement rejects any complementarity of science and religion, it alludes to the *Deus absconditus*, the hidden God, a belief that is certainly coherent with Bahá'u'lláh's assertion, quoted above, that the origin of creation is shrouded in mystery and known to God alone.

The Contributions of Alexander Friedmann, Vesto Slipher, and Edwin Hubble

It should be noted that before Lemaître, the outstanding Soviet physicist and mathematician, Alexander Friedmann formulated the Friedmann Equations of 1922. (He died in 1925 of Typhoid Fever at the young age of 37). Like Lemaître, Friedmann posited an expanding universe, a groundbreaking cosmological theory. Friedman modified Einstein's General Theory of Relativity, which the brilliant Russian used as a basis for his solutions to Einstein's field equations. Friedmann's equations are really historic in that they provided all at once a mathematical and physical basis for a dynamic, expanding, contracting and oscillating universe. The importance of Friedmann's equations should not be underestimated, for they provided the mathematical foundation for the Big Bang Theory and modern cosmology, showing that the universe has a dynamic history. His equations allowed scientists to model the universe's past, present, and future evolution based on its observable properties.

In 1927 Georges Lemaître independently came to several of the same conclusions as Friedmann, regarding the Big Bang and cosmic inflation. Lemaître built on the work not only of Albert Einstein but also that of American astronomer Vesto Slipher (1875-1969). Slipher's work was one of the few strands of empirical evidence Lemaître possessed. Lemaître was well acquainted with Slipher's work because the two men met at MIT. Vesgo Slipher was the first astronomer to systematically measure the radial velocity of spiral galaxies.[103] He also discovered through long, systematic observations (1912-1925) that redshifts, which refers to the increasing wavelength of light emitted by distant galaxies as it moves toward the red end of the spectrum, are linked to cosmic expansion.The galactic redshift discovery was crucial to Lemaître's theory of the expanding universe.

Although Slipher's work on redshifts first suggested cosmic inflation, Edwin Hubble confirmed the theory. Slipher provided the velocity measurements of galaxies, while Hubble combined these with distance measurements to establish more fully cosmic expansion. Both men made essential contributions, but Hubble's work led more directly to the modern understanding of an expanding universe. Hubble's famous paper

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[102] https://inters.org/pius-xii-lemaitre Accessed 14 January, 2025.

[103]Scientists rarely make discoveries uniquely on their own. Hubble's work was built on Slipher's. Any discoveries in science are often linked to the work of others, since scientists work in community.

(1929), titled "A Relation between Distance and Radial Velocity among Extra-Galactic Nebulae [Galaxies]"[104] which resulted in Hubble's Law, demonstrated the relationship between a galaxy's distance and its recession velocity.

Simply put, Hubble's law states that the further a galaxy is from earth, the faster it appears to be moving away. As a result of Hubble's groundbreaking work, some cosmologists have proposed referring jointly to the "Hubble-Lemaître Law." The Hubble Constant is a related theory that represents the rate of expansion of the universe at a given time. The Hubble Tension[105] indicates a discrepancy in measurement of the universe's expansion rate. The universe is expanding at a faster rate than astronomers would expect, based on the initial conditions at the time of the Big Bang and what we know about the universe's evolution. Cosmologists are currently working on resolving this discrepancy.

The Steady State Theory: Sir Fred Hoyle the Reluctant Atheist

The Steady State Model was proposed in 1948 by Sir Fred Hoyle (1915-2001 CE), Thomas Gold and Hermann Bondi. Like Hawking and Krauss, Hoyle was at one time a convinced atheist. He proposed the Steady State Theory of the eternal universe because it required no belief in a Creator, unlike the Christian cosmological theory of creation from nothing. But Fred Hoyle was not your average atheist. Being a free-thinker, he did eventually come to believe in Intelligent Design (ID) and the fine-tuning argument. He also rejected Darwinism because he did not believe that life could have arisen purely by chance. In a famous simile, he said that the possibility of life arising from chance was like a whirlwind assembling a Boeing 747 from a junkyard.[106] His work on the fine-tuning of the universe led Hoyle to believe that "A common sense interpretation of the facts suggests that a super-intellect has monkeyed with physics, as well as with chemistry and biology, and that there are no blind forces worth speaking about in nature."[107] Although Hoyle did not believe in a personal Deity, nonetheless unlike Einstein and Newton, he did not attribute this super-intelligence to God. It should be noted in passing that Einstein did not believe in a personal Deity either, but rather in a supreme intelligent force. Newton believed in a both a personal Deity and a supreme intelligent force. Hoyle's theory of life on earth originated in panspermia, a doctrine that he helped to create with his collaborator Chandra Wickramasinghe, a theory that posits that life exists throught the universe and was brought to earth from space by dust, meteoroids, asteroids, comets, and planetoids. Panspermia remains a fringe-theory

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[104] In the "Proceedings of the National Academy of Sciences."
[105] The findings of Hubble Tension conflict with the alternate theory that the universe's rate of expansion driven by dark energy is constant.
[106] This memorable simile is found on p. 19 of his book *The Intelligent Universe* (1983).
[107] He made this remark at a physics conference at CalTech in 1981.
https://apologetics315.com/2009/08/sunday-quote-fred-hoyle-on-fine-tuning/
Accessed 15 January, 2025.

within the scientific community, although some scientific evidence supports certain aspects of the theory.[108]

The Steady State Theory did recognize, like the Big Bang, that the universe is expanding. Einstein also at one time favoured the Steady State Model which was known in Einstein's day as "the static universe." Without the cosmological constant, Einstein's equations would have predicted either an expanding or contracting universe. Although he at first resisted the idea, Einstein later acknowledged that Friedmann's equations were correct about an expanding universe.

Unlike the Big Bang, the Steady State Model held that the universe maintains a constant average density and that new matter is being created as the galaxies move apart. As new matter is being formed, the matter from stars and galaxies is being destroyed in a balanced steady state. This does not mean that matter is itself being annihilated, but rather that matter is being transferred from one state to another. The Steady State Theory also proposed that the universe is isotropic (the same in all directions) and homogeneous (the same in all places) and unchanging in time.

If we view the video of the universe, as relayed by the James Webb Space Telescope launched late in 2021, it would appear to give credence to the Steady State Model. It appears at first glance that the universe is isotropic and homogeneous, but it is not actually the case. As we shall see in the section below, such factors as the Hubble's Law, the Cosmic Microwave Background radiation, and Big Bang inflation could not support the "perfect cosmological principle" claimed by those who posited the Steady State Model.

The Demise of the Steady State Theory

The Steady State Model, which was once an alternative to the Big Bang, has been largely discarded by contemporary cosmologists, although it is sometimes referred to in the context of the history of cosmology. The Steady State Theory was abandoned mostly because of solid observable data such as the Cosmic Microwave Background. (See #3 below). Unlike the steady state, the Standard Model is dynamic because it demonstrates cosmic inflation. Hubble's Law shows that the galaxies are moving away from one another at speeds proportional to their distances, i.e. the farther they are, the faster they are moving away. We know, consequently, that the universe is still expanding, although at a slower velocity than the initial inflation of the singularity, which occurred faster than the speed of light. The static view of the Steady State Model became difficult to maintain in face of the accumulating evidence of the initial inflation of the hot, dense singularity.

There were three other principal reasons for its demise. (1) Radio astronomers led by Martin Ryle in the 1950's showed that faint, distant radio sources had a higher

[108] https://www.universetoday.com/11584/an-experiment-to-test-panspermia/#google_vignette. Accessed 15 January, 2025.

density than nearby bright ones. This observation showed the universe had changed over time, contradicting the isotropic and homogeneous theory of the steady state, expressed as the "perfect cosmological principle." (2) Hoyle's Steady State Theory required the presence of chemical elements to be synthesized in stars. Although Hoyle's theory of stellar nucleosynthesis contributed to the recognition of helium production, it could not account for the abundance of helium, which was explained instead by Big Bang nucleosynthesis/nuclear fusion. Although the steady state universe favoured by Hoyle met its demise, his theory of stellar nucleosynthesis became pivotal to the cosmological principle that stars are veritable factories producing vital chemical properties necessary to life.

(3) In 1965 radio astronomers Arno Penzias and Robert Wilson discovered that Cosmic Microwave Background radiation fills the entire universe. It led them to conclude that CMB was a relic of the hot, dense early universe. While CMB does not definitively prove cosmic inflation, it indirectly suggests it. The steady state theorists had no convincing explanation for the existence of CMB. The discovery of CMB helped to close the coffin on the Steady State Theory, although sometimes discarded theories have a way of reappearing. Unlike the Steady State Theory, the Big Bang Model holds that all past and present matter originated only after initial cosmic inflation occurred, thus maintaining the First Law of Thermodynamics that energy can be neither created nor destroyed, otherwise known as the Law of Energy Conservation.

Critics of the Steady State Theory said that the creation of new matter claimed by the model violated the First Law of Thermodynamics, by which matter and energy (mass-energy) remain constant. Einstein's famous equation $E=mc^2$ posits the related but somewhat different concept of the interchangeability of matter and energy, whereas the First Law of Thermodynamics posits that the total energy in a system remains constant. By 1970 the Steady State Theory was all but dead. It was, however, revived in the early 1990's in a modified form as the Quasi-Steady-State-Hypothesis (QSS), formulated by Fred Hoyle, Geoffrey Burbidge and Jayant V. Narlikar. Although the QSS and its earlier version have become obsolete, the theory proved useful to the history of cosmology for prompting physicists either to prove or disprove it.[109]

COSMOLOGICAL CYCLES IN PHILOSOPHY AND RELIGION

Cyclic Models Are Generally Coherent with Bahá'í Doctrine

The Bahá'í Faith recognizes both linear and cyclic time. Linear time can be compared to an arrow that moves ahead toward a target, a *telos* or goal, such as the biblical promise of the Kingdom of God on earth. Linear time was the Hebrew conception of time. Cyclic time, which is more typically Hindu and Buddhist, witnesses

[109] https://history.aip.org/exhibits/cosmology/ideas/bigbang.htm Accessed 14 January, 2025.

repeated cycles in the universe of very long duration which involve destruction of the old order and recreation of a new order. In the view of cyclic time, the Golden Age which is associated with greater purity, wisdom and harmony, is in the past, accompanied by the hope for its future renewal.

Historians of science have noted that beginning in antiquity, cosmological models have undergone many complex changes over thousands of years. Although cyclic theories have been revived in modern physics in two different models that will be considered below, the idea of a cyclic universe is very ancient. Hindu cosmology is perhaps the oldest recorded scriptural mention in the world's religions of a cyclic universe. Egyptian and Babylonian (Mesopotamian) myths suggest the periodic regeneration of the world or cycles linked to the seasons and agricultural renewal. It is probable that the idea of a cyclic model was first suggested by simple observation of the recurring seasons.

The cyclic model is consistent with the Bahá'í teachings not only for its scientific basis but also because we find references to cycles in the Bahá'í sacred writings, notably the Adamic Cycle which began with the prophet Adam approximately 6,000 years ago.[110] Cyclic scientific cosmological theories posit very long periods of billions and even trillions of years that include creation, destruction and recreation. Although in context 'Abdu'l-Bahá is referring to the cycle of the Divine Manifestation, it is important to note that His statement also includes cataclysms in the physical world in which traces are lost and a new beginning commences. His statement consequently has implications for physics.

These cataclysms correspond to the history of the universe itself since cosmologists have theorized that the universe could end, as has already mentioned above, by either a Big Crunch (collapse) or Heat Death (deep freeze) or Big Rip (tearing apart of matter and spacetime) or Vacuum Decay (sudden inflation of a "bubble" of stable space destroying everything). But the cyclic cosmological model also posits that the perceived "end" of the universe is only the end of one cycle. In Bahá'í theology, likewise, this end is only the beginning of a new cycle:

> Each of the Manifestations of God has likewise a cycle wherein His religion and His laws are in full force and effect. When His cycle is ended through the advent of a new Manifestation, a new cycle begins. Thus cycles are inaugurated, concluded, and renewed, until a universal cycle is completed in the world of existence and *momentous*

[110] The Guardian wrote to the North American believers on the first centenary of the Martyrdom of the Báb: "Moved to share with assembled representatives of American Bahá'í Community gathered beneath the dome of the Most Holy House of Worship in the Bahá'í world, feelings of profound emotion evoked by this historic occasion of the world-wide commemoration of the First Centenary of the Martyrdom of the Blessed Báb, Prophet and Herald of the Faith of Bahá'u'lláh, Founder of the Dispensation marking the culmination of the six thousand year old Adamic Cycle, Inaugurator of the five thousand century Bahá'í Cycle. (Shoghi Effendi, *Citadel of Faith*, p. 80)

> *events transpire which efface every record and trace of the past; then a new cycle begins in the world, for the realm of existence has no beginning*."[111]

Selected Ancient Greek Philosophers: The Cyclic Eternal Universe

When 'Abdu'l-Bahá taught the eternity of the universe, His idea was consistent *inter alios* with the ancient Greek philosophers Aristotle, Democritus, Epicurus, Parmenides, and Empedocles. These Greek philosophers believed in the eternity of the universe because they deemed that matter was eternal, essentially because creation from nothing was impossible. The Steady State Theory mentioned above was advocated by Aristotle (384-322 BCE) in its basic outline in his *Metaphysics* and *Physics*.[112] The philosopher maintained that the universe was not created but existed eternally in a constant steady state. Based on the principle of *ex Nihilo Nihil fit*, Aristotle posited that the universe was generated from a previously existent substratum. He theorized that motion was also eternal and time was infinite.[113]

Aristotle's insights, however, contained several errors. Among them he proposed a geocentric instead of a heliocentric model of our solar system and that the universe was finite in size, limited to a total of 55 objects.[114] Following Empedocles proposal of the four essential elements of earth, air, fire and water, which he called "roots," Aristotle also proposed the notion of the quintessence,[115] or fifth essence, out of which the four fundamental elements were made. For Aristotle, this fifth essence was "ether," a pure, eternal and incorruptible substance that made up the heavenly bodies and was distinct from the earthly elements. Aristotle's theories not only on cosmology but also physics and biology dominated western thought for almost 2,000 years, from antiquity until the 17th century.

However, the Michelson-Morley experiment in 1887 failed to detect ether because the presumed existence of "ether wind" did not affect the speed of light. The unexpected "null result" suggested that the medium of ether was not actually present. Einstein's 1905 Special Theory of Relativity helped to eliminate the concept of ether, but not entirely. His concept of ether at first rejected the earlier classical definition of ether

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[111] 'Abdu'l-Bahá, *Some Answered Questions*, p. 183. Italics mine.

[112] For an excellent analysis of Aristotle's arguments for the eternity of the world/universe, see https://plato.stanford.edu/archIves/spr2017/entries/aristotle-natphil/index.html#pagetopright/ Accessed 17 January, 2025.

[113] Ibid

[114] https://www.cambridge.org/core/books/abs/maimonides-on-the-origin-of-the-world/aristotle-and-the-arguments-for-eternity/81CE67364969F53118F488C4E43363D8 Kenneth Seeskin in *Maimonides on the Origin of the World* (Cambridge University Press, online publication 7 December, 2009) explicates these three reasons in chapter 3, "Aristotle and the Arguments for Eternity." Maimonides rejects his arguments in favour of creation *ex nihilo*.

[115]The following link gives a good account of Aristotle's view of the quintessence. https://www.thearchaeologist.org/blog/the-quinta-essentia-aristotles-mysterious-fifth-element#google_vignette. Accessed 18 January, 2025.

as a physical medium, following Isaac Newton and James Clerk Maxwell. But in the General Theory of Relativity (1915), Einstein allowed that the gravitational field could be considered as a form of ether, capable of influencing the behaviour of matter and light in spacetime. But in the final analysis, Einstein proposed that ether should not be considered to be a physical property, but rather as an abstract geometrical property of spacetime.

'Abdu'l-Bahá also commented on the existence of ether. His explanation departed from the classical notion that still lingered during His time. He maintained that ether was a medium for the transmission of heat, light and electricity, but with an important distinction: He underscored the idea that ether was an "intelligible and not a sensible reality." [116] Like Einstein, 'Abdu'l-Bahá considered that ether was not a physical medium. In describing ether as an intellectual reality, 'Abdu'l-Bahá was coherent with Einstein's definition of ether as a geometric property of the curvature of spacetime, rather than a physical property. Sir Arthur Eddington's observation in 1928 that "the stuff of the universe is mind-stuff"[117] suggests that an intellectual medium remains the filter for all physics. With his remarkable insight, Eddington challenged the purely materialistic concept of physics. In redefining the term, 'Abdu'l-Bahá departed from the current physical notion of ether prevalent in His day and preserved instead the idea of ether as an intellectual reality, thereby avoiding a scientific error.

In ancient Greece, well before Aristotle, Pythagoras (c. 570-500-490 BCE) believed in a cyclic universe that operated in repeating patterns. We pause to mention that this great sage was highly praised by both Bahá'u'lláh and 'Abdu'l-Bahá. 'Abdu'l-Bahá mentions him in the *Tablet of the Universe* in the context of the heliocentric theory of our solar system:

> As for the view that the earth revolves around the sun, that it is one of the bright planets of this solar system, and that the diurnal movement that brings about sunrise and sunset is caused by the rotation of the earth about its axis -- these are not modern ideas nor discoveries of recent times. On the contrary, the first person to state that the earth moved about the sun was the sage Pythagoras, one of the five pillars of wisdom, a defender of its sanctuary and unfolder of its secrets. He it was who recognized this truth 500 years before the advent of Christ and reasoned that the sun was a center in relation to the earth, because of its fieriness.[118]

Bahá'u'lláh likewise praises this great figure of antiquity in His *Lawh-i-Hikmat* (Tablet of Wisdom). The "station"[119] of Pythagoras is not exactly clear from Bahá'u'lláh's

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[116] *Some Answered Questions*, chapter 16, para.3 and chapter 48, para.12. The corresponding chapter titles are "Intelligible Realities and their Expresson Through Sensible Forms" and "The Difference Between Man and Animal."
[117] In his book *The Nature of the Physical World* (1928), Eddington discussed this concept on pp. 276-281.
[118] *Tablet of the Universe*, p. 4.
[119] In Bahá'í parlance "station" refers especially to the high regard in which Bahá'ís hold the rank of the prophets, but it can also refer to other individuals and their "station in life."

reference. Bahá'u'lláh alludes to his station as being associated with prophethood. But if Pythagoras is not to be counted among the prophets, Bahá'u'lláh still mentions his angelic station and that his wisdom came from "the treasury of prophethood." In Islam, both David and Solomon are are described in the Qur'án[120] as wise kings and prophets, while the former's book would have been the Psalms (*Zabur*). If Pythagoras was not a prophet himself, Bahá'u'lláh's reference suggests that his divine wisdom was inspired by prophetic teaching. In the context of the passage below, since King David or King Solomon lived before Pythagoras, "the treasury of prophethood" could have referred to either the prophet David or the wisdom of Solomon.[121] (This idea assumes that in the passage below, the "he" mentioned refers to Pythagoras).

> Empedocles, who distinguished himself in philosophy, was a contemporary of David, while Pythagoras lived in the days of Solomon, son of David, and acquired Wisdom from the treasury of prophethood. It is he who claimed to have heard the whispering sound of the heavens and to have attained the station of the angels. In truth thy Lord will clearly set forth all things, if He pleaseth. Verily, He is the Wise, the All-Pervading.[122]

Although the philosophy of Pythagoras did not explicitly state that the universe is eternal, his focus on eternal mathematical truths implied a belief in a perpetual cosmic order. This belief was based on his view that the universe was governed by numerical and geometrical principles which revealed universal truths. Pythagoreans proposed that the planets and stars moved in circular orbits, which are synonymous with the cycle, following the geometric form of the sphere, or the sacred circle, which held a special place in their cosmology, as the most perfect shape. It represented, moreover, divine unity, completeness and the cosmos itself.

Pythagoras, famous for his geometric Pythagorean theorem,[123] associated the movements of the planets and stars with mathematical ratios. His view of mathematics was correlated to music, namely, that the cosmos was structured according to musical

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[120] In Surah An-Nisa (4:163), Surah Al-An'am (6:84), and Surah Al-Anbiya (21:78-79) Solomon is described as a prophet and leader. David is mentioned in Surah Al-Isra (17:55), Surah Sad (38:17, 26) and Surah An-Nisa (4:163). David is referred to as both prophet and servant.

[121] A chronological problem exists in the above passage, if one takes a strict reading of Bahá'u'lláh's dating. There are three possible interpretations to address this conundrum. Modern Jewish historians estimate Solomon's reign, based on biblical chronology, to have taken place from 970-931 BCE, while Pythagoras is estimated to have lived in the sixth century BCE. In that case, Bahá'u'lláh's phrase "in the days of" still makes sense if it is interpreted in the biblical sense of a long period of great spiritual and cultural significance. The second possibility, although it is remote, is that the dates of Solomon's reign, as based on biblical chronology, could be wrong. But this is highly unlikely because even secular historians have found a maximum of only 50 years difference compared with Jewish historians. The third possibility is that Bahá'u'lláh was simply reflecting the historical understanding of when Pythagoras and Solomon lived that was current during His lifetime. In other words, He was reflecting the historiography of His time and presenting it as such, without attempting to correct it. I find the first and third interpretations of the phrase "in the days of" to be the most likely option for avoiding the erroneous idea that Bahá'u'lláh made a historical error and was consequently not infallible.

[122] Bahá'u'lláh, *Tablets of Bahá'u'lláh*, p. 144.

[123] In any right triangle, the square of the length of the hypotenuse (the longest side of a right triangle) is equal to the sum of the squares of the lengths of the two other sides.

numerical proportions, akin to the octaves in the diatonic scale, which they associated with the harmony of celestial bodies, “the music of the spheres.” Musical intervals represent the difference in pitch between two notes, which can be mathematically expressed through ratios–for example, an octave has a ratio of 2:1, meaning that the higher note’s frequency is double that of the lower note. Their belief in the music of the spheres suggested that the planets produce harmonious sounds which are not audible to the human ear because the sound is constant, with no silence intervening to allow the human ear to recognize the sound.

The music of the spheres suggests that each planet’s movement generated a distinct vibration or “note,” based on its orbit, speed and distance from Earth, the all forming a cosmic harmony. In the final analysis, the Pythagorean notion of the harmony of the spheres was both a metaphysical and “musical” understanding, based on the notions of cosmic harmony, regularity and stability. Although a scientific understanding of gravity was not current in the days of Pythagoras, gravity remained implicit to his understanding of the stability of overall cosmic structure and the celestial bodies.

In His *Tablet of the Universe*, ‘Abdu’l-Bahá alluded to the great law of gravity that holds celestial bodies in place:

> This movement [of the celestial bodies] must be governed by some check or rein, some regulator or director, otherwise order will be disrupted and the spheres and bodies will fall from the heavens. For this reason God brought into being a universal attractive force between these bodies to hold sway over them and govern them, a force deriving from the firm ties, the mighty correspondence and affinity that exist between the realities of these limitless worlds.[124]

The Stoics, founded by Zeno of Citium (modern day Cyprus) (490-420 BCE), were among the first in western philosophy to develop a well-defined philosophical and physical model of a cyclic universe. At the end of each cosmic cycle, the Stoics believed that the universe was consumed in a fiery conflagration (*ekpyrosis*) followed by a new creation in a process called palingenesis, rebirth or recreation. The Stoic cyclic model of the universe was grounded in their belief in the pantheistic divine Logos, which they conceived as the fiery, rational, and deterministic force that governs the structural order of the entire universe and determines its fate.

Atomism, a materialist school of Greek philosophy, was first proposed by the pre-Socratic Democritus (460-370 BCE), the “laughing philosopher,” so called because of his ethical emphasis on cheerfulness. He taught that the universe is composed of minute, indivisible particles called atoms that are in perpetual motion in the void, a vacuum or empty space. The atoms, he theorized, are eternal and indivisible. They come in infinite varieties of shapes and sizes and they existed already at the beginning

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[124] *Tablet of the Universe* online version previously cited.

of the universe. For him atoms and the void are the only true realities since they lie at the foundation of physical reality.

Both Plato and Aristotle opposed the materialistic view of the atomists. With Plato the essential non-material "Forms were the eternal, unchanging realities. For Aristotle, matter is composed of both substance and form, while matter provides the potential and form gives shape, purpose and actuality. For him the Prime Mover/Unmoved Mover was the ultimate cause of all motion and change, a non-material source not recognized by the atomists. Thus the debate between matter and spirit as to which is the most real essential substance is an ancient one.

Epicurus of Samos (341-270 BCE) also believed that atoms provided permanence and stability to the universe. Both Democritus and Epicurus were seeking some firm foundation for being or reality, and they found it mainly in the physical universe because of its duration. Being an atomist like Democritus, in his school of philosophy that he called "the Garden," Epicurus underscored the idea of atomic structure to the universe, following Democritus in believing that there was a perpetual motion of atoms existing in a vast void. While Epicurus was not hostile to the gods and religion, his philosophy focused more on ethics to achieve a tranquil life free from fear. In that sense, his "garden" philosophy did not include the teaching that the gods intervened in human life or meted out divine retribution. For him they were aloof, blissful and immortal beings who were unconcerned by human affairs.

The pre-Socratic philosopher Parmenides of Elea (c. 460-370 BCE). "the father of metaphysics," was so called because he was the first to systematically explore the nature of being/existence. In his *On Nature*, the poetic fragments for which he is noted, in his concept of "the unity of nature," Parmenides posited a monistic philosophy of reality that he called "Being" (*eon*). For Parmenides Being is one, eternal, and uniform. Behind the infinite variety in the material world lies one unchanging greater reality. Like Aristotle, Parmenides thought that the universe was formed out of eternal, pre-existing matter, a belief that rejected the notion of *Creatio ex Nihilo*. For him it was impossible for the mind to form an idea of absolute nothingness or non-being. Not only was the universe eternal, but so was Being itself, an entity that is "uncreated and indestructible, alone, complete, immovable and without end."[125] Parmenides' description of Reality/Being bears a close resemblance to the classical metaphysical concept of God.

We should note that since he was priest of Apollo, it was natural that Parmenides allied his philosophy to religion. In a philosophical poem, he claimed that an unnamed goddessled him on a mystical journey into the "halls of night," where he received revelations from her on the nature of reality.[126] His claims suggests that knowledge was

[125] https://socratesjourney.org/parmenides-and-being-idea-of-eternal-being/ Accessed 20 January, 2025.

[126] One theory has it that the goddess was Nyx, the personification of Night, due to her association with the "halls of night." Another theory is that the goddess was Justice. Parmenides left her identity intentionally vague. But it is remarkable that his philosophy is associated with revelations in the night, the symbol of darkness, whereas knowledge is usually associated with light. However, light does proceed from darkness; in that sense the two realities

revealed to him in the form of the divine feminine as Lady Wisdom (*sophia*), a central concept in Hellenistic philosophy, particularly in Platonism and later in Gnosticism and Christian theology, where Lady Wisdom is associated with divine wisdom (*sancta sophia)* that is dispensed by Christ through the Holy Spirit. This belief inherits the Judaic view in Proverbs,[127] the Wisdom of Solomon and Sirach which personify wisdom as a female figure.

He viewed change and motion as illusory, which seems like a strange, counter-intuitive idea. But Parmendies did not trust the senses; what the senses perceived was for him mere illusion or appearance compared to the permanence and stability of the one Being. Parmenides was both a mystic and a strict rationalist. While he was initiated into the truth or reality by the unnamed goddess in deep darkness, "the halls of night," he also used rigorous logic, rational thought or reason (*logos)* to formulate his philosophy, which he based on truth/reality/revelation (*aletheia*), "the way of truth," rather than *doxa*, "the way of opinion/seeming,"[128] which explains natural phenomena through universal principles. Although Parmenides initiation into truth/reality came by way of revelation from the goddess, he believed nonetheless that humans had to rely on the power of reason and the mind alone, not on the senses.

But his exercise of strict logic sometimes came to paradoxical, radical conclusions, such as birth and death do not really exist, change and motion do not exist, the infinite variety in creation does not really exist, and the notion of "becoming" does not exist. Parmenides held that only being was real; becoming was illusory because it involved a transition from non-being to Being, and for him non-being was logically impossible. The human world was essentially a theater of perpetual change which could not be relied upon since it was perceived through the senses. Reason alone held the key to understanding Being. Unchanging Being was the sole basis of his rigorously logical philosophy. It is only unchanging Being, perceived through the lens of reason, that we can rely on and trust.[129]

Although some academics have made a *rapprochement* of Heraclitus and Parmenides regarding motion and change, Parmenides' view is generally considered to

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are deeply interconnected. In the Christian tradition, "dazzling darkness" is associated with the Athenian, Pseudo-Dionysius the Areopagite, the Christian convert of St. Paul mentioned in Acts 17:34, who wrote under the pseudonym Dionysius. Dionysius heard St. Paul speak in the Areopagus in Athens, a governing council that had political, judicial and religious authority. It contributed to the philosophical and intellectual life of Athens. The Areopagus was also a location on Mars/Ares Hill where the council met. The concept of dazzling darkness was further explored by Gregory of Nyssa (c. 335-394 CE) in his work *The Life of Moses*. He viewed the mystical journey paradoxically as movement away from light into a deeper divine darkness filled with God's dazzling presence. In his poem "The Night," the mystical, metaphysical poet Henry Vaughn (1622-1695 CE) wrote that divine darkness is an expression of light so intense that it appears paradoxically as darkness. He wrote of "a deep but dazzling darkness."

[127] See Proverbs 9:1, 8:22-31. In Eastern Orthodox Christianity, Sophia is especially revered as a manifestation of God.

[128] https://socratesjourney.org/parmenides-the-mystic/ Accessed 20 January, 2025.

[129] https://plato.stanford.edu/entries/parmenides/ This link gives an excellent account of the philosophical theology of Parmenides. Accessed 21 January, 2025.

have challenged the more traditional idea of Heraclitus of Ephesus,[130] (c. 540-450 BCE) a philosopher known for his famous dictums that “Everything flows” and “No man ever steps into the same river twice.” Unlike Parmenides, Heraclitus taught that change and plurality were inherent to the cosmos. Change was based on the tension between “the unity of opposites” which is necessary for harmony to be maintained in the universe: disease cannot be imagined without health and vice-versa.

Empedocles (490-430 BCE), who is also mentioned by Bahá’u’lláh in the *Lawh-i-Hikmat*, along with Pythagoras, proposed a more poetic cosmology in which the universe, following the Greek pattern, is likewise eternal and undergoes continuous cycles of change. Like Aristotle, the Stoics, Democritus and Parmenides, he also believed in eternal, indestructible matter. Empedocles first proposed that matter was composed of the four fundamental elements or “roots” of earth, air, fire, and water. The eternal cycles of the universe are driven by two main forces, love and strife. However in Empedocles’ view of the universe, strife also plays a creative role. When love predominates, all the four elements are united in a harmonious whole, imagined as a sphere, the sacred circle that was featured in the geometry of Pythagoras. When strife predominates instead of love, the elements separate and form distinct entities, leading to the creation of individual beings and the various forms in nature. The eternal universe is tied consequently to an eternal process of cyclic transformation in which both attraction and separation, as love and strife, act as creative agents.

TWO CYCLIC MODELS IN MODERN COSMOLOGY

Cyclic Model One: The Ekpyrotic Universe of Branes and String Theory According to Neil Turok and Paul Steinhardt [131]

In terms of modern scientific cyclic theories, Alexander Friedman first introduced the Oscillating Universe Theory in 1922, but it was challenged by Richard C. Tolman in 1934 based on issues with entropy. Albert Einstein also briefly considered the oscillating model in 1930 that posited eternal cycles of inflation (Big Bang) and expansion, followed by contraction (Big Crunch) without beginning or end. The difference between the cyclic and oscillating universe is that in the former model, the transition from one universe to another involves a smoother transition without a total collapse, whereas the oscillating universe model specifically involves a bounce or rebound between each cycle.[132] Einstein formerly held the steady state or static universe theory, but he abandoned it because of Edwin Hubble’s observational discovery of the expanding universe, known

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[130] Now in Turkey, the ancient city of Ephesus is located in the modern town of Selçuk. Ephesus remains a major archaeological site and tourist destination.

[131] I have included this section of brane theory because it is coherent with the stance of the Bahá’í sacred writings that the universe is cyclic and eternal.

[132] https://www.astronomy.com/science/what-would-this-cyclic-model-of-the-universe-mean-for-the-big-bang/ Accessed 22 January, 2025.

as Hubble's Law (1929). A famous photograph has Einstein peering into a telescope, as a pipe-smoking Edwin Hubble looked on. That moment was the turning-point in Einstein's gradual acceptance of the expanding universe.[133]

The cyclic feature of ancient Stoic philosophy was revived in its bare outline in modern cosmology by Neil Turok and Paul Steinhardt in the online edition of *Science* (2002). They gave a more fulsome explanation to the general public in *Endless Universe: Beyond the Big Bang* (2007). The word "ekpyrotic" ("conflagration") harks back to the Stoic philosophical cosmological model by which the universe undergoes fiery cycles of death and rebirth, a process Stoics called *ekpyrosis*.

The revised later view of Turok and Steinhardt overcame the earlier objections to cyclic models beginning the 1930's by Richard Tolman, who pointed to the increase of entropy in the Second Law of Thermodynamics, geometric constraints and instabilities and non-homogeneity. In their cyclic model Turok and Steinhardt were attempting to reconcile three issues: Big Bang Theory and inflation, string theory and quantum mechanics, and dark energy observations.

In the ekpyrotic universe, "Bounce"[134] becomes the transition point between universes, replacing the onetime Big Bang event. String theory is used to develop the concept of "branes" (short for membrane). The universe is recreated when two branes collide and separate. Dark energy is the force that drives the collision and separation of the branes. To understand branes in simple terms, one can imagine a two-dimensional membrane like a flat sheet of paper, although branes can also be curved or round since they are multi-dimensional, depending on the model that is used. Physicists have greatly multiplied the variety of branes.

There are four main categories of branes which break down into subsets of particular members. In the D-Brane category alone, only one of the four, as many as 9 different types of branes are found, depending on the string theory type. Turok's and Steinhardt's ekpyrotic model is based on the concept that branes exist in a higher multi-dimensional space called the "bulk."

Brane theory posits an eternal cyclic model of expansion and contraction based on brane collision and separation. The cycles last trillions of years. One could compare this collision of branes to two pieces of plasticine colliding through gravity, generating heat and energy. The branes bounce apart after impact leading to cosmic expansion. In this way, the universe is recycled in an eternal process of destruction and recreation or palingenesis. Each cycle begins with a Big Bounce which is the transition point between cycles. No end is envisioned for the process.[135]

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[133] https://phys.org/news/2014-02-einstein-conversion-static-universe.html Accessed 23 January, 2025.

[134] This word is a description of the transition point between universes as used by theoretical cosmologist, author, and science communicator, Katie Mack, in chapter 7 of her book *The End of Everything (Astrophysically Speaking)*. (2020). It was not used by Turok and Steinhardt.

[135] https://www.discovermagazine.com/the-sciences/this-cyclic-model-of-the-universe-has-cosmologists-rethinking-the-big-bang Accessed 24 January, 2025.

Turok and Steinhardt proposed Brane theory partly because the Big Bang Model failed to posit anything that existed before the initial explosion and inflation of the singularity. Unlike the Big Bang Theory that proposes an absolute beginning to time 13.8 billion years ago, their cyclic theory posits that time is eternal, extending infinitely into the past and into the future. In other words, time and the universe have always existed.[136] Based on the passages that we have already cited, this view correlates positively to the Bahá'í sacred writings. Here is another example from 'Abdu'l-Bahá that underscores the fundamental principle of the eternity of creation:

> It is, therefore, evident that inasmuch as the reality of Divinity is without a beginning, creation is also without a beginning. This is as clear as the sun. When we contemplate this vast machinery of omnipresent power, perceive this illimitable space and its innumerable worlds, it will become evident to us that the lifetime of this infinite creation is more than six thousand years; nay, it is very, very ancient.[137]

Brane theory, which developed out of string and superstring theory, is a very ambitious, complex and comprehensive theory that attempts to explain all particles and forces within a single framework. Superstring theory includes "supersymmetry" which posits a symmetry between boson and fermion particles. Superstring theory includes both bosons that allow particles to interact and fermions that make up matter itself, while string theory includes only bosons. Brane theory, like superstring theory, is a multi-dimensional theory that incorporates objects of varying dimensions, or 11 higher dimensions in M-theory, compared to the 10 dimensions in string theory, 9 spatial and 1 temporal. Edwin Witten, the originator of M-theory (1995), has said in an interview that the nomenclature refers to membrane theory.[138]

String theory posits that the quantum particle building blocks of the universe are not points or dots, but are instead tiny, vibrating strings. Like different notes on a violin string, vibrating at different frequencies, these one-dimensional energy strings produce "notes," with each note creating a different particle, which produces in turn the particle field, that includes *inter alia* electrons, neutrinos, photons, gluons, gravitons, microstate black holes, and quarks. But the theory reinterprets them in a new way so that strings at Planck length[139] act like point-particles. In string theory, although particles may look like points at the large scale, they are conceived of as quantum loops or segments of string.

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[136] https://cosmosmagazine.com/science/physics/new-model-of-the-cosmos-a-universe-that-begins-again/ Accessed 21 January, 2025.

[137] *The Promulgation of Universal Peace*, p. 463.

[138] Some different names suggested originally by Witten for "M" were matrix, mother, and magic, but he settled on membrane as the most accurate descriptor. "What are Breakthroughs in Science?" YouTube interview of Edward Witten by Robert Lawrence Kuhn, May 15, 2021, at 4:51.

[139] In physics, the Planck length is the smallest meaningful length in physics, approximately 1.6 X 10 to the minus 35 power. At this length, the effects of quantum gravity are believed to become significant, whereas at any distances smaller than Planck length, our current understanding of the laws of physics breaks down. Concepts like "point" and "location" lose meaning in distances smaller than Planck length.

M-theory, as elaborated by Edward Witten (b. 1951), Professor Emeritus at the Institute for Advanced Study in Princeton, is an overarching theory of the 5 basic types of string theory, making it more comprehensive and inclusive. But he reduced the 5 basic types of string theory to a single theory, positing that the 5 types of string theory were not actually distinct types, but rather limits of a single theory. Superstring theory also operates in a greater or lesser number of dimensions. “Dimensions,” are spatial and temporal directions necessary for mathematical consistency.

These dimensions can be reduced from the usual 10 to the more familiar 4, the latter being called “effective field theory,” the everyday world in which we operate. The additional 6 dimensions that are used in superstring theory are thought to be extraordinarily highly compacted. Compactification is not detectable with our current methods of observation. The 6 dimensions remain theoretical, although computers have created graphic models of compactification of the 6 dimensions. Extra dimensions are required to maintain mathematical consistency which avoids anomalies that could arise in particle interactions.

Although string theory has attracted great interest over the past few decades and has its avid supporters, it remains a topic of controversy and debate within the cosmological community. Some experts praise its comprehensive, all-unifying “Theory of Everything” approach, its ambitious attempt to unify the gravity of Einstein’s general theory of relativity and quantum mechanics. String theory has produced mathematical advances, applications in black hole theory and the dense compactification of matter. But others physicists say that string theory fails at providing empirical evidence and testable predictions, two of the mainstays of the scientific method. Its complexity offers 10 or 11 extra-spatial dimensions, dubbed as “the string theory landscape,” a landscape that includes the multiverse, a bewildering number of possible universes that is based in M-theory.

However, Edward Witten and other physicists have asserted that string theory has more accurate predictive power, at least mathematically speaking, than other theories. In experimental physics, however, string theory has failed to produce testable results, unlike experiments in quantum field theory. Witten claims, on the contrary, that more things about physics can be explained by string theory because of its comprehensive nature. Witten also speaks about the aesthetic value of string theory, which recalls Einstein’s quasi-mystical language in describing the beauty and harmony revealed by the physical laws of the universe. Einstein's perspective on the universe's beauty was deeply intertwined with his religious and philosophical views. He often expressed a “cosmic religious feeling,” describing it as a rapturous amazement at the harmony of natural law.[140] This sentiment led him to frequently use the term “God” as a metaphor for the transcendent unity he perceived in the cosmos.[141] Using a similar

[140] Albert Einstein - The Mystic — Vedanta Society of New York Accessed 21 January, 2025.
[141] Ibid

musical metaphor, Witten likened string theory to the harmonics of stringed instruments that produce beautiful melodies.[142]

Cyclic Model Two: Sir Roger Penrose and Conformal Cyclic Cosmology

Nobel Prize winner (2020), Sir Roger Penrose (b. 1931) posits another cyclic model that he calls Conformal Cyclic Cosmology or CCC. The word "conformal" refers to Penrose's use of conformal geometry. Simply put conformal geometry studies shapes and spaces, particularly the set of angle-preserving transformations on a space. Penrose uses conformal geometry because he theorizes that the universe can be changed without altering its geometric structure or the relative angles between objects.[143] He also uses differential geometry, which also studies smooth shapes and smooth spaces called "smooth manifolds," using differential calculus, integral calculus, linear algebra and multilinear algebra.[144] Penrose's notion of conformity is crucial to his theory of connecting successive "aeons," expanded spans of time consisting of trillions of years. It scales the spacetime metric such that the infinite future of one aeon is mapped onto the Big Bang of the next. Penrose views the Big Bang not as a point of infinite density but as a conformally regular boundary, facilitating a continuous transition between successive cosmic cycles. Penrose's model is developed within the framework of general relativity.[145]

Unlike the Standard Model of the Big Bang that posits an absolute beginning to spacetime, Penrose advocates an eternal recurrence of the Big Bang, which repeats through the loops or cycles of aeons. In proposing CCC Penrose argued against "eternal inflation" proposed by Alan Guth, which remains the standard model in cosmology. Penrose posits that the Big Bang, which becomes for him a transition point between cycles, is born from a previous cycle's Heat Death/Big Freeze. In his view, black holes play a crucial role in entropy and information transfer between aeons. In 1969 Penrose collaborated with Stephen Hawking to prove the Hawking-Penrose Singularity Theorem, by which singularities or points of infinite density in black holes are a fundamental feature of general relativity. Their work led to further research on the dynamics of black holes. Supermassive black holes play a central role in CCC. The loss of mass explained by black holes devouring matter is crucial for Penrose's theory of transition to the next cycle. Penrose posits that black holes eventually disappear and emit Hawking radiation, which implies that black holes lose mass over time.[146]

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[142] The Exchange: The Range and Edward Witten discuss the state of String Theory. - Scientific Inquirer Accessed 22 January, 2025.
[143] https://en.wikipedia.org/wiki/Conformal_geometry. This site gives a technical explanation of Conformal Geometry. Accessed 23 January, 2025.
[144] https://en.wikipedia.org/wiki/Differential_geometry. Accessed 23 January, 2025.
[145] https://en.unav.edu/web/ciencia-razon-y-fe/los-ciclos-del-tiempo. Javier Sanchez Canizares, "The Cycles of Time. An Extraordinary New View of the Universe." Accessed 24 January, 2025.
[146] https://physicsworld.com/a/new-evidence-for-cyclic-universe-claimed-by-roger-penrose-and-colleagues. Accessed 25 January, 2025.

(Hawking radiation overturned the original theory that nothing escaped the gravity of black holes).

As Katie Mack explains it, ”It [Penrose’s theory] involves piecing together the far future spacetime of one universe and the singularity at the beginning of another.“[147] In CCC the empty smooth state at one aeon looks very similar to the extremely dense, smooth state at the beginning of the next aeon which begins with a Big Bang. Penrose’s theory, however, does not require inflation because he views entropy as being very low, approaching but never reaching zero at the transition between aeons. At the boundary-point, low energy radiation is all that remains. Both low-to-high entropy and low energy radiation stretch and smoothen space.

This stretching is different from inflation because in the Standard Model inflation happens in a sudden burst, whereas Penrose holds that the universe gradually stretches over trillions of years before transitioning into the next aeon. His use of conformal geometry was employed to explain that space can be stretched or shrunk, while keeping its essential structure intact, allowing one aeon to transition to the next, without a unique singularity like the Big Bang. Once the universe is without mass, this state allows the conformal transformation that characterizes the transition between aeons.[148]

Penrose’s CCC model also differs from the Standard Model of the Big Bang regarding time. Penrose believes that the universe is much older than the 13.8 billion years proposed by the Big Bang. He posits that the cumulative effect of the cycles of aeons amounts not to billions but potentially to trillions of years. (A trillion is equal to a 1,000 billion and a billion is a 1,000 million). Penrose theorizes that time has neither beginning nor end.[149] His view correlates positively in that respect to Bahá’í doctrine. This view of eternity was corroborated by ‘Abdu’l-Bahá who said during a talk in the United States:

> Bahá’u’lláh says, "The universe hath neither beginning nor ending." He has set aside the elaborate theories and exhaustive opinions of scientists and material philosophers by the simple statement, "There is no beginning, no ending." The theologians and religionists advance plausible proofs that the creation of the universe dates back six thousand years; the scientists bring forth indisputable facts and say, "No! These evidences indicate ten, twenty, fifty thousand years ago," etc. There are endless discussions pro and con. Bahá’u’lláh sets aside these discussions by one word and statement. He says, "The divine sovereignty hath no beginning and no ending." By this announcement and its demonstration He has established a standard of agreement among those who reflect

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[147] Katie Mack, *The End of Everything*, p. 175.
[148] https://universemagazine.com/en/what-was-before-the-big-bang-the-theory-of-roger-penrose/ Accessed 27 January, 2025.
[149] https://physicsworld.com/a/inside-penroses-universe/ Accessed 28 January, 2025.

> upon this question of divine sovereignty; He has brought reconciliation and peace in this war of opinion and discussion.[150]

Just like brane theory, Penrose's CCC is highly speculative and remains controversial among cosmologists. Especially debated are the loss of mass at the point of transition to the next cycle and the destruction of information in black holes. Penrose claims to find observational evidence of his theory in the Cosmic Microwave Background, but this is not yet accepted by a majority of physicists.

Parallels Between Hindu Cosmology and Scientific Cyclic Cosmology

Among the world's religions, the Hindu scriptures offer the closest and most accurate parallels to the cyclic theories of contemporary cosmologists. The *Vedas* and the *Chandogya Upanishad*, the *Puranas* and the *Bhagavad Gita* contain creation stories, metaphysical concepts relating to cosmology, cycles of creation and destruction, and even the modern concept of multiple universes. Some of these ancient teachings correlate positively to modern cosmological theories.

The *Bhagavad Gita* (the Song of God), discusses large time scales, such as the *kalpa*, corresponding to a "day of Brahma," the creator in the *Trimurt*i, the Hindu trinity consisting of Brahma (creator), Vishnu (preserver) and Shiva (destroyer). The Day of Brahma is equivalent to 4.32 billion human years. Brahma imposes cosmic order on creation. The Day of Brahma reflects the cyclic nature of virtually endless time. The current age of the universe is calculated from the end of the previous "Night of Brahma" which is also lasts 4. 32 billion years. The Day and the Night of Brahma incorporate cycles of creation (Day) and dissolution (Night), closely resembling modern cosmological cyclic theories of the age of the universe.[151]

The *Rig Veda's Nasadiya Sukta*, the Hymn of Creation, anticipates Bahá'u'lláh's statement quoted above that the origins of the universe remain shrouded in mystery. The *Deus Absconditus* is very much present in this *Sukta*. The Hymn proposes the enigmatic and speculative statement that in the beginning neither existence nor non-existence was present. Creation emerged through a cosmic impulse from a primordial void, a state of nothingness. But even the gods, the scripture reminds us, who emerged after creation, were ignorant of the mysterious creative process.[152] In the Big Bang theory, although creation did not emerge from a void, quantum fluctuations in a vacuum allowed particles to appear from what seems like "nothing," relatively speaking. (Quantum fluctuations, however, are definitely not nothing; these energetic fields are something). Like the Hymn of Creation, although some physicists like Stephen

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[150] 'Abdu'l-Bahá, *The Promulgation of Universal Peace*, p. 220.

[151] https://hinduism.stackexchange.com/questions/54033/what-happens-during-the-night-of-brahma. Accessed 27 January, 2025.

[152] https://human.libretexts.org/Bookshelves/Religious_Studies/Scriptures_of_the_Worlds_Religions_(Burke)/02:_Hindu_Scriptures/2.01:_Vedic_Creation_Hymn. Accessed 28 January, 2025.

Hawking have proposed that nothing existed before the Big Bang,[153] nonetheless, other cosmologists have also speculated as to what might have existed before the Big Bang. Cyclic scientific theories of the universe have emerged from that speculation.

The Age of the Universe According to the Vedas: Trillions not Billions of Years

The Hindu scriptures include extremely comprehensive and vast notions of time. More than any other world religion, Hinduism defines time and the age of the universe in terms of virtual infinity. Like some theories of modern cosmology, the *Vedas* posit that the universe undergoes long cycles of creation and dissolution, with each cycle lasting 311.04 trillion years, a cycle that is known as a *Maha Kalpa*, or the lifetime of Brahma, a much longer period than the four *Yugas*, with each *Yuga* representing an age of mankind. The four *Yugas* constitute a *Mahayuga*, lasting some 4.32 million years. These figures are not meant to be taken literally, as scientific measurements, but their symbolic astronomical numbers represent the eternal existence of the universe.[154]

If we compare the length of the trillions of year of the *Maha Kalpa* to Sir Roger Penrose's calculation of "aeons," in his Conformal Cyclic Cosmology, we find that each aeon also lasts trillions of years, although Penrose does not propose a precise number of years. What is interesting, however, is that both Hindu cosmology and Penrose's CCC calculate the age of the universe, not in terms of billions but rather trillions of years, a much longer timespan than the 13.8 billion years, the age that is given in the Big Bang theory.

According to Hindu cosmology, humanity is currently living in the *Kali Yuga*, the fourth and final *Yuga* of the current cycle, which began in 3102 BCE and will last for 432,000 years. The current *Yuga* is characterized by an extreme decline in morality and spirituality, marking the end of a cycle (*Mahayuga*) before a cataclysmic event ushers in a new cycle beginning with the K*rita/Satya Yuga*, which signalizes the Golden Age, a period of truth and righteousness, during which humanity at long last will live in harmony according to well-established moral and spiritual principles. It will last for 1,728,000 years. The textual parallel to the *Krita/Satya Yuga* in Judeo-Christianity is the reign of the Kingdom of God on earth, the Messianic kingdom, the promise of both the Hebrew Bible and the New Testament.[155]

The Complex Thread of Islamic Eschatology

There is no exact Muslim equivalent to the Hindu Golden Age of *Krita/Satya Yuga*. On the contrary, no Islamic Golden Age is actually envisioned in the more complex thread of Islamic eschatology. In Islamic eschatology, the end times begin

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[153] http://www.xinhuanet.com/english/2018-03/05/c_137017609.htm. Accessed 29 January, 2025.

[154] https://timesofindia.indiatimes.com/life-style/books/features/understanding-hindu-time-cycles-with-yugas-and-kalpas/articleshow/110578564.cms. Accessed 29 January, 2025.

[155] https://www.yogapedia.com/definition/5302/kali-yuga#google_vignette. Accessed 30 January, 2025.

when the Mahdi and Jesus will rule during a period of peace and prosperity. In Shia Islam the Twelfth Imam, currently believed to be in occultation, corresponds to the Mahdi. During the Day of Judgement, Jesus will defeat the Antichrist, the *Dajjal*. Although temporary peace is initiated by the Mahdi/Twelfth Imam and Jesus, this peaceful interlude eventually leads to the world's end following the Day of Judgement. The return of the Mahdi and Jesus is seen as the significant eschatological sign that precedes the even greater event of the Day of Judgement, during which all humanity will expire and be resurrected and gathered together for the final reckoning. After the judgement, souls will be sent either to paradise or hell. During this period, the two tribes of Gog and Magog will be released, spreading chaos and corruption on the earth, but they will eventually be destroyed by divine intervention. This era will see Islam prevail around the world, with a limited period of peace in which no enmity exists among people.[156]

At this point a strange twist occurs in Islamic eschatology, one of the major signs of the Day of Judgement: a gentle, scented, breeze, "a cool wind from Syria," will cause the peaceful death of all true believers, who are taken to paradise, leaving only the most resistant, the corrupt worst of humanity to face the final hour of Judgement Day. This event ensures that true Muslims do not witness the horrific events of Judgement Day. After the blowing of "a cool wind from Syria," the archangel Isra'fil blows his trumpet twice, two blasts that signal death and resurrection. At the first "death blast" all creatures die, except for those whom God pleases to spare, marking the end of the world. Then a period of desolation begins, lasting for "forty," although whether this be days, months or years is not specified. On the second blast, all beings are resurrected in preparation for the Day of Judgement (*Yawm al-Qiyamah*), the final reckoning. Although "a cool wind from Syria" has already saved the righteous, a second chance for salvation occurs at the final judgement. The righteous, those who have lived according to Islamic teachings, are ushered into the blissful existence of *Jannah* (paradise), while the unrighteous are sent to *Jahanamm* (hell).[157]

Bahá'ís might interpret the twin trumpet blasts of Isra'fil as the end of one religious cycle, the approximately 6,000 year Adamic cycle, and the beginning of the Bahá'í cycle, which is expected to last for some 500,000 years. The dispensation of the Báb, the first blast, would signify the end/death of the Adamic cycle, while the second blast, the Dispensation of Bahá'u'lláh, beginning in 1863, would mark the resurrection/beginning of the inauguration of the Bahá'í cycle. These blasts may be understood to be largely metaphorical, signaling spiritual renewal and transformation,

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156 https://www.encyclopedia.com/environment/encyclopedias-almanacs-transcripts-and-maps/eschatology-islamic-eschatology. Accessed 1 February, 2025.

157 https://www.knowledgequran.com/major-signs-of-the-day-of-judgement/ Accessed 2 February, 2025.

following the death of unbelief, although literal apocalyptic events cannot be ruled out in the interpretation of the twin blasts.

It should be noted that “twin blasts” are not specifically mentioned in the Qur’an, although Surahs 69:13-16 and 81:1-14 describe powerful blasts and cosmic disturbances that signal the onset of Judgement Day. In the Hebrew Bible twin trumpets are mentioned, but there they have a completely different meaning.[158] In Islamic eschatology, the end times literally signifies not only the end of the world but also the entire universe. Bahá’ís would understand this literal end to all creation as the death of the old order and the establishment of the new order, the Kingdom of God on earth. Islam’s absolute, literal eschatological ending to all creation may be interpreted as underscoring how radically different the future world order will be from humanity’s tragic, conflicted, warring past and present, what Shoghi Effendi characterized as regrettable “internecine strife.”[159]

Bahá’u’lláh was banished in 1868 to Acre/Akka/Acco to what was then Ottoman Syria, where He continued to live until His death in 1892 CE. “A cool wind from Syria” could possibly refer to His major writings that were revealed during His exile in Syria, works such as the *Kitáb-i-Aqdas,* the K*itáb-i-Íqán* and His various proclamation letters to the kings, clerics and rulers of His time. It was in Syria, during the Akká period (1868-1892 CE), that Bahá’u’lláh’s influence grew considerably both among His own followers, as well as with notables, dignitaries, and the general public who were fortunate enough to have met Him. Islamic scholars have interpreted the land of Syria to signify the source of both divine trials and blessings, an idea that is coherent with this period of Bahá’u’lláh’s life.

‘Abdu’l-Bahá declared when He was in the United States, “When Bahá’u’lláh arrived in Akká, through the power of God He was able to hoist His banner.”[160] The military metaphor of hoisting the banner, which symbolizes soldiers or followers uniting under a common cause of allegiance, indicates that it was during the Akká period, despite a lifetime of opposition, that the influence of Bahá’u’lláh’s mission reached its zenith. Through His key writings, His great station as a Manifestation of God was further clarified. During the Akká/Acco/Acre period, the community transitioned from a persecuted religious minority into a resilient and firmly established community that was empowered to continue its global mission after Bahá’u’lláh’s ascension in 1892 CE. Much “cool wind” did in fact blow from Syria from 1868-1892 CE.

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[158] In Numbers 10:1-10, two silver trumpets are mentioned, but in that passage Moses is instructed by God to use the two silver trumpets for calling the congregation and/or directing the movement of the camps. If both trumpets are blown, the entire congregation is to gather at the tabernacle’s entrance, but if just one trumpet is blown, only the leaders are to assemble.

[159] *The Promised Day is Come*, p. 105

[160] *The Promulgation of Universal Peace*, p. 27.

Multiple Universes/Multiverse in the Hindu Scriptures, Modern Cosmology and the Bahá'í Writings

In the Puranas, a vast range of Hindu literature, including a wide range of topics, and in the Bhagavad Gita, part of the epic Mahabharata, the former being a dialogue between Prince Arjuna and his charioteer Krishna, the concept of multiple universes is discussed. Lord Krishna reveals to Arjuna that there are infinite forms of existence, including countless universes within his cosmic body.[161] The Bhagavata Purana elaborates on the Gita by describing various Brahmas (Creators), each governing his own universe, emphasizing that Krishna is only one Creator among many. The Gita reveals that infinite universes are created within each breath of Maha Vishnu, the sustainer of the universe, illustrating the infinite divine scale of creation. As mentioned above, Hindu cosmology presents a cyclic nature of existence, in which universes undergo endless cycles of creation and destruction, reflecting an eternal multiverse.

The scientific proposal of the multiverse dates back to 1957, with the original work of physicist Hugh Everett III (d. 1982). Everett's doctoral thesis proposed what is now known as the "many worlds interpretation" (MWI) of quantum mechanics. Everett posited that every quantum event results in the universe splitting, somewhat like branches of a tree, into multiple non-interacting parallel universes, each representing different possible outcomes. Within this framework, all possible outcomes exist simultaneously across these universes. With his theory of "the universal wave function," Everett challenged the widely accepted Copenhagen theory of the notion of wave function collapse in quantum mechanics.

Everett visited Copenhagen to present his theory to Niels Bohr and the Copenhagen scientific community, a meeting he described as "hell,"[162] when his theory was flatly rejected by Bohr and his associates. Bohr's concept of wave function collapse, which was central to his theory, involved a quantum system in superposition, collapsing into a single state upon measurement, producing randomness and indeterminacy. Everett's theory eliminated the need for collapse and maintained deterministic evolution according to the non-relativistic Schrödinger equation. Everett's theory of the branching structure of the many worlds posits that each branch represents a different outcome.

Although it was at first dismissed with skepticism, Everett's MWI has since gained traction, within the scientific community, popular culture and philosophy. Although Everett's theory lacks an experimental test to determine its truth one way or the other, and while it remains controversial, the British physicist David Deutsch (b. 1953), winner of the Dirac medal (2017), is a leading advocate of the theory, which has taken its place along other mainstream theories. Deutsch favours the more deterministic and simpler theory of the MWI.[163] Stephen Hawking also used the multiworlds

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[161] See Chapter 11, verses 5-16.
[162] https://en.wikipedia.org/wiki/Hugh_Everett_III. Accessed 4 February, 2025
[163] https://thereader.mitpress.mit.edu/the-many-worlds-theory/ Accessed 4 February, 2025.

interpretation in his theoretical work involving black holes and the Big Bang, where wave function collapse is less applicable.[164]

Alan Guth's Cosmic Inflation Theory, which along with cyclic theories, is the other leading theory in addition to the Big Bang, also posits an infinite number of universes. In his theory of eternal inflation, certain regions stop inflating while others continue, generating "bubble universes" that can evolve independently. This process suggests an infinite number of universes or multiverse. Each "bubble" can have different physical properties, leading to diverse universes within this framework.

The Bahá'í sacred writings support the notion of many worlds, both as a scientific theory of the physical universe and the infinity of spiritual worlds. Bahá'u'lláh has revealed: "As to thy question concerning the worlds of God. Know thou of a truth that the worlds of God are countless in their number, and infinite in their range. None can reckon or comprehend them except God, the All-Knowing, the All-Wise."[165] This quotation does not specify whether these worlds are physical or spiritual, but a Bahá'í interpretation would generally support the existence of both infinite physical and spiritual worlds. Also, "Know thou that every fixed star hath its own planets, and every planet its own creatures, whose number no man can compute."[166] Shoghi Effendi has interpreted 'Abdu'l-Bahá as saying that "There are other worlds than ours which are inhabited by beings capable of knowing God."[167] This answer clearly assumes the existence of many other worlds.

Conclusion

In the foregoing article, we have argued that the standard model of the Big Bang, which posits an absolute beginning to spacetime some 13.8 billion years ago, is a flawed theory. This conclusion was reached based not only on the Bahá'í sacred writings, which clearly state that the endless universe has no beginning, but just as importantly on other scientific theories that have questioned the accuracy of the Big Bang model, and which posit instead cyclic theories of the universe. These cyclic theories are more coherent in both letter and spirit with the cosmological statements revealed in the Bahá'í writings. By correlating Bahá'í scripture with the more recent cyclic scientific theories of the origin of the cosmos, this article has also upheld the Bahá'í principle that religion and science *mutatis mutandis* should agree. At the same time, ancient cosmological theories proposed by Greek philosophers, the Hindu scriptures and a particular interpretation of Hebrew cosmology were analysed to show a

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164 https://www.cbc.ca/radio/asithappens/as-it-happens-monday-full-episode-1.4582515/stephen-hawking-s-final-theory-could-prove-the-existence-of-the-multiverse-1.4582520. Accessed 5 February, 2025.

165 *Gleanings from the Writings of Bahá'u'lláh*, p. 151-152.

166 *Gleanings*, p. 163.

167 *The Lights of Divine Guidance,* vol. II, p. 80, answer # 7 to a series of questions put to Shoghi Effendi, 31 March, 1949.

certain compatibility between modern science and ancient religion and philosophy regarding the origin of the cosmos.