The Lightning Theory of the Origin of the Universe:

With Explanations of Space, Time, and the Creation of Gravity

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Abstract

This monograph offers a new theory, i.e., the "Lightning Theory" of how the universe was created. After contextualizing the need for a new theory by explaining the concept of scientific revolution, this monograph identifies problems with the "big bang" theory in terms of its false assumptions that promulgated illogical deductions and a theoretical drift for that model of the universe, which has reached a crisis in terms of its increasing number of unexplained phenomena and theoretical anomalies, including their distortion of basic concepts of physics. Therefore, this monograph offers the new Lightning Theory of the origin of the universe by establishing clearer definitions for the basic concepts of "space," "time," and the "universe," which are needed to resolve the unexplained phenomena and demystify the anomalies of the big bang theory. This monograph also explains why space and time are not linked as a continuum, why space cannot be curved, resolves the question of "dark matter' and "dark energy," and discusses why the speed of light might not be a true speed limit. Additionally, a solution is offered to answer the previously unresolved question of how gravity is created.

Keywords: Lightning Theory, universe, gravity, cosmology, astrophysics, neutrons, space, time, creation.

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I. Introduction

At the outset of this monograph, it should be made clear that proposing a new theory on the origin of the universe is a formidable task. The first reason for this is that the event occurred billions of years ago, long before any humans existed to observe it. Thus, there is no evidence to examine from that time because nothing existed upon which any records could be etched. And from the moment of its creation the universe has undergone constant change, such that the universe today is immensely different than what it was at its inception.

Another reason that proposing a new theory about the origin of the universe at this time is so difficult is because the first theory was proposed almost a century ago, and no other theories exist to challenge it. Hence, the original theory, regardless of how accurate or inaccurate it might be, is the only theory in the minds of scientists and non-specialists alike, which tends to make nearly everyone believe the old theory almost without question.

Thus, the most scientific way to offer the new theory proposed in this monograph is to first explain the need for a new theory of the origin of the universe before presenting it. This requires extensive refutation of the old theory, which is provided in Sections I and II, before the new theory is presented in Section III. But, whereas so much refutation is needed, the first two sections are relatively lengthy. The reader is asked to be patient while reading those sections. It is hoped that, in the end, readers will decide the effort was worthwhile.

A. Why a New Theory of the Universe?

A new theory on the origin and the nature of the universe is needed because the existing theory, namely, the "big bang theory" of the universe, has some critical gaps in knowledge and several factors that it cannot explain. As one example, but truly the most serious example, it never explained what caused the big bang. Another critical factor is that recent discoveries regarding various phenomena in the universe contradict and raise questions about relativity theory, which is integrally related to the big bang theory. Whereas those critical concerns and/or questions remain unanswered, the old theory of the universe needs to be replaced with another theory that addresses those concerns.

That is why a new theory of the universe is needed, namely, the "Lightning Theory of the Origin of the Universe," which is presented in this monograph. Furthermore, there are additional phenomena that either remain unexplained or that the existing theory does not adequately explain. Therefore, this new theory will answer the various, critical, unanswered questions, and also address additional questions, as well as provide clear explanations of several phenomena that the old theory does not adequately explicate.

To achieve the objectives of presenting the new theory, answering critical questions, and explaining phenomena that need clear articulation, this monograph (I) briefly places this endeavor into the context of how "scientific revolutions" occur, (II) redefines some elements of physical theory (upon which theories of the universe need to be based), (III) presents the new "Lightning Theory" regarding the origin of the universe, which includes identifying the old theory's main anomalies (unanswered questions and irregularities), while demonstrating how the new theory answers those questions and resolves the phenomena that are anomalies in the exiting theory, but which can be readily explained in the new theory, (IV) proposes an explanation for how gravity is created, and (V) offers an evaluation of the new theory.

B. Scientific Revolution and New Theories

Thomas Kuhn (1962) suggested why and how scientific theories change in a 5-step process from normal science to paradigm change. The process is shown in Figure 1, below:

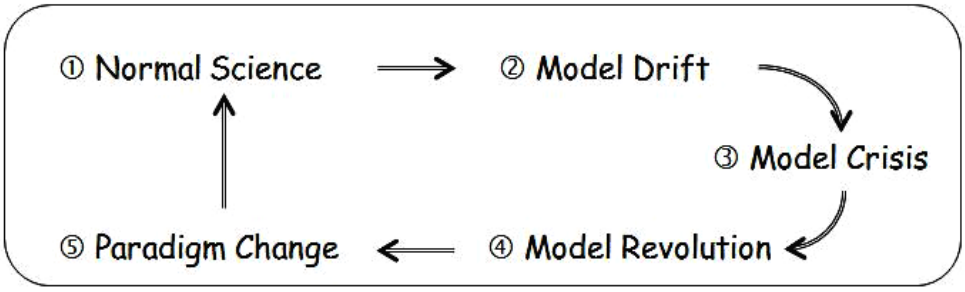

Figure 1: *Kuhn's (1962) model of scientific revolutions*.

Scientific theories offer models to represent some principles, and science develops in a "normal" way by gradually adding details of a phenomenon (e.g., how the universe began). A "Model Drift" occurs when anomalies (i.e., incongruities or irregularities) in a theory are discovered. For example, the theory is found to have knowledge gaps, raising new questions that cannot be answered, or requiring additional propositions that cannot be proven or that are inconsistent with the original model. Eventually, a "Model Crisis" is reached when those anomalies and unanswered questions become so problematic that the veracity of the theory itself comes into doubt. Then, a "Model Revolution" occurs when a new theory, with a new model, is proposed that not only explains the same phenomena, but also answers questions that could not be answered by the original model. "Paradigm Change" occurs when scientists accept the new theory. The whole process thus represents a scientific revolution.

C. How to Evaluate a New Theory

Kuhn (1977) also identified five criteria that can be used to decide whether a new theory should be accepted to replace an existing theory. The criteria were:
(1) *Accuracy*: Does observation and experimentation support the new theory?
(2) *Consistency*: Do various aspects of the theory coincide, and fit with related theories?
(3) *Scope*: Do consequences of the theory extend beyond what it was designed to explain?
(4) *Simplicity*: Does the new theory explain phenomena in simpler terms?
(5) *Fruitfulness*: Does the theory reveal new phenomena or relationships of phenomena?

Kuhn cautioned that his five criteria were not absolute "laws," but, rather, were tools that could be used for comparative purposes. That is, a person who evaluates a new theory would compare the old and new theories according to the five criteria, determine which one better satisfies each criterion, and make an overall evaluation in order to decide which theory to employ. Readers may find that the new theory offered in this monograph is comparatively better than the old theory because of the new theory's simplicity, fruitfulness, and scope, while it resolves most of the existing inaccuracies and inconsistencies. Thus, it should satisfy the criteria sufficiently to merit accepting the new theory to replace the existing one.

D. The Need for the New "Lightning Theory of the Universe"

The new Lightning Theory of the Universe, described in Section III of this monograph, is proposed to replace the old "big bang" theory because the old theory has reached a point where the ideas it has been adding (for more than 50 years) have become inconsistent and illogical. That is, the big bang theory has reached a point of "model drift" because its supporters are proposing ideas that have distorted the original model, and this has reached such an extent that the very integrity of the old theory is coming into doubt.

There are several examples of "drift" in the big bang theory. They include suggestions by scientists, who were unable to reconcile certain scientific observations (as well as certain facts in existing knowledge) with the big bang theory, and now say that space and time are not space and time as all sentient beings know and experience them. As a few examples, they have proposed that space is not a void (Einstein), that the space of the entire universe is "curved" (Einstein), that space and time are inextricably tied such that they distort each other (Einstein), that space is finite but that it has no boundary (Hawking), that space exists beside itself in "parallel universes" (Hawking), that "black holes" cause "worm holes" that extend to other universes (Hawking), and other ideas that caused the true nature of the universe to become more fantasy than fact. (*Note: All those ideas are refuted in this monograph.*)

In other words, the commonly accepted big bang theory has been found to have numerous unexplained phenomena, yet the ideas that its followers have offered to try to cover its shortcomings have modified that theory so much by distorting reality that it has "drifted" from its basic underlying concept (i.e., that the universe is expanding). This monograph posits that the big bang theory is in a "model crisis," and that a "model revolution" is needed. This means that a new theory of the universe is needed.

To make the new theory fully understandable, "the basics" of what space, time, and the universe really are need clarification. Hence, the next section of this monograph clearly and logically explains and defines those concepts to avoid the mistakes of the old theory. Therefore, Section II is the longest part of this monograph and readers are asked to be patient.

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II. The Basics Defined

The basics of every theory of the universe must have common elements. For example, the Standard Theory of the Atom (as containing protons, neutrons, and electrons) will not be disputed. But there are so many basic concepts that only a few can be explained here, i.e., those that have been distorted by the proponents of the big bang theory, namely, "space," "time," and the "universe," which are basic terms that require clearer definitions.

A. What is "Space"? & What is "the Universe"?

First, as space and the universe are inseparable concepts, they will be taken together. While it might seem odd to many readers that the question "What is space?" is being asked, the reason is that some modern physicists have been fantasizing (they say "hypothesizing") about what the universe is like, and why it seems (to them) to behave in ways that they cannot explain. For example, Hawking (1993), an astrophysicist, suggested that there may be what he calls "parallel universes," but he cannot explain how that is possible (see below); and it is a fantasy because there is, and there can be, only one "universe."

Now, the first definition needed clarifies what the universe is: "*The universe is the entirety of all space and all the stars, planets, and all other forms of matter and energy taken together*." Note the Latin origin of the word: *Universum* = *uni* (one, or the whole) + *versus* (to turn) = all things turning in unison. Space is included because it is the quintessential constituent of what the universe is. Hence, when speaking factually (not psychologically, e.g., people live in their own different 'universes'), there cannot be more than one universe because *everything* in existence – including all space – is part of the *one* (and only) universe.

To define space, some clarifications about the universe are needed. First, it is *infinite*, i.e., limitless and unending, *without boundary*. This must be stated because some authors (i.e., Hawking) suggested that the universe is "finite." But that is absurd because space must be included in the concept of the universe. In other words, if the universe is finite (à la Hawking), then what exists beyond the finite universe? The answer cannot be that space exists beyond the finite universe because "all space" is included in the definition of what the universe is.

Even if one were to tentatively entertain the idea that the universe might be finite (but *only* for the sake of theoretical argument), one must then ask what could be outside the realm of a finite universe. Whereas, by definition, more space cannot exist outside the universe, then the only remaining possibility is that there is some kind of "boundary" that sets the limit on the universe in order to make it finite. But what is that boundary? Whereas the boundary cannot be space, then it would have to be some form of matter. But that is absurd because any such matter would have to extend infinitely in all directions; and that would require asking what that matter is made of and how it got there. But, as anyone reading this can easily reason, it is impossible for an infinite wall of matter to exist beyond a finite universe. Furthermore, the idea that anything could exist beyond the universe is entirely implausible, and a blatant contradiction of what the universe is and how it is defined, namely, the universe is composed of *all* space, and *all* matter, and *all* energy.

Perhaps this is the reason Hawking (1988a, 1988b) proposed that there could be no boundary even though he thought the universe is finite. But if the universe is finite and there is no boundary, then what could possibly exist outside the universe? Clearly, from the above discussion, it is absurd to suggest that the universe is finite. Also, to put to rest the idea of a "finite universe" (and may it rest in peace), Donald Page (2007, p. 4) suggested that Hawking's proposal is wrong, and quoted Hawking's (1988a, pp. 136-137) admission of this: "*I'd like to emphasize that this idea that time and space should be finite without boundary is just a proposal: it cannot be deduced from some other principle. Like any other scientific theory, it may initially be put forward for aesthetic or metaphysical reasons.*" Consequently, whereas it is absurd to suggest that space is both finite and without boundary, the only conclusion that can be reached is that the universe is infinite because space is infinite.

Now, it is possible to define the term "space." Space may be defined as "*the infinite all-encompassing emptiness, or void, in which all matter (e.g., planets, stars, and galaxies) and energy (e.g., gamma rays, heat, and x-rays) are present, and that exists between all forms of matter (e.g., between atoms, atomic particles, and between subatomic particles), and in which or through which matter and energy exist and can travel*."

B. Why Space Cannot Be Curved

As a further clarification on the nature of space, it should be pointed out that space cannot be "curved." There is something inherently bizarre in Einstein's (1915, 1917) theory, i.e., he created a "principle" that declares space to be curved. Despite mathematical claims for his theory (e.g., Sagan, 1996), his idea assumes something that is neither logical nor possible, namely, Einstein argued that "space" is not a void! But that suggestion could only have been made to satisfy his equations, *not* because there is any evidence – either logical or physical – that space is curved or that it is not a void.

[*Note: Einstein must have struggled immensely with his idea of space not being a void because saying that space is not a void contradicts what every scientist had always considered space to be; this placed him in a dilemma, i.e., either he had to admit that his mathematics were incorrect and re-do his computations, or he had to declare that space is not a void! But he was evidently so tied to his mathematics that he had to declare something that he must have known was not true*.]

The contrary view argued in the present monograph, namely, that space is a void which is not *composed* of matter of any type (although, by definition, matter can exist at any location of infinite space) is a critical departure from what most physicists think because Einstein proposed that objects with very large mass cause the *space* around them to "curve." But he invented that idea because his mathematics did not work without it! Whereas this monograph disagrees with Einstein's suggestion, the argument that space *cannot* curve must be clearly explained. What follows examines this in detail.

To begin the analysis, ask what a curve is and what *can* be curved. A curve is a bend, and any physical object can be curved, either by applying pressure, or applying other forms of energy (such as heat) to different parts of the object. For example, a leaf or a branch of a tree can be bent or curved by applying physical pressure to its ends. An object made of glass or metal can be made to curve by applying heat to different locations on the object.

Also, objects that travel can curve along their paths. For example, the path of a baseball through air can be made to curve when the ball is caused (by throwing it) to spin such that its ridges create a zone of high air pressure on one side of the ball, which deflects the ball during its flight, changing its path (that is a "curve ball"). Another method is by the force of gravity. That is, when an object, such as a comet or asteroid, that is traveling through space comes within the strong *gravitational* field of a planet or star, the strong gravitational pull causes the asteroid or comet to curve in the direction of that planet or star.

Returning to the question of whether space can be curved, a problem occurs because Einstein argued that, instead of a gravitational field, large massive celestial bodies cause space itself to curve. Einstein's proponents (e.g., Eddington, 1919) tried to demonstrate this by observing the path of light from distant stars when the Sun passed between those distant stars and the observers on Earth during a solar eclipse (which allowed the observers to photograph the apparent location of those background starts).They argued that the position of the background stars appeared to have shifted from their usual position when the Sun was located in the path of the light from those stars. They used this as evidence to claim that the massiveness of the Sun "curved the space" around it, causing the light from the distant stars to appear to have shifted from their expected positions.

But there is no reason to believe that claim because there is another more simple logical explanation for the outcome of that experiment. That is, <u>it was the path of the light that was curved by the gravitational force</u>, in the same way that any other material object is affected by gravity. In fact, as early as 1704, Isaac Newton predicted the bending of light rays that passed near a strong gravitational field, such as that of the Sun, and even computed in considerable detail (to a fraction of a second of arc) the extent to which the background stars would appear to be shifted. [*Note: There was a minimal discrepancy between Newton's 1704 computation and that which was computed in 1919, but there remained doubt by the scientific community about the accuracy of the 1919 computations*; see Soedarto, 2017.]

Some curved-space proponents might argue that gravity is not strong enough to cause light to change its path, but even Einstein (1916), in a paper called "*The foundation of the general theory of relativity*," said that gravity affects light. And it is also known that this happens throughout every galaxy wherever there is a neutron star (which is often, but erroneously, called a "black hole"). That is, neutron stars possess such tremendously powerful gravitational force that they pull all the light particles (photons) that pass within their huge gravitational fields into them, and do not permit any light to escape (thus, the misnomer "black hole"). [The nature of "black holes," and why that name was erroneously applied to them, is discussed later in this monograph.]

Now, based on the foregoing, it is possible to discern the real nature of space. First, in all the examples, the thing that was curved or had its path curved was a piece of matter, including particles of light. This is the critical deciding point, that is, *space is not matter*. Rather, space is a void. A void cannot be made to curve because it is not matter. It is only emptiness. The anomaly between reality and Einstein's proposition required him to claim that space is not a void! While that helped support Einstein's equations, it violates a basic reality of the universe. Thus, Einstein's suggestion that a large mass causes space to curve must be declared to be wrong. Rather, what happens is that <u>gravitational force causes curvature</u> *in the path of moving objects*, not in space. This is a very profound point. Only matter can be made to curve. Space is a void, which contains no matter, and, therefore, cannot be made to curve.

Refuting the curved-space idea regarding the planet Mercury: Whereas physicists used Einstein's math to describe the changes in Mercury's path around the Sun, a return to Einstein's dilemma is needed to (1) refute the "curved-space" argument and (2) explain how Mercury's precession (or that of any other orbiting object) could occur without space being curved. [*The precession of Mercury is covered in detail in Section II.D.3(c)*.]

(1) Einstein, rather than try to work out all the nuances of what gravity really is, invented a fantasy that he called "curved space" because his mathematics required having a solvable equation. In other words, the laws of gravity, if they were all known, should be able to produce the exact equations that explain the observable phenomena. But no one, including Einstein, knew all the nuances of how gravity functions. Furthermore, Einstein did not know (and even today, 100 years later, no one knows) what really *causes* gravity (that question is answered later in this monograph)! Therefore, it is not surprising that Einstein invented the idea of curved space because (a) he was not able to explain how gravity is actually generated, and (b) he did not know the subtleties of gravitational force. Thus, when one examines what he argued, one learns that he basically gave up on the idea that gravity even exists! Instead, what he said was that "mass" curves the space around it, that is, he tried to distort everyone's thinking about reality into an artificial fantasy that would fit his mathematical equations.

(2) Newton predicted the precession, i.e., the change in orbital rotation, of the planet Mercury around the Sun using only his mathematics of gravitation 300 years ago, but modern tracking of Mercury found a slight deviation. Perhaps the small change could be described by Newton's computations with a slight correction (the gravitational correction is explained in Section II.D.3(c), below). For clarity, Figure 2 diagrams Mercury's orbital precession.

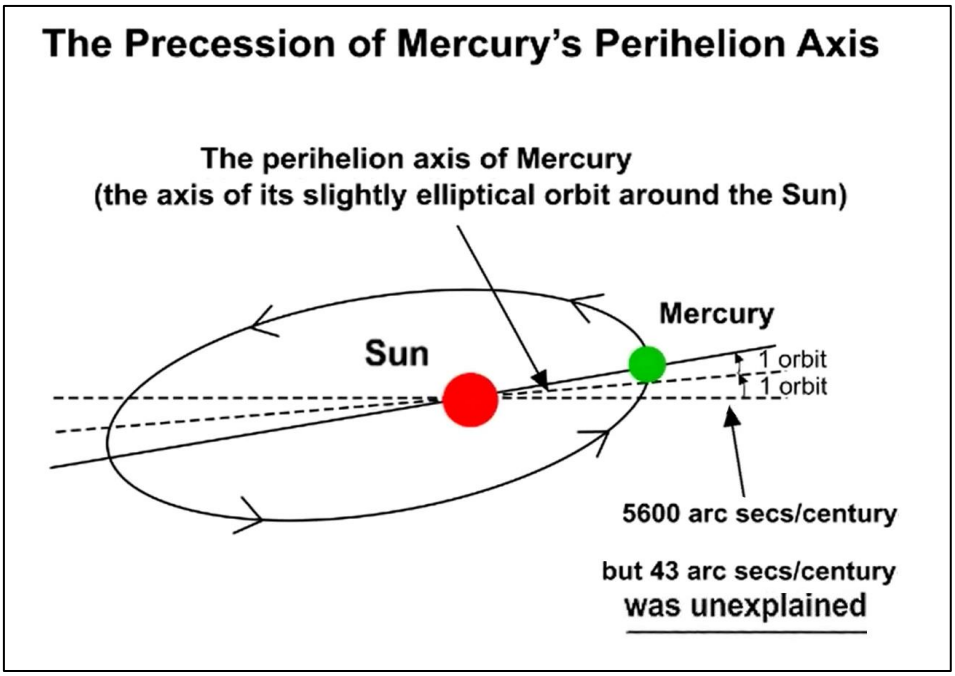

Figure 2: *The "precession" changes in Mercury's orbit*.

It should be noted that Newton's equations were not "wrong." Rather, they did not account for an additional gravitational factor that was not known to him at the time he was writing. Einstein used a different mathematical approach, but also did not know there were other gravitational factors. Thus, two mathematical approaches were used, i.e., Newton's gravity but without a needed additional variable; and Einstein's approach, which denied gravity and used his idea of "curved-space" (which is not possible). Newton knew about Mercury's precession and predicted it with a slight error, but Einstein, *after knowing the amount of the difference that was needed*, used alternate math and an impossible physical idea to explain it!

Thus, there are two approaches, which are in apparent disagreement, that need to be reconciled in order to resolve this apparent discrepancy: One is the idea that gravitation needs to be better understood; and the other is that the mathematics that were used to fit the fantasy of curved space needs to be reexamined so the two approaches can be brought into accord.

Regarding Gravity: The solution might be in knowing how gravity is created, that is, when it is known how gravity is generated, all the nuances of the way gravity operates should become discoverable, including how it operates at close distances from its source.

Regarding Einstein's Formulae: The key question Einstein (or any physicist) did not answer is *how* mass could possibly curve the space around it. Thus, it is conceivable that his formulae, rather than reflecting some characteristic of curved space, actually only reflected a feature of *gravitational pull* that is not yet known. For example, most people assume that gravity is the same at all locations on Earth, but the gravity of every planet, including Earth (and the Sun, and all planets and stars) varies because no planet or star is perfectly spherical or uniformly dense. That is, the gravitational pull of the Earth varies somewhat at different locations on the planet because of dissimilarities in the density of different types of matter (e.g., the types of rock) in different parts of the Earth. This was recently demonstrated unequivocally by Tapley, et al. (2005), who mapped the Earth's gravitational pull using two NASA satellites (called GRACE). Their webpage says they demonstrated that "*Gravity is determined by mass. Earth's mass is not distributed equally, and it also changes over time. The colors in this image represent the gravity anomalies measured by GRACE. One can define standard gravity as the value of gravity for a perfectly smooth 'idealized' Earth, and the gravity 'anomaly' is a measure of how actual gravity deviates from this standard*" (from: https://www.jpl.nasa.gov/spaceimages/details.php?id=PIA12104). See Figure 3 (below).

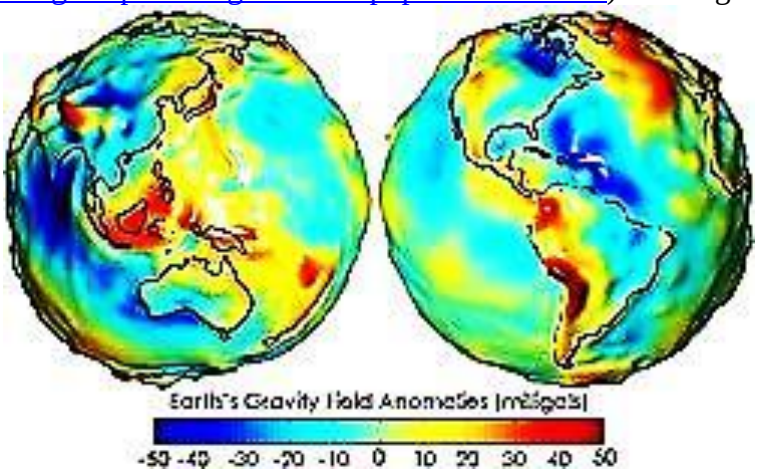

Figure 3: *NASA image of gravity variations on Earth (blue=weaker & red=stronger).* (from: https://earthobservatory.nasa.gov/Features/GRACE/page3.php)

Conclusion: The Sun's gravitational pull can also have variations because it is not a perfect sphere (see Merali, 2009, p. 21) and it could also have differences in its density that are not yet known. Thus, it is possible that Einstein's formulae might actually represent some (as yet unknown) deviation in the Sun's gravitational field rather than a curve in space. That is: Perhaps Einstein's equations could be revised, using a new theory of gravity once it is known how gravity is generated, without having to rely on the fantasy of "curved space" (which is a physical impossibility because space is a void, and a void cannot be curved). Consequently, some further scientific investigation together with a reevaluation of the relevant calculus is decidedly warranted in order to achieve reconciliation between Einstein's mathematics and the reality of Newton's gravitational force.

Postscript: An additional consideration is that Einstein only discussed curved space for objects having very large amounts of mass because he did not consider whether objects of low mass might curve the space around them. But once it becomes known how gravity is generated, Einstein's fiction of curved space will no longer distort physicists' thinking; and other remaining questions about what gravity is and how it operates should be answerable. The explanation for how gravity is generated is explained in Section IV of this monograph.

C. What is Time?

Defining "time" requires a critical review of how humans conceive and measure it because scientists, physicists, and virtually all human beings rarely *define* "time." Rather, they invariably and implicitly assume they know what it is and use it in their theories and daily activities without questioning its nature (see Muller, 2016). Thus, a review of what time has been conceived to be, and how it has been measured, is needed before an accurate definition of time can be derived.

The earliest conception of time is based on the rotation of the Earth, which gave humans the concept of day (when there was light) and night (when there was darkness) as units of time. Indeed, as the Earth has been rotating for billions of years, the sense of day as a period of activity and night as a period of sleep existed from prehumen ancestry for many millions of years, and is therefore embedded in the human DNA. But as humans evolved with the increased cranial capacity to combine observation with rational thinking, new ways of conceiving of time emerged. The earliest humans observed how the shadows of non-moving objects, e.g., trees, changed position from the mornings, when the Sun appeared to rise over the eastern horizon, to the afternoons, when the Sun appeared to set over the western horizon.

Then the sundial was invented. The obelisks in Egypt had apparently been used to tell the passage of each day as early as 3500 BC. And the earliest known sundial, which dates to about 1500 BC, found in Egypt's Valley of the Kings (see Bickel & Gautschy, 2014; Vodolazhskaya, 2014), was in the form of a flat plate divided into 12 segments with a thin pole (gnomon) that casts a shadow onto the dial. [*Note: It is interesting that the Egyptians marked their dial plates into 12 equal parts to represent equal portions (hours) of daylight, but there is no evidence regarding how the Egyptians of that era were able to determine that the day should be composed of 12 hours because Egypt's southernmost region is more than 20º North Latitude, meaning that the hours of daylight were not exactly equal, as would be the case at the Equator, which is 1,198 miles (or 2,219 kilometers) away to the south*.]

Without recounting the history of clock making (since the invention of the sundial), the point is that time was, and still is, measured in terms of the rotation of the planet Earth. This means that what is called time, in units of hours, minutes, seconds, and fractions thereof, is a measure that is entirely based on the rotation of the planet Earth on its polar axis.

This raises the question of how time would be conceived and measured by intelligent beings that reside on a different planet (wherever in the universe they may be located). Taking a nearby example, the planet Venus is about 80% the size of the Earth, and, interestingly, rotates "backwards" (opposite direction of Earth), and the "time" needed for it to complete one rotation around its own polar axis is 2,802 hours (measured in Earth time) compared to Earth's 24 hours! This means it takes 116.75 Earth days for Venus to make one full turn on its axis, i.e., to complete one "Venus day." Venus is too hot to support life, with an average surface temperature of 737º K = 464º C (i.e., hot enough to melt lead and zinc), but if there were intelligent beings there (or on any other planet), "time" would have a much different meaning for them. [*Note: On Mercury, it takes 176 Earth days from one sunrise to the next*.] Thus, on what basis would beings on other planets conceive that the rotation of their planets could inherently distort time if they travel through space – especially if their planets rotate "backwards"? (See the discussion of space and time in Section II.D, below.)

As one example, while humans measure the speed of light in terms of kilometers (or miles) "per second," how would Venusians measure the speed of light? Of course, it can be argued that the speed of light will always be the same (when measured in a vacuum) regardless of the units used to measure it. But the point here is that the conception of what "time" is, as well as how it has been defined, has always relied entirely on the rotational speed of the planet on which one lives. For example, Stedman's Dictionary (2002) defines time as "*a duration or relation of events expressed in terms of past, present, and future, and measured in units such as minutes, hours, days, months, or years*."

That raises the question of how time could be defined (a) in a way that is applicable to all planets (which humans might one day populate) that all have different rotation periods, and (b) when there were no planets or stars, i.e., the state of the universe before matter was created. To resolve the problems regarding the measurement of time on different planets and before matter was created, it is necessary to develop a new definition of time.

Based on the foregoing, the new definition is: "*Time is the continuum of infinity that had no beginning and will have no end, and exists independently of space (because it transpires everywhere in the universe regardless of location) and independently of matter (because it existed before matter existed); but which can be measured with reference to space and matter in terms of rhythms or cycles (or fractions thereof), such as atomic (or subatomic) cycles, or in terms of the revolving of any planet on its polar axis in relation to the star around which it rotates; and, thereby, events can be conceived as having a beginning and an end, such as the duration of life (from birth to death) of a thing or creature, with 'the past' being some period before a specified event begins, 'the present' being the current transiting moment, and 'the future' referring to some period that has not yet occurred*."

Using this more accurate definition of time, it can now be realized that previous definitions of time are inadequate. This definition also explains why earlier theories do not consider the possibility of time existing before the material universe came into being. Time, however, has always existed, including before matter existed, but it could not be measured before matter existed because human measures of time depend on matter. That is, earlier theories could not conceive of what time could have been before the material universe came into existence, and denied that time even existed then (e.g., Hawking, 1996). The present definition allows that time existed before matter came into being.

This definition obviously differs from the concept that most modern physicists accept. That is, physicists believe Einstein's proposal that time is *dependent* on space, and vice versa. Some physicists even suggest that time could somehow "expand" (see Muller, 2016), but time is unequivocally immaterial (i.e., independent of matter), and, for that reason, cannot expand or contract. The present author adamantly disagrees with the idea of a space-time continuum; and the theoretical argument for this disagreement follows.

D. Why there is No "Space-Time Continuum"

The space-time continuum proposed by Minkowski (1908) and accepted by Einstein (1915) is a complex matter that requires some background explanation on the origin of that concept. The need to refute it is the reason it needs explanation, i.e., to understand what is wrong with it so that it can be meaningfully dismissed. Sadly, it has been generally accepted over the last hundred years by physicists who accepted their textbooks' views of the concept as if they were unassailable laws; and virtually all other people accept that idea because they think the science of physics is beyond their understanding. Hence, to facilitate understanding, it is necessary to explain the problem in a simple, logical, comprehensible way. Therefore, the following sub-sections are needed: (1) Summarizing the origin of the space-time concept (to provide the necessary background), (2) An explanation of why that concept is fallacious, and (3) Refuting the few studies that were supposed to support that fallacious idea.

1. <u>Summarizing the Origin of the Space-Time Concept</u>: Originally, the idea that space and time might be inter-dependent was proposed by Minkowski (1908) and later accepted by Einstein (1915). They assumed all physical laws and the speed of light cannot change, i.e., must always remain the same regardless of how fast an observer is moving; and, in order for their contention to be true, this required that space and time could not be independent. Thus, they argued that the two factors also must be "converted" into each other so that the speed of light will always remain constant (for everyone who observes it).

It is now necessary to summarize Minkowski's idea regarding the connection between space and time, and then discusses Einstein's insistence that the speed of light cannot be exceeded; this is necessary because Einstein based his ideas upon Minkowski's conception. [*Note: In fairness to Minkowski, it should be noted that he first explained his idea in a lecture to the 80th Assembly of German Natural Scientists and Physicians on 21 September 1908, and did not have time to elaborate any further on his idea, or to withdraw it, because soon thereafter he died of appendicitis in Göttingen, Germany, on 12 January 1909.*]

Regarding Minkowski's idea for connecting space and time, the crucial "conversion" (mathematical alteration) is usually written as $t=-it'$ (or $t = -i\tau$,), where "t" is time, and "$-it$" (or "$-i\tau$") represents something he called "imaginary time." Imaginary time is like an imaginary number (a complex number that can be written as a real number multiplied by the imaginary unit, i, namely, $i^2 = -1$; that is, 1 is a real number and −1 is an imaginary number). For Minkowski and Einstein, if "regular time" progresses in one direction from past to future, "imaginary time" runs 90º (perpendicular) to real time from some imaginary past to some imaginary future. In other words, their math implies that it is possible to travel through some "imaginary time" at any given point in real time, as diagrammed in Figure 4, below:

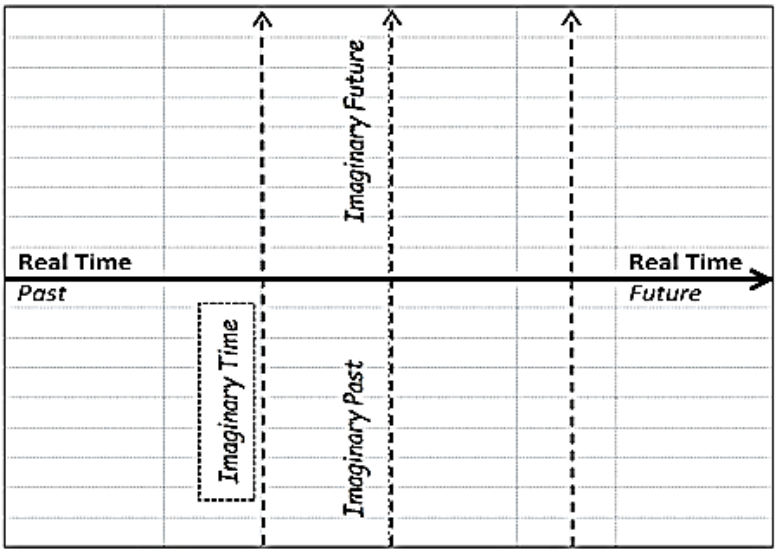

Figure 4: *Diagram of Minkowski's concept of* "*real time*" *and* "*imaginary time*."

Furthermore, although physicists might argue that Minkowski's "imaginary time" is not "unreal" (i.e., is not made-up), it is actually only a mathematical device that can be used in calculus. For example, the negative sign "converts" the complex overall equation in order to simplify it so it can be solved more easily; and then, subsequently, is re-converted back into its original form. Consequently, in the opinion of the present author, "imaginary time" simply and truly does not exist (except as a person's imaginary fantasy).

Later, Einstein (1920, 1922) declared that space was not a void, and decided to call it an "*ether*," which only served to further confuse everyone because the dictionary definitions of an ether could mean "air" (which is composed of molecules and thus would be matter), or some philosophical concept of "heaven," which is not measurable in the physical sciences.

Specifically, Einstein stated that "*This space-time variability of the reciprocal relations of the standards of space and time, or, perhaps, the recognition of the fact that 'empty space' in its physical relation is neither homogeneous* [being consistently the same] *nor isotropic* [having equal physical properties along all axes], *compelling us to describe its state by ten functions (the gravitation potentials g_{mn}), has, I think, finally disposed of the view that space is physically empty*."

Einstein (1920) confirmed his view of space being some kind of "ether" when he added, "*According to the general theory of relativity space is endowed with physical qualities; in this sense, therefore, an ether exists. In accordance with the general theory of relativity space without an ether is inconceivable*." That idea, of course, has been shown to be false in Section II.A of this monograph. The refutation of Einstein's idea that space is not a void is further elaborated in the discussion of the speed of light (later in this section).

Consequently, given all that was explained above, it can be logically concluded regrading what Einstein said about space is either that (a) the numerical value he used in his formulae for the speed of light should be revised (i.e., the value should be reduced because, if space is not a void, as Einstein claimed, then there must be some physical particles in Einstein's "space" that will impede the speed of light through such space), or, (b) space really is a void (vacuum), which means Einstein's contention that space is not a void, is wrong.

Returning to the concept of space-time, Minkowski (1908) first presented this idea in a diagram he called a "light cone" for a flash of light moving from the past to the present in a figure with two cones, one with its base at the bottom and the other inverted, such that their points intersect, to represent the idea that space (shown as "x") and time (shown as "ct") were in an orthogonal relationship. He claimed that the lower cone represented the past, and the upper cone represented the future, and their point of intersection represented the present time; with the walls of the cone representing the flash of light moving from the past (lower cone) to the future (upper cone) through the point where the cones intersect, which is supposed to represent the present time. Minkowski's light cone is shown in Figure 5, below.

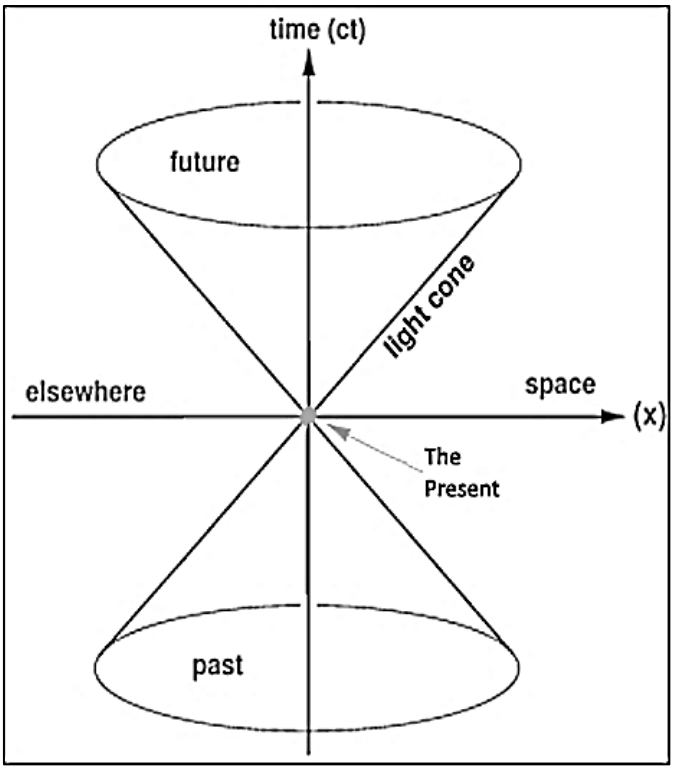

Figure 5: *Minkowski's (1908)* "*Light Cone.*"

According to Minkowski, everything that exists in "reality" is inside the cones, while everything outside the cones ("elsewhere") is in some "imaginary space," which (as claimed by relativity theory) could never be accessed because a person (or any object) would have to travel faster than the speed of light to reach it. But Minkowski and Einstein also insisted that it is impossible for anything to travel faster than the speed of light. Yet, even *that* contention needs to be examined because there are reasons to doubt its veracity. Therefore, it is necessary to reflect on the speed of light more closely, and to consider the possibility that the speed of light may not be an absolute limit.

Further notes on the speed of light. Einstein did not include in his computations that *the speed of light actually does vary*, depending on the medium through which it passes, a process called "refraction." In all his formulae, Einstein only used a fixed value of "c," i.e., the speed of light through a *vacuum*. But recall that Einstein insisted that space is an "ether" and refused to admit that space is a vacuum. Hence, there should be errors in his calculations (e.g., starlight traveling through the Sun's atmosphere or Earth's air). When Einstein was writing, the best estimate of the speed of light was measured between two mountain tops, i.e., through air, as 299,810 kilometers per second (Carter & Carter, 2002). Today, light speed through a vacuum is measured as 299,792 kilometers per second (2.998×10^8 m/sec). For some examples of light speeds through media with different refractive indexes, see Table 1.

Table 1: The speed of light in various media (*the speed of light in a vacuum is shown first*):

Media (n)	**Light Speed ("c"** in m/s**) ÷ Refraction of n**	**Light Speed in Media (v)***
A vacuum (no medium)	$2.998 \times 10^8 \div 1.000$	$= 2.998 \times 10^8$ m/sec
Air (at Earth's surface)	$2.998 \times 10^8 \div 1.003$	$= 2.989 \times 10^8$ m/sec
Water (pure)	$2.998 \times 10^8 \div 1.333$	$= 2.249 \times 10^8$ m/sec
Glass (clear)	$2.998 \times 10^8 \div 1.516$	$= 1.977 \times 10^8$ m/sec
Diamond (clear)	$2.998 \times 10^8 \div 2.417$	$= 1.240 \times 10^8$ m/sec

*The computation is: c (light speed in vacuum) ÷ n (refraction) = v (light speed through medium)

The fact that the speed of light changes is something Einstein must have known, but his theory used only one speed. According to his theory, *time* must speed up when anything slows down, such as when light travels through any material, e.g., water or glass. And the theory also states that time must slow down when one travels at high speeds.

Thus, one must ask what happens to the theory when *people* move at different speeds. First, consider a person sitting still, e.g., in a chair. One normally thinks a person sitting still is not traveling. Actually, everyone is "traveling," even when sitting still! For demonstration purposes, the speed at which a person is traveling when sitting still is shown in Table 2.

Table 2: The speed of a person "sitting still" on the Earth's surface (*in miles/hour*):

Type of Motion*	**The Motion a Person Experiences**	**The Person's Speed**
Earth revolves on its own axis	Person is moving because Earth spins	1,000 miles/hr
Earth revolves around the Sun	Earth's annual motion around the Sun	66,000 miles/hr
Sun revolves around the Galaxy	The Milky Way is a spinning spiral galaxy	450,000 miles/hr
Galaxy travels through space	Galaxies move away from each other	1,300,000 miles/hr
Total Speed	(*the speeds are cumulative*)	**1,817,000 miles/hr**

*These speeds may be found at: https://astrosociety.org/edu/publications/tnl/71/howfast.html

The table shows that a person who is "sitting still" on the surface of the planet Earth is actually moving at a speed of 1,817,000 miles/hr. To relate this to the speed of light, i.e., 186,282 miles/second, make the units the same (by multiplying the speed of light times 60 to obtain the speed per minute, and then multiplying by 60 again to obtain the speed per hour), which yields 67,061,520 miles/hr. Thus, the speed of a person sitting still is:

Sitting person = [(1,817,000 miles/hr)÷(67,061,520 miles/hr)] = 0.027% of the speed of light

That is, by sitting still on the surface of the Earth, a person is traveling through intergalactic space at a speed that is 0.027% of the speed of light! Thus, without even leaving one's chair, a person is indeed traveling through space at a very great speed, i.e., 1.8 million miles/hour! And, of course, anyone who is traveling in a spacecraft, or in an airplane, or a train, or a car, or on a bicycle, or is just walking, is moving at an even greater speed.

Also, according to Minkowski's and Einstein's "space-time" theory, if time slows down for any objects "approaching" the speed of light, time should slow down for every object in the universe, even a person sitting down! [*Note: They did not define "approaching," but, logically, anything that moves is "approaching" the speed of light*.] And compared to a seated person, time should slow down at different rates for any person who rides a bicycle, car, train, or airplane. That is, according to relativity theory, every person or thing that is moving through space is traveling through time at a different rate. Hence, if time slows down for everyone who travels at a different speed, then how could people even communicate with each other if time is different for everyone? Thus, if Einstein's theory were correct, with all objects passing through time at different rates, the entire universe would be in utter chaos.

But that is not what anyone experiences in reality. In fact, the more one learns about the world and the universe, the more *ordered* everything appears to be. Moons travel around planets in ordered ways, planets travel around stars in ordered ways, stars evolve in ordered ways, and galaxies revolve about their centers in ordered ways. Consequently, the abundant evidence that exists in the form of the obvious facts of the surrounding reality adds further to the refutation of relativity theory.

Lack of evidence for the speed of light as an absolute limit. The main reason physicists defend the claim that "nothing can travel faster than the speed of light" is that they have not been able to directly observe any objects that travel faster than the speed of light. They offer two reasons to support that claim: (a) They say galaxies do not travel faster than the speed of light; and (b) They cannot find any subatomic particles that travel faster than the speed of light. Here, each of those arguments is considered in turn.

Example (a): Why do they not see galaxies traveling faster than the speed of light? To understand the answer to this question, it is necessary to remember a few points. First, the galaxies are traveling away because the universe is expanding (this is explained in detail in Section III). That is, all galaxies are moving away not only from Earth's specific point in the universe, but, based on astronomical observation, all galaxies are also moving away from each other. Another related fact is that observations indicate that the farther away the galaxies are, the faster they are moving away. And an important fact, especially for physicists who try to defend the speed-of-light limit, is that there is evidence that the farthest galaxies are actually traveling away at velocities that approach – or even exceed – the speed of light.

The answer to why galaxies are not *seen* traveling faster than the speed of light is because the detecting instruments, i.e., optical telescopes (based on visible light), and radio telescopes (which sense invisible radio waves from distant objects), are both based on electromagnetic radiation; but the galaxies themselves are moving away too fast to be seen. That could explain why galaxies traveling faster than light have not been "photographed." However, there is an alternate method to detect speed, namely, the "Doppler shift," which could reveal speeds greater than the speed of light (this is explained below).

Stated another way, the farthest galaxies are both too small and traveling too fast to be directly detected, and, while it is not possible to photograph those galaxies that are traveling faster than the speed of light, some of their photons that they once emitted are now detectable even though those galaxies cannot be directly observed. However, as just noted above, the speed of an object can be mathematically estimated from its photons that reach the Earth.

And that fact reveals another profound problem for relativity theory. Observations being made today with more accurate measurement instruments (but still limited by the speed of light) have determined spectral "Doppler" shifts, also called "redshifts," which indicate that some distant objects are traveling away at speeds greater than the speed to light! Note that changes in the wavelength of spectral lines reflect the speed of astronomical objects relative to the Earth. (For how to compute the speed of an object based on its "redshift," see: http://skyserver.sdss.org/dr1/en/proj/basic/universe/redshifts.asp.)

For example, galaxy GN-z11 (found by the Hubble Space Telescope in 2016), is 13.4 billion light years away. Using its redshift (an indicator of speed relative to the speed of light), the velocity of GN-z11 can be computed as: *velocity* (v) = *speed of light* (c) x *redshift* (z); where:

v = the velocity of an object moving away from us relative to the speed of light.

c = the speed of light (i.e., c = 299,792,458 meters per second; or 2.998 x 10^8 m/s).

z = the redshift (for GN-z11, z = 11.09; see https://en.wikipedia.org/wiki/GN-z11).

This gives the velocity at which the galaxy GN-z11 is traveling away from Earth as:

$$\text{velocity of GN-z11} = (2.99792458 \times 10^8 \text{ m/s}) \times (11.09) = 3.324698359 \times 10^9 \text{ m/s}$$

The equation shows GN-z11 *traveling significantly faster than the speed of light*! And GN-z11 is only one of many recently discovered objects that have been computed to be traveling faster than the speed of light (see: https://en.wikipedia.org/wiki/List_of_galaxies). The problem is that physicists are baffled because these new discoveries contradict their "law," which says nothing can move faster than the speed of light. They search for reasons to argue that those speeds do not really exceed the speed of light. For example, they say the redshift value is not accurate because "space is expanding," which they say makes it "seem" as if an object is traveling faster than the speed of light. Others argue that the photons are being "stretched" by the expansion of space (but photon stretching cannot be measured, i.e., how does one compare the "length" of a photon that came from 13 billion light years away with one that came from 13 meters away?). Another argument says that Einstein would use a more complicated formula (to reduce v) when z values approach 1! Thus, physicists reject the apparent fact that some things in the universe *are* moving faster than the speed of light!

Example (b): Why do they say subatomic particles cannot exceed the speed of light? The answer is similar to that for the problem of measuring the speeds of distant galaxies. Recall that the difficulty in measuring a galaxy's speed is that it cannot be measured directly; it is instead computed mathematically by using the amount of shift (change) in the position of spectra (lines emitted by light from a moving object) on a spectrometer that receives light from the distant object. In the case of trying to measure the speed of subatomic particles, the problem is at the opposite end of the scale of size of the objects to be measured. While galaxies are immense, subatomic particles are miniscule, making them difficult to measure.

The academic field of particle physics has expanded so extensively in the past few decades that there is too much material to explain here, so it will be somewhat condensed in order to move more directly to the problem of measuring the particles. Basically, for a considerable number of years, the accepted model of the atom (of which matter is composed) is called the "Standard Model," which states that the atom is composed of three main parts, i.e., protons, neutrons, and electrons. Whereas these particles are what atoms are composed of, they are all smaller than the whole atom, and therefore are called "subatomic" particles.

Additionally, in the 20th Century, by means of various experiments with advanced equipment, some additional subatomic particles were detected. Other than the components of the atom, only about six particles have been detected, but they are very unstable. For example, muons, which are naturally produced (e.g., by cosmic rays interacting with atoms in the Earth's upper atmosphere), have an average life of only 2 microseconds (a microsecond is a unit of time equal to one millionth of one second), meaning it exists for 0.000002 of a second, which makes its speed difficult to measure.

To make this clearer, Einstein's formula requires that anything that has mass cannot match or exceed the speed of light because, if it did travel at that speed, the formula would result in that particle of matter (regardless of how small it might be) having "infinite mass"! Here is (a simplified version for) the mathematical expression of Einstein's idea:

$$m' = \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}}$$

Where m′ = the "relativistic mass" (i.e., what the object's mass becomes when it is moving).
m_0 = the mass of an object "at rest" (i.e., when it is not moving).
v = the velocity of a moving object (i.e., of an object being studied).
c = the speed of light (i.e., $c = 2.998 \times 10^8$ m/s).

The formula indicates that when "v" reaches the speed of light, the value in the denominator on the right side of the equation becomes zero. And, with a denominator of zero, any fraction having a numerator of any number greater than zero takes on a value of "infinity." As everyone knows (and Einstein knew), it is impossible for the mass on any piece of matter to take on a value of infinity because anything having "infinite mass" would engulf the entire universe! Hence, physicists claim that the "expansion of space" (which does not happen) causes the "apparent" high speeds without increasing the speed of the moving objects!

Returning to the speed of subatomic particles, first, at present, there are no devices sensitive enough to measure the speeds of free-moving subatomic particles that travel faster than the speed of light. Some physicists, however, recognize that a subatomic particle with no mass, such as a photon, which is light and therefore travels at the speed of light, or other particles of minimal mass, might be able to reach or exceed the speed of light. Thus, some physicists are still open to the idea that subatomic particles may be able to move faster than the speed of light! Cosmic "rays" (actually cosmic "particles") represent one example because Cronin, Gaisser, and Swordy (1997) explained how those particles could travel faster than the speed of light, for example, when they are accelerated by supernova or other cosmic events. Other examples, such as particle acceleration by the tremendous gravitation at the center of galactic nuclei, have also been cited (see Diehl, 2009).

An additional peculiarity of Einstein's speed-of-light theory. There is a strange contradiction in Einstein's theory about the speed of light that centers on the question of why that value (symbolized by the letter "c") must be *squared* in the formulae that Einstein used. That is addressed momentarily, but some clarifications must be made first. The reason for needing clarification is that, interestingly, there have been debates and arguments about all the versions of Einstein's equation since it first appeared in 1905. And confounding that debate is the fact that there are thousands of articles attacking or defending it in several languages, i.e., in its original German, as well as in Russian, English, and Chinese. Hence, to best understand the "peculiarity" of Einstein's theory requires a brief historical note; but the reader is advised that the debate over the various versions of Einstein's formulae, which have been argued about for over a century (and are still argued about today), is not the real problem. The real problem is whether the speed of light should even be used in the formula, which is answered in the "*Conclusion*" paragraph at the end of this sub-section (on p. 21).

Briefly, the essence of the "debate" regarding Einstein's formula was between his early version, which he abandoned, and a later version that he ultimately accepted. But the abandoned version is the one that was popularized among scientists and lay people alike. The simplest summary of that debate was presented by Okun (2009), who clarified the following:

Early version of Einstein's formula: $\mathbf{E = mc^2}$ [*which he abandoned, but was popularized*] (1)
Later version that Einstein accepted: $\mathbf{E_0 = mc^2}$ [*which Okun, 2009, claimed is correct*] (2)

Okun explained that Equation (1) leads to the idea that mass would become infinite, which is why it had to be abandoned; and that Equation (2), where E_0, the "rest energy" of a body of any given mass (m), is more accurate. Thus, as the latter formula refers only to "rest energy," Okun (2009) states "*That means that m has the same value in all reference frames, hence does not depend on velocity*" (p. 2). That may resolve the problem about mass taking on values approaching infinity when an object's speed approaches the speed of light (a fact that was pointed out to Einstein, and that ultimately caused him to revise his formula).

Nonetheless, a major "peculiarity" in Einstein's theory is in the contradiction between Einstein saying nothing can exceed the speed of light, and then multiplying the speed of light *times* the speed of light (i.e., c^2) when he tried to compute the amount of energy (E) that is supposed to exist in any given amount of mass (m). The contradiction is this: If "c" is the speed of light, which cannot be exceeded, then what was Einstein's reason for multiplying it times itself (or times any number whatsoever) if the speed of light cannot be exceeded?

When this blatant contradiction is stated openly (as it is here for the first time), at least two things become apparent, i.e., that Einstein was apparently fascinated by the value of the speed of light, which caused him to base all his ideas on it, and that the speed of light does not necessarily have to be used in his formula because (as shown below) an alternate value for "mass-energy equivalence" could be substituted. Consider these separately:

Why was Einstein obsessed with the speed of light? First, he was fascinated by math from childhood, and the best measure of the speed of light was published in 1883, when Einstein (born in 1879) was 4 years old. Also, he was only 26 years old (in 1905) when he started using that value in his formulae. Thus, he may have had a "schoolboy fascination" with the enormous value of the speed of light and therefore sought ways to include it in his mathematics. As Corry (1998) pointed out, "*In the early years of his scientific career, Albert Einstein considered mathematics to be a mere tool in the service of physical intuition. In later years, he came to consider mathematics as the very source of scientific creativity*." In other words, Einstein was so fascinated with the speed of light that he based his theories about mass and energy on it; and, rather than revise his formulae to fit basic physical knowledge, he insisted that physical facts (e.g., space as a void, which it really is) had to be changed instead.

Consider that the speed of light does not have to be used in formulae for mass-energy equivalence. First ask why should energy be computed as a function of the speed of light *squared*, i.e., $E_0 = mc^2$? The answer requires some speculation on Einstein's way of thinking and the problem that is posed by the characteristics of variables in the equation. Thus, the answer could be a combination of a few factors, each of which is examined below.

(a) The first factor is the apparent fascination Einstein always had with the speed of light, and his use of it as the basis for his physics (see the discussion in previous paragraphs), which would partly explain why he used it in his formulae.

(b) Another factor could be that Einstein was probably thinking of a single atom to simplify the problem and more easily imagine a mathematical formula to estimate the energy in a piece of matter/mass (at rest). Unfortunately, most people think of atomic bombs, which can release huge amounts of energy. But the bombs use very large atoms because heavy metals are required to obtain large amounts of energy. To demonstrate this, take one atom of Uranium-235 (U-235). Here is the computation:

The fission of one atom of U-235 produces .000000000032 Joules [note1]
1 Joule = work needed to produce one watt of power for one second [note2]
Thus, 1 Joule needs (1 atom ÷ .000000000032 J) = 3,125,000,000 atoms of U-235!

This means that one atom produces an extremely small amount of energy. But keep in mind the fact that the computation is for only one atom because this fact is necessary to understand why the speed of light was used (see next paragraph, below). If this idea of the minute force in an atom, seems at odds with the idea that U-235 has been used to create an atomic bomb, there are 2.563×10^{23} (256,300,000,000,000,000,000,000) atoms in 1 kilogram of U-235 and that a *minimum* of 15 kilograms of U-235 (which amounts to 3.8445×10^{24}, in other words, 3,844,500,000,000,000,000,000,000 atoms) are needed to produce such an explosion.

Notes 1 & 2: The values can be obtained from the following sources for verification:
[1] https://www.quora.com/How-much-power-is-generated-from-a-kg-of-uranium
[2] https://en.wikipedia.org/wiki/Joule

(c) Why was Einstein looking for such a large number to multiply times the mass of an object? As explained, above, even for the "powerful" element of Uranium, the energy of a single atom is very small! And that is what suggests the reason Einstein needed a very large number in order to "convert" the small amount of energy into measurable terms. The speed of light was the largest number in physics that was known when Einstein was writing. But in consideration of the smallness of an atom, and the smallness of the energy one atom could release, Einstein must have thought that even the speed of light was not a large enough number. And given his fascination with the value of the speed of light, he came up with the idea of *squaring* the speed of light, i.e., multiplying it times itself, namely, (c x c), giving: $(2.998 \times 10^8) \times (2.998 \times 10^8) = 8.987 \times 10^{16}$, which is an enormous number indeed!

(d) Furthermore, there are three additional concerns on the peculiarity of the equation:
(i) The speed of c^2, which is 8.987×10^{16} meters/second, exceeds the speed Einstein said could not be surpassed. Physicists say a "speed" is needed to compute the energy of an object, even when it is not moving, and c^2 is used "to make the units right." But a contradiction still exists when using c^2 with the force of gravity, which is in "meters per second-squared," i.e., an object falls a certain distance in one second and then accelerates by the same distance in the next second. The contradiction is that they are still saying c^2 exceeds the speed of light.

For example, the pull of gravity the Earth exerts on a falling object is 9.8 m/s^2. That is, gravity accelerates the falling object at 9.8 meters per second per second. After one second, an object is falling 9.8 m/s; and after two seconds, it is falling 19.6 m/s (and so on). In other words, the convention of adding some distance to an object's "per-second" movement *every additional second* means that the speed of the object is increasing. So, by that analogy, c^2 would be a speed! When asked why the value must be c^2, physicists reply that, in relativity there is only one constant to work with, namely, the speed of light. Stated simply, the speed of light "is the only game in town," and since it is Einstein's "game," everybody must use c^2!
(ii) It should also be noted that the value of c^2 (using only the speed of light in a vacuum) is a "constant" value, i.e., a value that never changes. Therefore, rather than presenting a number that, according to his own theory, cannot exist, Einstein could have written the formula more simply as: E = mK, where K is a large constant value. Of course, Einstein's formula was an expression of energy conversion, which, traditionally in physics, has always used a speed that is squared, and, thus, both Einstein and the field of physics are limited by the way they *define* the variables in their calculations.

The formula is a "definition" of the idea that mass contains energy, but with the values set by the mathematician. And, if the energy (E) of a certain amount of matter (m) is a fixed quantity, then E will *always* be equal to some mathematical function of that quantity of matter. Thus, the mathematician can "set" the function to any number that seems reasonable. And Einstein set the value at the highest number he could imagine, i.e., the speed of light!

(iii) One additional concern is actually a critical point. That is, conceptually, the speed of a photon (i.e., "c," the speed of light) is actually irrelevant to the rest energy in an atom, or in any body of mass of any type of element in the periodic table of chemical elements, regardless of the quantity. The value of "c" is simply a value of the speed of a photon, which means that any speed value could have been used. And that means that the "energy units" could also have been defined differently. Therefore, when applied to "the real world," the energy units could have been different, and the values that are actually being used could very well be computed as different units and different quantities. Hence, because of the arbitrary use of units, even with regard to Einstein's mass-energy equivalence formula in applications such as the atomic and nuclear bombs, one could speculate that the formulae are not exact, nor even accurate. The claim of accuracy comes only from all calculations being intentionally "standardized" because physicists want to use the same unit (i.e., "c").

Conclusion: The only conclusion one can reach from the foregoing analysis must be that the famous *c-based* formula, $E_0 = mc^2$, which has fascinated the world, is just a fantasy. Most physicists would be outraged by this conclusion, but others (quietly) say that "*This expression for energy implies that matter at rest has a huge amount of energy, and it is not clear whether this energy is physically real, or just a mathematical artifact with no physical meaning*" (see https://en.wikipedia.org/wiki/Mass%E2%80%93energy_equivalence).

2. Why the Concept of a "Space-Time Continuum" is Fallacious: The following discussion explains why Minkowski's and Einstein's reasoning was flawed, and why there is no such thing as a space-time continuum. The explanations in the previous parts of this section revealed the reasoning that Minkowski and Einstein used to try to represent space and time, which, *even though artificial*, made it appear that the two concepts are tied together! They used pure mathematics to create their own view of what the physical universe should be. It is "artificial" because calculations can be manipulated in any way mathematicians desire in order to try to offer "proofs" of their ideas. A simple example follows; it is one of many and there are more complicated "proofs." This (hopefully) is not from the relativity computations, but it shows how, mathematically, it is possible to "prove" that +2 = –2:

(i) First, let $x = -2$,
(ii) Then square both sides of the equation, which gives: $x^2 = 4$,
(iii) Take the square-root of both sides of the equation: $x = \sqrt{4}$,
(iv) Thus: The original number of –2 now equals +2: $-2 = +2$!

But apart from the mathematics, the "space-time" idea is flawed in an even more fundamental way, namely, in the way that humans have always perceived and measured speed. That is, as explained in Section II.C, above, the human perception of time is entirely based on the rotation of the Earth (on its polar axis, and also around the Sun), such that the only way humans ever perceived of space and time has been to implicitly assume that they must both be used together. But, as explained previously, in Section II.D, above, space and time are not – and do not need to be – one and the same thing.

As indicated in the above discussion of time, human beings have a "mind-set," which gives them the impression that space and time are related. This is because all measures of "speed" are in terms of some material object that traverses some specific distance over some specified period of time. For example, when describing the speed of an automobile, one says it can travel at 100 kilometers (spacial distance) per hour (time), which is because the only measure of speed that humans know requires speed to be described in terms of space and time. This limitation in the way speed is conceived limits human thinking to the idea that space and time are interrelated. But if it is realized that such a relationship is only "conceptual," and therefore artificial, then one's thinking can be freed from the constraints that the equations of quantum mechanics place on how space and time can be more realistically conceived.

Regrettably, the erroneous idea of space and time being inextricably bound together has caused critical problems for theoretical physics. When viewed logically, many theories being propounded sound as if they were imagined by authors of pulp magazines about implausible "science *fantasy*"! The most troublesome is the idea that "space is expanding." That idea was introduced as an excuse to try to argue against recent data that show distant galaxies traveling faster than the speed of light. The "expanding space" argument states that those objects only "seem" to be traveling faster than the speed of light because the rapid expansion of space all over the universe puts those objects farther away because the whole universe is expanding. That is, they say that the increased distance caused by the expansion of space – when added to the speed of those fast-moving galaxies – only makes those galaxies *seem* to be moving faster than the speed of light.

There are more problems with that "expanding-space" fantasy. The problems become apparent when it is remembered that space is a void. As explained in Section II.B (above), only matter can be curved, and whereas space is a void, it contains no matter and therefore cannot be curved. Likewise, only matter can expand (or contract), and, whereas space is a void it cannot expand (or contract). An interesting objection to the space expansion idea is the fact that, if true, the space between atoms should also be expanding, which would make humans become larger as they age; and a related anomaly is the fact that humans shrink as they age (Rudman, 1985)! Yet, when such objections are made, physicists say their idea is valid only on the large scale, e.g., for galaxies, but not on small scales, i.e., on Earth! Why?

An important point here is that Einstein was never able to adequately explain *how* mass is supposed to cause space to become curved. He only stated that the "presence" of immensely massive bodies, such as stars, *cause* the space around them to curve. Similarly, modern physicists simply accept the idea that space "expands," but do not explain *how* that could be possible. They suggest that space was created at the same time matter was created from the "big bang," and that space expands along with matter. But, if space did not exist before the "big bang," then what existed before space existed? No answer has been offered to this simple, but crucial and important question. Hence, today's physicists merely use the fantasy they call "expanding space" as their only rationale for denying the fact that there are objects – large objects, including entire galaxies – that travel faster than the speed of light.

The fantasy of a space-time continuum is one of the numerous anomalies that have emerged since Einstein proposed his theory. And it should be kept in mind that (according to Kuhn, 1962) anomalies, i.e., unexplained phenomena that arise from a theory (in this case, Einstein's "model" of the universe) and that cannot logically be explained are evidence that a theory is "drifting" from its original propositions and changing into a different concept. That is, Einstein's theory is now becoming distorted with implausible explanations that are convoluting what used to be the "science" of physics, and turning astrophysical theory into a potpourri of imaginings that seem to be little more than unprovable phantasmagoria.

Two principal examples of problems with Einstein's theory that indicate "model drift" are (a) propositions that have never been proven, and (b) the much more difficult problem of contradictions between his theory and what is known from experimentation in related theories.

For (a), a significant example is Einstein's proposition that there are gravity particles, which he called "gravitons." This is "significant" because Einstein's conception of gravity was a cornerstone of his space-time theory. That is, he denied the very existence of gravity (as it was known to all scientists before him, and to all people in the world in their everyday experiences) and replaced it with an idea that massive objects "curve" the space around them, which Einstein insisted caused objects to fall toward those massive bodies. But, "gravitons" have never been found, despite efforts to detect them by physicists all over the world for the past 100 years since Einstein proposed them [*Note: This matter is discussed further in the new theory of gravity proposed in Section IV of this monograph*.]

For (b), namely, the conflict between a theory and known experimental results, a critical problem has arisen for Einstein's theory. Specifically, quantum mechanics, which is a branch of physics that identifies scientific laws that describe the structure, energy levels, and behavior (including movement) of atoms, photons, electrons, and other subatomic particles, operates very well when it uses "time" in the standard sense of existing *separately* from space. That is, Einstein's computations that use space-time as a continuum simply do not work for the branch of physics that studies subatomic particles! In one particular example, Ng and van Dam (1994) reported a "limitation" on the measurement of space-time distances when they simultaneously applied quantum mechanics and general relativity. Considering that Einstein invented space-time, in which time changes (to replace the existing theory of gravity, in which time is not distorted), and that the distorted-time concept does not work for small-scale matter, then there must be something wrong with Einstein's theory. This means that the computations from general relativity do not apply in another field of physics, and, therefore, according to Kuhn's (1977) test of "consistency," reflects a problem with Einstein's theory.

3. <u>Refutation of Studies Seeming to Support the False Space-Time Continuum</u>: This sub-section refutes three arguments from studies that were supposed to have supported the idea about time slowing down as the speed of an object increases, i.e., (a) atomic clocks traveling at high speeds versus those on Earth; (b) the decay of subatomic particles at high speeds versus those at rest, and (c) the precession of the planet Mercury.

(a) <u>Atomic clocks traveling at high speeds</u>: There is an often-cited experiment by Hafele and Keating (1972a; 1972b) that is supposed to support the idea of time slowing down for objects that travel at high speeds. But even within that experiment, there is a peculiar result that conflicts with the space-time theory. Here, the study and the conflicting result are first described; and then published criticisms are noted so that a decision on the veracity of the space-time theory can be reached. Regarding the study, Hafele and Keating (1972b) placed an atomic clock in each of two commercial jet aircraft; both flew (approximately) along the equator, one from east to west and the other flew from west to east. When flying eastward (along with the Earth's rotation), the clock *lost* time during the trip, and when flying westward (against Earth's rotation), the clock *gained* time (or lost less time) during the trip. Hafele and Keating concluded that their results supported relativity theory.

But there are several problems with that study. The most obvious is the fact that, in their experiment (Hafele & Keating, 1972b), time in one of the atomic clocks *increased* when it flew in the opposite direction. This is a blatant anomaly because relativity theory did not predict that time will increase (clocks will go faster) for objects when they travel fast. But the two planes were traveling at the same speeds! Relativity theory is based on a mathematical formula that explicitly states that time will slow down for an object when its speed increases. In other words, relativity theory was concerned with the amount of speed, not the direction (i.e., east or west) in which the object in question was headed.

Some physicists have argued that the Hafele-Keating study was flawed. Schlegel (1974) suggested that further mathematical adjustments are needed to make the calculations work, but he also stated that if the clocks flew between the North and South Poles, the gain or loss in the clocks' times would be "*velocity independent*," i.e., that velocity would not matter, which also contradicts relativity theory! He concluded that the study "*leaves the question of special-relativistic kinetic effects on a macroscopic clock an open one empirically*" (p. 183). Also, Rodrigues and de Oliveira (1989) said the Hafele-Keating result "*is non sequitur from the epistemological point of view and wrong according to the mathematical structure of relativity theory*" (p. 479). And Yao (2016) argued that "mathematical manipulations" are needed to make the Hafele-Keating computations support relativity theory. However, it should be noted that the need for such manipulations (often proposed for that purpose) undermines Einstein's mathematics, which increases doubt about relativity theory!

And there are more reasons, in the form of practical evidence, to abandon the idea of a "space-time continuum." For example, if a clock slows down in a spacecraft that travels faster than Earth clocks, then the two clocks will have different times; and the faster the spacecraft moves, the greater the time difference. Consider spacecraft traveling to the outer reaches of this solar system. They start at 18,000 km/hour to escape Earth orbit, and NASA uses the gravity of other planets to give "gravity assists" to help spacecraft reach greater speeds in order to reach distant planets more quickly. The fastest spacecraft to date hit 70 km/second (252,000 km/hour); and in 2018, when two satellites will be launched using the Sun's huge gravitation to propel them to higher speeds, they will reach 200 kilometers/second, which is about 0.067% of the speed of light (Huffington Post, 2017).

This point is important because, if a clock slows down in a commercial aircraft that travels at 900 km/hour, then, according to relativity theory, clocks on spacecraft would slow down immensely, yielding a great time difference between the spacecraft's clock and the clock on Earth. To clarify why the theory of space-time does not work in practice, consider spacecraft traveling at great speeds in order to reach distant planets that they are sent to orbit. Whereas Earth-based clocks, which are used to guide satellites, would have a time that is different than the time on a satellite's clock, there should be errors in controlling the satellite. That is, if an Earth clock is used to send a signal with instructions to the spacecraft, e.g., to fire its engines to enter an orbit around another planet, the satellite, which has a clock that reads a different time, will receive the instruction too early. Hence, the satellite would fire its correcting engine too soon and either crash into the planet, or fly off into space and never enter the distant planet's orbit. But, in reality (in actual practice) 150 spacecraft have been successfully sent into deep space and completed their missions (Solar System Probes, 2017.) Therefore, the supposed space-time idea of general relativity theory regarding time slowing down when an object travels at high speeds must be false.

(b) Decay of subatomic particles at high speeds: This discussion is about particle physics, and requires a certain amount of explanation for each experiment that was conducted. Thus, to avoid lengthening an already long refutation of relativity theory, the ideas of the relativity proposal, as well as the refutations made by authors who examined them, are summarized here so that the presentation of the new theory of the origin of the universe (in Section III) will not suffer even more unwarranted delay.

Whereas the main arguments proponents of relativity make are based on "clock time," it is necessary to clarify that most physicists regard all matter, including atoms and subatomic particles, to be "clocks" because they each have a "life time" (period of existence) such that they use the "life" of a subatomic particle as a clock. This is noteworthy because the idea of clock-time gives physicists an excuse to use subatomic particles to support their belief in relativity theory, i.e., by arguing that subatomic particles (e.g., muons) traveling near the speed of light decay at a slower "rate" than similar particles that are "at rest." Thus, the idea of clock-time is discussed together with the weaknesses of the physicists' experiments as related problems. Here, the afore-mentioned debate over the Hafele-Keating (1972b) study is briefly revisited, and then the question about the validity of the experiments on subatomic particle decay is examined.

To most readers, who are unfamiliar with relativity theory, it should be pointed out that the idea of a change in the speed of a "clock" was first proposed by Hendrik Lorentz (1904), who suggested the idea of "local time" in his work on mathematical transformations, and soon after by Einstein (1905), who based his relativistic idea of "time dilation" on Lorentz's mathematics. Lorentz suggested that there is such a thing as a "true clock," which is one at rest on Earth, and that clocks could slow down when they are in motion because certain (e.g., gravitational) forces are acting on them. But Einstein revised Lorentz's ideas to state that clocks that are in motion will slow down relative to each other.

That is, as explained by Percival (2015), "*Einstein derived his time dilation equation which looked very much like Lorentz's clock retardation equation except that absolute velocity was replaced by the relative velocity between the two clocks being compared. Hence, Einstein's time dilation equation was inherently symmetric as it was based on* ***relative*** *velocity*." And that "*Special Relativity time dilation requires that the data be symmetric between the two frames being observed. Lorentz clock retardation requires that the data show asymmetric, physical clock retardation as a function of velocity with respect to a unique frame. Empirical data from GPS* [Geo-Positioning Satellites], *Hafele-Keating, muon creation in the atmosphere, and half-life data from accelerator experiments, show that the data are consistent with Lorentz clock retardation, but not with Special Relativity*."

Also, in one of his later papers, Lorentz (1910) expressed doubts about Einstein's idea of "space-time" by stating that he (Lorentz) did not want to give up the idea that space and time are separate things: "*If one understands the idea (which I would abandon only reluctantly) that space and time are completely different things, and that there is a 'true time' … then it can be easily seen that this true time should be indicated by clocks at rest*."

At this point, the "clock-time" idea can be confusing to most readers because both Lorentz and Einstein insisted that clock-time will change (slow down) when the clocks are traveling. Lorentz's idea suggests that *gravity* could cause the mechanisms of a clock to slow down (which might explain the results of the Hafele & Keating, 1972b, experiment). Einstein, on the other hand, said that it is not the clocks, but rather that it is *time* that slows down when an object is traveling. Therefore, it is Einstein's idea about time changing, which he called "time dilation," that needs to be examined for its validity. Thus, experiments about subatomic particle decay are considered to determine whether time changes or whether there are alternate interpretations of the experiments that could explain the results of those experiments. If alternate interpretations are likely, then the idea of "time-dilation" would be further refuted.

Regarding subatomic particle decay rates, the idea that high-speed subatomic particles decay faster than other such particles that are "at rest" is actually a false proposition because (i) all such particles, including the muons that were studied, are never "at rest" because they are expelled at extremely high speeds when they come into existence due to collisions between subatomic particles from space that are moving at high speeds with high energy in the upper atmosphere, which means all muons are always moving, i.e., they are never really "at rest," (ii) muons cannot be measured directly, but only by means of complex electronic detectors that measure the time between a miniscule light flash when a muon hits an atom in the detector and a second miniscule light flash that occurs when the muon releases a photon during its decay, and (iii) the "lifetime" of a muon lasts only about 2 millionths of one second, which means that measurement errors can easily be made regarding both the "lifetime" of the muons and the muon's supposed time-dilation, which is only inferred from the distance it travels. That is, there is no direct measurement of time slowing down for the muon!

Muons are generated by collisions between "cosmic rays" (a name invented by Victor Hess, 1912), which are actually high-energy particles that are mainly protons (89% the nuclei of hydrogen, 10% of helium, and 1% of other elements) arriving from outer space, mostly from the Sun, that collide with the nuclei of atoms in the Earth's atmosphere, and those collisions expel subatomic particles (i.e., "pions") that immediately decay into "muons" (see: https://home.cern/about/physics/cosmic-rays-particles-outer-space).

Muons are the particles physicists use in their experiments to support their ideas about time dilation, i.e., time slowing down. But muons are extremely unstable, which means that they could decay instantaneously, i.e., as soon as they come into existence, or they might last some very small fraction of a second. The fact that muons are exceedingly unstable is important to understand because their instability makes them extremely difficult to "capture" for study; thus, their lifetime (their extremely brief period of existence) can only be inferred.

Now consider alternate interpretations that could explain the results of the particle decay experiments. Percival (2015) recently offered possible answers, namely, "*Either the muons are traveling at greater than the speed of light in the earth frame, which is not consistent with Special Relativity, or their half-life has been physically and asymmetrically extended between the event of being created in the upper atmosphere and the event of reaching the earth*." In other words, one possibility, which is always ignored or simply dismissed by physicists, is that muons could, conceivably, travel faster than the speed of light; which would allow them to travel further than other muons, and thus reach the greater distances during their typical, i.e., not time-dilated, lifetime. The other possibility is that the instability of the muons means that any given muon can have a shorter or longer lifetime, and, given that billions of them are created every minute, it is inevitable that a large number of them would have much longer lifetimes, which also would allow them to travel further than other muons, and therefore reach the greater distances during their inherently longer, i.e., not time-dilated, lifetimes.

It should also be mentioned that physicists selected muons to measure because their mass is large compared to other subatomic particles. This is important because particles of much smaller mass are much more difficult (if not impossible) for physicists to detect, which means that the smaller particles could be traveling faster than the speed of light, and, thus, the physicists would never be able to measure them. In other words, whereas physicists cannot "capture" or even detect such faster-than-light particles, the physicists would not be able to obtain the physical evidence that something really could travel faster than the speed of light.

In summary of the particle decay experiment vis-à-vis time dilation, physicists cannot measure the "clock" of a muon directly, cannot know if some particles travel faster than the speed of light, can only infer the "life" of a muon based on how far it has travelled, and there are alternate explanations for the results of the particle decay experiments. Therefore, those experiments cannot be considered as validating the time-dilation hypothesis.

(c) <u>The precession of the planet Mercury</u>: The concern about the precession of Mercury's orbit has already been explained above, in Section II.B, where it was discussed in order to explain why space is not, and cannot, be curved. Here, however, the refutation against curved space and relativity theory must be extended because physicists continue to use orbital precession to support relativity theory even though Newton's classical gravity theory, with some adjustments, can provide an explanation without having to introduce the impossible and indefensible concept of curved space.

The peculiarity of Einstein's equations again raise concerns because it seems to some scientists that Einstein's equations were "too perfect" to be derived purely from theory. Most physicists would not say that (for fear of being ostracized), but one Ukrainian physicist, Dunaev (2013), stated it directly, "*Einstein… had fully used the Newtonian methodology just completing it with an adjustment, <u>the value of which he knew in advance</u>. Here it would be worth to add that the General theory of relativity itself is fully based on the Newtonian Law of Universal Gravitation, that neither explains the nature of gravitational forces, nor their transfer mechanism, nor their interaction with the attracted objects. Einstein had supplemented Newton's Law*." And "*The numerical value of this adjustment calculated by Einstein was 43, the exact value needed, that Einstein already knew, which <u>cannot avoid the suspicion that the adjustment was doctored by Einstein to the a priori known result</u>*" (p. 2).

Dunaev's (2013) declaration may be the first time that doubt about the ethical veracity of Einstein's relativity mathematics has been so openly criticized. But, in any case, it clearly makes Einstein's results suspect. Therefore, it is necessary to turn again to Newton's laws of gravity to determine whether some additional gravitational force(s) that Newton did not know about 300 years ago might bring his calculations for the precession in the orbit of Mercury into better agreement with observation.

Based on scientific measurements of the Sun that have been made in recent decades, there are three gravitational factors that could conceivably account for the 43 arc-second difference in Mercury's orbit. These three factors are (i) Solar oblateness, (ii) Gravitational distortions inside the Sun, and (iii) Gravitational influences of the planet Venus that had not been included in previous calculations. Each is explained separately below.

(i) Solar oblateness. This refers to the additional mass found at the Sun's equator, which could affect Mercury's orbit because of the stronger gravitational pull from the Sun's equator. And Mercury's orbital plane of 7 degrees (greater than most planets) makes its orbit irregularly related to the Sun's equatorial mass. This idea was first suggested and presented as a mathematical proof in a book by Charles Poor, a professor of physics at Columbia University and a contemporary of Einstein. Poor (1922) mathematically demonstrated that a small amount of additional matter at the Sun's equator could account for the 43 arc-second difference in Mercury's orbit using only Newtonian mathematics. Incidentally, according to Poor, also using only Newtonian gravitational mathematics, the previously unaccounted-for matter at the Sun's equator could similarly explain the results of the "eclipse" experiment, i.e., the one performed in 1919, where light from distant stars was supposed to curve around the Sun. Consequently, the suggestion regarding the Sun's oblateness raises more concern about the veracity of relativity's "curved-space" hypothesis!

Somewhat more recently, evidence has been offered to support the suggestion that "extra matter" at the Sun's equator could help explain Mercury's orbital precession. That is, as demonstrated by two Princeton physicists, Robert Dicke and Mark Goldenberg (1967), the Sun is oblate, which means it is wider at the equator than if the Sun were a perfect sphere. The Sun's oblateness was confirmed by several other researchers, including Rozelot, Godier, and Lefebvre (2001), who stated "*It is well known that an oblateness occurs when a non-rigid body (a planet, a star, the Sun) rotates*" (p. 226), and their research focused on determining the extent of the Sun's oblateness.

Furthermore, the Sun has an equatorial band (like a "belt") that rotates at a different speed than the material to its north or south. Rüdiger, Krause, Tuominen, and Virtanen (1986) demonstrated that the Sun has unusual rotational characteristics, that is, "*The Sun has zones rotating faster than the average angular velocity and some which rotate more slowly. These zones migrate from the poles towards the equator with a period of 22 years. Always at each hemisphere there exist two fast rotating zones and two slowly rotating ones. The magnitude of the linear velocity is nearly constant during the equatorward migration*" (p. 306). Therefore, there is, in fact, more matter in the Sun's equator, which could mean that its gravitational pull at different locations around its surface would be stronger at some places and comparatively weaker at others. And this could account for the 43 arc-second difference between Newton's formulae and the physical observations of Mercury's orbital precession. But this difference, which has been confirmed, was not included in Einstein's formula.

(ii) Gravitational distortions inside the Sun. As noted previously, in Section II.B (above), it could be possible that there are differences in the density of materials inside the Sun. One might think that the material inside the Sun would not change its gravitational pull because it is made mostly of hot gas rather than heavy materials such as are found in planets, such as the Earth. But one must consider the possibilities within the physical constraints. First, although the Sun is composed mainly of hydrogen (~70%) and helium (~28%), with some carbon, nitrogen, and oxygen (~1.5%), there is also 0.5% of the Sun that is composed of other elements, including iron, silicon, magnesium, and sulfur. This might seem insignificant, but the mass of the Sun is about 1.989×10^{30} kilograms, which means that the mass of the heavier elements would equate to $0.005 \times (1.989 \times 10^{30}) = 9.95 \times 10^{27}$ kilograms. And whereas the Earth's mass is 5.972×10^{24} kilograms, this means the Sun's denser mass is equal to about 1,667 Earths, which, of course equates to a very strong gravitational pull.

And, as far as the distribution of the denser materials in the Sun is concerned, Rozelot, Godier, and Lefebvre (2001) also stated that "*the density distribution of the matter inside* [the Sun] – *which is never homogeneous – and due to the internal velocities of* [its] *rotating mass – may be not constant*" (p. 227). They also add that there are "*complex distortions inside the Sun due to different phenomena. Magnetic fields are certainly one of these, and even more certainly if the Sun contains a strong magnetic field in its core (Sturrock, et al., 1986). This effect can be reinforced if the axis of rotation of the core does not coincide with that of the whole Sun… we know that stresses occur at different depths inside the Sun*" (p. 228). Sturrock, Holzer, Mihalas, and Ulrich's (1986) 3-volume work by numerous scientific researchers provided the evidence for variations in the distribution of materials in the Sun by virtue of the fact that its interior is dynamic, rotates, and has magnetic fields. Their books also discuss solar waves, and oscillations, including on the surface of the Sun, which changes its shape. That is, the different amounts of matter on the Sun's surface, as well as the changing location of quantities of matter around the Sun as a result of recurring solar flares and solar wind, all add huge quantities of matter swirling around the Sun and into the space between the Sun and Mercury.

All of this research means that the Sun's gravitational force varies according to the type of matter, particularly the denser matter that is unevenly distributed within the Sun, and also because the interior of the Sun is constantly changing. That is, changes in the location of the various materials inside the Sun supports the idea that there could be changes in the Sun's gravitational pull on the planet Mercury, which could contribute to the changes in Mercury's orbital precession. Whereas all this new information could all be incorporated into formulae based on Newtonian gravitation, it is conceivably possible that this new information might be able to account for the 43-arc-second difference between Newton's original mathematics and observations of Mercury's actual orbital path. But, again, this factor is not included in Einstein's formula. In other words, if the new gravitational information were added to Newton's mathematics, would that make his calculations more accurate; and would that same information, if added to Einstein's calculations, make his computations less accurate?

(iii) <u>Gravitational forces of Venus not previously considered</u>. In early attempts to explain the 43 arc-second difference between Newton's computations and the observed orbit of Mercury, the influence of Venus' gravitational force was not given much attention because of Venus' size (just 80% of Earth's mass). Instead, the influences of the Earth and Jupiter were thought more important, i.e., Jupiter has the strongest gravitational pull because it is the largest planet in the Solar System, and Earth is the largest planet between Mercury and Jupiter. Yet there was still some arc-second difference that remained unexplained.

One attempt to examine this idea was conducted by Narlikar and Rana (1985), who addressed this by saying "*There was a discrepancy of ~43 arcseconds per century between observations and the Newtonian prediction*" (p. 657). But they also noted that relativity theory, likewise, did not fully answer the problem (despite claims made by Einstein and other believers in relativity theory). This led Narlikar and Rana (1985) to re-examine the Mercury perihelion because "*the agreement between* [relativity] *theory and observation… does not leave room for any other small effect*" (p. 658). In other words, Einstein's "perfect" mathematics must be suspect because there were still some gravitational factors that must be affecting the orbit of Mercury but were not included in relativity theory!

Furthermore, according to Narlikar and Rana's (1985) computations, there were, in fact, large fluctuations in Mercury's orbit "*by as much as 10 arcseconds*" (see p. 659) compared to the expected 43 arc-seconds per century in the advance of Mercury's perihelion. They found that those fluctuations occur when Venus and Mercury are in close proximity at certain points in Mercury's orbit. That is, contrary to Einstein's equations, which suggest that the perihelion advance is a smooth progression, there are fluctuations, as shown in Figure 6.

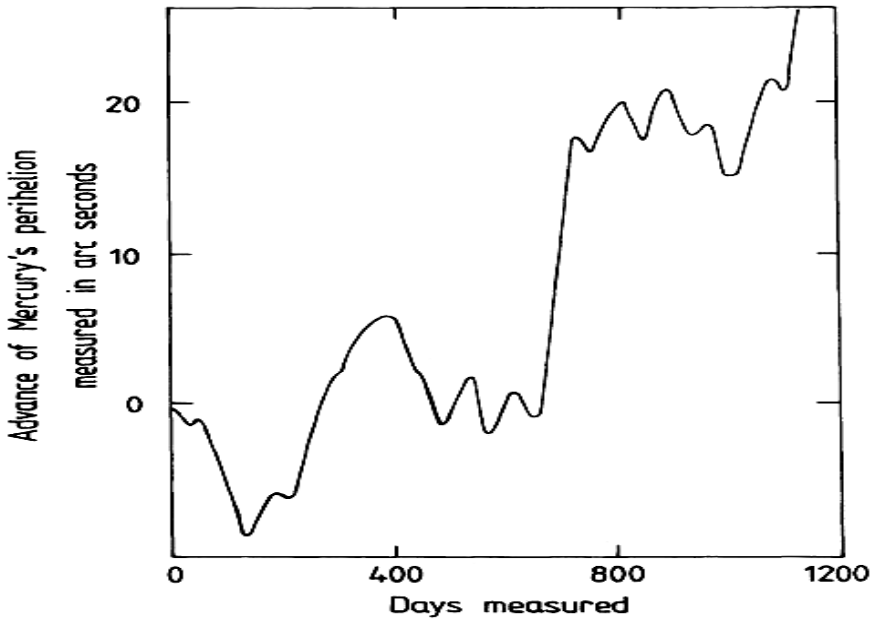

Figure 6: *Unaccounted-for variations in Mercury's orbit (from Narlikar & Rana, 1985).*

The point is that Venus' gravitational pull on Mercury becomes strong enough to alter Mercury's orbit when the two planets come in close proximity, especially when that happens at Mercury's farthest orbital distance from the Sun. Narlikar and Rana tried to mathematically correct the discrepancy between relativity theory and observation, but a discrepancy still remained. Thus, the authors (possibly under pressure from reviewers) added a note saying the discrepancy might be reduced in order to fit relativity theory if additional century-long changes in Mercury's orbit (i.e., the changing tilt in its orbital ecliptic) are included. In other words, the gravitational pull of Venus is another factor that perturbs Mercury's orbit.

Conclusion regarding space and time. This sub-section was included because it was necessary to refute the three main studies that are often cited as supporting the idea of a "space-time continuum." Those studies were about (a) atomic clocks traveling at high speeds, (b) the decay of subatomic particles at high speeds, and (c) the precession of Mercury's orbit. In this review, alternate explanations were found that could refute each of those studies.

For atomic clocks, that experiment showed some clocks *gained* time when traveling at high speeds even though relativity theory says clocks should lose time. Thus, the only conclusion is that time does *not* slow down with the speed of an object, which means space and time are not inherently connected. For the decay of subatomic particles, which relativity theorists think reflects time slowing down, alternate explanations, such as variations in the "lifetimes" of the particles that could allow them to travel farther during a normal lifetime, suggest that time does not slow down at high speeds. And regarding Einstein's computations for the 43 arc-second per century discrepancy that occurs in Mercury's observed path, several explanations were found, which, together, could conceivably support Newton's theory of gravitation. To help make this idea complete, it must be kept in mind that Einstein's relativity formulae would become erroneous when those corrections are added. Thus, if Newton's math works with the added gravity considerations, Newton's approach should not be abandoned; and, space does not need to be curved (which, in any case, is an impossibility). Therefore, given all the evidence, it may be concluded that there is no space-time continuum!

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III. "The Lighting Theory of the Origin of the Universe"

A. Introduction to the Lightning Theory

To present a new theory on the origin of the universe is a formidable task because the current "big bang" theory has existed since it first appeared in 1927, which means that physicists worldwide have accepted that old theory, and based their work on it for 90 years. This is the situation now, even though the old theory never explained the cause of the origin of the universe, and that many theoretical anomalies have accumulated. Scientists today want to defend the old theory because they built their professional lives on it. And, as editors and reviewers of mainstream scientific journals, they typically refuse to publish alternate theories, which is why new theories on the origin of the universe have never been published.

Moreover, the presentation of the new theory is a challenging endeavor because the "big bang" theory has numerous false assumptions, all of which need to be refuted before the new theory could be presented; and that was the reason Sections I and II of this monograph required so much discussion, i.e., to explain those refutations. Also, during the presentation of this new theory of the origin of the universe, some discussion must be devoted in the current Section of this monograph to demonstrating why the new theory is not constrained by the various anomalies of the previous theory. Whereas the important pieces of this scientific puzzle have just been resolved (i.e., via clarification about some basic principles of physics), it is now possible to present the new Lightning Theory of the Origin of the Universe.

B. Historical Background of the Big Bang Theory

To replace an old theory with a new theory, it is necessary to explain what the old one claims. Therefore, a brief history of "big bang" theory is given first. The term "big bang" was not its original name. Rather, the first paper on the idea of an expanding universe was written by Georges Lemaître, a Belgian Roman Catholic priest, who studied physics and astronomy. Lemaître's (1927) paper was titled "*Un Univers homogène de masse constante et de rayon croissant rendant compte de la vitesse radiale des nébuleuses extra-galactiques*" (in English: "A homogeneous universe of constant mass and increasing radius accounting for the radial velocity of extragalactic nebulae"). That theory *described* the expansion, without stating the cause; but the new Lightning Theory explains why the universe's expansion is accelerating.

Lemaître's main proposition was that the universe is expanding, i.e., that galaxies in the universe are moving away from each other. In 1927, that seemed strange to many people, including Einstein, who thought the universe was static (i.e., stable, not expanding). Einstein initially rejected Lemaître's idea, which means he had no idea that galaxies were dispersing at great speeds, which should have been an essential part of Einstein's theory. Thus, that was another weakness of relativity theory. [*Note: Einstein was said to have later accepted the expansion, but afterwards regretted his acceptance (see Carroll et al., 1992).*]

It was not until four years later that Lemaître (1931) proposed that the universe must have started from some particular point, which he called the "*primeval atom*." In a letter to the journal *Nature*, he stated "*we could conceive the beginning of the universe in the form of a unique atom, the atomic weight of which is the total mass of the universe; This highly unstable atom would divide in smaller and smaller atoms by a kind of super-radioactive process*" (p. 706). It was not until 1949 that the term "Big Bang" was first used, namely, during a British Broadcasting Corporation radio interview with a British astronomer named Fred Hoyle. Hoyle was a life-long believer in a static universe, so he strongly rejected Lemaître's idea and made up the term "Big Bang" as a disapproving and scornful description of Lemaître's theory. But whereas it was an easy term to remember, and could readily be imagined by the general public, "Big Bang" became the popular name of that theory.

C. The Lightning Theory of the Origin of the Universe

The Lightning Theory of the Origin of the Universe declares that the "creation event," which is the name used in Lightning Theory for the time that matter originated in the universe, was different than Lemaître's "*primeval atom*" that was supposed to have exploded (which is the "singularity" in big-bang theory). Instead, the actual event was in the form of what may be termed a "lightning" occurrence. The two events are conceptually depicted below, with the Big Bang in Figure 7(a), and the Lightning Theory's creation event shown in Figure 7(b).

Fig. 7(a): "*The Big Bang*." Fig. 7(b): *The Lightning "Creation Event."*

At this point, there are several differences between the two theories that need to be clearly elaborated because the theories are based on different assumptions, and, therefore, they have different consequences.

Differences in Defining Space and in the Nature of Space:

💣 Big Bang Theory assumes that space itself did not exist before the "singularity" event, i.e., that theory claims that <u>*space*</u> was created along with matter.

🗲 Lighting Theory (as explained in Section II.A) posits that space has always existed, and that only matter was created at the time of the lightning "creation event."

💣 Big Bang Theory states that space is not a void, but instead is some kind of "ether," i.e., some type of matter that Einstein (1920, 1922) stated exists because his theory of relativity required that space is not void (but the so-called "ether" has never been detected).

🗲 Lightning Theory states that space is a matter-less void (see Section II.A); and defines space as "*the infinite all-encompassing emptiness, or void, in which all matter (e.g., planets, stars, and galaxies) and energy (e.g., gamma rays, heat, and x-rays) are present, and that exists between all forms of matter (e.g., between atoms, atomic particles, and subatomic particles), and in which or through which matter and energy exist and can travel*."

💣 Big Bang Theory states that space is somehow "curved" as a function of the mass of large bodies, i.e., stars, and galaxies (but not small bodies), and that the curvature is the reason objects orbit massive bodies. That idea is used to replace Newtonian gravity; but did not clarify *how* massive objects are supposed to curve space, or *how* the curvature could cause other objects to orbit, fall toward, or into those massive objects.

🗲 Lightning Theory states that space (see Section II.B), as a void, cannot be curved. It also accepts Newtonian gravity, which is still used today in physics and spaceflight, and suggests that Newtonian gravitational mathematics could be adjusted when the gravity of previously unknown objects are discovered in order to help explain orbits more precisely.

💣 Big Bang theorists readily admit that they cannot explain what could possibly have caused the Big Bang to occur.

🗲 Lightning Theory specifies what caused the lightning event, which is explained in the following subsections on (1) the void as the setting, and (2) what caused the event.

1. Empty Space as the Setting for the Origin of the Universe

The most critical "gap" in the big bang theory is that it cannot explain what caused the big bang, upon which that entire theory is based. All proponents of that theory admit that they have no explanation for what could have caused the explosive bang. Consequently, as the big bang theory has no proposition to refute, filling the knowledge gap is mainly a matter of identifying the actual "cause," i.e., what caused the matter in the universe to be created in the first place. In line with this, it is necessary to conceive what the universe was like before the creation event that produced the matter that evolved into the universe as it is known today. That requires revisiting the explanation of what space is.

Space (as explained in Section II.A) is defined as a void. Whereas this contention conflicts with Einstein's claim that space is not a void, that difference must be clarified. Recall that Einstein declared that space is not a void because he needed a way to defend his mathematical calculations, which could only make sense if he contradicted what had always been the basic fact that the science of physics and the common-sense understanding of the universe had always been based upon, namely, that space is a void. Therefore, the argument for space as a void is made here once again, but this time from the perspective of viewing a situation in which the matter that now exists in the universe had not yet been created.

If, according to Einstein, space is not a void, then one must assume that space has always been something other than a void, and, therefore, that it was not a void before the big bang (or the event that caused matter in the universe to be created). That raises the question of how it is possible that *non-void* space (i.e., Einstein's "ether") could have existed before matter existed. That is, how could matter exist in Einstein's non-void space before matter was created? It seems Einstein never thought of this problem because he apparently never raised the question. And that is equivalent to a logical contradiction in Einstein's theory, namely, it is irrational to claim that matter existed before it was created. Hence, Einstein's claim that space is not a void is a logical absurdity, and therefore must be dismissed.

The logical impossibility in Einstein's theory becomes the starting point in theorizing about the origin of the universe, i.e., a universe in which the only thing that existed before matter was created was an infinite void, an unending expanse of complete and utter emptiness, namely, empty space.

2. The Origin of the Universe as a Lightning "Creation Event"

Now, it is necessary to explain how it was possible for matter to be created in an infinitely empty void. It is the same question Big Bang theory never answered, but Lightning Theory offers the solution. The answer, interestingly, is reasonably simple, namely, the infinite void is a tremendous *vacuum* that, in-and-of itself, has a tremendous pulling energy. This is explained below and should be easy to understand; but, unfortunately, the problem has been made so complex by physicists and astronomers that they are not sure *whether* the question can be answered, which led them to what they call a "vacuum energy density crisis" [which Kuhn (1977) would call that theory's "Model Crisis"]. The "energy crisis" is briefly explained so that the more credible Lightning Theory answer can be readily understood.

Physicists admit that "vacuum energy" exists and define it (without citing a source) as follows: "*Vacuum energy is an underlying background energy that exists in space throughout the entire universe*" (https://en.wikipedia.org/wiki/Vacuum_energy). That definition can be accepted, but must be adapted in Lightning Theory. It must also be clearly stated that the way physicists attempt to explain their version of the concept is regarded as an absolute absurdity that is *not* acceptable to Lightning Theory. Physicists preposterously hypothesize that the vacuum of space is created by "virtual particles" (that do not really exist); and their definition, i.e., "*particle pairs that blink into existence and then annihilate in a timespan too short to observe*" (https://en.wikipedia.org/wiki/Vacuum_energy), is another science-fantasy idea that might work only mathematically, but that cannot be proven scientifically.

To complicate matters further, physicists try to mathematically describe vacuum energy as a function of how many particles exist in the vacuum; but that is absurd because space was an empty void before matter was created, i.e., it contained no matter. Thus, physicists try to fit their answer into Einstein's relativity theory (which assumes that a void does not exist), so they try to estimate what the "density" of the atoms in space could be. But that puts them in a dilemma because if they use a value of zero density (i.e., zero particles per any unit of space), that would destroy relativity theory, while, on the other hand, if they use values of higher density in their formulae, those values do not match estimates from observation (see next paragraph). But, in reality, their mathematically projected values could never be accurate because the universe is infinite, i.e., it is impossible to measure infinity!

That led a few physicists to recognize that their dilemma is real, even if their concepts are not! For example, in a review paper on this topic, Carroll, Press, and Turner (1992) stated the problem as follows: "*Although particle physicists do not know how to compute* ρ_{vac} [namely, the vacuum value] *exactly, theory allows one to estimate its value. Unfortunately, the estimates disagree with observational limits by a factor of* 10^{120}" (p. 500). And Oldershaw (2011), who refers to this problem as the "vacuum energy crisis," confirmed that the disparity in theoretical particle physics and general quantum [i.e., relativity] assumptions can be as large as 10^{123}, and cited Wilczek (2001) as saying that the large disparity "*indicates that there must be one or more fundamental errors in the standard models of particle physics*" (p. 7). That must be a correct statement because even Wikipedia, in explaining what a vacuum is, says that "*The theory* [i.e., quantum field theory] *considers vacuum to implicitly have the same properties as a particle*" (https://en.wikipedia.org/wiki/Vacuum_energy), which is a blatant disregard for the true definition of what a vacuum is.

3. The Cause of the Lightning Event was the Universal Vacuum or Void

The energy that caused the lightning event was the vacuum of space itself! This needs clarification because it was not the so-called vacuum that modern physicists theorize come from "virtual particles" (which they say "blink" in and out of virtual existence so fast that they can never be measured)! The vacuum energy in Lightning Theory is the source of the energy that created the matter that now exists in the universe. It was the powerful "pull" of the infinite vacuum that existed before matter was created (and still exists today).

The term "vacuum energy" is used for this powerful force, but the reader is cautioned to not confuse this term with the phrase that is used in particle physics. The reason is that modern physicists are trying to estimate the energy in the universe because they have no other ideas to explain why the expansion of the universe is speeding up instead of slowing down (as Einstein wrongly predicted). But the mistake that physicists are making is that they are using *post-facto* thinking when trying to make their estimates. That is, they are looking for particles today – *after* matter had been created – as a possible source of the energy that is speeding the expansion of the universe. But there was no matter, i.e., no particles, before the creation event. Consequently, the "virtual-particles explanation" is doomed to failure. Modern physicists are using the idea that matter can be converted into energy, so they are seeking some source of energy from space, and the only candidates, according to their theory, would be some type of particles (matter) that exist in deep space. This is why they are looking for particles (even "virtual particles") as a source of energy in space.

That effort is doomed to failure not because it is difficult to estimate the energy that can come from free particles in space, but, rather, because: (1) space is infinite, which means any number that physicists compute would incredibly underestimate the actual force because the amounts of energy offered by virtual particles is infinitesimally small, and the particles are widely dispersed and thus cannot combine forces, i.e., the total amount of such energy could not possibly reach the huge amount of energy that exists in the universal vacuum; and, (2) no such particles existed before matter was generated in the creation event.

4. How the Universal Vacuum Caused the Lightning "Creation Event"

Vacuum energy is a force that is critical to explaining the origin of the universe, Thus, to avoid misunderstanding, it was imperative that the confusing arguments made by modern physicists had to be corrected, which is why the prior paragraphs of this monograph were necessary. This point is repeated because some papers on vacuum energy have the essence of the truth, but it is obscured by the authors' preoccupation with the erroneous idea that space is not empty, i.e., an idea that has been meticulously discredited throughout this monograph.

One paper that holds "a grain of truth," but misrepresents the facts is by Reucroft and Swain (not dated) that tries to explain "the Casimir Effect," which was predicted by Casimir (1948). As Casimir explained, "*There exists an attractive force between two metal plates which is independent of the material of the plates as long as the distance is so large that for wavelengths comparable with that distance the penetration depth is small compared with the distance*" (p. 795)]. Reucroft and Swain begin by saying that "*one first has to understand something about a vacuum in space as it is viewed in quantum field theory. Far from being empty, modern physics assumes that a vacuum is full of fluctuating electromagnetic waves that can never be completely eliminated… that are always present and can never be stopped… come in all possible wavelengths, and their presence implies that empty space contains a certain amount of energy – an energy that we can't tap, but that is always there*."

The misrepresentation of fact, i.e., the error, in Reucroft and Swain's statement was when they refer to space as "*far from being empty*." As explained previously, any materiel that exists in space today was the result of the "creation event" that generated all matter. Therefore, the error in the thinking of modern physicists is their failure to clearly state that space was a complete void before matter, cosmic rays, wavelengths, etc., were created. However, the one point that holds a "grain of truth" in Reucroft and Swain's statement is that "*empty space contains a certain amount of energy*."

This "*certain amount of energy*" is the extremely powerful "pull" of the infinite void, that is, the universe was created by the "stress" that exists in the infinite void of empty space! The pull of the infinite void of empty space, incidentally, is also the force that explains the expansion of the universe, which is discussed below (in Section III.C.5).

To try to understand how vacuum energy occurs, consider what happens when an aircraft in flight has a breach, e.g., when a crack develops in the hull. For an aircraft flying at a height of 35,000 feet (10,670 meters), the density of the air outside the aircraft is much less than the density of the air inside the aircraft. Specifically, the air pressure inside airliners on long-distance flights is 1,633 pounds per square foot (set by international aviation regulations, which is less than at ground level, i.e., 2,116 pounds per square foot, for passenger comfort), but the pressure outside the aircraft at 35,000 feet is only 499 pounds per square foot. Thus, the significantly lower pressure outside the aircraft acts as a *vacuum* that pulls the air from inside the aircraft to the outside (such events have been depicted in movies, e.g., *Goldfinger*, see the 1-minute clip: https://www.youtube.com/watch?v=6gKHzfGhjQo).

When a breach occurs, the relative vacuum outside the craft "pulls" the air out. But for spacecraft, such as the International Space Station, which orbits 220 miles (i.e., 354 km) above the Earth, the vacuum force is stronger because such craft are at the outer edges of the Earth's atmosphere. And, for spacecraft that travel in interplanetary space, or that would go into interstellar space, the "air pressure" is *zero*, which makes the vacuum pull much stronger. [*Note: The "density" of interstellar space is measured in terms of (hydrogen or helium) atoms per cubic centimeter (cm^3) of space, which has been said to average 1 atom per cm^3. That must be interpreted carefully as most space is an absolute vacuum of 0 particles per cm^3, but physicists average those empty spaces with the much denser locations around stars that eject the atoms*.] Thus, the fact is that most space (whether it is cubic meters or cubic miles) is actually a total void (see Elert, 2017).

Regarding the ***cause*** of the creation event, first keep in mind the power of the vacuum that has been described above and that is still evident throughout space. Now imagine the infinite space of the entire universe. And it is also critical to remember that the time period under consideration is the era *before matter had been created*, i.e., there was no matter at all anywhere in the absolute infinite void of empty space that existed then. Consequently, the strength of the vacuum that existed in the universe was therefore immense!

This tremendous power of the infinite void pulling from all directions created a type of "stress" that may be called "stress energy." The idea here is the matter-energy conversion concept, i.e., as matter can be converted to energy, and vice versa, then the tremendous stress energy in the infinite universe could be what was converted into matter at the creation event. Every point in space was under stress, i.e., every point was being pulled upon by the void from all directions (to visualize this imagine being inside a sphere that is completely surrounded by very powerful magnets that are pulling from every location around the sphere). And in the void of empty space, the pull comes from an infinite number of locations because space is infinite in all directions. This means that "lines of stress" must have existed. In theory, some stress lines might have combined, such that some of the lines were more intense, thus increasing the stress energy along those lines.

Also, in theory, the overall stress along some of the lines must have reached a critical degree of intensity such that the tremendous energy became a force that converted itself into some form of matter. It was not Lemaître's (1931) "*primeval atom*" because there is no logical reason that any single point in infinite space would be the only location where matter would be created because space is infinite with no "center." Rather, a linear-like mass was generated, but a linear mass that was twisted by the other lines of stress from other directions, causing the main line to have "branches" that twisted and diverged, forming more lines to newly create matter. The result would look like a lightning bolt having a twisted linear form with branches. This type of structure is depicted in Figure 7(b), which is shown again, below.

Figure 7(b): *Conceptual depiction of the Lightning "Creation Event."*

Physicists guessed that there is some kind of *force* "pulling" all matter in the universe out to the distant reaches of space; a force causing the speed of galaxies to accelerate. They first guessed it was some kind of matter they called "dark matter" because it was not visible (see Section III.C.5). But as no such matter was ever found, they imagined a "dark energy." The energy they seek is actually the immense pull of the infinite void. Physicists had hoped to find small amounts of energy from "virtual particles," but that is impossible because particles did not exist before the creation event. At any rate, computations for those theorized particles would pitifully underestimate the tremendous power of the infinite void!

5. Why the Expansion of the Universe is Accelerating

Einstein, after accepting Lemaître's (1931) idea of an expanding universe, theorized that most of the matter at the origin of the "big bang" explosion would provide sufficient gravitational force to cause all the matter that is traveling away to decelerate, and eventually be pulled back to the location from which the explosion originated. But that contradicts his own theory about the curvature of space (rather than gravity) being the supposed cause of matter/objects falling into more massive objects because all objects are supposed to be expanding away from all other objects. That is, the distant galaxies are not orbiting anything; thus, Einstein contradicted himself because he used the idea of Newtonian gravity as a force – not his idea of curved space – to theorize that the expansion would slow down and be pulled back to the place where he thought the majority of matter in the universe is located.

That is an error in Einstein's theory, which all physicists know and which causes them immense consternation, namely, that the expansion of matter in the universe is *accelerating*. It is an observable fact that contradicts Einstein's theory, but no physicists can explain it.

Lightning Theory can explain the accelerating expansion of the universe. Stated as simply as possible, it is the immense vacuum-like pull of the infinite empty void that is pulling all the galaxies that exists in the universe apart, away, and off into the farthest reaches of infinite space.

This explanation for why the universe is not only expanding, but also accelerating, provides equally understandable reasons that dispel the incorrect and unworkable hypotheses that modern physicists have proposed in their efforts to resolve the anomalies of Einstein's relativity theory. Two of their hypotheses, namely, (a) the idea of "dark matter," along with the idea of "dark energy," and (b) the expansion of space, are discussed below.

(a) There is no such thing as "dark matter." Zwicky (1933) initially hypothesized the existence of a force he thought was causing galaxies to accelerate away from each other, and called the force "dark mass." Modern physicists call it "dark matter" and suggest that some huge amount of matter with tremendous gravitational force might exist beyond the detectable universe, and they theorized that such matter is pulling the galaxies apart, i.e., that the gravitational pull of that "dark matter" makes the galaxies accelerate away from each other, pulling them further apart and into even deeper space.

Physicists call it "dark matter" because they could not see it and could not detect it. Of course, there are blatant weaknesses in that idea, which are reflected in questions that must be asked about it; and here are a few questions, along with the logical replies:

<u>Question 1</u>: *How did dark matter come into existence*?

<u>Reply 1</u>: Dark matter could not have existed before the creation event that generated all the matter in the universe because no matter could have existed before it was created. Thus, if dark matter were created at the same time as all other matter, it should behave the same way, i.e., dark matter should also be accelerating away; but if it is, what is causing it to accelerate?

<u>Question 2</u>: *What is the reason that dark matter cannot be detected*?

<u>Reply 2</u>: Dark matter cannot be detected because it does not exist.

<u>Question 3</u>: *Why has dark matter not been found locally or anywhere else in the universe*?

<u>Reply 3</u>: Dark matter is not here or anywhere in the universe because it does not exist.

The idea of "dark energy" also needs to be mentioned. Some physicists realized that dark matter cannot exist and renamed it "dark energy" because they recognized that some form of energy is causing the galaxies to accelerate. Lightning Theory asserts that there is a form of "energy," but from a different source, i.e., <u>*the great vacuum energy from the void*</u> (not from nonexistent "virtual particles"). Hopefully, when physicists read this, they will understand the answer. That is, the "energy" for which they are searching is actually the "vacuum energy," i.e., the pull of the infinite void. When they realize how immensely powerful that force is, they will have found their "dark energy"!

(b) Empty Space Cannot Expand. Another concern about the concept of the "expansion" of space. Big bang theory insists that space itself is somehow growing larger, and that the speed of light is an absolute barrier. They say distant objects only *seem* to be moving faster than light, and use the "*space* expansion" idea to try to account for the faster-than-light speed of the remote galaxies; but space expansion is an illogical and unproven idea.

At this point, it is necessary to reiterate that the new Lightning Theory of the Universe also states that the universe is "expanding," i.e., that the galaxies are moving apart from each other. However, the new Lightning Theory posits that space is a void, which cannot curve or expand, and that it is rather the objects that were created that are moving at different speeds; and it also allows the possibility that objects can travel faster than the speed of light.

Logically, a void does not – and cannot – expand or contract because there is no matter in a void, and, by definition, space is a void. Only matter can change shape. Thus, the *matter* that was created in the void started to move apart (expand) after it was created. The important point is that *space*, the infinite void, was not "created" when the lightning event occurred that generated matter. Empty space existed before matter was created. Then, the matter began to move apart. By definition, "expand" means an object (matter) increases in size, or parts of an object, or a set of separate objects, move away from each other. Hence, space, which is an empty void, cannot expand because space is not composed of matter.

D. The Shape of the Lightning Creation Event and the Collision of Galaxies

1. The Shape of the Lightning Creation Event

The "creation event" that generated all matter in the universe had a shape like a streak of lightning (not a single point in space). The event was in the nature of a bolt of lightning, with numerous "branches" that went in all directions. During the creation event, a linear-like mass was formed, i.e., a line of matter like a bolt of lightning that was twisted by other lines of stress from other directions. Also, some stress lines could have been strong enough to also form lines of matter, and those lines joined the dominant lightning bolt to create "branches" that diverged from the main line of newly created matter. The result would look like lightning, i.e., a twisted linear form with branches, as shown in Figure 7(b). The number of branches is not known today, but some astronomers might use computer-graphics programs that could detect the linear forms that exist now and reverse them in time to obtain the original forms. For example, Figure 8(a) depicts part of the present-day structure of galaxies (Powell, 2017), and Figure 8(b) shows that same picture with an overlay of possible lightning-bolts.

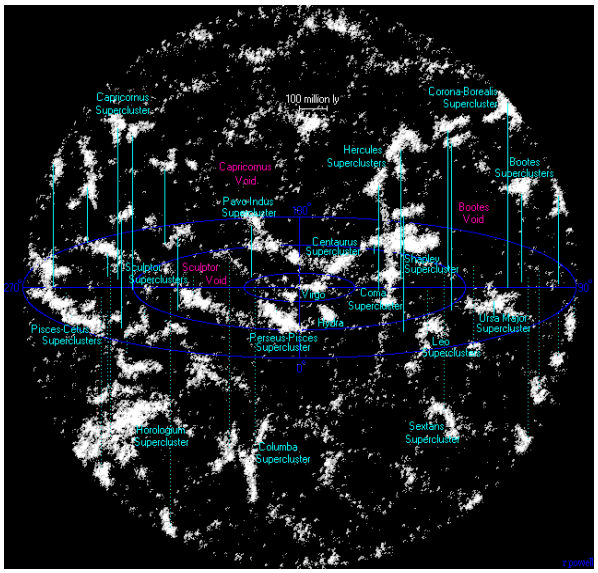

Figure 8(a): *Hubble picture of galaxies*.

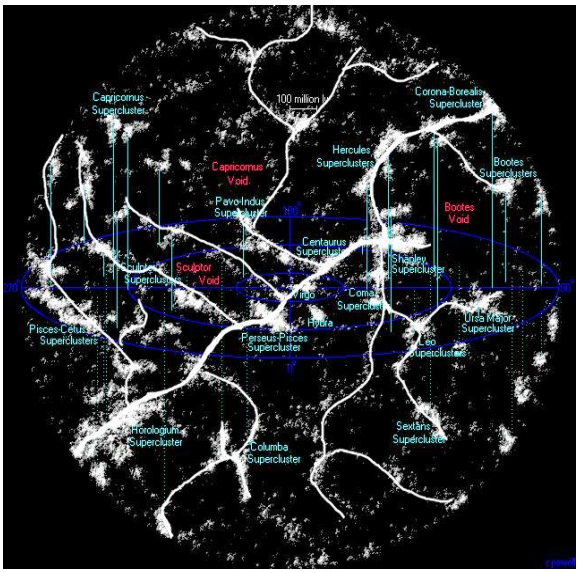

Figure 8(b): *Same galaxies with lightning*.

What is the evidence that the matter in the universe could have originated in the form of a lightning bolt? Figure 8(a) displays telescopic data showing galaxies that appear to be in clusters (Powell, 2017). Note that there are clusters of galaxies that take linear-like form. And there still exist empty spaces, where no stars or galaxies exist! "*Intergalactic space is the physical space between galaxies. Studies of the large scale distribution of galaxies show that the Universe has a structure with clusters and groups of galaxies lying along filaments that occupy about a tenth of the total space. The remainder forms huge voids that are mostly empty of galaxies*" (Wikipedia, https://en.wikipedia.org/wiki/Outer_space). This could be a consequence of matter initially being formed along a structure that resembles a lightning bolt.

Figure 8(a) depicts what has recently been detected. It is not a simple, sharp-lined lightning bolt because, for billions of years, all the created matter has been expanding from where it originally formed and has also been interacting gravitationally. But, in the part of space shown in the picture, when the clusters are connected with a white-line "overlay" to represent lightning lines, it resembles branches with some empty spaces between them.

2. Galaxy Collisions in Lightning Theory versus Big Bang Theory

There is another important factor that must be considered when comparing Lightning Theory with the Big Bang Theory. That factor is a very large number of galaxies that have been – and still are – colliding, which has resulted in remarkable patterns of matter in the shape of distorted galaxies, combined galaxies, and a variety of shapes that astronomers could only categorize as "unclassified" shapes. Note that this could not happen if there were only a single-point, big-bang explosion because all the matter created from a single-point explosion would always have to be moving away from each other.

That is, in the big-bang scenario, all galaxies must travel *away* from each other; and therefore should never be able to collide because, by definition, a collision means that the objects in question must physically be coming from different directions in order to meet and impact each other. In other words, a collision requires objects to travel toward each other. Therefore, in order for galaxies to collide, they must have had some independent points of origin that allow the galaxies to travel *toward* each other!

To clarify this, the big bang may be likened to an explosion of a hand grenade in empty space where nothing else exists. That is, one can imagine that the hand grenade is like Lemaître's "*primeval atom*," namely, one can think of it as the only thing that existed except for empty space. When it exploded, each fragment had a separate outward trajectory, such that every fragment was moving away from every other fragment, which means that there should be no collisions between the fragments of the hand grenade. Big-bang theorists might argue that the paths of the fragments were inhibited by matter in space, namely, Einstein's "ether," which would resemble a situation like injecting material into a pool of water. That is, the path of the material would be inhibited by the water molecules, which would cause the injected material to change course and start to swirl around other parts of the injected material. But there was no other matter in space at the time of the explosion; therefore, nothing inhibited the path of the newly created matter. Hence, just like the fragments of a hand grenade, the newly created material of a single-point "big bang," namely, the outward moving primeval matter of the universe, including the galaxies, would not collide.

In Lightning Theory, however, the matter that became galaxies had been formed along the various branches of the original lightning bolt. Then, the newly created matter expanded along each branch and eventually formed galaxies. Recall that those galaxies had different starting points, i.e., they originated from different branches. And those galaxies started to move apart in all directions from each branch. Thus, it is not difficult to imagine the galaxies in 3-dimensional space moving away from any given branch, and, whereas some of the branches diverged from the main lightning bolt, their galaxies could head toward each other, which would allow them to collide. This idea is depicted in Figure 9.

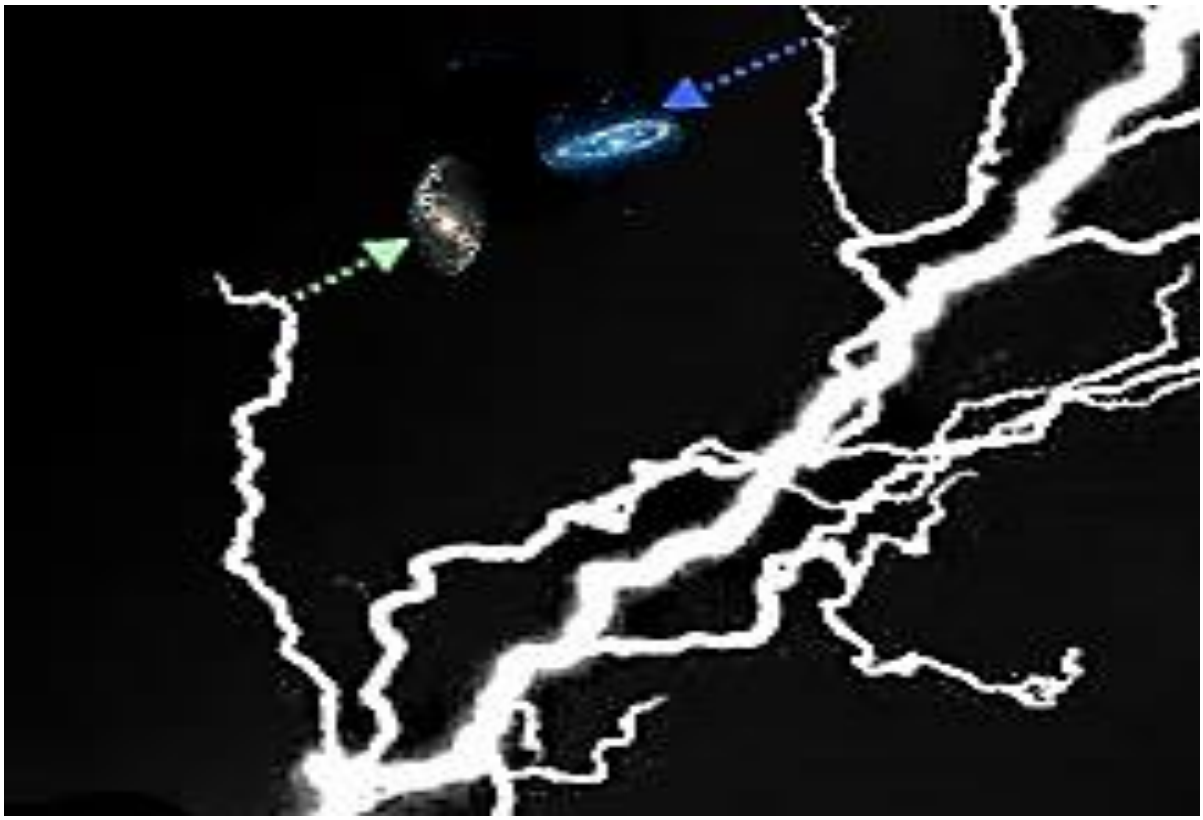

Figure 9: *How galaxies from different branches can head toward each other*.

In a universe where mass and galaxies are created along lightning branches, it is not only possible, but inevitable, that galaxies will collide! And many are colliding! According to the Harvard-Smithsonian Center for Astrophysics (2013), "*Collisions between galaxies are common. Indeed, most galaxies have probably been involved in one or more encounters during their lifetimes*." And a recent study raised the estimated number of galaxies from billions to *trillions* (Conselice et al., 2016), thus increasing the chances of galaxy collisions.

Figure 10 (NASA, 2008) is a Hubble Space Telescope image (ESO 593-8) of two galaxies colliding. Note they intersect at right angles, which would be impossible if all matter in the universe were expanding away from all other matter, as proposed by big bang theory.

Figure 10: *Two galaxies colliding* (https://www.spacetelescope.org/images/heic0810aj).

Another example, ARP-148 in Figure 11 (also from Hubble), exposes an on-going collision of two galaxies. Note how these two galaxies are nearly perpendicular to each other.

Figure 11: *ARP-148 shows two colliding galaxies*.
(http://hubblesite.org/image/2309/news_release/2008-16)

Yet another image, called IC-2148 (again from Hubble), shown in Figure 12, reveals two galaxies that are colliding at an angle of about 30 degrees (which resembles a "V" shape). As explained by Mundy (2016), elongated streams of gas, dust, and stars that extend from each galaxy happens when galaxies collide and their separate gravitational fields cause the material from each to fly out into space in opposite directions

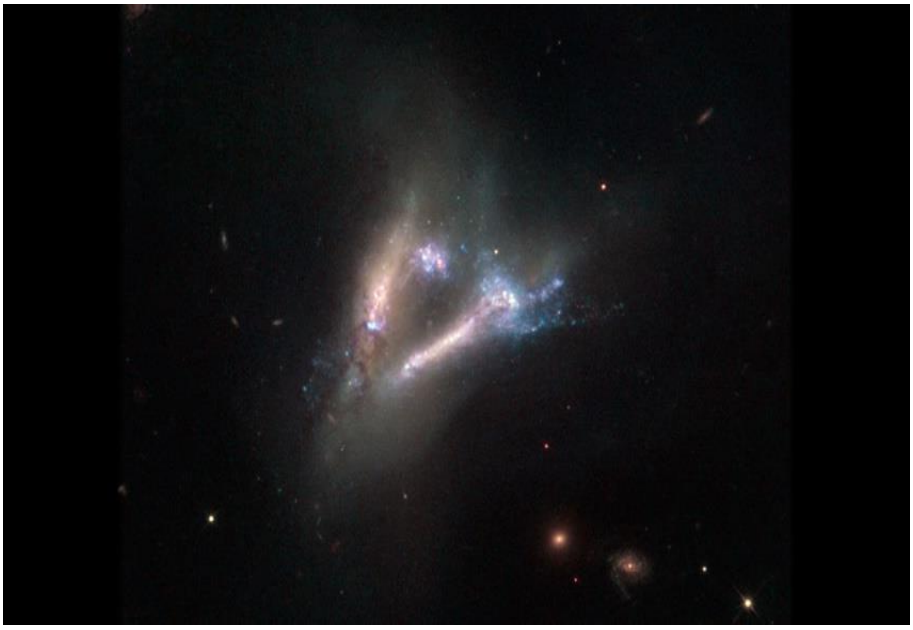

Figure 12: IC-2148, *V-shaped colliding galaxies*.
(http://blogs.nottingham.ac.uk/newsroom/files/2016/06/potw1306a.jpg)

Figure 13 (called ARP-271) depicts two spiral galaxies, NGC-5426 and NGC-5427, starting to collide. They are headed toward each other, but more importantly, their "pitch" angles (in relation to the viewer) are different, i.e., they are not on the same plane. Rather, the left galaxy is seen from the top and the right galaxy is seen tilted to one side, which means they originated at different locations. Yet, they are on a collision course.

Figure 13: *ARP-271 shows two galaxies beginning to collide*.
(http://www.paulandliz.org/Galaxies/ARP/Arp271_Gemini.jpg)

3. A Brief Note on Lightning Theory in Relation to "String Theory"

It must first be stated that this author is not a proponent of any of the multitude of versions of what has come to be called "String Theory." Instead, this note is merely a minor conjectural idea on the possibility that there might be some connection between the ideas put forward in this monograph on Lightning Theory and some aspects of String Theory.

The only reason String Theory is mentioned here is that Lightning Theory proposes that the origin of matter in the universe occurred along a linear (albeit twisted) "string-like," lightning-type form of matter. This idea is supported by the "filaments" that have been noticed in a large-scale study of the location of mass, particularly galaxies and galaxy clusters, in the universe (see Powell, 2017). Whereas Lightning Theory proposes that the creation of matter was linear-shaped, which has received empirical support from an independent source (Powell, 2017), String Theory might benefit from the ideas of Lightning Theory.

Of all the versions of string theory, the only one to be mentioned here is the attempt by some string theorists to apply their mathematics to the field of cosmology. Thus, here, it is conjectured that the cosmological "strings," which the string theorists are looking for, are the lines of force that were exerted by the vacuum energy from the void of infinite space at the time of the creation event. It must, however, be kept in mind that the theorists who suggested the idea of energy coming from minute particles that are widely scattered around the universe have greatly underestimated the tremendous amount of force that exists in the universal void. Thus, string theorists who wish to apply their theory to the universe should not be looking at tiny particles, but, rather, should be considering the immense energy exerted by the infinite void (vacuum) of the entire universe, which extends beyond the known outer galaxies, to the as-yet-unseen empty (truly empty) space that exists far out in the infinite cosmos.

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IV. The Creation of Gravity

Almost everyone takes gravity "for granted" and rarely gives it a second thought because no one can escape it (even astronauts are in "micro-gravity" when in space), but it is worthwhile to take a look at the definition and origin of the word to ensure that a scientific approach is being used in this discussion. It is also worthwhile to consider Isaac Newton's original concept about gravity because he was the mathematician and physicist who identified gravity as a universal force. And also because Newton's thoughts about the force of gravity turn out to be remarkably insightful, particularly in regard to the hypothesis being presented in this section about how gravity is created. A brief note on the definition of gravity and a look at the critical point Newton made about the force of gravity are used with some history in order to lay the foundational framework for the conceptual propositions that are made in the present theory on *what causes the force of gravity to exist*.

The definition of the modern word "gravity" can be traced to its Latin origin, which had two forms, namely, "gravis," which meant "heavy," and "gravitas," which meant weighty or serious. (It will not be necessary to trace the word through 2,000 years of its use so that it will be possible to focus on the more important points that lead to the hypothesis about the creation of gravity.) The modern use of the word gravity to refer to a natural, physical "force of attraction" between any two objects can be attributed to Newton (1687), from his book, entitled *Mathematical Principles of Natural Philosophy* (the original title was in Latin, i.e., *Philosophiæ Naturalis Principia Mathematica*).

To answer "*What is gravity?*" a National Aeronautics and Space Administration (NASA) webpage said: "*We don't really know. We can define what it is as a field of influence, because we know how it operates in the universe. And some scientists think that it is made up of particles called gravitons which travel at the speed of light. However, to be honest, we do not know what gravity "is" in any fundamental way - we only know how it behaves. Here is what we do know: Gravity is a force of attraction that exists between any two masses, any two bodies, any two particles. Gravity is not just the attraction between objects and the Earth. It is an attraction that exists between all objects, everywhere in the universe. Sir Isaac Newton (1642-1727) discovered that a force is required to change the speed or direction of movement of an object. He also realized that the force called "gravity" must make an apple fall from a tree, or humans and animals live on the surface of our spinning planet without being flung off. Furthermore, he deduced that gravity forces exist between all objects*" (https://starchild.gsfc.nasa.gov/docs/StarChild/questions/question30.html).

The long NASA quote was used because it contains critically important points. First, NASA's answer to the question of what gravity is was "*We don't really know*"! This is very interesting because the average person tends to think that scientists know what gravity is, but, in fact, they do not. And that is the starting point for the hypotheses in this section of this monograph. Another very critical point (which was made twice in NASA's answer) is that NASA used Newton's theory to define what gravity is, i.e., "*Gravity is a force of attraction that exists between any two masses, any two bodies, any two particles*," and "*he* [Newton] *deduced that gravity forces exist between all objects*." The reason this point is so important is because Newton, some 330 years ago, provided the basis for answering the most difficult question of what *causes* gravity, even though he was not able to explain what causes gravity! That question will be answered after a brief review and refutation of the two main theories that have been suggested in the history of scientific thinking about this problem.

Theories proposing the possible causes of gravity have been along two main avenues: (1) that gravity might be caused by some distortion in the cosmological structural of space, and (2) that gravity might be caused by some type of miniscule particle or subatomic particle. Those theories are reviewed below.

A. Review and Refutation of Previous Theories on the Cause of Gravity

Physicists have never been able to explain how or where gravity is created. What they do know is that the gravitational force of a material object is proportional to the mass of that object. Although physicists can compute the amount of gravity of a celestial body (such as the Sun, the Moon, or the planet Earth) based on its mass, no one has determined *how* gravity is *created*. Physicists can calculate the gravitational pull of celestial objects, and can even use those calculations to navigate satellites and spacecraft and maneuver them to orbit around those and other celestial objects, including using the attractive force of a celestial object to increase or decrease the speed of a satellite or spacecraft as it travels through space.

Physicists are able to use gravitational force in their research, but where is the explanation for the origin of gravity? This as-yet-unanswered question has plagued people (and physicists) from the time the human mind began to think about surviving on the planet, for example, in attempting to retrieve fruits that hang from high trees, and trying to find ways to avoid falling from a tree to preclude their descent into the jaws of predators that wait below. Thus, the previous attempts to explain gravity are now reviewed.

1. Gravity is Not Curved Space: In the early part of the 20th Century, Einstein introduced the idea that space is curved around massive objects such as planets, stars, and galaxies, and stated that his supposed huge curvature in space is what causes other objects to fall toward those massive objects. Einstein insisted that Newton's gravity should be replaced with the idea of massive objects causing curves in what he called the "space-time continuum," but he was never able to explain by what mechanism massive objects could possibly cause space to curve. Incidentally, it should also be noted that – unlike Newton, who stated that all particles, *regardless of size*, have attractive force with all other particles – Einstein did not discuss the possibility that small particles could possibly exert a gravitational force. Consequently, Einstein's theoretical hypothesis, namely, that some kind of curvature in space-time could be what gravity is, should be dismissed outright because previous sections of this monograph have demonstrated that space is not curved, and there is no such thing as a space-time continuum. In other words, the idea of a large curvature in space does not, and cannot, explain the <u>*cause*</u> of gravity.

2. Gravity is Not a Unique Subatomic Particle: The idea that gravity might be caused by some special type of subatomic particle has been suggested by a few physicists; but those suggestions range from being only remotely plausible to being completely absurd. However, whereas those suggestions have attracted a number of theorists, and some have attempted mathematical and/or empirical tests of that idea, this review looks at that idea a bit (*no pun intended*) more closely. Like the review of the curved space idea, this review will be brief because physicists have never been able to solve this problem.

Apart from Newton's suggestion that all particles have gravity, an early suggestion, which inferred that some sort of subatomic particle might cause gravity came from Einstein (1916), who discussed gravity waves, which *implied* that there might be gravity particles because all particles have a wave nature (Greiner, 2001). That is, according to "particle-wave" theory, if gravity takes the form of waves, then the gravity waves should be produced by a gravity particle. However, the term for the suggested particle, namely, the "graviton," which is used today was originated by Blokhintsev and Gal'perin (1934), two Russian physicists.

The idea of subatomic gravitons creates problems for physics. The first problem is that the idea of a gravity particle contradicts Einstein's insistence that curved space – rather than Newton's gravitational force – is what causes bodies to fall toward massive objects. In other words, gravitons were supposed to be particles that cause gravity. But that contradicts the ideas of Einstein and other relativists. That is, how could subatomic "gravitons" exist as the pulling force of gravitation if curved space is supposed to be what causes all matter to "fall toward" massive objects? That question remains unanswered.

Another approach to the idea of investigating subatomic particles was suggested by Chew and colleagues (see Chew, Gell-Mann, & Rosenfeld, 1964), whose main contribution to physics was the idea that what had been thought in the 1950s to be "elementary particles" were composed of yet smaller subatomic particles. The concept, which was based on an idea that was called "bootstrapping," implied that particles were held together by the interaction of forces among subatomic particles. Later, in the 1970s, their suggestion to conduct more research on subatomic particles laid the foundation for gravity theory (which is now called "quantum gravity theory") as well as for "string theory," which is concerned with what might hold particles together.

Although the subatomic-particle approach to explaining gravity never found a solution, "string theory" recently gained followers because it claims to be applicable at all levels of material in the universe, from subatomic particles, including the supposed gravitons (Gubser, Klebanov, & Tseytlin, 1997) to galaxies. String theory focuses on the idea that there are "invisible forces," called "strings," that hold matter together. String theory also suggested that a graviton could exist as a "closed string," which those theorists claim is something that is not bound to this universe and, therefore, "could travel between universes" (Morisse, 2009); but that idea is absurd (i.e., that suggestion reflects a complete misunderstanding of the real universe because, as explained previously, in Section II.A, there is only one universe).

In other words, string theorists use pure mathematics ("pure" meaning theoretical mathematics that is not based in reality; that is, pure mathematics uses ideas for proposed equations, which include factors that might *or might not* exist; and the numbers themselves might not exist, e.g., the square root of any negative number is an "unreal" number). Therefore, as a consequence, it must be understood that when string theorists work out a mathematical solution to a problem, their mathematics might indicate (e.g., by solving some type of equation) that something does exist, even though it does not exist in the real world! Hence, when string theorists say that a graviton *could* exist mathematically, they recognize that it is only their formulae that *imply* that gravitons *might* possibly exist; and the string theorists then conclude that the effects of a graviton might conceivably work – under the condition that they possess certain properties – even if they do not exist!

There are still other problems with the idea of a graviton particle. As one example, if gravitons exist as independent subatomic particles, and if they are what is supposed to be the cause of gravity, then they would, according to their very nature, necessarily have to gravitate toward each other. Therefore, if gravitons are the very essence of gravitational attraction, then they would conglomerate to form masses of graviton spheres. And such spheres could be of varying sizes depending on how many gravitons there might be in some particular vicinity. And whereas they should be everywhere in the universe (if they existed), then they should be easy to find. But no gravitons have ever been found anywhere on Earth or anywhere in space, either singly or grouped together. Hence, as gravitons should be everywhere, but none have ever been found, it may be concluded that gravitons do not exist.

Here is another dilemma for the graviton theorists: If gravitons are particles, why are not all the gravitons of a neutron star ("black hole") absorbed into the neutron star, leaving none of the gravitons outside to attract other objects? That is, neutron stars have tremendous gravitational force, and if gravitons are *the* particles that cause gravity, why are the gravitons independent of the mass of a neutron star? Existing theory suggests that gravitons, like photons, would have no mass, which physicists might use as an excuse for neutron stars not attracting them; but photons have no mass, yet even photons cannot escape the tremendous pull of a neutron star. Thus, logically, one must conclude that gravitons, or any unique particle that is supposed to be what causes gravity, do not exist. Hence, something else must cause the gravitational force that exists everywhere in the universe.

B. Where Gravity is Created

To answer the question of where gravity is created, it was first necessary to disqualify certain possibilities, which was accomplished in the foregoing paragraphs. That is, the idea of curved space was dismissed because it is impossible for space to be curved. That century-old fantasy might work with a set of complex mathematical formulae (but they may be replaced by Newtonian mathematics with minor adjustments needed to include some new information about the universe that was discovered after Newton had worked out the gravitational laws 300 years earlier according to what was known about the universe at that time). It was also explained that gravity cannot be caused by subatomic "gravitons," which would have to exist in huge amounts because the effects of gravity are found everywhere, not only on Earth, but also in deep space, yet, not even a single such particle has ever been found.

Consequently, if the cause of gravity is not a characteristic of space, and no unique subatomic particle has been found to generate gravity, the only logical place to search for the cause is in the atom itself. That is, whereas the foregoing analysis employed the process of elimination, the only remaining place to search for the cause of gravity is within the atom. In the Standard Model of the Atom (if unproven theoretical subatomic particles are excluded), that leaves the electron, the proton, and the neutron. Each is deliberated below.

1. Consider the Electron: Using scientific insight, basic logic, and continuing with the process of elimination, one needs to ask whether electrons can generate gravity. The answer becomes clear from two points: First, electrons are all negatively charged particles and therefore repel each other; second, electrons do not inherently gather together in larger masses composed exclusively of electrons only. As explained for the case of gravitons, there are no electron spheres that hold each other together in unique, persistent entities. There are also no "electron stars" that are composed entirely of electrons that pull upon each other and hold themselves together because of their gravitational force. Hence, electrons, *by themselves*, do not generate gravity. There is a very important related point here, namely, some subatomic particles (such as electrons) may have mass, but, according to the logic presented in this part of this monograph, it will become clear that, contrary to what is generally believed about gravity, *mass alone* is <u>not</u> a sufficient factor to generate gravitational force!

2. Consider the Proton: Now consider the proton. The same scientific and logical analysis that was used for the electron also can be applied to determine whether the force of gravity is generated by the proton. That is, in the Standard Model of the Atom, every proton has a positive electric charge, which normally makes them repel each other. Thus, protons, by themselves, would not attract each other to form spheres of pure protons; which would happen if they were the source of the gravitational force in the universe. And there are no "proton stars" that are composed exclusively of protons pulling upon each other and holding themselves together because of their gravitational force. Therefore, protons, *by themselves*, do not generate gravity.

3. Consider the Neutron: Explaining how the neutron could be the actual source of gravitational force is more difficult than deliberating on the electron or the proton as possible sources of gravity because the neutron has a mass that is greater (albeit only slightly) than that of the proton and the electron *combined*. In other words, the peculiar mass of the neutron led to arguments about what the neutron really is. That is, should gravity be discussed using the Standard Model of the Atom that originally viewed the neutron as a combination of a proton plus an electron (plus a "neutrino"); or should gravity be discussed according to ideas from more recent theorists, who reject the previous explanation and instead offer the proposition that the neutron is composed merely of three "quarks," i.e., subatomic particles that each has "a fraction of an electric charge"? That difference in theories, of course, makes the discussion even more cumbersome. Therefore, it will be necessary to first determine how to proceed with addressing the question about where (and how) gravity is created.

Before going further, the reasons for the two views should be noted. The earlier view, i.e., the original concept, was conceived because research revealed that, when a neutron decays naturally (as opposed to being bombarded by other particles), the result is that a proton, plus an electron, plus a certain amount of energy are released. The recent "quark" view is a theoretical idea, which states that the combination of subatomic particles with certain electric charges could explain why neutrons have no charge. The quark argument is that a neutron consists of 1 "Up quark," with a charge of +⅔, plus 2 "Down quarks," each with a charge of -⅓; and when those quark charges are added the result is: +⅔ -⅓ -⅓ = 0 (neutral). [*Note: Quarks have never been observed, but some research supports them in theory, based on predictions of what would happen if they did exist when electrons are hurled at neutrons. But no judgement is made at this time about the possible existence of quarks*.]

In consideration of the two possible ways to discuss the neutron as a possible source of gravitational force, modern particle physicists, unfortunately, do not give a structural unit to discuss. That is, to date, quarks have only been theorized to exist as "fractional charges," but have never been observed. Also, other than the interaction of plus and/or minus fractional charges, no descriptions of actual particles with physical characteristics that could explain how quarks might generate a gravitational force have been offered (or demonstrated). Therefore, the theory of gravity presented here starts by examining the earlier, "classical" theory, which envisions that the neutron possesses certain distinctive physical characteristics (then subsequently considers how quark theorists might proceed with their theories).

C. How Gravity is Created in the Neutron

It has been established that "neutron stars," namely, stars that are composed almost exclusively of the neutrons of atoms, possess the most tremendous gravitational force in the universe (apart from entire galaxies, which contain collections of various types of stars, including neutron stars, and other celestial matter that are composed of neutrons). These facts, namely, that neutrons are intimately connected with gravitational force, offer strong evidence that the neutron must be the physical entity that generates gravity. And because of the previous analyses that eliminated the electron and the proton as gravity generators, the neutron, theoretically and logically, is the only physical entity that could generate gravity!

Whereas neutron stars provide the most convincing evidence, it is necessary to explain some additional terminology. For the purpose of clarification, the difference between a neutron star and a "black hole" must be explained. In modern physics theory, when a neutron star become sufficiently dense it then becomes what has been named a "black hole." A few points need to be made about this. First, neutron stars are the remains of very large stars that had exploded into supernovae, leaving behind the heaviest particles, namely, neutrons, which condensed to become massive objects with tremendous gravitational pull because of their huge mass (recall that the neutron is the most massive particle of an atom). And the mass increases as it pulls unto itself surrounding gas and other remnants from the supernova, all the while stripping the atoms it absorbs down to only their neutrons, while also condensing free electrons and protons into neutrons (Faure & Mensing, 2007).

When a neutron star reaches a certain mass, the gravity becomes so strong that even photons, i.e., light particles, cannot escape. As a consequence, whereas light is no longer emitted from extremely massive neutron stars, physicists used the term "black holes" to describe them. This is where an objection must be lodged because that is a terrible misnomer as it gives the impression that there are "holes" in space into which everything near the neutron stars "disappears." Therefore, whereas the so-called "black holes" are irrefutably neutron stars, but that have reached a mass sufficient to absorb even photons, and the term "black hole" is a misleading misnomer, the remainder of this explanation of the theory regarding how gravity is created shall use the term "neutron star" for both cases.

1. The Proton-Electron Interaction within the Neutron Causes Gravity: Using the original Standard Model of the Atom, which characterized the neutron as being composed of a proton and an electron, this section proposes that it is the interaction of the proton and the electron *within the neutron* that creates the force that is called gravity. According to this model, neutrons are dynamic units that interact with the protons (for deuterium, one proton) and the electrons in their immediate atomic environment.

The question becomes how do neutrons create gravity? A description of the neutron will make this easier to comprehend. But it should be noted that "quark" terminology and theory will not be used in this description (thoughts about quarks and gravitation are offered in Section IV.C.2, below). Instead, here, the original concept of the structure of a neutron in the atom is used. That is, the neutron was originally conceived as being composed of a proton and an electron [because the mass (in atomic mass units) of a neutron is 1.008701, of a proton is 1.007316, and of an electron is 0.000549]. In other words, as the mass of a neutron appears to be nearly equal to that of a proton plus an electron (in addition to a relatively small supplemental mass; the sources and masses of which are not yet known) this description uses the proton-plus-electron terminology.

To begin, the characteristics of a neutron are as follows: The neutron is a subatomic particle in the nucleus of every atom (except the hydrogen atom, which contains only one proton and one electron). Neutrons have no electric charge, but are extremely dense. One neutron weighs 1.675×10^{-27} kilogram, which certainly sounds small, but one teaspoonful (about 5 milliliters) of neutrons would weigh millions of tons on the surface of the Earth!

Gravity is "associated" with the mass of an object (the word "associated" has always been used by physicists because they do not know how gravity is created). And the high mass of the neutron has high gravitational force. The more neutrons that are present in an object, the stronger its gravitational force. Also, when a large star explodes into a supernova, the remaining matter is so extraordinarily dense that it collapses under its own immense gravitation. When it reaches a certain density, the free electrons and protons are crushed together, and converted into more neutrons (Faure & Mensing, 2007). These objects become "neutron stars," which are the densest stars that are known to exist (Glendenning, 2012), averaging 10^{17} kg/m^{-3} (Milner, 2002). And, as noted previously, when the star becomes dense enough, it compresses further from its own gravity to become a (so-called) "black hole" because even photons do not escape and thus cannot be seen.

Be sure to note an important clarification: The so-called "black holes" are not "holes" in space. That idea, unfortunately, has been popularized to such an extent that people think holes in space really exist. Sadly, some theorists (e.g., Hawking, 1988, 2015) actually think neutron stars that are called "black holes" transport the matter they absorb through what they call "wormholes" and spew it out in other parts of the universe. If they existed, matter would be suddenly spurting forth all over the universe because there are more than 100 million "black holes" in this galaxy alone (HubbleSite, 2017). But there is no evidence whatsoever of matter suddenly appearing in space. Another important fact is from basic physics, i.e., space is an empty void, and, as such, cannot have holes of any type. Thus, to suggest that there are "holes" in empty space like saying there are "holes in holes," which is pure fantasy and an absolute falsehood. There are no "holes in space" and thus there are no "wormholes" in space.

Now, the creation of gravity is here stated simply and clearly: *Gravity is a byproduct of the interaction between the proton and the electron within every neutron*, whether it is at the core of an atom or traveling free in space. A proton has a positively charged force, while an electron has a negatively charged force. And opposite charges attract each other, which is why protons and electrons hold together. That information is accepted as indisputable fact. Therefore, given that there is a proton and an electron within every neutron, it is conceivable that the proton and electron therein are attracting each other within the neutron.

Yet another fact that is already known is that all particles spin. Furthermore, the two entities that are electrically bound to each other within the neutron are not merely motionless, or inert. The opposite is the case. That is, in the present theory of gravity creation, the electron and the proton have formed a strongly linked dyadic pair that is in constant motion. One may consider them to be spinning around some mutual center somewhere between them. And it is this spin that is of central interest to gravity theory.

Despite the fact that these basic points about the makeup of atoms and the properties of electrons and protons have been well-known for about a century, no one seems to have suspected that a gravitational wave could be created by the positively charged protons and negatively charged electrons that are dynamically spinning together in combination with their powerful pulls on each other. In other words, whereas both parts of the dynamic dyad, namely, the electron and proton, are powerfully pulling upon each other, their two pulling functions, in synchronization with their remarkably fast spinning functions, is so magnified that a new type of pulling force is created. That "new type of pulling force" is gravity.

That explains how gravity is created! Gravity has a wave-like character, namely, the combined pulling forces of the proton and electron, along with their fast spin, create a dynamic, wave-like pulling force called "gravity." The method by which gravity is created in the neutron – with the gravity waves shown as the wavy lines – is diagrammed in Figure 14.

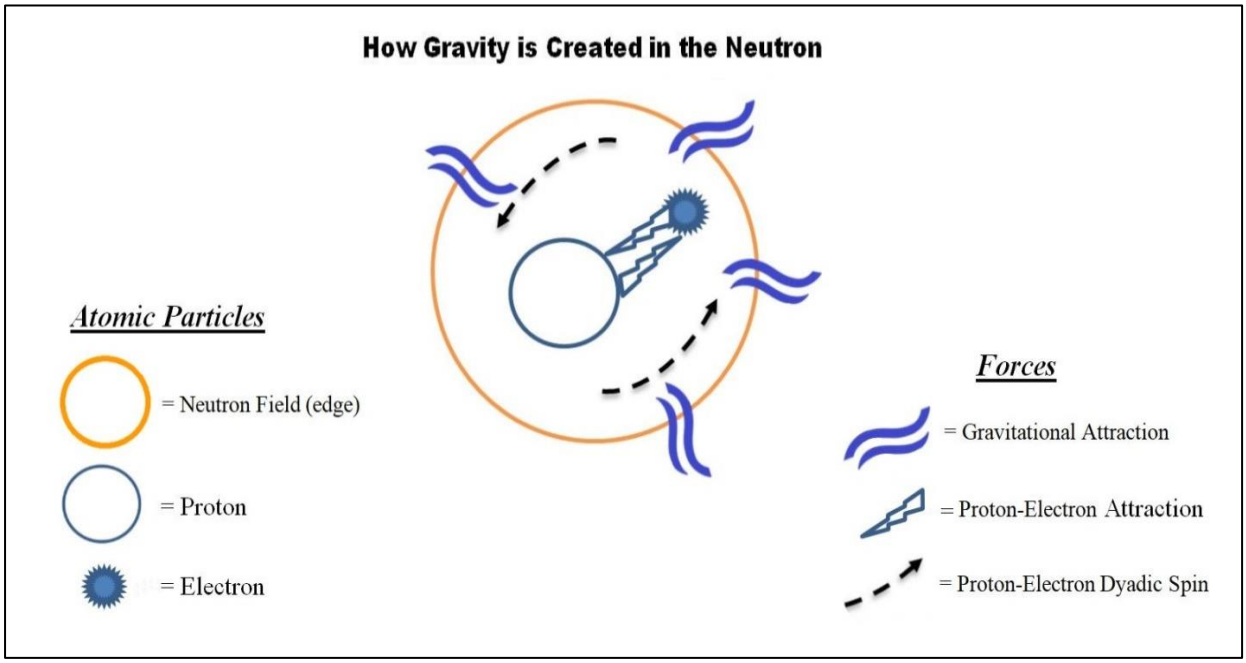

Figure 14: *Diagram of the Creation of Gravity*.

2. Neutron "Spin" and the Gravity Wave: The rapid spin along with the pull of the electron-proton dyad combine to create a "pulling wave," which is the gravity wave. The gravity wave, by itself, is small but likely "harmonizes" with the gravity waves of other neighboring neutrons, whether they originate from the same or different elements. This suggests a cumulative increase (rather than an exponential amplification), which is consistent with the usual computations for mass and gravitational force. Why is gravity cumulative while ignoring the chemical elements from which the waves are generated? Whereas the gravity *waves* are not positively or negatively "charged," it is possible for them to harmonize, e.g., in a way similar to how a musical note harmonizes even when the note comes from very different musical instruments. The more instruments, the louder the sound will be; thus, the more neutrons, the stronger the gravitational force.

As possible evidence, experiments on the International Space Station included a test to determine what would happen to water droplets in a controlled vacuum in the microgravity environment inside the space station. Over a period of time, the water droplets were attracted to each other, forming larger droplets until they all combined into a single ball of water. If all the atoms of water were suspended in the vacuum and were motionless at the start of the experiment, and all other conceivable forces (e.g., the force of photons propelling the water molecules) can be controlled and ruled out, the only explanation for the water molecules attracting each other would be that each molecule generates its own small gravitational pull.

D. Neutron Gravity Waves and Spinning Neutron Stars

The idea that the spin of the electron-proton dyad within the neutron could produce gravitation may have implications for the rotational speed of neutron stars. Considering that a neutron star is composed almost exclusively of neutrons, except for a few percent of protons (Douchin & Haensel, 2001, p. 152) and that gravity waves are produced by all of the neutrons, it may be possible that the accumulation of tightly packed neutrons in a neutron star could synchronize. If this happens, it would seem possible for the synchronization of the huge mass of neutrons to result in the rotational spin of the entire neutron star reaching very high speeds (which does not happen for planets because they contain complete atoms, not only neutrons).

Empirical evidence seems to confirm this idea, for example, Hessels, Ransom, Stairs, Freire, Kaspi, and Camilo (2006) found more than 30 neutron stars rotating at hundreds of times per second. One of the neutron stars they detected (named PSR J1748-2446ad) is about 32 kilometers in diameter and has the fastest rotation rate of any celestial object ever found, namely, at 716 times per second, or 42,960 revolutions per minute, which means that the rotational speed at its surface is almost one-fourth the speed of light! To understand how fast that is, compare that speed to the time it takes for one rotation of the Sun, which takes about 25 days to complete one revolution!

E. Neutron Gravity Waves and "Quantum Gravity"

According to the present theory, which posits that the gravity wave is created at the atomic level, gravity may be conceived according to the traditional definition of a "quantum," namely, the smallest possible distinct unit of any physical property. Therefore, this theory of gravity creation in the form of a wave generated by the combined pull of a rapidly spinning electron-proton dyad (rather than a single particle such as Einstein's supposed "graviton," which does not exist) lays the foundation for "quantum gravity" theory to be developed. Of course, to ascertain whether "quantum leaps" occur with gravity would require constructing a measuring instrument that can detect the small gravitational force of a single neutron, which, in turn, would make it possible to measure the effects of gravitational pulls generated by multiple neutrons. It should be noted that the old idea of "mass associated with gravity" will have to be revised because "mass" includes particles, such as electrons, which, by themselves, according to the theory presented here, cannot generate a gravitational pull.

Although the gravitational force is *generally* cumulative as more atoms are added, there is nonetheless a possibility that "quantum leaps" might conceivably be able to occur at certain levels. For example, at what point in the "continuum" of accumulating mass will gravity reach a level that is sufficient to have enough gravitational pull to capture a "satellite"? That is, molecules do not have satellites of orbiting atoms; and likewise, neither humans, elephants, nor whales have "satellites" orbiting around them (even though they might be accompanied by spouses or offspring, who stay – or leave – of their own volition). On the other hand, of course, it is known that asteroids of a certain mass, at some quantum, can generate a strong enough gravitational pull to hold a spacecraft that is soft-landed upon its surface, and that planet-sized bodies can hold moons in orbits around them.

At yet another level of mass, stars can hold planets, asteroids, and comets that orbit along paths that extend tremendous distances. The most distant known to exist is the comet named Ikeya-Zhang (designated 153P), which has an aphelion (its farthest distance) at 101.92 Astronomical Units (i.e., 9,478,560,000 miles) from the Sun, and takes 366.51 Earth *years* to complete one solar orbit (see: https://en.wikipedia.org/wiki/153P/Ikeya%E2%80%93Zhang). Then there are neutron stars, which represent another, much higher, level of gravitational pull and have very unique properties. Beyond the level of neutron stars, the next "quantum leap" would likely be the galaxies, which might represent yet another unique gravitational level. That is, galaxies interact with each other in unique ways, including having collisions, and often interact with other galaxies in clusters. Inevitably, quantum theorists will need to decide how to use this new theory of gravity to develop quantum gravity theory.

F. Thoughts about "Quarks" and Gravity Creation

As a consequence of the proposition that protons and neutrons are composed of theorized subatomic particles called "quarks," a multitude of new particles and antiparticles have been hypothesized, with countless combinations of particle and subatomic particle interactions in real or theorized environments. This propelled mathematicians and particle physicists into a virtual equation-generating factory that exponentially increased the rate of publications on quarks. And some quark theorists suggested there could be such a thing as a "quark star" (Ivanenko & Kurdgelaidze, 1965). But regarding such stars, "*their existence has not been confirmed. The equation of state of quark matter is uncertain, as is the transition point between neutron-degenerate matter and quark matter. Theoretical uncertainties have precluded making predictions from first principles*;" and "*quark stars consisting entirely of ordinary quark matter will be highly unstable and dissolve spontaneously*" (Wickipedia: https://www.google.com/search?hl=en&source=hp&q=quark+star&oq=quark+star&gs_l=psy-ab.3..0i131k1j0l9.1392.3584.0.4033.10.10.0.0.0.0.103.949.8j2.10.0....0...1.1.64.psy-ab..0.10.947...0i131i46k1j46i131k1j0i10k1.0.F0PSFG1n_2Y). Therefore, quark theory has numerous weaknesses, including the absence of convincing confirmation.

Additionally, despite the numerous papers that have been written about quarks, the only ones that discussed them in relation to (real or theorized) gravity used mathematical models to suggest how they might be *affected by* gravity (e.g., Babington, Erdmenger, Evans, Guralnik, & Kirsch, 2004). In other words, no publications (known to this author) have suggested how quarks might be able to *create* gravity.

Nonetheless, if there are such things as fractionally charged subatomic particles, i.e., quarks, it is here suggested that quark theorists might consider how those fractional charges could interact within the neutron to *create* a gravitational force. In this regard, there are two suggestions that can be made. One is to keep in mind the logical arguments regarding the location at which gravity is created, i.e., that the only location where gravity could be created is within the neutron; and the other suggestion is to try to explain how the interaction of the proton's two Up and one Down quarks (in quark theory) could interact with the (non-quark) electron to create gravity waves within the neutron.

That could be a difficult mission for quark theorists, particularly if they view neutrons as composed only of fractional charges. But if it is difficult for quark theorists to reason through how the neutron generates gravitational force, it might be easier for them if they try to think of the proton (which the Standard Model of the Atom states exists within the neutron) as a "proton essence," i.e., a physical entity that possesses the same characteristic (essence) as a proton, which has a positive charge (regardless of whether it is a particle or made of quarks).

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V. Evaluating the New Theory

As noted at the outset of this monograph, Kuhn (1977) listed five criteria, namely, *accuracy*, *consistency*, *scope*, *simplicity*, and *fruitfulness*, which can be used to evaluate whether a new theory should be accepted to replace an existing theory. Here, those five criteria are each considered by examining the various anomalies, incongruities, abnormalities, and inconsistencies of the existing "big bang" theory, and other peculiarities which that theory generated, to assess whether the new Lightning Theory of the Origin of the Universe resolves any of those problems. Whereas there are so many points that have been discussed in the new theory, it would be excessive to include them all in this part of the monograph. Therefore, for each of Kuhn's five criteria discussed below, only a few examples are given to avoid unnecessary repetition of the ideas that have already been explained.

(1) *Accuracy*: Does observation and experimentation support the new theory?

Observation refers to evidence that can be perceived from practical facts and/or from empirical study. The new theory pointed out discrepancies in the definitions invented by various theorists in their attempts to support the big bang theory, particularly in their efforts to define basic concepts. As examples: Proponents of the old theory contradicted basic physics by creating definitions of space and the universe that were untenable, such as the idea that space "did not exist" before the big bang occurred, that the universe is finite but has a boundary, which they could not define or explain; they say space is not empty, but is composed of some kind of "ether" that they could not scientifically define, or prove exists; and they say empty space would have to be constantly "expanding" in order to defend the old theory which insists that the speed of light cannot be exceeded, despite the fact that there is evidence that numerous galaxies are speeding away at many times the speed of light.

The new Lightning Theory of the Origin of the Universe refuted those incongruities by providing clear and workable definitions that are much more in line with practical facts, and, in the case of the speed of light, the new theory proposes that the speed of light can be exceeded, which is supported by the empirical evidence from the measurement of the speed of numerous galaxies that are traveling faster than the speed of light. Also, the new theory does not employ the old theory's impractical and unsupportable idea that empty space, itself, is constantly expanding. The new theory, in addition to defining "space" as a non-expanding empty void offers much more accurate and provable propositions.

(2) *Consistency*: Do various aspects of the theory coincide, and fit, with related theories?

To understand this criterion it must be remembered that the present new theory of cosmology is designed to replace the existing big bang theory. Therefore, the big bang theory itself is not the theory to which this criterion refers. Instead, the focus is on the term "related theories." The theories with a relationship to cosmology that may be cited here could be subatomic particle theory and quantum gravity theory.

Interestingly, those theories currently have their own challenges and/or "model drifts." It is also remarkable that some of those problems seem to be a consequence of trying to explain (or "fit" with) the peculiarities of the erroneous, big-bang theory. For example, subatomic particle theorists now proposes that matter is composed entirely of fractionally charged subatomic particles called "quarks." But that theory cannot demonstrate how the quarks behave in the super-dense interiors of neutron stars, and offer no suggestions regarding how quarks could generate a gravitational pull. The new Lightning Theory, on the other hand, has a specific proposition regarding the creation of gravity, namely, that it is generated inside every neutron based on the interaction of the neutron's principal internal components. Therefore, the new Lightning Theory offers quark theorists an opportunity to address the question of gravity generation by using the new theory's propositions.

Additionally, on the larger, cosmological, level, the new Lightning Theory coincides very closely with the facts regarding the acceleration of the most distant galaxies that are moving away. Recall that relativity theory originally proposed that all of the most distant matter, including galaxies, should be slowing down and eventually be pulled back to where the big bang originated because that theory deemed the majority of matter in the universe to be near where it originated and that the greater amount of matter would have a stronger gravitational pull that would pull all the distant matter in the universe back to where it originated. But the galaxies are still traveling away, and they are speeding up, which is a fact that blatantly contradicts relativity theory as it relates to the big bang.

The new Lightning Theory resolves the question of how distant galaxies are speeding up as they travel away because it defines space as a void, which, on the scale of the entire universe, acts as a tremendous vacuum that is pulling the distant galaxies away from the locations where they originated. Relativity theorists invented the idea that *space* is expanding to try to explain the speeding-up of galaxies while defending their claim that nothing can travel faster than the speed of light. But that was not enough to explain what causes the speeding-up. They thus invented the idea that, at the outer edges of the universe, there is "dark matter" that they claimed has powerful gravitational force that is pulling the galaxies away. But neither of those ideas (of expanding space or dark matter) has been supported.

The new Lightning Theory, however, answers the question. That is, the tremendous vacuum pull, which is not a form of gravity, combines with the great force of the creation event that initially propelled the original matter. Together the initial propulsion and the pull of the universal vacuum increase the speed of those galaxies. Also, as Lightning Theory has no upper limit on the speed at which objects can travel through empty space, the new theory allows for the galaxies to exceed the speed of light, which is what the empirical data show. Thus, with the new theory, there is no need to invent the (unsupportable) idea of expanding empty space, or invent "dark matter" (that has never been found), which the old theory claims is a force of gravity pulling the galaxies away at higher speeds than they theorized.

(3) *Scope*: Do consequences of the theory extend beyond what it was designed to explain?

The new theory was designed to explain how the universe was created, including the *cause* of the creation event, which is a question that had not been answered by the big bang theory. Thus, the new Lightning Theory goes beyond the existing theory. However, as this question is about the "scope" of the new theory, to address this criterion it is necessary to anticipate possible consequences of the new theory.

The term "consequence" usually refers to some results, effects, or significance that the theory could have, so a few possibilities may be mentioned. As the new theory identified numerous anomalies or inconsistencies in relativity theory and refuted several of its claims, the new Lightning Theory could have some important consequences. The first is to replace relativity theory, which would revolutionize the way modern physicists view the universe. Also, the new theory identified the immense universal vacuum as the cause of lightning-like stress lines that created the primordial matter, explained why there are so many colliding galaxies and empty intergalactic spaces that are known to exist in the distribution of mass in the universe, and also explained the reason that the speed of distant galaxies is increasing.

Additionally, as gravity is an essential aspect of any theory about the origin of the universe, the new theory offered an accompanying theory of gravity. This is where one of the most important and significant effects of the new theory can be found. That is, the newly proposed theory of gravity answered the profound question of where and how gravity is created. Undoubtedly, the new knowledge about how gravity is created can have far-reaching effects, particularly if physicists use the new theory to reproduce the creation of gravity.

(4) *Simplicity*: Does the new theory explain phenomena in simple terms?

Kuhn (1977) based this criterion on the "law of parsimony" by William of Ockham (1287-1347), who deduced that, among competing hypotheses, the one with the fewest assumptions is usually more correct and should be selected. The idea was also used by Newton (1687) as his first rule of philosophical reasoning, i.e., "*Rule I. We are to admit no more causes of natural things than such as are both true and sufficient to explain their appearances*." Thus, the question asks if the new theory explains phenomena simply.

The new Lightning Theory is much simpler and clearer than the big bang theory and relativity theory, which are plagued by unproven assumptions and illogical deductions. As examples of their use of confusing ideas, relativity theory proposes that space is filled with some unknown substance called "ether" (the existence of which has never been proven), that the space of the universe is "curved" by mass, but does not explain *how* mass can curve space, that space and time are one and the same thing, that space is finite but has no boundary, that space can exist beside itself in "parallel universes," and that "black holes" have "worm holes" that go to other universes. Further complex ideas from those theories that make the universe unexplainable include relativity theory's denial that anything can travel faster than light, and their proponents created unsupported deductions, e.g., that "space is expanding" to make galaxies only "appear" to be traveling faster than light, and invented the idea of "dark matter," which they say increases the speed of the galaxies. Those are unproven assumptions and/or explanations that obfuscate rather than clarify the phenomena that need to be explained.

Lightning Theory remains clear and uses simpler terms. For gravity, it claims space is an empty void, which is not curved, and suggests that the "simpler" Newtonian mathematics (with adjustments) could be used instead of the overly complex relativity formulae. Lightning Theory denies that "dark matter" exists, and allows that objects can exceed the speed of light, which is supported by spectral evidence of galaxies that travel many times the speed of light.

(5) *Fruitfulness*: Does the theory reveal new phenomena or relationships of phenomena?

There are two main new phenomena. One is the effects of the powerful vacuum force of the infinite void, with its heretofore unsuspected immensity of strength. This power has been grossly underestimated by modern physicists; and in terms of relationships, this power is what created the matter in the universe by means of the lightning-like stress lines, which caused the structure of matter in the universe to take the shape it has evolved into today.

The other main new phenomenon is the identification of the source of gravity being in the neutron, and shows how gravity is generated. As the source is subatomic, its discovery provides the basis for developing quantum gravity theory from subatomic to cosmic levels.

Conclusion

The Lightning Theory of the Origin of the Universe is new because it offers new concepts that have never been suggested before, e.g., that the universal vacuum created matter in the universe, and offers new ideas that answer profound long-standing questions, such as how gravity is created. And it is not affected by the anomalies of relativity theory. Lightning Theory also satisfies the criteria that have been recommended (by Kuhn, 1977) for evaluating whether a new theory should be accepted to replace an existing theory.

Finally, as Einstein (1950) himself explained, "*The great attraction of the* [relativity] *theory is its logical consistency. If any deduction from it should prove untenable, it must be given up; a modification of it seems impossible without destruction of the whole*" (p. 110). Therefore, the new Lightning Theory of the Origin of the Universe should be adopted.

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