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Article

The Big Bang Was Not the Beginning, But a Repeating Pattern of Expansion and Contraction of Spacetime

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Abstract: In this paper, I present a possible explanation for accelerated expansion of the universe, and introduce the cosmic scale, size of the universe and cosmic time, age of the universe. The observed expansion of the universe, which relates the stretching of Shrunk space to the new theory, is derived. This model is based on the two principal long-range forces: the gravitational force and the repulsive force generated by shrunk space. They are the two most basic fundamental quantities in the universe that govern cosmic evolution. They may provide the clockwork mechanism that operates our eternal cyclic universe. This model of Space-time and its unique properties of shrinking and stretching enables us to describe a sequence of events from the Big Bang to the Big Crunch.

Keywords: big bang and big crunch; cosmology; dark energy; gravitational force; the cyclic universe

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1. Introduction

Modern cosmology has rapidly evolved both experimentally and theoretically, seeking to unravel the origins, evolution, and future of the universe. Approximately a century has passed since Einstein introduced the General Theory of Relativity, and it is within this span of time that significant advancements have taken place. These advances have been driven not only by classical mechanics but also by quantum mechanics. Einstein introduced what is known as the cosmological constant into his equation, which brought about a repulsive force rather than an attractive force. This cosmological constant aimed to avoid the depiction of the universe contracting under the influence of gravity [1]. When evidence of the expansion of the universe was indicated by redshift through Edwin Hubble's observations [2], it led to the assumption that the universe had a beginning. George Gamow and others proposed the Big Bang theory, suggesting that the early universe was in a state of high density and high temperature [3].

The recent discoveries of an accelerated expansion of the universe indicating self-repulsive dark energy [4–6] were not predicted and have no clear role in the standard model. Dark energy is just the name that astronomers gave to the mysterious substance "something" that is causing the universe to expand at an accelerated rate. However, dark energy is one of the important mysteries in the modern day of cosmology.

In this paper, I present a cosmological model consisting of an endless sequence of expansion and contraction of the universe that repeat indefinitely, by introduced the cosmic scale, size of the universe and cosmic time, age of the universe. This model provides a rational explanation for the expansion of the universe, and its accelerated expansion. We follow up on this approach to predict the future and the ultimate end of the cosmos. This core concept significantly influences the modern cosmological worldview.

2. Unique Nature of Shrinking and Stretching of Space-Time

In simple terms, the stretching of space literally means that the scale of the universe is increasing. The greater the distance between galaxies and clusters of galaxies distributed in the universe, the larger the universe itself becomes. The key piece of evidence is the redshift-distance relation that was first observed by Lemaître and then by Hubble [2]. This observation shows us that the redshift, which

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is the increase in wavelength of light reaching us, reveals how fast a star or galaxy from which the light was emitted is moving away. This information indirectly helps us decide the rate of expansion. This means that these galaxies are moving away from us; the farther they are, the faster they move. The second key piece of evidence is the cosmic microwave background radiation. This was, in fact, a prediction of the expanding universe model. At first, I would like to accept the expansion of the universe as an observational fact. I will focus on the notion of spacetime by introducing the unique nature of shrinking and expanding of spacetime, in which shrunk space exerts the repulsive force that force is responsible for stretching the shrunk space, or expansion of the space. Furthermore, I will focus on the notion of expansion discussed above within the context of stretching the shrunk space. This core concept significantly influences the modern cosmological worldview.

Let me elaborate this, which ultimately leads to providing an explanation for the fundamental reason behind the current expansion of the universe. In order to discuss the entire universe, we need to establish a basic fundamental model of cosmic scale, the size of entire universe and cosmic time, the age of the universe. The observed expansion of the space, which relates the stretching of shrunk space to the new theory, is derived and suggests that as the space shrinks, it exerts the repulsive force that is responsible for stretching the shrunk space, or expansion of the space. This model introducing a unique nature of shrinking and expanding spacetime and suggests the existence of expanding space behind matter. When matter comes closer to each other, the space also shrinks between them. As space shrinks, it exerts a repulsive force, which stretches the shrunk space. The space itself is not creating, but shrunk space is stretching, which leads to the appearance of space, whereby the scale of space changes. The universe does not expand "into" anything and does not require space to exist "outside" it. This property of space causes the size of the universe to change over time, growing or shrinking. As the particles get closer to each other, the vacuum space should also consequently get closer. In a way, we can say that space shrunk, and as shrunk space expands, it allows particles to move away from each other. One way to imagine space is like a stretchy band with galaxies stuck to it. As the band stretches, the galaxies all move away from each other, and they are moving due to the stretching of the space; they are not moving through the space. The galaxies move away from each other as shrunk space stretches. The stretching of shrunk space follows the Hubble Law: the farther away a galaxy is from another, the faster its velocity. This is true from the perspective of any of the galaxies in the universe. This illustrates what is meant by saying that shrunk space is stretching and carrying objects along with it, in contrast with saying the objects are moving through space. It is not necessarily stretching space into anything. So, for example, the universe does not necessarily expand into previously existing space. The expansion is instead caused by the stretching of shrunk space everywhere, constantly.

Our space-time model suggests and demonstrates some properties of space:

1) Space-time itself is finite, and it consists of unique properties of shrinking and expanding. When space is exponentially shrunk, it exerts a repulsive force, which causes the stretching of the shrunk space.

2) The force of shrunk Space differs from gravity. Curved space exerts the inward pulling force, we call it gravitational force, and shrunk space exerts the outward pushing force. The shrink space force is repulsive; it exerts a force opposite to that gravitational force, we can say antigravity. So gravity and antigravity are not forces at all; they are the influences of vacuum space.

3) Vacuum space might be the most fundamental entity in the universe. There cannot be anything without space; without space, there is "nothing.".

4) We might point out certain implications of our universe. It could be that our universe is cyclic and there is no beginning; there may have been big bangs before ours.

5) Finally, we also comment on the ultimate fate of the universe, as this topic is also quite controversial in the scientific community. The ultimate fate of the universe, with any level of certainty, will depend on how much space has shrunk, which essentially determines how the repulsive force of the shrunk space responds to the stretching of the shrunk space. The force of shrunk space will cease when the universe reaches its maximum volume of cosmic scale, and the expansion

of the universe will eventually cease. After that, the universe will begin to contract until all the matter and energy in the universe re-collapses to a final singularity (the Big Crunch).

3. Cosmic Scale : The Maximum Size of the Cosmos

This model attempts to explain the expansion and contraction of the universe based on the concept of finite cosmic scale, and cosmic time of the universes. Let me elaborate on this view. As we discussed above, shrinking and expanding are the properties of spacetime itself. When matter comes closer to each other, the space also shrinks between them. As space shrinks, it exerts the repulsive force, which stretches the shrunk space. It suggests that the increasing distance between galaxies and clusters of galaxies depends on how much space had shrunk between any two points. This implies that the universe could be finite, because eventually repulsive force of shrink space would cease at a certain time, this also indicate that there must be the cosmic time, which would be the age of the universe.

As we know that Planck length is the smallest unit of length, and Planck time is the smallest unit of time in the universe. Here I introduce the largest scale, the Cosmic Scale and Cosmic Time. The cosmic scale is the maximum size of the universe, it is "large size" unit of length and a fundamental upper bound on lengths scales.

The cosmic time is the age of the universe, it is the time in which space expand to the cosmic scale and contract back into singularity.

$$Cosmic\ scale\ Cs = \sqrt{\frac{Planck\ length\ 2 \times 10^{100}}{GC^2}}$$

Where,

Planck length $lp = 1.61622874843 \times 10^{-35}$

$G\ \ is\ Gravitational\ constant\ = 6.6740831 \times 10^{-11} m^3 kg^{-1} s^{-2}$

$Speed\ of\ light\ \ speed\ of\ light\ C = 2.99792458 \times 10^{8ms}$

2×10^{100} is the Cosmic increasing factor

By putting these value,

$$Cosmic\ scale\ Cs = \sqrt{\frac{1.61622874843 \times 10^{-35m}\ 2 \times 10^{100}}{6.6740831 \times 10^{-11} m^3 kg^{-1} s^{-2}\ \ 2.99792458 \times 10^{8ms^2}}}$$

We find,

$Cs\ diameter\ d\ = 2.3213995917 \times 10^{29m}$

$= 2.3213995917 \times 10^{26km}$

$= 24.53721304532\ Trillion\ Light\ Years$

radius of the Cosmic Scale r,

$Cs\ r = 1.16069979585 \times 10^{26} km$

$= 12.26860652266\ Trillion\ Light\ Years$

$= 3761571.8599106483\ Mpc$

We find that the size of the entire universe d is $= 24.53721304532\ Trillion\ Light\ Years$.

3.1. Cosmic Time: The Age of the Cosmos

The cosmic time is the age of the entire universe from the big bang to the big crunch.

$$Cosmic\ time\ Ct = \sqrt{\frac{Planck\ time\ \ 2 \times 10^{100}}{GC^3}}$$

$where,$

$Planck\ time\ tp = 5.39115880103 \times 10^{-44s}$

$Gravitational\ constant\ G = 6.6740831 \times 10^{-11} m^3 kg^{-1} s^{-2}$

$speed\ of\ light\ C = \ 2.99792458 \times 10^{8ms}$

$2 \times 10^{100}\ is\ the\ Cosmic\ increasing\ factor$

By putting these value,

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$$Cosmic\ time\ Ct = \sqrt{\frac{5.39115880103 \times 10^{-44s}2 \times 10^{100}}{6.6740831 \times 10^{-11}m^3kg^{-1}s^{-2}\ \ 2.99792458 \times 10^{8ms^3}}}$$

We find,

$$Cosmic\ time\ Ct = 7.74335554399 \times 10^{20s}$$

Divide seconds into years we get,

1 year = 31557600 seconds

$$Ct = 24.537213045 \times 10^{12} years$$

$$= \ 24.53\ Trillion\ years$$

We find that the total age of the universe is 24.53 Trillion Years. It is the time in which space expand to the cosmic scale and contract back into singularity. Here is interesting thing is that the cosmic scale which D is = 24.53 Trillion Light Years and the cosmic time which is equal to 24.53 Trillion Years.

So here we rewrite the equation,

$$Cosmic\ scale\ Cs = \ Cosmic\ time\ Ct \times\ Speed\ of\ light\ C$$

$$Cosmic\ time\ Ct = \frac{Cosmic\ scale\ Cs}{Speed\ of\ light\ C}$$

As we know that V = d/t , so we can say that V is speed of light, and d is the Cosmic Scale, t is the Cosmic Time.

$$Speed\ of\ light\ C = \frac{Cosmic\ scale\ Cs}{Cosmic\ time\ Ct}$$

We find that, light can travel at the constant speed to reach the maximum cosmic scale, in given cosmic time, it indicate us that the Cosmic time and the Cosmic Scale could be the constant in each cycle of expansion and contraction of the universe.

Astronomers would have needed to rethink many of their cherished ideas. But Hubble laws would fits well with what we know from other kinds of measurements. Hubble laws follow the expansion of the universe well. It was Edwin Hubble's seminal 1929 PNAS paper, "A relation between distance and radial velocity among extra-galactic nebulae" [7], that led to a turning point in our understanding of the universe. In his short paper, Hubble presented the observational evidence for one of science's greatest discoveries—the expanding universe. Hubble showed that galaxies are receding away from us with a velocity that is proportional to their distance from us: more distant galaxies recede faster than nearby galaxies. Hubble's classic graph of the observed velocity vs. Distance for nearby galaxies is presented in Figure 1; this graph has become a scientific landmark that is regularly reproduced in astronomy textbooks. The graph reveals a linear relation between galaxy velocity (v) and its distance (d)

$$V = \ Ho \times\ d.$$

Velocity-Distance Relation among Extra-Galactic Nebulae.

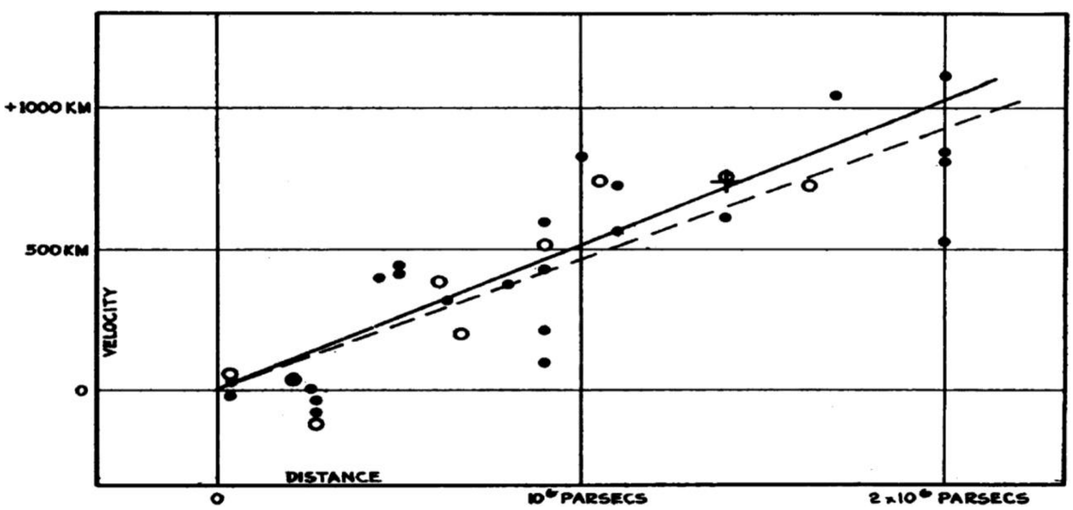

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Figure 1. Velocity–distance relation among extragalactic nebulae (1). "Radial velocities, corrected for solar motion, are plotted against distances estimated from involved stars and mean luminosities of nebulae in a cluster. The black discs and full line represent the solution for solar motion using the nebulae individually; the circles and broken line represent the solution combining the nebulae into groups; the cross represents the mean velocity corresponding to the mean distance of 22 nebulae whose distances could not be estimated individually" (1). (Note: Velocity units should be in kilometers per second.).

This relation is the well-known Hubble Law (and its graphic representation is the Hubble Diagram). It indicates a constant expansion of the cosmos where, like in an expanding raisin cake that swells in size, galaxies, like the raisins, recede from each other at a constant speed per unit distance; thus, more distant objects move faster than nearby ones. The slope of the relation, Ho, is the Hubble Constant; it represents the constant rate of cosmic expansion caused by the stretching of space-time itself.

The size of the entire universe is fixed, but it had shrunk. So the expansion of the universe actually is stretching of shrunk space, which leads to appearance of space! Cosmic scale is only shrunk in current size of the universe. The force of the shrunk space depends on how much space has shrunk, which essentially determines how the force of the shrunk space responds to the expansion of the universe. Eventually expansion of the universe would cease at the certain time. And gravitational force contracted the universe until all the space shrunk and matter re-collapsed to a final singularity, restarting the cycle. I don't the the exact figure, how much time the universe would take to expanding, this would be the expansion time of the universe, and how much time it would take to contracting. But it is certain that the force of shrunk space expands the universe until all the shrunk space expands at a certain large cosmic scale. According to this model the expansion of the universe should speeding up over the time, because the decreasing repulsive force of shrunk space leads to stretching the shrunk space faster and faster, that is, although in general, decreasing of the repulsive force of shrunk space leads to accelerating the stretching of space. This is the big key to understanding the accelerated expansion of the universe. (I'll explain it in the 3.3 section).

The two principal long-range forces, the gravitational force and the force generated by shrunk space, play an important role in the reformation of the universe. The force of shrinking space differs from gravity. Curved space exerts the inward pulling force, we call gravitational force, and shrunk space exerts the outward pushing force. The shrink space force is repulsive; it exerts a force opposite to that gravitational force, we can say antigravity. So gravity and antigravity are not forces at all; they are the influences of vacuum space. About 14 billion years ago, there was an infinite repulsive force in Shrunk space. We speculate that the infinite repulsive force in Shrunk space gave rise to the Big Bang and caused the rapid growth of space. That process would appear to have moved very rapidly in the early universe and was only readily observable by detectors of high-frequency gravitational waves such as the Li-Baker [8,9]. It then expanded and cooled, undergoing phase transitions to radiation, fundamental particles, and matter. Matter grew into galaxies and was further consolidated by gravity into superclusters. Thus, the Big Bang was not only an explosion of matter and radiation all over space, but it may just have been a silent burst of infinite force in infinite shrink space that caused the simultaneous appearance of space everywhere.

The universe may have had no beginning—the Big Bang may have been just a particular moment in the evolution of this always-existing, not a true beginning. This theory would enables us to describe a sequence of events from the Big Bang to the Big Crunch.

3.2. Accelerated Expansion of the Universe

Recent observations of supernovae reveal not only the universe's expansion but also its accelerated expansion [10], and so an enigmatic form of energy is responsible for explaining this phenomenon. In the standard Big Bang and inflationary models, the recently discovered dark energy and cosmic acceleration [6,11] are an unexpected surprise with no clear explanation, and it has presented a challenge to its theoretical understanding.

First, Einstein aimed to maintain a static model of the universe and adjusted his equation known as the cosmological constant. When observational evidence later revealed that the universe did in fact seem to be expanding but not static, Einstein withdrew that suggestion. However, closer analysis of the expansion of the universe during the late 1990 once again led astronomers to believe that a cosmological constant should indeed be included in Einstein's equations. It is quite intriguing that his cosmological constant still exists in cosmology as a form of dark energy, or vacuum energy. However, dark energy is one of the most important mysteries in the modern cosmology.

According to this model, the universe should keep expansion until it reached its cosmic scale, so the expansion is the most fundamental part of the universe. The force of the shrunk space depends on how much space has shrunk, which essentially determines how the force of the shrunk space responds to the expansion of the universe. The decreasing repulsive force of shrunk space leads to stretching the shrunk space faster and faster, that is, although in general, decreasing of the repulsive force of shrunk space leads to accelerating the stretching of space. This is the big key to understanding the accelerated expansion of the universe. Because, the size of the universe is fixed, it only stretches and shrunk. So extra space is not creating due to the dark energy, but the shrunk space is stretching, which leads to the appearance of space, whereby the scale of space changes.

The overall scenario of this model and its implications explain the expansion of space and its accelerated expansion. At the very beginning, there was an infinite shrunk space. This infinite shrunk space produced the infinite repulsive force in the singularity, which force gave rise to the Big Bang, and shrunk space began to stretch very rapidly. Since the beginning of the universe, shrunk space has continued to expanding, but in the distant past, the density of the universe should have been greater, so the universe must have been expanding more slowly than it is today. As the density of the universe decreases, the repulsive force of shrunk space decreases. The force of gravity is directly proportional to the repulsive force of shrunk space, and inversely proportional to the universe's expansion. The universe will not continue to expand forever; there is no need, however, for dark energy. The universe does not expand "into" anything and does not require space to exist "outside" it. Eventually, after some Billion years, the universe reached its maximum cosmic scale, and all the shrunk space stretched, the expansion stalled. After that, gravitational force contracted the universe until all the space shrank and matter re-collapsed to a final singularity.

This model not only explains the way phenomena occur but also provides a clear worldview on the expanding space concept. The expansion of the universe is not a consequence of the space itself expanding; rather, it is caused by the stretching of shrunk space. This explanation of the universe's expansion is straightforward and it drive us to deeper understand the universe.

4. Summary and Conclusions

This model of the universe is designed to solve some of the seemingly unsolvable problems of cosmology." It allows us to go beyond the Big Bang, the Eternal Cyclic Universe, and inflationary models. The new theory provides possible answers to several longstanding questions about the Big Bang model, which has dominated the field of cosmology for decades. It addresses, for example, the nagging question of what might have come before the beginning of space-time, and how did space-time come into existence? Why the expansion of the universe accelerating?

This model suggests that the space would be shrunk at Planck length and it expanded at a certain cosmic scale. This model deals directly with the cosmic singularity, explaining it as a transition from a contracting to an expanding phase. This model describes that the universe started with the shortest meaningful length, Planck length (the smallest measure of length because shorter than it becomes meaningless), and the shortest meaningful measure of time, Planck time.

Although inflation does not address the cosmic singularity problem directly, it does rely implicitly on the opposite assumption: that the big bang is the beginning of space and time and that the universe emerges in a rapidly expanding state [12]. In our model, the infinite force of infinite shrunk space gave rise to the big bang and caused the rapidly expanding of space. It then cooled, undergoing phase transitions to radiation, fundamental particles, and matter. The inflation theory also gets stuck at the point "before" the Big Bang because, according to it, there is nothing before it.

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"The fundamental philosophical problem with the Big Bang is that there's an after, but there's not a before." "In a similar way, we don't know 'one-time only' things that happened in history." But this model drives us to a deeper understanding of the universe and explain the past present and future of the universe.

This could also fill some of the biggest gaps in our common understanding of the way space and time work. Spacetime and its unique nature of shrinking and expanding are the most fundamental quantities in the universe that govern cosmic evolution. Thus, it brings the universe back to its initial state, ending in a big crunch. The universe will not continue to expand forever; there is no need, however, for dark energy. This could account for the fact that the Big Bang was not the beginning of the universe; there's always a universe before the Big Bang. The universe may have had no beginning—it has simply always existed. What we perceive as the Big Bang may have been just a particular moment in the evolution of this always-existing universe, not a true beginning.

Researchers suggest that our expanding universe is now entering a new phase of exponential expansion due to dark energy [4]. Here again, we have no idea how long this inflationary phase will last. If it continues for more than 10 times the current age of the universe, our galaxy will be left alone, surrounded by darkness with no other source of light in sight. However, dark energy is one of the most important mysteries in modern astronomy.

My explanation for dark energy is that it is a repulsive force of shrunk space, which is responsible for the stretching of shrunk space. We have elaborated on the mechanism by which force emanates from the shrink space and provides the repulsive force , which stretches the shrink space.

Above I have mathematicaly prove that the cosmic scale, the size of the entire universe is fixed, it only stretches and shrunk. So extra space is not creating due to the dark energy, but the shrunk space is stretching, which leads to the appearance of space, whereby the scale of space changes. The decreasing repulsive force of shrunk space leads to stretching the shrunk space faster and faster, that is, although in general, decreasing of the repulsive force of shrunk space leads to accelerating the stretching of space. This is the big key to understanding the accelerated expansion of the universe.

This research's major breakthrough is that the problem of dark energy could be fully addressed by revising the structure of spacetime and requiring further understanding of the properties of spacetime instead of new material components that have not been found up to now. Another advantage of this theory is that it automatically includes a prediction of the future of the universe because it goes through definite repeating cycles lasting perhaps about 24.5 trillions of years each. The Big Bang and inflation model has no built-in prediction about the long-term future; in the same way that inflation and dark energy arose unpredictably, another effect could emerge that would alter the current course of expansion.

Reviewing the overall scenario and its implications, what is most remarkable is that our model can differ so much from the standard picture in terms of the origin of space and time and the sequence of cosmic events that led to our current universe. It appears that our universe is cyclic and has no beginning; there may have been Big Bangs before ours.

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