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# The Big Bang Was Not the Beginning, but a Repeating Pattern of Expansion and Contraction of Space Time

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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:** The cyclic universe theory is a model of cosmic evolution according to which the universe undergoes endless cycles of expansion and cooling, each beginning with a big bang and ending in a big crunch. In this paper, the researcher finds a unique property of Space-time, this particular and marvelous nature of space shows us that space can shrink, expand, and stretch. This property of space is caused the size of the Universe changing over time: growing or shrinking. The observed accelerated expansion, which relates the stretching of Shrunk space for the new theory, is derived. This model is based on three underlying notions: First, the Big Bang was not the beginning of Space-time, but rather at the very beginning fraction of a second there was an infinite force of infinite Shrunk space in the cosmic singularity, that force gave rise to the big bang and caused the rapidly growing of space-time, and all other forms of energy are transformed into matter and radiation and a new period of expansion and cooling begins. Second, there was a previous phase leading up to it, with multiple cycles of contraction and expansion that repeat indefinitely. Third, the two principal long-range forces are the gravitational force and the repulsive force generated by shrunk space. They are the two most fundamental quantities in the universe that govern cosmic evolution. They may provide the clockwork mechanism that operates our eternal cyclic universe. The space will not continue to expand forever, no need however, for dark energy and dark matter. This model of Space-time and its unique properties 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; dark matter; gravitational force; the cyclic universe

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## 1. Introduction

Only five per cent universe is visible. The visible universe—including our solar system, other stars, and galaxies is made of neutrons, protons, and electrons bundled together into atoms. Perhaps one of the most surprising discoveries of the 20th century was that this ordinary matter makes up less than 5 per cent of the mass of the universe. The rest of the universe appears to be made of a mysterious, and invisible substance called dark matter (25 per cent) and the recent discoveries of cosmic acceleration indicating self-repulsive dark energy (70 per cent) [1–4] were not predicted and have no clear role in the standard model. [5–7] Furthermore, no explanation is offered for the 'beginning of space-time', the initial conditions of the universe, or the long-term future and ultimate fate of the universe. Most scientists adding in dark energy as a cosmological constant could nearly explain how space-time is being stretched apart. But that explanation still leaves scientists clueless as to why the strange force exists in the very beginning. However, the standard model has some cracks and gaps.

In this paper, we present a cosmological model consisting of an endless sequence of cycles of expansion and contraction of the universe that repeat indefinitely. We explain a more descriptive physical model and properties of Space-time. Our model provides a rational explanation for the accelerated expansion of the universe (Dark Energy), and affects the movement of stars within galaxies (Dark Matter). We follow up on this approach to predict the future and the ultimate end of

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the cosmos. This new theory is best understood by pictures rather than by a large number of equations.

## 2. Theory of shrinking and Expanding Nature of the Space-time

The reality and property of vacuum space and its quantization have not been discussed much in the scientific literature. It is treated like a canvas in which a portrait of the Universe as a function of time, in effect, a film recording [8]. We proposed a different concept about space-time. Space is all around us, it expands, it reacts to what it contains (matter, energy, radiation). It grows, and shrinks, it has a finite volume, it could shrink at Planck Length and it could grow at a cosmic scale. Our model takes that space consists of unique properties of shrinking and expanding, in which participate in the evolution of the universe, we can follow and trace its progress and its ultimate fate. Space-time is part of our universe and plays a very important role in it.

The observed accelerated expansion of the space, which relates the stretching of Shrunk space for the new theory, is derived and suggests that as the space shrinksit exerts the force which is responsible for stretching the Shrunk Space, or expansion of the space.
Our Space-time model suggests and embodies some properties of space:

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

2) The force of shrink Space differs from gravity. Curved space exerts the inwards pulling force, we call gravitational force, and shrunk space exerts the outwards 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 is not a force at all, but it is the influence of vacuum space.

3) Vacuum Space might be the most fundamental entities in nature. 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 that will depend on how much space has shrunk, which essentially determines how the force of the shrunk space responds to the stretching of the shrunk space. The force of the shrunk space will cease in a certain time, or the far future, so the expansion of the Universe will eventually stall, and the universe will begin to contract until all the matter and energy in the universe re-collapses to a final singularity (Big Crunch).

## 3. The Big Bang was not the beginning, but a repeating pattern of expansion and contraction of spacetime

It is proposed that about 14 billion years ago the Universe started from the shortest meaningful length, Planck Length and the shortest meaningful measure of time, Planck Time. The nascent Universe passed through a phase of exponential expansion soon after the Big Bang, driven by a positive vacuum energy density [9]." The cyclic universe theory is a model of cosmic evolution according to which the universe undergoes endless cycles of expansion and cooling, each beginning with a "big bang" and ending in a "big crunch". Although the cyclic model differs radically from the conventional Big Bang–inflationary picture in terms of the physical processes that shape the universe and the whole outlook on cosmic history [10].

Our model has no zero-volume singularity because the size of space is finite, and limited, i.e., the shrinking space (hence the volume) cannot be zero at the quantum scale. The space consists of a unique property, this particular and marvellous nature of space shows us that space can stretch, expand, and shrink, it is like a spring. If we push the spring it shrinks, in the same way when the matter comes closer to each other, the space also shrinking between them. As space shrinks it exerts force, which stretches the Shrunk space. This property of space is causes the size of the Universe changed 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. The force of shrinking space produces an exponential change in the size of the Universe. When space exponentially shrinks, it exerts the force, which leads to stretching the shrink volume of space.

This proposed theory depends upon the force generated by shrunk space, which force caused the exponential growth of space. We speculated that space-time, grows in concert very rapidly at first. (In particular, that the infinite shrunk space, which stretched very rapidly at first). About 14 billion years ago, the infinite shrunk space produced the infinite force in the singularity, which force gave rise to the Big Bang, and shrunk space began to stretch very rapidly. 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 of infinite shrink space, that caused the simultaneous appearance of space everywhere. The two principal long-range forces are the gravitational force and the force generated by the shrunk space play an important role in the reformation of the Universe. But the interesting thing is that they are not actually forces, but a result of the influence of space-time. Curve of Space-time produced the gravitational force, and the shrunk space exerts the outward force opposite to that gravity.

The force of shrunk space expands the universe until all the shrunk space expands at a certain large scale. 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 after trillions of years, the expansion stalls. And Gravitational force contracted the Universe until all the space shrunk and matter re-collapsed to a final singularity, and restarted the cycle, see Figure 1. 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 new model of Space-time and its unique properties enables us to describe a sequence of events from the Big Bang to the Big Crunch.

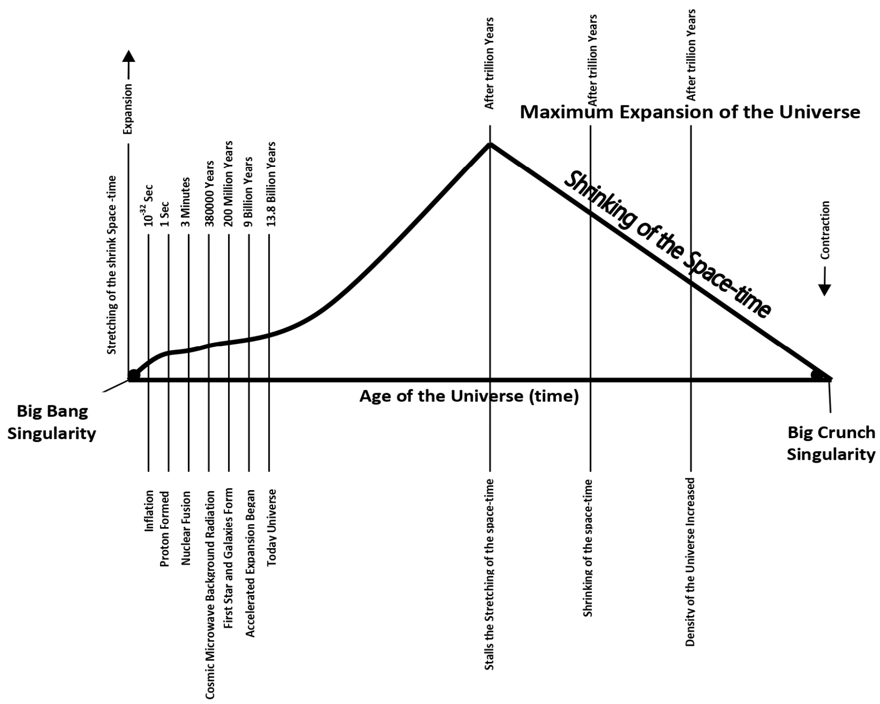


**Figure 1.** The Big Bang was not the beginning, but a repeating pattern of expansion and contraction of the spacetime.

*3.1. Exponentially Shrunk Space Affects the Movement of Stars Within Galaxies.*

Galaxies in our universe are rotating with such speed that the gravity generated by their observable matter could not possibly hold them together; they should have torn themselves apart long ago. The same is true of galaxies in clusters, which leads scientists to believe that something we

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cannot see is at work. They think something we have yet to detect directly is giving these galaxies extra mass, generating the extra gravity they need to stay intact. This strange and unknown matter was called "dark matter" since it is not visible, and it provides extra gravitational pull, causing the stars to speed up – a theory that's become widely accepted [11].

However, I proposed that about 14 billion years ago, early seeds of stars, planets, and galaxies expanded out from the exponentially shrunk space. It spread in such a way that the universe became highly smooth, and exponentially shrunk space makes the flat space. This flat space affects the movement of stars within galaxies and galaxies, requiring no invisible matter. As we discussed earlier, as matter comes closer to each other the space also shrinking between them. To make this clear, let us imagine a compression spring. Like the compression spring used to push a ballpoint pen out of its case and return into the case. Now, imagine placing a bowling ball on the compression springs. We know that the compression springs will get pulled down by the bowling ball. The ball would curve the spring in a similar manner to how masses curve space-time. Now, imagine that if we push the compression springs on both sides, the spring will gets hrunk, and as the spring gets shrunk the curve of the spring gets flat, in the same way, as the space gets shrunk, the curve of space gets flat.

In our solar system, almost all of the mass is in the sun. The innermost planets like Mercury and Venus orbit the sun the fastest. As the distance from the sun increases, the speed at which planets move decreases. This is because there is a curve in space-time, so there is a less gravitational pull from the sun on planets farther out and, to keep from spiralling into or away from the sun, they must move slower. We can apply a similar analogy to galaxies if we assume that there is exponentially shrunk space around the galaxy, and most of the mass of the galaxy is near the center, and at the dim edge of a galaxy there should not be much mass. Therefore, objects orbiting far from the center of the galaxy, and objects closer to the center should move atthe same velocity because there is no such a curve in space-time around the galaxy, which could slow down the orbital velocity of stars with increasing of distance from the center. They are rotating with such speed that the flat space-time could possibly hold them together; The same is true of galaxies in clusters. The orbital velocity of an object only depends upon the influence of space-time, if there is no curve in space-time around the center, the orbital velocity should not be varied, no matter whether distance increases or decreases. Therefore, the orbital velocity of an object should be varied, regarding the curvature of space-time.

To test this hypothesis, scientists already recorded the incoming light from a distant spiral galaxy (our home galaxy, the Milky Way, is also considered a spiral galaxy) and plotted the velocities of the stars vs. their distances from the center of the galaxy. Scientists discovered that the stars were not behaving in the way anticipated. They found that the stars farther away from the center were moving much faster than predicted. The only way this is possible, if there is exponentially shrunk space-time around the galaxy, and there is no such a curve of spacetime, which could slowdown the orbital velocity. The fact is that we are unable to see the flat space or shrunk space-time, and as well as the curvature of space-time, because it is invisible.

### *3.2. Curve Space And Shrunk Space Bends Light*

Astronomers have found a way to discover the mass of a celestial object, like a galaxy, using a technique known as gravitational lensing [12]. However according to our model gravitational lensing is based on two major facts, one is that the mass of an object influences the density of space around it. And second is exponentially shrunk space bends light. When light travels through dense space, it bends. To make this clear, let us imagine a flat stretched sheet. The sheet represents space when no masses are near it. Now, imagine placing a bowling ball on the sheet. We know that the sheet will get pulled down by the bowling ball. The ball would curve the sheet in a similar manner to how masses curve space-time. When light passes near an object in space, it travels on a curved surface, which bends the light waves. The larger the mass of the object, the more the light bends.

And the second major fact is that, when light travels through the shrunk space, it bends. When light passes near an object in shrunk space, it travels on the stretched surface of space, rather than shrunk surface of space, which bends the light waves. The larger surface of the shrunk space, the

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more the light bends. With the help of this theory, we can determine how much space shrunk by watching how much the light from a star right behind it bends.

*3.3. Accelerated Expansion of the Universe*

The recently observed accelerated expansion of the universe has put a challenge for its theoretical understanding. In the standard Big Bang and inflationary models, the recently discovered dark energy and cosmic acceleration [4,13] are an unexpected surprise with no clear explanation. The expansion of space is the increases in distance between any two given gravitationally unbound parts of the universe with time. Actually 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 model, however, not only is the source of the accelerated expansion of the universe explained, but it also predicts its ultimate fate.

The overall scenario and its implications explain, the expansion of space, and it's accelerated expansion. At the very beginning fraction of a second, there was an infinite force of infinite Shrunk space, we speculate that the infinite force of Shrunk space gave rise to the Big Bang, and caused the rapid growth of space. That process would appear to move very rapidly in the early universe, and was only readily observable by detectors of high-frequency gravitational waves such as the Li-Baker [14–16]. After the beginning of the universe, the Shrunk space continues to expand, but in the distant past, the pressure of the shrunk space, and density should have been greater, so the universe must have been expanding more slowly than it is today.

About 4 billion years ago the accelerated expansion of the universe began because the Shrunk space stretched, the force of shrink space decreased. As the force of Shrunk space decreases, the expansion of space increases, that is although in general, decelerates in the force of shrunk space leads to accelerating the stretching of space. In other words, stretching Shrunk Space is causing the expansion to accelerate by causing the deceleration in force of Shrunk Space. This is the big key to understanding the accelerated expansion of the universe. The universe will not continue to expand forever, no need however, for dark energy.

As much space shrunk, the greater outward force produced. As the outwards force of shrunk space decreases, as a consequence the shrunk space stretches, and as the stretched space shrinks, which leads to increasing the outwards force.

As the shrunk space stretches, the density of matter and energy decreases, and outward force of the shrunk space decreases accordingly.

The force of Shrunk space is directly proportional to the density of the universe and inversely proportional to the stretching of Shrunk space.

| **Symbol** | | **Description** |
|---|---|---|
| **Fs** | = | Force of shrunk space |
| **Es** | = | Stretching of shrunk space |
| ϱuni | = | Density of the universe |

$$F_s \propto \rho_{uni} \quad (1)$$

$$F_s \propto \frac{1}{E_s} \quad (2)$$

*3.4. The fabric of the cosmos, smoothness, and homogeneity of the universe:*

In the spirit of Galileo, we can measure the actual cosmic geometry experimentally. Although it is a simplification, the fabric of space-time can be imagined as a plane that can be curved into a sphere, a saddle, or a flat surface. See Figure 2, In each case, the curvature of space-time would be positive, negative, or flat, respectively.

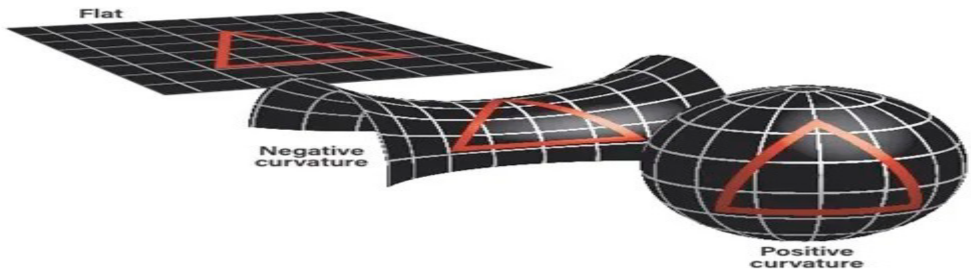


**Figure 2.** A triangle drawn in a universe with positive curvature would have internal angles summing more than 180°; a triangle drawn in a negative universe would enclose less than 180°. In a flat universe, the angles add up to exactly 180°.

Researchers performed this experiment in 2000 and later refined the measurement to a high level of precision with the latest data from the Planck satellite. The result revealed that the geometry of the universe is the simplest one we can imagine: flat!

According to general relativity, spacetime may be warped or curved, depending on the density of mass energy. Inflation predicts that our observable universe should be spatially flat to very high accuracy. Inflation offers a simple explanation for why the universe should be so flat today. In inflationary models, any original curvature of the early universe would have been stretched out to near-flatness as the universe underwent its rapid expansion, it would have grown so quickly that the sphere became larger, and its surface became more and more flat. So, the exponential expansion of spacetime during inflation causes it to become spatially flat.

Our model provides one possible explanation. Although the fabric of the space-time is curved into a sphere, the result shows that the fabric of the space-time is spatially flat. Because we are in this sphere and we have flat space all around us but imagine that if we measured this curve out of this sphere, we will find the curved space. Technically, we are in the spherical shape of the universe and there is nothing out of this sphere, but the fabric of the space-time is spatially flat. Let's example to understand this, if we draw a circle on the page, and its radius, we find the radius of the circle is flat or straight, but the circumference of the circle is curved, and if we draw a triangle in this circle, and measure the sum of its angles, it would be exactly 180°see Figure 3. In the same way, the shape of our universe is spherical, but the fabric of space-time is flat, and if we draw a large triangle through the universe and measure the sum of its angles, it would be exactly 180°.

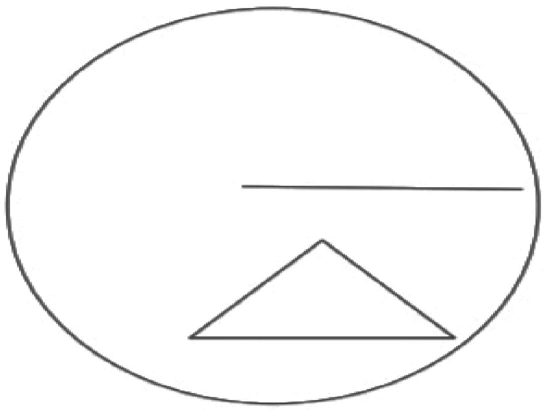

**Figure 3.** The shape of our universe is spherical, but the fabric of the space-time is spatially flat.

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We know several facts from observing the universe over the past century. First, the universe is expanding. Second, on very large scales, the expanding universe is nearly homogeneous (meaning it has the same density of matter and radiation) and isotropic (meaning it has the same expansion rate in all directions). This has been measured with extraordinary accuracy during the past decades. Starting in the 1960s, and now satellite detectors have measured the cosmic microwave background radiation (CMB), a thermal bath of photons that fills the sky. The photons today have a frequency that corresponds to a temperature of 2.728 K [17]. These photons were released ~ 380,000 years after the inflationary epoch when the universe had cooled to a low enough temperature that would allow stable (and electrically neutral) atoms to form. Soon after the big bang, the ambient temperature of matter in the universe was so high that would-be atoms were broken up by high-energy photons as soon as they formed, so that the photons were effectively trapped, constantly colliding into electrically charged matter. Since stable atoms formed, however, the CMB photons have been streaming freely, and CMB temperature today is terrifically uniform: this measured from any direction in the sky have the same temperature from one part to another part [18].

This large-scale smoothness appears quite puzzling. According to ordinary (noninflationary) big bang cosmology, these photons should never have had a chance to come to thermal equilibrium: The regions in the sky from which they were released would have been about 100 times farther apart than even light could have travelled between the time of the big bang and the time of the photons' release [19–22]. According to the inflationary model, the observable universe originated from a much smaller region than that in the noninflationary scenarios. This much smaller patch could easily have become smooth before inflation began. Inflation would then stretch this small homogeneous region to encompass the entire observable universe.

Our model provides a simple and generic reason for the observed homogeneity of the CMB: A major element of the current model is that the rapid expansion, a period of hyperfast expansion that occurred within the first second after the Big Bang, due to the infinite pushing force of infinite shrunk space. Each cycle, the universe refills with hot, dense matter and radiation, which begins a period of expansion and cooling like the one of the standard Big Bang picture. After trillions of years, the expansion stalls. And gravity contracted the universe until all the vacuum space shrunk and matter or energy recollapse in a final singularity and restarts the cycle. It simply means everything would be fold in the singularity and when it reopen or explode everything would be the same. No space is creating in the universe, but the shrunk space is expanding/stretching, which leads to appearance of space. Let's take an example, if we draw a figure on the page and fold it, and reopen the page, the figure would be the same. In the same way, the sketch of the universe is the same in each cycle, everything only reverses in each cycle. So, the universe looks the same in all directions and this makes the smoothness and homogeneity of 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, Eternal Cyclic Universe, and inflationary models. The new theory provides possible answers to several longstanding questions with 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.

Mathematically, the Big Bang looks like it came from an undefined state — something that isn't explained by the laws of physics under Einstein's theory of general relativity. This is called a "zero volume singularity". But our model has no zero-volume singularity. It suggests that the space would be Shrunk at Planck Length and it would be expanded at a certain cosmic scale. However, the Shrunk space (hence the volume) cannot be zero at the quantum scale. Our model deals directly with the cosmic singularity, explaining it as a transition from a contracting to an expanding phase. This model described that the Universe started from 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 (23). In our model the infinite force of infinite shrunk space gave rise to the big bang, and caused the rapidly expansion 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. "The fundamental philosophical problem with the Big Bang is, 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 suggests that the future of the Universe with any level of certainty that will depend on how much space has shrunk, which essentially determines how the force of the shrunk space responds to the stretching of the shrunk space. Eventually, the accelerated expansion of space will cease because the shrunk space will expand until it reaches its maximum volume of cosmic space. And then the universe starts to contract until all the space shrinks at the Planck Length. This could fill some of the biggest gaps in our common understanding of the way space and time work. The space-time and its unique nature of shrinking and expanding are the most fundamental quantities, which govern cosmic evolution. Thus, bringing the universe back to contract to its initial state, ending in a Big Crunch. The universe will not continue to expand forever, no need however, for dark energy. This could account 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 — that 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, not a true beginning.

Scientists are confident that dark matter exists because of the gravitational effects it appears to have on galaxies and galaxy clusters. But scientists have not yet observed dark matter directly. Scientists believe that dark matter doesn't interact with baryonic matter and it's completely invisible to light and other forms of electromagnetic radiation, making dark matter impossible to detect with current instruments. According to standard physics, stars at the edges of a spinning, spiral galaxy should travel much slower than those near the galactic center, where a galaxy's visible matter is concentrated (24). According to our model dark matter may not exist, it is the effect of exponentially shrunk space which makes the flat space. The orbital velocity of objects should be varied regarding the curvature of space-time around it. If stars orbit at more or less the same speed regardless of where they are in the galactic disk, it makes sense that boundary stars are feeling the same gravitational effects, or the effect of flat space. Therefore, objects orbiting far from the center of the galaxy, and objects closer to the center should move at the same velocity because there is no such a curve in space-time around the galaxy, which could slow down the orbital velocity of stars with increasing distance from the center. They are rotating with such speed that the flat space-time could possibly hold them together. The same is true of galaxies in clusters.

Shrunk Space-time could also explain certain optical illusions that astronomers see in the deep universe. For example, pictures of galaxies that include strange rings and arcs of light could be explained if the light from even more distant galaxies is being distorted and magnified by the influence of exponentially shrunk space-time in the foreground phenomenon known as gravitational lensing.

Researchers suggest that our expanding universe is now entering a new phase of exponential expansion, due to dark energy. 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 the modern day of astronomy (1,2). Our explanation for dark energy is that it is a property of space-time, empty space is nothing. Space has amazing properties. The first property is that more space can come into existence. As shrunk space stretches more space would appear, as a result, this appearance of space would cause the universe to expand faster and faster. But the interesting thing is that we cannot see which space is shrunk, and which space is stretched because this is invisible. But we can observe this phenomenon by seeing the receding velocity of an object, because according to our model shrunk space is stretching faster, this would cause the universe to expand faster and faster, and as a result, distances between two objects would keep increasing faster and faster. We have elaborated on the mechanism by force emanates from the Shrink space and provides the repulsive force or antigravity, which stretches the Shrunk space. The stretching of Shrunk Space is causing the expansion to accelerate by causing the deceleration in the force of shrink space.

The theory of inflationary proposed that, If the universe went through an early period during which it inflated exponentially, then all traces of its initial curvature would be flattened out. But this seems unrealistic. Our model also provides one possible explanation, for the spatially flat geometry of the universe. Our universe is spherical in shape, but we are in the universe, so we always find the flat space. It's just like if we live in the center of the earth, and we measure the curve of the earth by drawing a triangle.

A major element of the current model is explaining the smoothness and homogeneity of the universe observed by astronomers. We have found a simple explanation for the observed fact that the universe on large scales looks the same to us left and right, up and down -- a seemingly obvious and natural condition -- that in fact has defied explanation for decades.

This research's major breakthrough is that the problem of dark matter, and dark energy could be fully addressed by revising general relativity at galactic scales and requiring further understanding of the properties of Space-time 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 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 lead to our current universe. It appears that we now have two disparate possibilities: It could be that our universe is cyclic and has no beginning; there may have been Big Bangs before ours and a universe with a definite beginning. The ultimate arbiter will be Nature.

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## References

1. S. Perlmutter, et al, Ap. J. 517 (1999) 565.
2. A. G. Riess, et al, Astron.J. 116 (1998) 1009.
3. P. M. Garnavich et al, Ap. J. 509 (1998) 74.
4. N. Bahcall, J.P. Ostriker. S. Perlmutter, and P.J. Steinhardt, Science 284 (1999) 1481.
5. A. H. Guth, Phys. Rev. D23 (1981) 347.
6. A. D. Linde, Phys. Lett. B108 (1982) 389.
7. A. Albrecht and P. J. Steinhardt, Phys. Rev. Lett. 48 (1982) 1220.
8. Futch, M. (2008) Leibniz's Metaphysics of Time and Space. Springer, Berlin. https://doi.org/10.1007/978-1-4020-8237-5
9. Lemley, B. and Fink, L. (2002) Guth's Grand Guess. Discover Magazine, 1/8-8/8, April. 23, No. 4.
10. Steinhardt, Paul J. "Cyclic universe theory." Access Science, McGraw Hill, Nov. 2019.
11. G. Kauffmann, S. D. M. White, B. Guiderdoni, The formation and evolution of galaxies within merging dark matter haloes, Monthly Notices of the Royal Astronomical Society, Volume 264, Issue 1, September 1993, Pages 201–218, https://doi.org/10.1093/mnras/264.1.201
12. ↑ Wambsganss, J. 1998. Gravitational lensing in astronomy. Living Rev. Relatives. 1:12. Doi: 10.12942/lrr-1998-12
13. S. Perlmutter, et al, Ap. J. 517 (1999) 565.
14. Li, F. and Baker Jr., R.M.L. (2007) Detection of High-Frequency Gravitational Waves by Superconductors. International Journal Of Modern Physics B, 21, 3274-3278. https://doi.org/10.1142/S0217979207044366
15. Baker Jr., R.M.L. (2001) Peoples Republic of China Patent Number 01814223.0 Gravitational Wave Generator and Detector. Filed July 13, 2001, Granted September 19, 2007.
16. Woods, C.R., Baker Jr., R.M.L., Li, F., Stephenson, G.R., Davis, E.W. and Beckwith, A.W. (2011) A New Theoretical Technique for the Measurement of High-Frequency Relic Gravitational Waves. Journal of Modern Physics, 2, 498-518. https://doi.org/10.4236/jmp.2011.26060

doi:10.20944/preprints202207.0121.v6



17. D. J. Fixsen et al., "The cosmic microwave background spectrum from the full COBE FIRAS data set," Astrophys. J. 473, 576 (1996) [arXiv: astro-ph/9605054].
18. D. N. Spergel et al., "First year Wilkinson Microwave Anisotropy Probe (WMAP) observations: Determination of cosmological parameters," Astrophys. J. Suppl. 148, 175 (2003) [arXiv: astro-ph/0302209].
19. A. H. Guth, "The inflationary universe: A possible solution to the horizon and flatness problems," Phys. Rev. D 23, 347 (1981).
20. A. D. Linde, Particle Physics and Inflationary Cosmology (Harwood, Philadelphia, 1990).
21. E. W. Kolb, M. S. Turner, The Early Universe (Addison-Wesley, Reading, MA, 1990).
22. A. R. Liddle, D. H. Lyth, Cosmological Inflation and Large-Scale Structure (Cambridge Univ. Press, New York, 2000).
23. Guth, A. and Steinhardt, F. (1984). The inflationary universe. Scientific American 250 (No.5) 116.
24. G. Kauffmann, S. D. M. White, B. Guiderdoni, The formation and evolution of galaxies within merging dark matter haloes, Monthly Notices of the Royal Astronomical Society, Volume 264, Issue 1, September 1993, Pages 201–218, https://doi.org/10.1093/mnras/264.1.201