Article

The Cyclic Universe, the Big Bang was not the beginning, but a repeating pattern of expansion and contraction of the space-time

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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 we propose a unique property of Space-time, this particular and marvelous nature of space shows us that space can stretch, expand, and shrink. This property of space is caused the size of the Universe changed over time: growing or shrinking. The observed accelerated expansion, which relates the stretching of Shrunk space for the new theory, is derived. This theory is based on three underlying notions: First, the big bang is not the beginning of space or time, but rather at the very beginning fraction of a second there was an infinite pressure of infinite Shrunk space in the cosmic singularity, that pressure gave rise to the big bang, and caused the rapidly growing of space, and all other forms of energy are transformed into new 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 pressure of shrink 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 universe will not continue to expand forever, no need however, for dark energy and dark matter. 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.

Keywords: The Cyclic Universe; Big Bang and Big Crunch; Cosmology; Gravitational force; Dark Energy; Dark Matter

1. Introduction

Only five percent of the universe is visible. The visible universe—including Earth, the sun, other stars, and galaxies—is made of protons, neutrons, and electrons bundled together into atoms. Perhaps one of the most surprising discoveries of the 20th century was that this ordinary, or baryonic, matter makes up less than 5 percent of the mass of the universe. The rest of the universe appears to be made of a mysterious, invisible substance called dark matter (25 percent) and the recent discoveries of cosmic acceleration indicating self-repulsive dark energy (70 percent) [1,2,3,4] were not predicted and have no clear role in the standard model. [5,6,7] Furthermore, no explanation is offered for the 'beginning of space and time', the initial conditions of the universe, or the long-term future. Scientists adding in dark energy as a cosmological constant could neatly explain how space-time is being stretched apart. But that explanation still leaves scientists clueless as to why the strange force exists in the first place. 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 based on the theory of The Cyclic Universe. Our model provides a rational explanation for the accelerated expansion

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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 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 have a different concept about vacuum space. Space is all around us, it expands, it reacts to what it contains (matter, energy, radiation). It is a dynamical entity. It grows, and shrink, but it has a finite volume, it could be shrink at Planck Length and it could be grows cosmic scale. Our model takes that space consists of unique properties of shrinking and expanding, which participant 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 shrink it exerts the pressure which is responsible for stretching of Shrunk Space.

Our Space-time model suggests and embodies some properties of space:

1) Space-time itself is a eternal, finite and it consists of unique properties of shrinking and expanding. When space exponentially shrunk it exerts the pressure, we called the Pressure of shrunk space.
2) The Pressure of shrink Space differs from gravity. Gravity is an attractive force between material objects. The shrink space force is repulsive; it exerts a pressure opposite to that of gravity.
3) The space field is a scalar field. It is similar to the gravitational field. 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 no beginning; there may have been Big Bangs before ours.
5) Finally, we may 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 had shrunk, which essentially determines how the pressure of the shrunk space responds to the expansion of the universe. The pressure of the shrunk space will cease at a certain level, so the expansion of the Universe will eventually stop, and the universe will begin to contract until all the matter in the universe re-collapses to a final singularity (Big Crunch).

3. The Eternal Cyclic Universe

It is proposed that, about 14 billion years ago the Universe started from the shortest meaningful length, Planck Length, (the smallest measure of length because shorter than it, quantum effects dominate and it becomes meaningless to consider exact values of measurements) and the shortest meaningful measure of time, Planck Time [9].

Our model has no zero volume singularity because the size of space is finite, limited, i.e., the shrink space (hence the volume) cannot be zero at the quantum scale. Space consists of a unique property, this particular and marvelous nature of space shows us that space can stretch, expand, and shrink, it is like a spring. If we push the spring it shrunk, in the same way when matter comes closer to each other, the space also shrinking between them. As space shrunk it exerts the pressure, which pressure stretching 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 pressure of shrink space produces

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an exponential change in the size of the Universe. When space exponentially shrank, it creates pressure, which leads to stretching the shrink volume of space. This interpretation is simpler than some portions of the theory for the Big Bang: such as "…that 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].

Whereas this proposed theory depends upon the infinite pressure of shrunk space, which pressure caused the exponential growth of space. We speculated that space-time, grow in concert very rapidly at first. (In particular, that the infinite shrunk space, which stretching very rapidly at first). About 14 billion years ago, the infinite shrunk space produced the infinite pressure in the singularity, which pressure gave rise to the big bang, and shrunk space began to stretching 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 super clusters. Thus the Big Bang was not only an explosion of matter and radiation "all over the place"; it may just have been a silent burst of infinite pressure of infinite shrink space, that caused the simultaneously 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.

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 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 providing extra gravitational pull, causing the stars to speed up – a theory that's become widely accepted [19].

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 in, requiring no invisible matter. As we discussed earlier that, as matter comes closer to each other the space also shrinking between them. To make this clear, let us imagine a compression springs. Like the compression springs used to push a ballpoint pen out of its case and return back 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 getting shrunk, and as the spring getting shrunk the curve of spring getting flat, in the same way, as the space getting shrunk, the curve of space getting 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 curve space-time, so there is less gravitational pull from the sun on planets farther out and, to keep from spiraling 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 in the same velocity, because there is no such

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a curve space-time around the galaxy, which could slowdown 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; they shouldn't have torn themselves apart long ago. The same is true of galaxies in clusters.

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. The fact that we are unable to see this shrunk space-time, because it is not the affect of matter or energy, it is the influence of space-time itself, suggests the presence of shrunk space, it is not visible.

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 [11]. But according to our model gravitational lensing is based on the two major fact, 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 the 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 shrunk space, the more the light bends. With the help of this theory, we can determine the 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 [4,12] are an unexpected surprise with no clear explanation. The expansion of space is the increase in distance between any two given gravitationally unbound parts of the universe with time. Actually space itself is not creating, but it is a stretching of Shrunk 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 accelerated expansion of universe explained, but it predicts it's ultimate fate. The unique property of Space-time enable us to describe a sequence of events from the Big Bang to the Big Crunch. The overall scenario and its implications explain, the expansion of the space in three phase. Rapidly Expansion of space, Expansion of space and Accelerated Expansion of space. At the very beginning fraction of a second there was an infinite pressure of infinite Shrunk space, we speculate that the infinite pressure of Shrunk space gave rise to the big bang, and caused the rapidly growing of space. That processes would appear to move very rapidly in the early universe, and only readily observable by detectors of high-frequency gravitational waves such as the Li-Baker [13] [14] [15]. After the beginning of the universe, the Shrunk space continue to expanding, but in the distant past, the pressure of the Shrunk space, and density should have been greater, so in the distant past, 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 as the Shrunk space stretching, the pressure of shrink space decreasing. And as the

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pressure of Shrunk space decreasing, the expansion of space increasing, that is although in general, decelerate in the pressure of shrink space leads to accelerate the stretching of space. In other words, stretching Shrunk Space is causing the expansion to accelerate by causing the decelerate in pressure of Shrunk space. This is the big key to understand the accelerated expansion of the universe. The universe will not continue to expand forever, no need however, for dark energy.

As the expansion of space increases, the density of the matter and energy decreases, so the pressure of Shrunk space decreases.

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

3.4. The Future and Ultimate Fate of the Cosmos

A possibility is predicted by Rovelli's theory of Planck Stars [16, 17], that a "bounce" is more likely rather than a crunch. Using a quantum gravity approach, he showed that there is no singularity in a Black Hole because the universe undergoes a bounce due to quantum pressure counteracting the force of gravity and the volume does not shrink beyond a certain size. The universe may therefor undergo a bounce. This would lead to the "Heat Death" and "Big Freeze" often discussed in the literature. However, this will leave a lot of Black Holes floating around in the universe since their lifetime is longer than the age of the universe. This seems rather unrealistic.

Our model suggest that the ultimate fate of the Universe with any level of certainty that will depend on how much space had shrunk, which essentially determines how the pressure of the shrunk space responds to the expansion of the universe. Because the pressure of the shrunk space will cease at a certain level, and eventually the expansion of the Universe will stop, and then gravity will start to contract the Universe until all the matter in the universe re-collapses to a final singularity (Big Crunch). Gravitational force and pressure of shrunk space play an important role in the reformation of the Universe. Gravitational force contracted the Universe until all the matter in the universe re-collapses to a final singularity, and pressure of shrunk space expands the universe until all the shrunk space will expand at its certain large scale. Eventually the accelerated expansion of space, will cease at it reached its maximum volume of finite space. And then universe start to contracted until all the space will shrink at the Planck Length. Which we called the singularity Big Crunch. The eternal space and its unique nature of shrinking and expanding are the most fundamental quantities, which govern the 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. The two most fundamental quantities in the universe that govern cosmic evolution; the gravitational force and the pressure of shrink space. They may provide the clockwork mechanism that operates our eternal cyclic universe.

3.5. Is there an end for the universe in the cyclic model theory

There is no end for the universe as the universe is eternal and will remain as long as there are enough mass Balanced with enough energy, so we are facing an endless universe, but we only face and end of the cycle [18]. Each cycle starts at a single point of time and ends at a single point of time

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.

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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" [9]. But our model has no zero volume singularity. It suggest that the space could be Shrunk at Planck Length and it could be expanded at the certain cosmic scale. But, 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 correctly 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 (20). In our model the infinite pressure 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 drive us to deeper understanding the universe, and suggests that the Big Bang was not the beginning, but a repeating pattern of expansion and contraction of the space-time. This could fill some of the biggest gaps in our common understanding of the way space and time work.

Scientists have not yet observed dark matter directly. It 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. But scientists are confident it exists because of the gravitational effects it appears to have on galaxies and galaxy clusters. 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 (19). According to our model dark matter may not exist, it is the effect of exponentially shrunk space which makes the flat space. Orbital velocity of objects should be vary 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 in the same velocity, because there is no such a curve space-time around the galaxy, which could slowdown 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.

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 influence of exponentially shrunk space-time in the foreground-a phenomenon known as gravitational lensing.

However Dark Energy is one of the most important mystery in the modern day of astronomy (1,2). But we have elaborated on the mechanism by which pressure emanates from the Shrink space and provides the repulsive force or pushing pressure, which stretching the Shrunk space. The stretching of Shrunk Space is causing the expansion to accelerate by causing the decelerate in pressure of shrink space. The universe will not continue to expand forever, no need however, for dark energy. They are the two most fundamental quantities in the universe that govern cosmic evolution. The two principal long range forces are the gravitational force and the pressure of shrink space. The new definition of eternal space and its unique property enables us to describe a sequence of events from the Big Bang to the Big Crunch. They may provide the clockwork mechanism that operates our eternal cyclic universe.

Reviewing the overall scenario and its implications, what is most remarkable is that the 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.

This result means that the problem of dark matter, and dark energy could be fully addressed by revising general relativity at galactic scales and requiring further understanding properties of Space-time instead of new material components that have not been found up to now. It appears that we now have two disparate possibilities: It could be that our universe is cyclic and 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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