Article

The Beginning to the End of the Universe and Eternal Space-time

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Abstract: We present a cosmological model in which the Big Bang was not the beginning of space and time; there was a previous phase leading up to it, with multiple cycles of contraction and expansion that repeat indefinitely. 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. When matter comes closer to each other, the space also shrinking between them. As space shrunk it produced 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. The observed accelerated expansion, which relates the stretching of Shrunk space for the new theory, is derived. When space exponentially shrunk, it creates the pressure, which leads to stretching the shrink volume of space. As pressure of shrink space decreases, the stretching of shrunk space increases, that is although in general, decelerate in the pressure of shrink space leads to accelerate the expansion of space. The pressure of the shrunk space will cease at the certain cosmic scale, so the expansion of the Universe will eventually stop, after that a period of slow contraction will begin, 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. The new definition of eternal space and its unique properties enables us to describe a sequence of events from the Big Bang to the Big Crunch.

Keywords: eternal space-time; Big Bang and Big Crunch; cosmology; gravitational force; dark energy

1. Introduction

The current standard model of cosmology combines the original big bang model and the inflationary scenario. [1, 2, 3, 4, 5, 6, 7] Inflation, a brief period (10–30 s) of very rapid cosmic acceleration occurring shortly after the big bang, can explain the homogeneity and isotropy of the universe on large scales (> 100 Mpc), its spatial flatness, and also the distribution of galaxies and the fluctuations in the cosmic microwave background. However, the standard model has some cracks and gaps. The recent discoveries of cosmic acceleration indicating self-repulsive dark energy [8,9,10,11] were not predicted and have no clear role in the standard model. [1,2,3] Furthermore, no explanation is offered for the 'beginning of space and time', the initial conditions of the universe, or the long-term future.

In this paper, we present a new cosmology consisting of an endless sequence of cycles of expansion and contraction. By definition, there is neither a beginning nor an end of Space-time. We explain a more descriptive physical model of Space-time based on the theory that the Space-time is eternal, finite and it consist of a unique nature of shrinking and expanding. Our eternal space-time model provides a rational explanation for the accelerated expansion of the universe. 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 Vacuum 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 [13]. 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 largest scale. It consists of its 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. Our model takes it space Shrink, and expand which is something more physical, as the space shrink it exerts the pressure which is responsible for stretching the Shrunk Space. 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.

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 generates 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 model, 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. A. The Eternal Space-time And Beginning of 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. 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. But it 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 produced 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 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 [12]." Whereas the proposed theory depends upon the infinite pressure of shrunk space, which pressure

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 19 August 2022 doi:10.20944/preprints202207.0121.v4

caused the exponential growth of space. It is speculated that spacetime, 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. Early seeds of stars, planets, and galaxies expanded out from that momentous point in time and space. It spread in such a way that the universe became highly smooth. 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.

B. 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 [8,11] 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 [14] [15] [16].

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. The rate of expansion of the Universe is expressed by a quantity called ‘the Hubble constant’. There is always much argument over its precise value, and it is a figure that is continuously updated by new research, but the Hubble constant is about 73 kilometres per second per megaparsec.

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 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 expansion of Shrunk space.

C. The Future and Ultimate Fate of the Cosmos

A possibility is predicted by Rovelli's theory of Planck Stars [17, 18], 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 Feeze" 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.

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, and inflationary model. "Because space and time has always existed in the past." A number of problems arise with the inflation model, which itself expanded and corrected previous models that arose from Big Bang theory. The inflation model was supposed to explain why, for example, the universe appears so homogenous on a huge scale without the same initial conditions.

One of the most compelling successes of inflationary theory was to obtain a nearly scaleinvariant spectrum of density fluctuations that can seed large-scale structure. (4) But, there are so many possibilities that arise from an inflationary model that it makes the model itself less useful. 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 from beginning to its ultimate end. This could fill some of the biggest gaps in our common understanding of the way space and time work. 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 because the space-time is eternal and the size of space is finite. Its property 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. In our model the infinite pressure of infinite shrunk space gave rise to the big bang, and caused the rapidly growing of space, it then cooled undergoing phase transitions to radiation, fundamental particles, and matter.

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 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. 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. 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. 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.

Funding: This research received no external funding.

Future Work: The theory could be best understood by equations in future works.

Acknowledgments: I am grateful to the Preprints Editor Ms Mila Marinkovic for her rapid and excellent attention in processing the submissions.

Conflicts of Interest: The authors declare no conflict of interest.

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