

宇宙演化膨胀坍缩理论

张少勇

(哈尔滨理工大学 理学院, 黑龙江 哈尔滨 150080)

摘 要: 宇宙大爆炸理论仍有许多核心问题没有解决。建立了宇宙从大爆炸, 经过膨胀、坍缩, 最终回到起点的宇宙演化膨胀坍缩理论。阐述了大爆炸的形成, 引起爆炸原因, 论述了宇宙加速膨胀、暗能量、引力波等宇宙学关键问题。

关键词: 大爆炸; 暗能量; 加速膨胀; 引力波; 超光速

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Expansion Collapse Theory of Cosmological Evolution

ZHANG Shao-yong

(School of Science, Harbin University of Science and Technology, Harbin 150080, China)

Abstract: In the big bang theory, many key puzzles have not been solved. This paper presents an expansion collapse theory of cosmological evolution that the universe originated from the big bang, expanding at beginning, then contracting, and finally collapsing to the origin of the big bang. Some answers are given to the formation of the big bang, the triggering mechanism of the big bang, the accelerating expansion of universe, dark energy and gravitational waves.

Keywords: the big bang; dark energy; accelerated expansion; gravitational waves; super-velocity of light

0 Introduction

With the aid of large-scale structure theories of the universe in Einstein's general relativity, many theories about cosmic evolution are proposed^[1-4], such as string theories, brane theories and bang theories. In 1927, Lemaître presented modern bang theory^[5-8]. In 1929 Edwin Hubble found that the entire universe was expanding uniformly. After the universe was discovered in accelerating expansion, the big bang theory has become the main theory of cosmic evolution. However,

the big bang theory has not explained many kernel questions, such as how the singularity of the big bang was shaped, what triggered the big bang, why our universe is in accelerating expansion, what dark energy^[9-11] is and why gravitational waves are too hard to detect. This paper represents an expansion collapse theory of cosmological evolution, which reveals the forming process of the singularity of the big bang and the mechanism that triggered the big bang, answers the reason for accelerating expansion, discusses the essence of dark energy and gravitational waves. The cosmological evolution process stars from the big bang,

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作者简介: 张少勇(1963—),男,副教授,E-mail: 13904603565@139.com

and then expands and finally collapses to the original singularity.

1 Several Concepts

1.1 The Light Ball

The light ball is a space ball in the universe, at the center of the big bang, with the radius that light can reach from the time of the big bang to date. The light ball is growing at the speed of light with the passage of time. All objects that we can observe are within the light ball. Outside the light ball, it is a world of super-velocity of light.

1.2 Inertial Matter and Wave Matter

According to Newton Law, any body moving at the speed lower than light still keeps inertial motion after the force acted on it is cancelled. Another type of matter moves with wave mode at the speed of light, such as electromagnetic waves, light, etc.

For convenience of discussion, all matter moving at the speed lower than light is defined as inertial matter. The rest, which moves with wave mode at speed equal to or faster than light, is defined as wave matter.

Inertial matter travels at a speed lower than light, moves in a straight line, occupies a certain amount of space, but does not fill all the space. Wave matter travels at a speed equal to or faster than light, propagates with wave mode, does not occupy any space, but fills all space which it can reach. Any limited space can be filled with unlimited amount of electromagnetic waves. The faster wave matter moves, the more energy it has. Light is the point of division of inertial matter and wave matter. Light has part of properties of inertial matter and wave matter. This exactly explains the phenomenon of wave-particle duality of light.

2 Basis of the Expansion Collapse Theory of Cosmological Evolution

Before the big bang, matter in the universe was attracted by gravity, converged together and formed a huge black hole. By the accumulation of more matter, the temperature and pressure, and then speeds and energy in the black hole rose gradually to higher degree.

In such huge black hole with high temperature and great pressure, matter in the kernel could not exist or move in form of articles. It could only exist by way of wave with high speed. When such waves got enough energy to escape tight bound to the black hole, the big bang happened. All matter escaped outward at the initial speed endowed by the big bang.

Light cannot escape from black holes, hence the speed and energy of waves propagating out from the big bang must be faster and higher than light. On the other hand, only such waves with faster speed and higher energy than light can create the big bang. Right after the big bang, most matter propagates with faster speed than light. At early stage, the propagating speed is actually reduced by the gravity. After a long period of time, the matter outside the light ball is coming to constitute a majority of the cosmic matter. When gravitational force outside the light ball is greater than that inside the light ball, matter inside the light ball starts to propagate and this propagating is accelerated.

All matter within or out of the light ball is attracted by gravity. Hence propagating speed of superluminal matter outside the light ball is reduced. However the propagating speed within the light ball is accelerated outward. When the propagating speed of superluminal matter outside the light ball is coming to stop, the matter outside the light ball begins to contract inward. Then the whole universe come to contract and at last collapses to a point again. A next big bang will happen!

3 Several Kernel Questions

The big bang theory has some unsolved problems. Various theories give many explanations, but they are not as credible as expected. No one theory has solved the questions completely. This expansion collapse theory of cosmological evolution may explain some problems about the big bang theory.

3.1 Right before and after the Big Bang

What the singularity of the big bang is, how it is formed, how it could contain so much matter of the universe in it, what the physical form before the big bang is like, what triggers the big bang? So many

questions like those have not been explained properly.

The center of this black hole is just the singularity as described as in the big bang theory. In such black hole, matter gathered was so much, gravity was so great, temperature was so high, which matter could not exist in form of particles but could only exist in form of waves. Just for the reason described above that wave matter does not occupy any space, the black hole could hold so much matter of the universe in it, accumulated by gravitation,

The big bang happened after the energy of waves exceeded the gravitation of the black hole. After this moment, all matter in the black hole began to propagate outward from the center of the singularity of the black hole, with the initial speed endowed by the big bang. The velocity of most propagating waves were faster than the speed of light, for the reason that light, with the speed of light, cannot escape from a black hole. The energy of light could not trigger the big bang.

3.2 Dark Energy

In the big bang theory, dark energy is assumed to explain the phenomenon of the propagation of our universe. What is dark energy? Many articles have been presented to date, but they discuss the cosmic propagation basically on the assumption of repelling force or negative gravitation of dark energy. Paper [1] gave a theoretical model for dark energy. Papers [2-3] analyzed dark energy by adjusting Einstein's equation or parameters of negative energy model. However, the essence of dark energy is not explained properly. No scientific experiments today can examine what it is. The concept of dark energy is perhaps created to try to explain what 70% of universe is. At the same time, repelling force is endowed in order to describe the propagation of our universe.

If dark energy, as described as in other theories, can fulfill the universe where we have probed to date. This dark energy should or basically should be uniformly distributed in the universe. Repelling force should be pointing in all directions. But this could lead to that the joint forces should be zero or insignificant. Thus, stars could not be affected by any repelling force and could not move significantly. On the other hand, even if the repelling forces are not uniformly distributed

somewhere, or the joint forces are big enough to influence some stars, the moving directions of those stars are not certain in line with that of the cosmic propagation. In other words, those influenced stars may move in all possible directions and some stars may come near and nearer. They do not dilate outward together! If our universe is congested with dark energy or repelling forces in it, all stars would, on the whole, move out of order, not in the direction of cosmic propagation. This contradicts what we have observed that all stars are accelerated to propagate outward.

According to the hypothesis of dark energy of present theories, the repelling forces of dark energy have existed right after the big bang and have been ubiquitous. The repelling forces of dark energy (70% of cosmic matter) are stronger than the universal gravitation. In such environment of powerful repelling forces, the diffuse cosmic matter could not gather and form stars and galaxies by the gravitation. Our universe would be like a bowl of more and more thin gruel, which would be in chaos for ever.

In one word, the forces that help cosmic matter to accelerate propagation outward cannot exist within our visible universe. They can only exist outside the light ball.

3.3 Reason for Accelerating Expansion

After long years' observation, we have found the universe is not in condensing by gravitation, but in accelerating expansion. What results in the accelerating expansion if it is not dark energy?

The essential reason for cosmic expansion is that the gravitation outside the light ball is stronger than that within the light ball. The joint force accelerates the matter in the light ball or our visible universe to expand outward, or the gravitation outside the light ball tows the matter within the light ball to expand outward. It is just like the phenomenon that air balloon will expand outward in negative pressure. The gravitation outside the light ball is originated in the superluminal matter which is produced in the big bang. The total quantity of such matter is much more than that of matter within the light ball. This is just the reason for the repelling forces of the 70% dark energy.

3.4 Accelerating Expansion Process of Universe

Right after the big bang, all matter propagated at the initial velocities endowed by the big bang. After some period of time, the universe began to accelerate the propagation. What triggered the accelerating expansion process? No answer is given in present theories. A concept of repelling forces is supposed to explain the accelerating expansion. Why have the repelling forces not worked at the early stage after the big bang?

After the big bang, most part of matter propagated with super-velocity of light. At this early stage, main part of matter remained within the light ball and the propagation is not accelerated. On the contrary, the propagating velocities are reduced by the cosmic gravitation on the whole. After a long time of propagation, superluminal matter outside the light ball constitutes main part of the universe. When the gravitation outside the light ball was greater than that within the light ball, the matter within the light ball began to accelerate to expand. This is why the universe began to accelerate the propagation after some period of time later. The so-called dark energy or repelling force, what we do not have found, also helps to prove the phenomenon that the matter or the gravitation outside the light ball is much greater than that within the light ball.

The repelling force of Casimir-Lifshitz is supposed to be a part of the repelling forces. However, this kind of force is inversely proportional to the four square of the distance. It is too small in the large scale of universe. On the other hand, it should be scattered randomly everywhere in universe and the vector sum of such Casimir-Lifshitz's repelling forces, just like that of dark energy, should be close to zero.

3.5 Situation outside the Light Ball

The superluminal matter is in a state of waves, which pervades in the universe where it can arrive. Waves with super velocity of light can not exist in particles, nor can they gather to evolve in any kind of stars. Outside the light ball, it is only a world of superluminal waves.

3.6 Future Fate of the Expanding Universe

No clear future results are given in the big bang theories and the universe is considered to expand slowly and continuously in the dark.

Any matter in the universe is influenced by the gravitation. The superluminal matter has energy and therefore has mass. The matter outside the light ball is also attracted by the gravitation of all matter in the universe, in the direction to the center of the big bang. The propagating velocity of superluminal matter outside the light ball is reduced. The universe will be condensing after the propagating speed of matter outside the light ball stops. Finally, our universe will condense to a point again. A new huge black hole will appear and prepare a next big bang. Perhaps, our present universe is one of many cycles of expansion collapse!

4 Gravitational Waves and Gravity

Gravitational waves are detected 100 years later after Einstein's prediction. Why does it take as so many years? What really are they and where do they hide in the universe?

Gravitational waves originated from gravitation. They exist in the whole universe all the time. Gravitation and then gravitational waves appear as long as matter exists. Gravitational waves are continuous waves and emitted by matter. Whenever encountering something, gravitational waves will drag it to the matter by which gravitational waves are emitted. This is the universal gravitation.

Gravitational waves would be considered as innumerable wave line originating from one point in space coordinates system. They fill any space where they arrive, just as electromagnetic waves are emitted by a magnet. The gravitation of each line of gravitational waves is too weak, but the integral force of enough gravitational waves is obvious and equal to the gravitation of the matter, obeying the law of universal gravitation.

Now that gravitational waves exist everywhere, why is it hard to detect? First, the energy of each line of gravitational waves is too weak. Second, gravitational waves are continuous and changes of their energy are too small in local range (even in quite a large range). Normally there is no energy mutation. Third, it is the most important that we are living in an ocean of gravitational waves. Every thing, including detecting equipments, is effected equally by gravitational waves. We

could not feel or detect temperature if we lived in a constant temperature world all the time.

Energy mutation of gravitational waves can only be created by changes of matter mass, not by gravitational waves themselves. Compared with speeds of gravitational waves, mass mutation in explosion of stars is slow and continuous and cannot be detected in local space-time. It may be easier in large scale or long duration. At present level of science and technology, it is hard to detect gravitational waves.

In the big bang, the sudden change of huge mass of the black hole is big enough to disturb the gravitational field existing before the big bang. The superluminal waves from the big bang, especially with lower speed close to light, have efficiently superposed disturbance on gravitational waves. The gravitational waves scientists have detected this year could be the remains of disturbance by the superluminal waves from the big bang. With the development of technology and the detection means, we can detect more evidence of gravitational waves in the future.

5 Super Velocity of Light

According to the principle of Einstein's invariance of light speed, the experiment of limit speed of light by W. Bertozzi^[4] and other experiments (such as Michelson-Morley, Phys. Lett., T. Alvager et al. & J. Bradley), the light velocity is the maximum speed of particles. This maximum velocity is widely accepted. Although this absolute maximum velocity is somehow not easy to understand, Einstein's^[5] theories and other accepted theories can not prove the existence of the super-velocity of light. The large hadron collider (LHC) has verified the existence of the Higgs boson. The super-velocity of light is created in extreme conditions, such as in the big bang, so it is hard now to prove the existence of the super velocity of light only by our present scientific methods.

Einstein's theories of relativity do not negate the correctness of Newton's laws for particles in low speed. The super-velocity of light also does not negate the correctness of Einstein's theories of relativity in speed not more than light. The topic of the super-velocity of light

runs counter to modern physics. However, hypothesis of the super velocity of light can explain many unsolved puzzles of the big bang. Now we infer the existence of the super velocity of light in the following several aspects.

5.1 System of Light

Summing up all the methods testing the inexistence of the super velocity of light, we find that all experiments are taken in the system of light. We use the methods and knowledge in the system of light to verify some nature outside the system of light. It is hard or even impossible in the world of light to prove the existence of the super-velocity of light by the methods and knowledge in the system of light.

5.2 Light Maximum Speed of Inertial Matter

According to the mass energy formula of relativity,

$$m = \frac{m_0}{\sqrt{1 - v^2/c^2}}, E = \frac{E_0}{\sqrt{1 - v^2/c^2}}$$

speed of any particles cannot reach the velocity of light. When the speed of a particle is close to the velocity of light, its mass will be close to infinity and the energy that the particle needs to accelerate will be also close to infinity. In all accelerating experiments, including γ ray, no matter how much energy we apply, Speeds of particles can not reach the velocity of light, not to exceed it. However, light can travel at the velocity of light easily. It is just the reason that light travels at wave. A particle moving at the speed close to light, just like γ ray, shows some properties of light, with which it can travel fast and far. In testing and deducing the theories of the maximum light velocity, the objects we take to study are inertial particles. The theories of the maximum light velocity are correct to all kinds of inertial particles.

Wave matter is out of restrictions of the theories of the maximum light velocity. On the contrary, the minimum velocity limit of wave matter is the velocity of light. The wave matter, we discuss here, is pure wave, excluding the properties of inertial particles, nor the corpuscular property of wave-particle dualism.

In our visible universe with the maximum light velocity, the value in the factor of the Lorentz transform

$$\frac{1}{\sqrt{1 - v^2/c^2}}$$
 cannot be negative, which is the base of the

theories of the maximum light velocity. However, light can travel at the maximum light velocity. Light is exceptive and is not suitable for this formula. The reason is that the Lorenz transform is built on the presupposition of principle of constancy of light velocity and the maximum light velocity, to study the theories of inertial particles. Hence, the supper velocity of light is not suitable for this formula. In another way, when the speed is greater than that of light, the factor is an imaginary number. This perhaps depicts some properties of the supper velocity of light.

6 Conclusion

A new cosmic complete evolution model from the big bang, expansion, collapse and finall to another starting point is established in this expansion collapse theory of cosmological evolution, which solves some puzzles in cosmic evolution, such as the formation of the singularity and the triggering mechanism of the big bang, the reason of accelerating expansion, the essence of dark energy and gravitational waves. The process of cosmic evolution is a difficult topic. Due to the limitation of technical means, some theories may be vindicated many years later. This expansion collapse theory of universe evolution is presented as a new cosmic evolution theory for all to discuss.

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