Random liquid cosmological model of the universe

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Abstract

There are many universe models, and the universe model based on general relativity has gained wide acceptance. The Big Bang theory is a view that many researchers accepted. However, what is the mechanism of The Big Bang in the universe, why the Universe Big Bang is produced, and what happened to the universe before the Big Bang in the universe, none of which is a good theory to explain. If we agree that there is Virtual Spacetime, we can explain the current expansion of the universe and the possible shrinkage from the mutual oscillation relationship between Virtual Spacetime and Real Spacetime. It is the expansion and contraction of the universe that is caused by the back and forth oscillation of the real spacetime and virtual spacetime component energy forms of the universe. That is, the mass and energy of the universe's Virtual and Real Spacetime transform each other, causing the expansion and contraction effects of the universe. The energy of Virtual Spacetime reflects the mass in Real Spacetime. In Real Spacetime, the reduction of the mass of the universe leads to an increase in the kinetic energy of Real Spacetime. Conversely, if the kinetic energy of Real Spacetime is reduced and the total mass of the universe is increased, it reflects the contraction of the universe. In addition, through the assumptions of Virtual Spacetime, we can also obtain a variety of states that may exist in the universe, including at least two states of gas and liquid. That is to say, if we look at the material composition of the universe from the scale of the universe, the forms of these substances include at least two forms, gaseous and liquid. The division of these two states of the universe also means that we can use the knowledge of fluid mechanics to deal with various problems of the universe.

Keywords: Universe model; Relativity; Virtual Spacetime

Случайная жидкостная космологическая модель вселенной

(Машинный перевод, только для справки)

Аннотация: Существует множество моделей вселенных, и модель вселенной, основанная на общей теории относительности, получила широкое признание. Большой взрыв - это точка зрения, которую приняли многие исследователи. Однако, каков механизм Большого взрыва во вселенной, почему создается Большой взрыв во Вселенной, и что произошло со вселенной до Большого взрыва во вселенной, и ни одна из них не является хорошей теорией для объяснения. Если мы согласны с тем, что существует Виртуальное пространство-время, мы можем объяснить текущее расширение вселенной и возможное сокращение взаимных колебаний между Виртуальным пространством-временем и Реальным пространством-временем. Это расширение и сжатие вселенной, которое вызвано колебаниями реального пространства-времени и компонентов энергии-пространства виртуального пространства-времени во вселенной. То есть масса и

энергия виртуального и реального пространства-времени вселенной трансформируют друг друга, вызывая эффекты расширения и сжатия вселенной. Энергия виртуального пространства-времени отражает массу в реальном пространстве-времени. В реальном пространстве-времени уменьшение массы вселенной приводит к увеличению кинетической энергии реального пространства-времени. И наоборот, если кинетическая энергия реального пространства-времени уменьшается и общая масса вселенной увеличивается, это отражает сокращение вселенной. Кроме того, исходя из предположений о виртуальном пространстве-времени, мы также можем получить множество состояний, которые могут существовать во вселенной, включая как минимум два состояния газа и жидкости. То есть, если мы посмотрим на материальный состав вселенной из масштабов вселенной, формы этих веществ включают, по крайней мере, две формы, газообразную и жидкую. Разделение этих двух состояний вселенной также означает, что мы можем использовать знания механики жидкости для решения различных проблем вселенной.

Ключевые слова: модель вселенной; относительность; Виртуальное пространство-время

1 Introductions

The construction of the universe model is a very interesting question. Unlike other physical problems, the construction of the universe model can only be proved by indirect evidence. For example, the Big Bang model of the universe, the universe state predicted in the early universe of The Big Bang in this model is now unable to obtain direct factual evidence. But through a series of indirect evidence, including microwave background radiation, the expansion process of the universe, and even the experimental data of the Large Hadron Collider can still support The Big Bang theory to some extent.

Even so, The Big Bang theory of the universe is of great significance. Like human history research, it studies the history of the universe and constructs corresponding models to gain more knowledge about the current universe and to some extent predict the future of the universe.

For this reason, if the relevant theories can be more abundant and diverse, it will help us to build a variety of universe models. The establishment of a variety of universe models is to help us more accurately grasp the law of the development of the universe, to achieve the advantages and fix weaknesses, to expand human understanding of the universe.

The universe model based on Virtual Spacetime Physics [1] proposed in this paper has a certain difference in the history and development process of the universe from The Big Bang theory, but it can also confirm the existing cosmic observation data. Believe it helps us to discover some facts and phenomena that were easily overlooked in the past.

2 The existence of Virtual Spacetime

Historically, imaginary numbers have been proposed to solve problems that are difficult to solve with real numbers alone, which greatly simplifies the difficulty of dealing with some real

problems. The current physics seems to have encountered the same dilemma, including the more and more dimensions of the problems we need to deal with, and the more and more implicit variables that cannot be directly confirmed, which are all right. The concept of space and time used in physics is changing, and Virtual Spacetime Physics is proposed in this context.

Some of the main foundations of Virtual Spacetime are mainly reflected in the following aspects:

1. Mass and energy are two different manifestations of the same physical quantity. If you use Virtual Spacetime for representation, mass is the energy form of Virtual Spacetime, which is easy to understand. The relativistic energy formula can also be represented by a more concise plural form. This is also very instructive for understanding the Dirac formula.

2. The volatility of microscopic world particles. The micro world is very different from the macro world in that it has the volatility of particles. This is because Newtonian physics, which can be processed with very high precision in the macroscopic world, has begun to have limitations when it comes to very small space and time. In this case, the concept of Virtual Spacetime is introduced to treat a certain limit of the very small microworld as a demarcation point between Virtual Spacetime and Real Spacetime, which can help us understand why such a problem arises.

3. The structure of elementary particles, the symmetry of quarks and lepton. Quark theory has achieved great success in explaining the structure of elementary particles, but it cannot explain why quarks have such high symmetry with lepton. Including the number, three generations of quarks and three generations of lepton. In addition, in the quark model, free quarks cannot be detected in the experiment, and there is no strong experimental evidence to prove the existence of fractional charges. If you consider that the quark is actually the Lepton of Virtual Spacetime, this can make the composition of the elementary particles more direct and easy to understand.

4. It is difficult to unify the gravitational and electromagnetic interactions. In the existing theory, since they are all interactions, the gravitational and electromagnetic interactions should be unified in a framework. The existing theory of quantum gravity is doing this kind of work. But the theory is very complex and rarely convinced by strong experimental evidence. If the consideration of gravitation is the spatial squeezing effect of an energy (which may include both Virtual Spacetime and Real Spacetime) in Real Spacetime, then this squeezing effect and electromagnetic interaction are two different properties of a thing. Electromagnetic interaction produces energy, and energy squeezing in space and time is closely related to the structure of space and time. Therefore, the unified work of the two interactions may need to be carried out from a higher level.

3 Oscillation or random walk

Same as the use of imaginary numbers, Virtual Spacetime Physics can be used to solve the problems that will be too complex and abstract for existing standard models. Using Virtual Spacetime's assumptions, there are some different forms available, but physical quantities with the same attributes can be divided into different space and time. Among them, the relationship

between mass and energy has been well described in the theory of relativity. If the mass is regarded as the energy of Virtual Spacetime, and the energy is regarded as a kinetic energy effect of Real Spacetime generated by the virtual photon carrying mass in Real Spacetime, then the two energy forms can be converted to each other, resulting in a series of observable effects.

The relativistic energy formula is simple：

$$\mathrm{E}^2 = (mc^2)^2 + (pc)^2$$

In order to reflect the effect of Virtual Spacetime, we will present it in the form of a plural number, ie

$$\mathrm{E} = mc^2 + ipc$$

One interesting phenomenon here is that the unit of *pc* is energy, but the kinetic energy we measured in the experiment is a whole effect of the combination of mass and energy. So, we can consider using *hv* instead of *pc* here. Here we call *hv*

the energy of the virtual photon.

This energy formula can be expressed as

$$\mathrm{E} = mc^2 + ihv$$

We can express the relationship between mass and virtual photon energy on the complex plane.

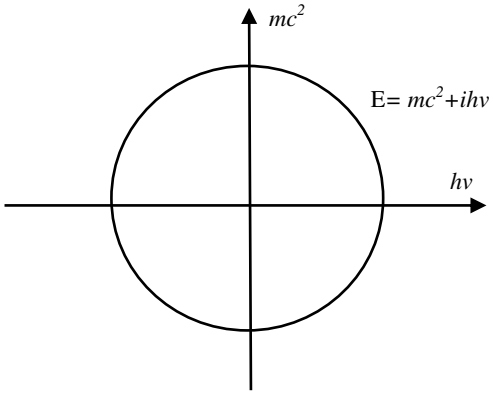

Figure 1 Relationship between mass and virtual photon

It can be seen from Figure 1 that the relationship between mass and virtual photons is a circle, that is to say all points on this circle are allowed by the Virtual and Real Spacetime energy. If *m* is considered to be the total mass measured by Real Spacetime, and *hv* is regarded as the total energy

of the Real Spacetime virtual photon, the total energy of the universe can be represented by the energy point above the circle in Figure 1. At present, the energy point of the universe we are in is located above a certain energy point in Figure 1.

Considering that the elementary particles in the universe can no longer continue to be segmented, there are only elementary particles in the universe, and when there are no atoms, the universe has a basic mass *m*, and the corresponding virtual photon energy is *hv*.

And if the universe cools to the limit, then the mass of Virtual Spacetime is not likely to be zero. The mass of Virtual Spacetime corresponds to the energy of Real Spacetime, so in this extreme case, there will still be a certain energy *hv'* in the universe, corresponding to a certain mass *m'*

Thus in Figure 2, we can see that the mass and energy variation range of the universe actually falls in a fan-shaped shadow area in the figure.

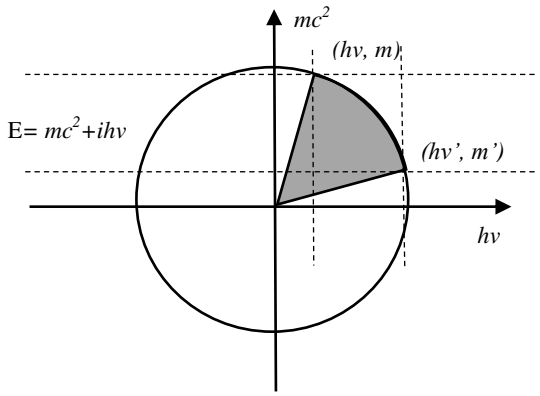

Figure 2 Range of changes in mass and energy of the universe

We can consider it in two ways.

1. The assumption of the oscillating universe

In the first case, it is assumed that there is an equilibrium position between the mass and energy changes in the universe. Due to the symmetrical relationship, this equilibrium position can be set at the same energy level of the Virtual and Real Spacetime, namely

$$mc^2 = hv$$

If it deviates from the equilibrium position, a restoring force may occur, causing the relationship between mass and energy to return to the equilibrium position. In this way, a constant oscillation will occur in the entire universe, just like a spring oscillator.

This recovery may be related to the interaction between the elementary particles. These include weak interactions, strong interactions, and electromagnetic interactions.

For example, when the temperature of the whole universe is very high, the material of the entire universe is composed of elementary particles. These elementary particles include four kinds of particles: protons, electron, photons, and neutrinos. The reason why we do not use quarks here is that we have not yet found a free quark [2]. There is also strong enough experimental evidence that protons and electrons do not decay.

To meet the requirements of only these four elementary particle compositions, it is necessary to have these elementary particles far enough apart to form a very thin elementary particle gas.

However, electromagnetic interaction is also a long-range interaction, so even if the distance between protons and electrons is far apart, electromagnetic interaction can still affect each other. More importantly, the role of gravity has also played a very important role. When the distance between the elementary particles is far enough and the radius of the universe expands enough, the kinetic energy of the particles will decrease, resulting in interactions between protons, electrons, neutrinos and photons, forming three generations of lepton and neutron, hydrogen atoms and helium atoms.

Under the influence of four major interactions, such as gravitation, electromagnetic interaction, weak interaction, and strong interaction, a richer atom will be formed, and then a nuclear fusion reaction will be formed to form the heavier atoms.

The formation of these heavier atoms means that more energy is converted into mass, the energy of the universe is reduced, the radius of the universe begins to shrink, and the temperature of the entire universe begins to decline.

When the temperature of the universe is reduced to the limit, there will be a situation in Virtual Spacetime same as in the Real Spacetime, that is, the entire Virtual Spacetime space is composed of very thin protons, electrons, neutrinos and photons, in the same way. Re-aggregate and form heavy atoms at Virtual Spacetime. Repeatedly.

The difficulty in this situation is why must the state of equal mass and energy be in equilibrium? Why is the thin elementary particle gas unstable? This may require further analysis of the various interactions.

2. The random walking universe

If we consider the change in entropy of the entire universe, due to the symmetry relationship, the number of states reduced in Real Spacetime can always be added in Virtual Spacetime. Therefore, the total universe state of the complete universe space and time including Real Spacetime and Virtual Spacetime will not change, that is, the total state of Real Spacetime and Virtual Spacetime remains constant regardless of the ratio of mass and energy in Real Spacetime. Since the number of states directly determines the size of the entropy, this also means that the entropy of a universe containing two space and time is constant.

Since the entropy of the complete universe is always constant, the changes in the energy mass of

the Real Spacetime or Virtual Spacetime will naturally not affect the changes in the entropy of the universe. Then in Figure 2, in the sector of the universe where energy and mass can exist, all points on the arc are points where the universe can exist steadily.

Therefore, under this assumption, the change in mass and energy of the universe can be a completely random process. Just as a person walks randomly in a particular area, in the end we will find that all points of the universe on the arc have the same probability of existence. That is to say, our current universe may be the state of energy and mass distribution of our present, or it may be more extreme that the whole universe is composed of very thin elementary particle gases, and it is also possible that heavy atoms in the entire universe occupy a large part, then the temperature of the entire universe is extremely low.

4 Two states of the universe

Due to the nonlinearity of the four interactions, the interaction between the substances in the universe becomes very complicated, and such complexity directly leads to different states of the universe. Just like the state of matter, there are gaseous and liquid and solid. That is to say, whether it is an oscillating universe or a random walking universe, in different states, the form that the universe presents will be very different.

Considering that in the more extreme cases, the universe consists entirely of elementary particle gases, considering the effects of the four interactions, the entire elementary particle gas is similar to the van der Waals gas. The van der Waals equation can be used for processing. Among them, universal gravitation plays a role in gas pressure, while electromagnetic interaction, weak interaction and strong interaction correspond to the interaction between molecules in van der Waals gas.

Then we can use the van der Waals equation to construct the equation of the elementary particle gas.

The gravitational attraction reflects the pressure of the basic elementary particle gas. Considering that at the macroscopic scale of the universe, there will be a large delay in gravity. This delayed interaction leads to a cosmic scale where the effect of gravitation on elementary particles is significantly different from that in a very small range, such as the gravitational interaction in the solar system. This result is usually such that at the cosmic scale, the effect of gravitation on matter is more uniform. This is more similar to the gas model we deal with in thermodynamics.

If the whole universe is regarded as a gas bound by a gravitational force in a spherical region, the pressure is P, and the volume of the ball is V, then according to the thermodynamic formula:

$$PV = kT$$

The relationship between pressure, volume and temperature can be seen.

As the construction process of the van der Waals equation, if protons and electrons also occupy the space of the sphere, the actual volume can be changed to

$$v' = v - b$$

Considering the attraction between protons and electrons, and the participation of particles such as neutrinos and photons, there is a deep reaction between protons and electrons, forming a whole neutron, which will cause the gas to be affected. The actual pressure will increase. Then the pressure becomes

$$p' = p + \frac{a}{v^2}$$

This equation of the state of the universe becomes

$$p'v' = \left(p + \frac{a}{v^2}\right)(v - b) = kT$$

This is actually the van der Waals equation. The solution of the van der Waals equation is a nonlinear form. Its figure is shown in Figure 3.

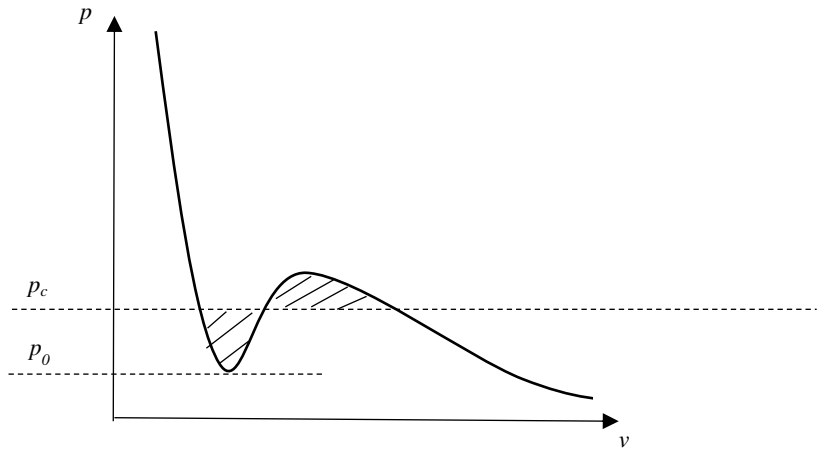

Figure 3 The curve of the solution of Van der Waals equation

It can be seen that from the right side of the horizontal axis *v*, when the volume *v* of the universe is relatively large, it reflects that at a certain stage, since the distance between protons and electrons is large enough, the radius of the entire universe is relatively large. At this time, the pressure caused by the gravitational force of the elementary particles such as electrons and protons is also relatively small.

If, for some reason, the radius of the universe begins to decrease, it can be seen that as the volume decreases rapidly, the pressure of the entire cosmic gas does not increase substantially

synchronously. And at a critical point p_c, there is even a case where the volume is reduced and the pressure is reduced. This shows that at a certain pressure and volume point, the state of the universe will undergo fundamental changes. After the critical point of p_c, there is an opposite situation, that is, the volume is not reduced much, but the pressure on the material system can be increased rapidly.

In the solution of the van der Waals equation, the zero boundary of p_c corresponds to the boundary point of two different physical states. Less than p_c belongs to the gaseous state, and the area larger than p_c belongs to the liquid state.

Similar results were obtained for both liquid and solid.

Since we apply the Van der Waals equation to the universe, it means that the universe should have at least two different states of matter, gas and liquid.

Gaseous means that the entire universe consists entirely of free protons, electrons, photons, and neutrinos.

Once the volume of the entire universe has been reduced to a certain extent, it will enter the "liquid" phase of the universe. At this time, there are substances composed of different atoms and states in which free protons, neutrons, photons, and neutrinos coexist. This is closer to our current state of the universe.

That is to say, our current universe is in the "liquid" stage of the universe.

The liquid is fluid and the liquid is also viscous. However, since the velocity of motion of an object is very small compared to the velocity of gravity, at a scale of the universe, this fluidity of liquidity represents the flow of a four-dimensional fluid in a Minkowski space. This should be solved by the Einstein equation.

5 Liquid universe

When the elementary particle gas of the universe is condensed, there is a substance that can flow together. This state of stability is due to the interaction of mass and energy. When matter is condensed by the action of gravitation, the increase in energy causes the matter to separate.

Considering the fan-shaped shadow area where the mass and energy of the universe exist in Fig. 2, all the points on the arc are stable, so the change from the gaseous state to the liquid state can be stably maintained. Of course, if the mass and energy of Real Spacetime changes due to the influence of Virtual Spacetime, the state will change.

For gravitation, on the scale of the universe, due to the effect of the postponement, the interaction force caused by gravitation is limited. Therefore, on the cosmic scale, the effect of gravitation is basically the same as that of the internal liquid of ordinary liquids.

If the assumptions of the liquid universe are true, the properties of ordinary liquids should also be observed on the scale of the universe. These include viscosity parameters of liquids, laminar and turbulent fluids, and other various hydrodynamic phenomena.

Since the human field of view is too small, this hydrodynamic property is not easily observed in the context of a planetary system. But if it is a very large star system containing about 10^{11} stars or more, this amount has statistical significance.

Figure 4 Arp 273 Galaxy (https://www.spacetelescope.org/images/heic1107a/)

The Arp 273 galaxy shown in Figure 4 is very similar to the pattern formed by the chocolate liquid agitating in a certain direction in the milk tea. The formation of this galaxy shape indicates that these stars are affected by a large mass of high-speed operation.

Figure 5 NGC 2841 Galaxy (https://www.spacetelescope.org/images/heic1104a/)

In figure 5, this galaxy exhibits a fluid vortex state, indicating that the galaxy has stabilized, and the huge mass in the middle is constantly attracting the surrounding matter.

Of course, these are just two examples. Other examples can be found on the Hubble Space

Telescope's official website. From the perspective of different galaxies, all galaxies are in accordance with the laws of fluid mechanics.

In addition to direct observation of photo support, other evidences that support the liquid universe include:

1. Cosmic rays

Cosmic rays contain a variety of elementary particles, which means that in addition to atoms in the universe, there are a large number of remaining elementary particle gases. These gases are like the vapor on the surface of the liquid. Under certain conditions, there is always transpiration. In particular, the liquid is in the vicinity of the boiling point, and there is a state in which the gas and the liquid are mixed.

There are many opinions about the origin of cosmic rays, including the belief that these cosmic rays are caused by galaxies such as supernova explosions. However, given the enormous number of cosmic rays we have observed so far, it is obviously not enough to explain the origin of cosmic rays by events such as supernova explosions. If we think of these cosmic rays as if they were microwave background radiation, a phenomenon in which the universe is in liquid form, it is easy to explain why cosmic rays are so much and continuous.

2. Microwave background radiation

Although microwave background radiation is an important piece of evidence supporting The Big Bang theory, it can also be used as evidence to support the liquid universe.

This can also be explained by the evaporation phenomenon of the liquid. Because in the composition of the basic particle gas of the universe, a variety of elementary particles such as protons, electrons, neutrinos, and photons are included. Cosmic rays usually refer to protons, electrons, neutrinos, and various composite particles. The microwave background radiation reflects the concentration of photons.

The temperature of the microwave background radiation can be used to see the overall temperature of the present universe. At present, the temperature of the universe is about 2.7K, which is a very low temperature according to the feelings of organisms such as the human body. However, this temperature is not very low compared to absolute 0K. The material in the universe is also very fluid.

6 Conclusion

The diversity of the universe model helps us to understand more deeply the generation and operation of the universe. From the analysis results of this paper, using the concept of Virtual Spacetime to build a cosmologic universal model is a path worth exploring.

Because of the existence of Virtual Spacetime, this can well represent the energy form of two different dimensions of mass and energy in a unified way, thus simplifying the material composition of the universe. The universe model built on this basis is more concise.

In addition, considering the overall interaction between Virtual Spacetime and Real Spacetime, energy can flow freely in two space and time, which also means that the problem of whether the universe is an open system or a closed system can be solved to some extent. The existing theory has only one space and time. If the universe is seen as an open system, it will inevitably involve the emergence of phenomena that may violate the law of conservation of energy. And if it is regarded as a closed isolated system, it is subject to the second law of thermodynamics. Now that we use the assumption of Virtual Spacetime, the universe of Real Spacetime we are now in can be seen as an open system, which solves the problem that the universe will eventually change toward the maximum direction of entropy. The whole universe that combines Real Spacetime and Virtual Spacetime is a closed and isolated system. Since the number of states in two space and time is constant, the overall entropy of Virtual and Real Spacetime remains constant, naturally there will not be a problem like "hot silence." The universe will be able to survive forever.

The virtual spacetime based universe model also brings the advantage of proving that there are at least two states of matter in the universe, namely gaseous and liquid. Gaseous state is a relatively extreme state, consisting of many types of elementary particles such as protons, leptons, neutrinos and photons. Corresponds to the relatively high temperature of the universe. After the energy exchange between the Real Spacetime and Virtual Spacetime of the universe, this temperature may be reduced. After the temperature is lowered, it is possible to change the universe toward another state of matter, the liquid form. Judging from various observations, our present universe is in a liquid phase. These facts include the hydrodynamic morphology of various galaxies, cosmic rays, microwave background radiation, and the like.

References

[1] Cheng, Z (2019). Foundations of Virtual Spacetime Physics. LAP LAMBERT Academic Publishing

[2] Cheng, Z (2019). On the Quark Model Based on Virtual Spacetime and the Origin of Fractional Charge. http://vixra.org/abs/1903.0311