The model of dark matter and dark energy

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ABSTRACT
I designed a model of dark matter and dark energy, and established some physical concepts and laws needed by the model. Then I used this model to analyze some physical problems, which is very effective.

1. Introduction

The existence of dark matter and dark energy is generally accepted. Their nature has always been a mystery. This model tries to explain dark matter and dark energy. There are several key problems in the process of modeling. These key questions must be explained before we can understand dark matter and dark energy. What is gravity? The biggest characteristic of dark matter is its gravitation effect. Therefore, the concept of gravity must be clear. What is the basic unit of matter? We know that some form of energy constitutes everything in the universe. What is this form? One of the most important characteristics of energy description is energy density. How does energy density work? Where does the repulsion of dark energy come from? All the answers and clues come from the existing materials. However, these new concepts are strongly interrelated. It is difficult to explain one part alone. It will be much easier to understand them as a whole. In order to reduce the confusion in reading, the article adopts a special order. In the second part, the conclusion is given, including new laws and new concepts. The third part gives clues and evidences. In the fourth part, the model is used to discuss some physics problems.

2. Conclusion

2.1 Energy Unit

The basic structure of the universe is the energy unit. The energy unit is an energy sphere with infinite radius. The energy density is the highest at the core and decreases rapidly with the increase of radius. As the basic structure of the universe, the energy unit is absolutely stable. Fig.1

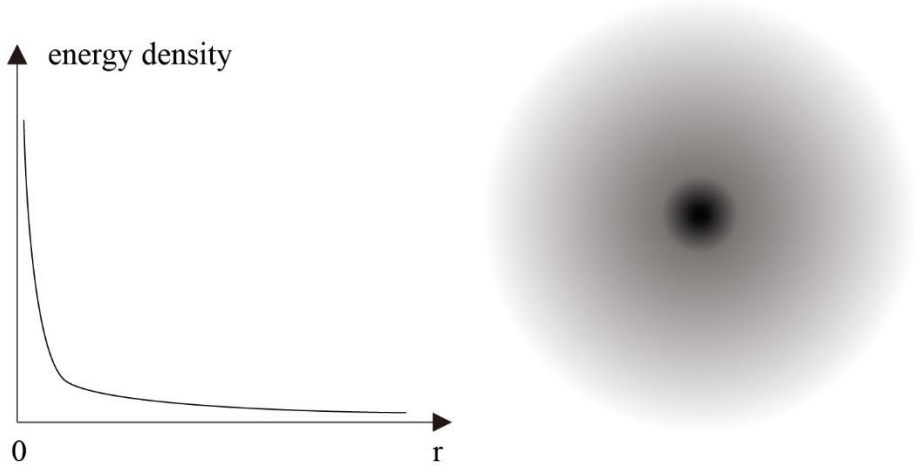

Fig. 1. Energy density distribution curve and imaginary shape of energy unit

2.2 Gravity

Gravity is a potential energy action. There is a trend of energy diffusion from high density to low density, and the potential energy effect caused by this trend is gravity. Positive correlation between gravity and energy density. For a single energy unit, the internal gravity is balanced. The gravitation between two energy units can be approximately expressed as the effect of the centroid on another sphere. We can use the 2D method to analyze the gravity of the centroid to another sphere. Draw a straight line through a centroid, perpendicular to the line between two centroids. The straight line divides the other sphere into two parts. When two centers of mass coincide, the two parts of the sphere are equal and the gravity is zero. When the two centers of mass do not coincide, the two parts of the sphere are not equal, and the gravity is the difference between the two parts. Fig.2

Fig. 2. A straight line divides the sphere into two parts. The difference between the two parts is gravity. When two parts are equal, the gravity is zero. When two parts are different, the gravity is not zero.

2.3 Gravity and degenerate pressure coexist. They are the most basic forces. The energy unit has both gravity and degenerate pressure.

2.4 Revision of the first law of thermodynamics

The known part of the first law of thermodynamics: In our universe, the total amount of energy remains the same, and energy can be transformed between various forms.

Revision part: In our universe, the total amount of energy is constant, and the total density of energy is declining. All kinds of reactions are conversion process from high energy density to low energy density, or part of this conversion process. The decrease of cosmic energy density is irreversible.

According to the big bang theory, all the energy in the universe comes from potential energy. This potential energy is generated by degenerate pressure and gravity. An important feature of this potential energy release process is the change of energy density from high to low. Obviously, this change is unidirectional and irreversible. Like a ball rolling down the steps. In the process of energy density reduction, at some time, the energy density will be too low to be detected by the existing technology. It's an illusion of energy disappearing. In fact, these very low energy density energies still exist, but they do not participate in most reactions and become unavailable energies. In short, the total energy is the same, but the energy involved in the reaction is decreasing.

2.5 Energy density law of reaction

The energy density of an object participating in a specific reaction must reach a certain value or higher before the reaction can take place. It's self-evident. Fig.3

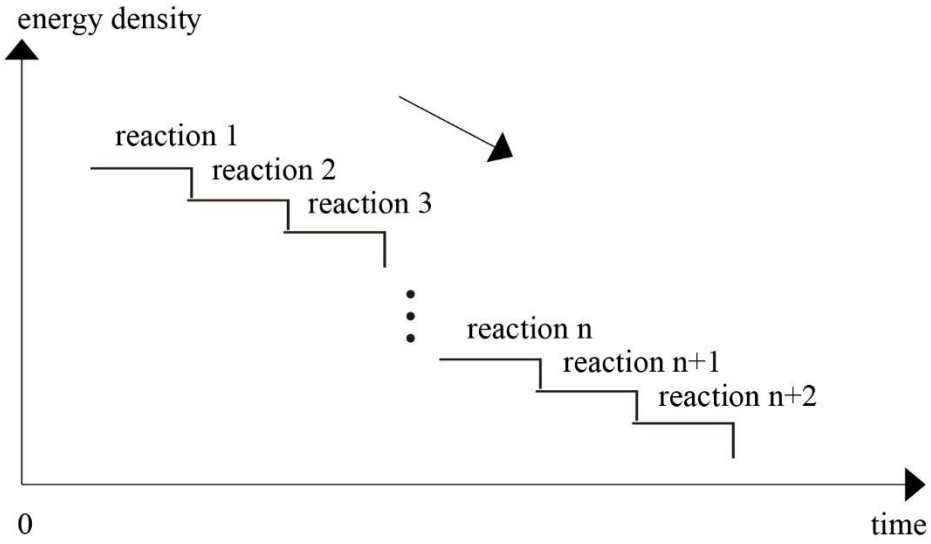

Fig.3. For each specific reaction, there is a minimum energy density requirement.

All detection methods are some kind of reaction, and also have their own minimum energy density requirements. The situation below this energy density cannot be detected.

2.6 Dark matter

Dark matter consists of the peripheral parts of the energy unit. As part of the energy unit, there is gravity, dark matter is extremely stable, and there is no interaction. Obviously, dark matter and matter are distributed in strict synchronization. Fig.4

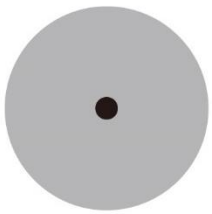

Fig. 4. Dark matter consists of the peripheral parts of the energy unit.

2.7 Matter

Matter consists of the core parts of a large number of energy units. A large number of energy units are integrated into the aggregate, which has a high energy density. All kinds

of reactions can take place between aggregates, showing various complex interactions.

2.8 Dark energy

Dark energy is composed of dispersive energy units and small cluster energy units. As the energy density is very low, the generated gravity is very small, less than its own degenerate pressure, so the overall performance is repulsion. Dark energy is produced by the decrease of cosmic energy density and the dispersion of energy units. According to the revised version of the first law of thermodynamics, all kinds of reactions lead to the decrease of the total energy density and the continuous increase of the total dark energy. Dark energy gradually dominates the evolution of the universe. Fig.5

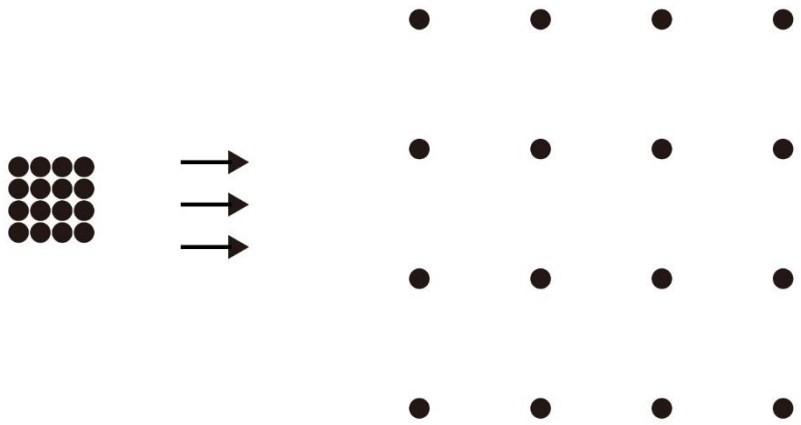

Fig. 5. Conversion of matter into dark energy.

3. Clues and evidence

Here are important clues or evidence, but not all.

Mass is energy. (Einstein)

Hierarchy problem and Casimir effect.

Asymptotically free and its potential energy curve. Potential energy curve between nucleons, atoms and molecules. Potential energy curve of dark matter in galaxies. These curves are so similar. In fact, asymptotically free phenomena occur simultaneously among quarks, nucleons, atoms, molecules, and dark matter halos.

Field superposition principle.

No particle has a hard boundary.

Gravitational lensing: The gravitational lens can only detect strong enough signals.[1]

The collision of bullet clusters: The observation data prove the existence of dark matter. The galaxy shows a good gravitational lensing phenomenon, which proves that there is dark matter accompanying it. Separation of plasma cloud from main gravitational lens. [2] However, there are two possible reasons for the separation of the plasma cloud from the main gravitational lens. There is no dark matter around the plasma cloud. Or, there is dark matter around the plasma cloud, but the gravitational lens signal is not strong enough. The intense colliding plasma cloud will form a complex shape, which may destroy the signal of the gravitational lens.

There is a constant density core in the center of the dark halos. [3]

Dark matter halos are not spherical.

Most of the dark matter is in the outer reaches of the galaxy, or in filaments and groups of galaxies. [4]

The dominant fraction of DM is probably cold and that it should be not only (sub)weakly interacting but also non-relativistic and massive. [5]

The cosmic coincidence, i.e., why dark energy started dominating the cosmic evolution only so recently.

Whatever the dark energy may be, it seems that physics beyond the standard model is necessary. [6]

4. Discuss some physics problems with this model

4.1 What is the mass origin of particles?

According to the definition of gravity, the mass of a particle is a kind of potential energy. Gravitation produces mass, potential energy produces gravitation.

4.2 Hierarchy problem

The particle can be approximately regarded as a combination of two spheres. A small sphere is located in the core part, representing the high energy density part at a small scale. A large sphere is located on the periphery, representing the low energy density part of the classical physical scale. Fig.6

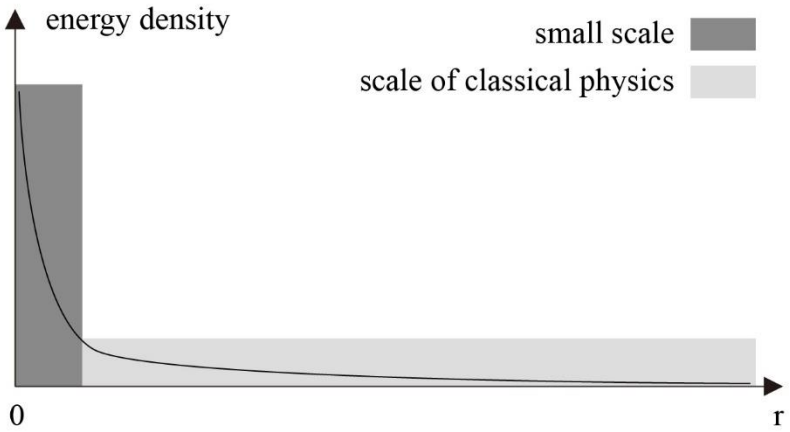

Fig. 6. The whole system can be divided into two parts.

When two particles are in the scale of classical physics, the gravitational effect between them mainly comes from the large sphere, and the gravitational effect of the small sphere can be ignored. The radius of the sphere is infinite. According to the concept of gravity, the gravity between two specified particles depends on the distance between them and the radius of the sphere. In short, on the earth scale, the dividing line is almost at the center of the sphere. The difference between the two parts of the sphere is almost zero, so the gravity is very weak. But on the scale of galaxies, the difference between the two parts of the sphere is very large, so the gravity is very strong. Fig.7

Fig. 7. Gravity is weak on the earth scale, but strong on the galaxy scale.

Similarly, when two particles are in a small scale, the gravity between them mainly comes from the small sphere, and the role of the large sphere can be ignored. According

to the definition of energy unit, the energy density of the core part will increase rapidly, and the gravity and energy density are positively correlated. In addition, on a small scale, the radius of the sphere and the distance between the two particles are very small. The ratio of distance to radius is much larger, and the split line deviates more from the center of the sphere. All these factors together lead to the strong gravitation among particles.

4.3 What is the mechanism of asymptotic freedom and quark closure?

According to the definition of gravity, the gravitational action between two particles can be regarded as the action between the centroid and another sphere. We can think of the sphere as a combination of a small sphere at the core and a large sphere around it. On a small scale, we only need to focus on the small sphere at the core. Obviously, if the centroid of two particles coincides completely, the gravity between them is zero. As the distance between the two centers of mass increases, the gravity will increase, and when it reaches an extreme value, it will fall back, but it will not be zero. Fig.8

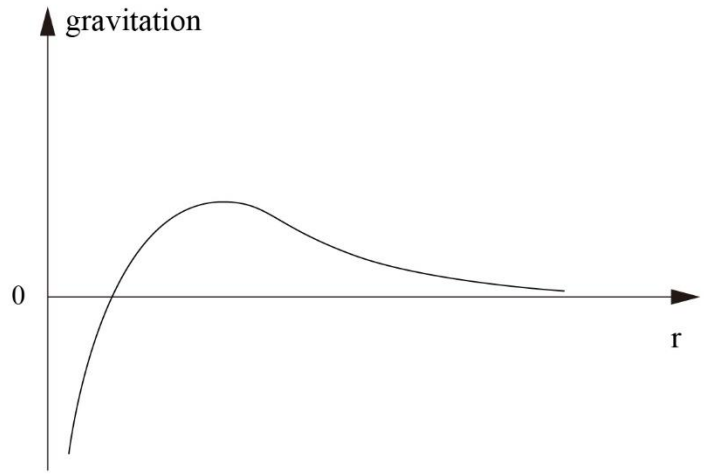

Fig. 8. Gravitation between two particles.

4.4 Why there are so many kinds of particles?

According to the definition of the energy unit, the energy density of the energy unit is very low, the property is very stable, and there is no reaction. So far, all kinds of particles can react. According to the law of energy density of reaction, these particles must have corresponding energy density. So, these particles are made up of many energy units. These energy units can be combined in many ways, and different combinations result in different kinds of particles.

4.5 What is dark matter?

Please refer to 2.6 concept of dark matter. Using five concentric circles to simulate the distribution of dark matter halos in galaxies.

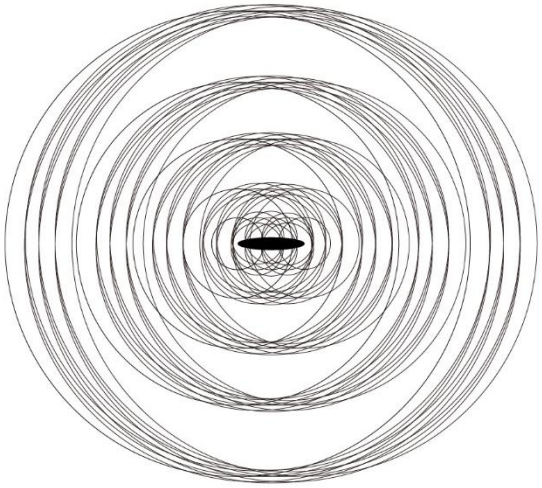

Fig. 9. Galaxy and dark matter halo

4.6 What is dark energy?

Please refer to 2.8 concept of dark energy. There's a huge void between Galaxy clusters, which is the domain of dark energy. The amount of dark energy is increased by the energy units dispersed from the galaxy cluster. According to the revised version of the first law of thermodynamics, dark energy will continue to increase. This process is like a piece of sugar dissolving in water, and finally the sugar disappears, leaving only a glass of sugar water. But the premise is that our universe is the only whole universe. If our universe is just a part of a larger universe, the story will be totally different.

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