A dark matter fluid model based on virtual spacetime

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Abstract

This paper constructs a model of the universe based on the flow of dark matter fluids in space-time in the universe, the model analyzes the hydrodynamic equations of dark matter fluids and the composition of dark matter fluids. It is also pointed out that the flow of dark matter fluids can be divided into two states: laminar flow and turbulent flow. The laminar flow of dark matter fluids is the main component of dark matter in the universe at present. The turbulence of dark matter fluids forms two symmetrical space-time. One is observable real spacetime, and the other is unobservable virtual spacetime. Virtual Spacetime is also part of dark matter. In dark matter turbulence, vortex structures of fluids can be formed. When vortexes of electromagnetic fields are formed, electrons, protons and magnetic monopoles are produced. Vortexes of electromagnetic fields will be able to automatically satisfy the conditions for Dirac's quantization of charge. Finally, this paper gives a hierarchy of matter in the universe.

1 Introduction

In my work last year, I envisioned a fluid model of dark matter [1]. This fluid model is composed of dark matter atoms, molecules, etc., and finally forms a dark matter fluid. Following this model, I tried to calculate the viscosity coefficient of dark matter fluids and the effect on the movement of galaxies [2].

Now I have a new idea by reflecting on the virtual spacetime physics [3]. Perhaps the structure of dark matter fluids is simpler than I originally thought. The basic composition of dark matter fluids may be electromagnetic fields. It's just that in the absence of energy input, dark matter fluids will be very stable, forming fluid structures that cannot be observed in our current physical world. But once energy is entered, it causes turbulence in dark matter fluids. The formation of this turbulence will form a separation of electric and magnetic fields on the microscopic structures of the dark matter fluid, and then form a vortex structure of the fluid. This vortex structure is the singular string [4] in the model of Dirac's quantization of charge. With this vortex structure, I have been able to calculate the mass ratio of electrons and protons and analyze the reasons why cause these mass differences [5]. This also brings confidence to the establishment of new dark matter fluid models.

2 Fluid equations and turbulence for dark matter fluids

2.1 Dark matter fluid equations

It can be described using Maxwell's equations [3] that span two space-times. In fact, Maxwell's equations are fluid equations.

With the addition of the description of virtual spacetime magnetic fluids, Maxwell's equations spanning two space-time can more effectively describe this duality of dark matter fluids.

The Maxwell equations in three-dimensional space are

$$\begin{cases} \nabla \cdot \boldsymbol{F} = \rho_e \\ \nabla \cdot \boldsymbol{G} = 0 \\ \nabla \times \boldsymbol{F} = -\dfrac{\partial \boldsymbol{G}}{\partial y} \\ \nabla \times \boldsymbol{G} = \dfrac{\partial \boldsymbol{F}}{\partial y} + \boldsymbol{J}_e \end{cases}$$

The Maxwell equations in three-dimensional time are

$$\begin{cases} \nabla_y \cdot \boldsymbol{G} = \rho_m \\ \nabla_y \cdot \boldsymbol{F} = 0 \\ \nabla_y \times \boldsymbol{G} = -\dfrac{\partial \boldsymbol{F}}{\partial x} \\ \nabla_y \times \boldsymbol{F} = \dfrac{\partial \boldsymbol{G}}{\partial x} + \boldsymbol{J}_m \end{cases}$$

Some common parameters are used here. Thereinto

$$\rho_e = \frac{\rho}{\sqrt{\varepsilon}}$$

$$J_e = \sqrt{\mu} J$$

$$\mathrm{F} = \sqrt{\varepsilon} E$$

$$\mathrm{G} = \sqrt{\mu} H$$

In addition, *x, y* is used to represent the time in virtual spacetime and real spacetime. ∇ and ∇_y represent differential operators in Real Spacetime and Virtual Spacetime, respectively.

With these very symmetrical Maxwell's equations, multiple wavefunction solutions can be obtained. At present, the electromagnetic solution has been fully confirmed and applied.

2.2 Laminar and turbulent flow of dark matter fluids

If the dark matter fluid is in a laminar flow state, the electric and magnetic fields in the dark matter fluid are compounded. It cannot be observed in both space-time at this time. But considering that the dark matter fluid is in flow, the dark matter fluid should also be able to absorb energy and accelerate the speed of the fluid.

The absorption of energy also means that it should be able to produce a gravitational effect. This may be the source of the currently observed gravitational phenomenon of dark matter in the universe. It deserves further in-depth analysis.

However, if the dark matter fluid absorbs energy, the flow of the fluid is disturbed, resulting in the separation of the electric field or magnetic field in the fluid, then it corresponds to the propagation of electromagnetic waves in the dark matter fluid.

From the solution of Maxwell's equations, the wave equation of electromagnetic waves is the most important solution. Therefore, electromagnetic waves reflect the fluctuation phenomenon of dark matter fluids. The fluctuation of this fluid is similar to the propagation of sound in the fluid, capable of transmitting energy. Electromagnetic waves do not cause energy dissipation during propagation, so this is just a property of dark matter fluids transmitting oscillating signals.

However, if the input of energy causes the dark matter fluid to vortex, this will lead to the phenomenon of energy dissipation. This also means that the dark matter fluid has a turbulent phenomenon.

Given that the structure of dark matter fluids is relatively simple, the turbulence formed mainly occurs in the form of electromagnetic vortex tubes. These electromagnetic vortexes make up the elementary particles in Real spacetime and Virtual spacetime: electrons, protons, and magnetic monopoles.

Dark matter fluids should be viscous. This viscosity affects the formation of turbulence. If the viscosity of the dark matter fluid is relatively low, turbulence can be formed when the dark matter fluid flow rate is not very large. If the viscosity of the dark matter fluid is relatively large, turbulence needs to be formed when the flow velocity of the dark matter fluid is relatively large.

Considering that the current speed of the solar system in the Milky Way reaches nearly three hundred kilometers, and the entire galaxy may travel at a speed of seven hundred kilometers, the viscosity coefficient of dark matter fluid should be relatively large.

If we assume that dark matter occupies 95% of the entire universe, and gravity is the cause of dark matter viscosity, then through the calculation of paper [2], we believe that the viscosity coefficient of dark matter fluids can be achieved

$$\mu \approx 4200(Pa \cdot s)$$

In contrast, the viscosity coefficient of water at 27 °C is $0.85 \times 10^{-3} Pa \cdot s$

2.3 Electromagnetic field vortex and charge quantization

The generation of turbulence in dark matter fluids means that the electric and magnetic fields of dark matter fluids are separated to form a vortex structure of fluids. Such a vortex structure is manifested in countless electric and magnetic field vortex tubes.

We can obtain the standing wave solution of electromagnetic waves through the charge quantization conditions envisaged by Dirac. This standing wave solution corresponds to the vortex in the fluid [6]. Each vortex connects positive and negative charges or magnetic charges together to form the elementary particles that make up the matter world. The structure of the vortex tube can be done in this way with the Dirac singular string. A Dirac singular string resembles an infinitely long solenoid.

Since there are two space-time, such a singular string needs to have two, one in the virtual spacetime is formed by the magnetic current, the singular string will generate electrons and protons at the real spacetime at both ends. The other, located in Real spacetime, is a singular string formed by the rotation of an electric field. The Singular string will generate two magnetic monopoles in Virtual spacetime.

In order to form a magnetic monopole in a virtual spacetime, this requires a singular string formed by an electric field rotational current in the real spacetime. It needs to meet the conditions for the Dirac's quantization of charge to ensure that the singular string will not be observed in real spacetime.

The magnetic currents that form the electric charge, the Singular string, follow similar quantization conditions, ensuring that the existence of the Singular string cannot be measured in Virtual spacetime.

The rotating electric field that forms the magnetic monopole is located at the location of electrons and protons. Due to the small radius of electrons, the electric field rotates relatively quickly, possibly exceeding the speed of light. If the proton radius is relatively large, the rotation speed of the electric field is relatively small. In this way, the spin angular momentum generated by the spins of two electric fields is equal.

Of course, the spin of this electric field can also generate observable magnetic moments in real spacetime. But the magnetic moment itself does not carry energy, which is different from the magnetic monopole.

Since the magnetic charge coexists with the electric charge, it is necessary to use the Schwinger charge quantization condition, ie

$$eg_e = \frac{2nh}{\mu}$$

After the calculation of the magnetic monopole magnetic charge [6] generated by the rotating electric field, the quantization conditions described above can be found

$$n = 1$$

This shows that the conditions for quantization of the charge are automatically satisfied. In this way, the vortex formed between electrons and protons is not visible.

3. Structure of dark matter fluids

3.1 Fluids composed of electric and magnetic fields

By observing electromagnetic waves, we can find an interesting phenomenon, that is, the electric and magnetic field oscillations in electromagnetic waves are symmetrical. That is, once the electric field oscillates, the magnetic field also oscillates in the same phase. Electromagnetic waves carry energy, which means that the basic reason for the separation of electric and magnetic fields when energy occurs. If no energy is present, the electric and magnetic fields will be a complex body. This may be the true state of the vacuum.

Therefore, we can further assume that the universe is full of dark matter fluids, which are a complex of electric and magnetic fields without being disturbed by energy. Therefore, if no energy enters, the dark matter flow will be very smooth and unobservable.

But if there is an energy input, there are two possible scenarios, the first is to increase the speed of the dark matter fluid. But this does not create turbulence, in the second case it does. Since turbulence consumes additional energy and is a dissipative structure, turbulence will be able to be observed, forming the visible matter world we now have.

According to the above assumptions, the turbulence of dark matter fluids is essentially the separation of electric and magnetic field flows, which in turn leads to quantization in the form of electric or magnetic charges. This is what we see as electrons and protons.

The formation of turbulence in dark matter fluid is related to the flow rate of dark matter fluid and the viscosity of dark matter fluid. If the flow rate of the dark matter fluid is too fast, or the viscosity of the dark matter fluid is not high enough, it is easy to produce turbulence. For the viscosity coefficient of dark matter fluids, I estimated it in [2].

Fig. 1 shows the contrast between the electromagnetic waves formed by the separation of electric and magnetic field oscillations and the turbulence of dark matter fluids.

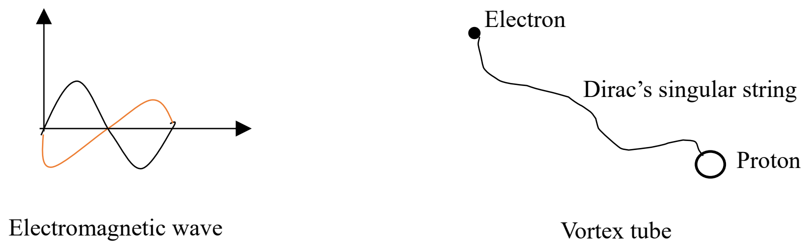

Fig. 1. EM wave and turbulence of dark matter fluids

3.2 Microstructure of dark matter fluids

Obviously, if the dark matter fluid can propagate electromagnetic waves, then the dark matter fluid must have a finer structure, so as to meet the needs of electric and magnetic field oscillations. This finer structure means that there must be vibrational waves in dark matter fluids faster than the speed of light.

This can be analyzed from the analogy between sound and electromagnetic waves. The propagation of sound takes the form of phonons, while the propagation of electromagnetic waves is in the form of photons. In solid state physics, vibrations in the lattice produce phonons. The vibration of this lattice is caused by thermal motion, which of course is also the result of energy input.

The viscosity coefficient of dark matter fluid is relatively large, which also shows that if dark matter has a fine structure, then the interaction between the most basic particles that make up dark matter should be relatively strong.

But on the other hand, in contrast to the vibration of sound, electromagnetic wave oscillation only has the separation and recombination of electric and magnetic fields. It can be seen from here that the microstructure of dark matter fluids should be much simpler than the microstructure of matter.

Considering the two properties of the electric field and magnetic field of dark matter fluids, we can divide the most basic particles composed of dark matter fluids into two types: one is electric fieldon, and the other is magnetic fieldon.

When the dark matter fluid is in a laminar flow state, the electric fieldon and the magnetic fieldon are in equilibrium, forming dark matter molecules. Once there is an energy input, the distance between the electric fieldon and the magnetic fieldon oscillates.

If it is an electromagnetic wave, dark matter molecules will propagate this vibration. And if the electric fieldon and magnetic fieldon in the dark matter molecule only oscillate locally and meet the conditions for quantization of the charge, so-called electrons and protons will be formed.

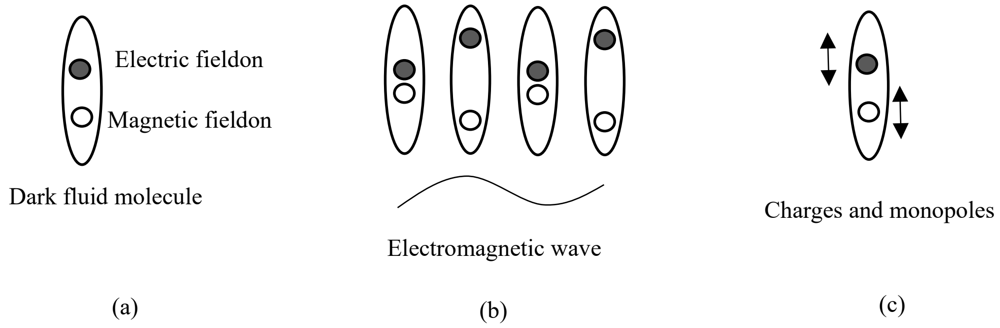

Fig. 2. Dark fluid molecule and energy

In Fig. 2, (a) is a dark fluid molecule. It consists of two elementary dark particles, Electric fieldon and Magnetic fieldon. (b) shows that when electromagnetic waves propagate, they cause the distance between two fieldons in dark molecules to oscillate and propagate. (c) shows that if the fieldon inside the dark molecule only oscillates, it does not propagate the energy of this oscillation. This is where the charge and magnetic monopoles appear. In the article [6], it has been proved that such oscillations can automatically satisfy the charge quantization conditions. The oscillations of the magnetic fieldon form electrons and protons, which make up the real spacetime we can observe. The oscillations of Electric fieldon form magnetic monopoles, so-called virtual spacetime or imaginary spacetime. Such a virtual spacetime cannot be observed in a real spacetime.

4 The level of matter in the universe

We can make a hierarchical division of the composition of matter in the universe. The bottom layer is the dark matter fieldon, which is composed of two dark matter fieldons with different properties to form dark molecules. Dark molecules interact to form dark matter fluids. Dark matter fluids fill the entire universe and flow through it.

When energy is transferred to dark matter fluids, laminar and turbulent flows can be created. Through laminar flow, energy can accelerate dark matter fluids or use it to transmit electromagnetic waves. Turbulence can form electrons, protons, and magnetic monopoles. Electrons and protons make up the observable real spacetime. Magnetic monopoles, on the other hand, make up virtual spacetime. Interactions between particles such as electrons and protons are mainly achieved by exchanging photons (propagating electromagnetic waves).

Fig. 3 shows the hierarchy of the matter composition of the universe. The orange text box in the figure represents the observable matter world. As can be seen from the figure, the matter that can be observed only accounts for a small part of the entire composition of matter in the universe.

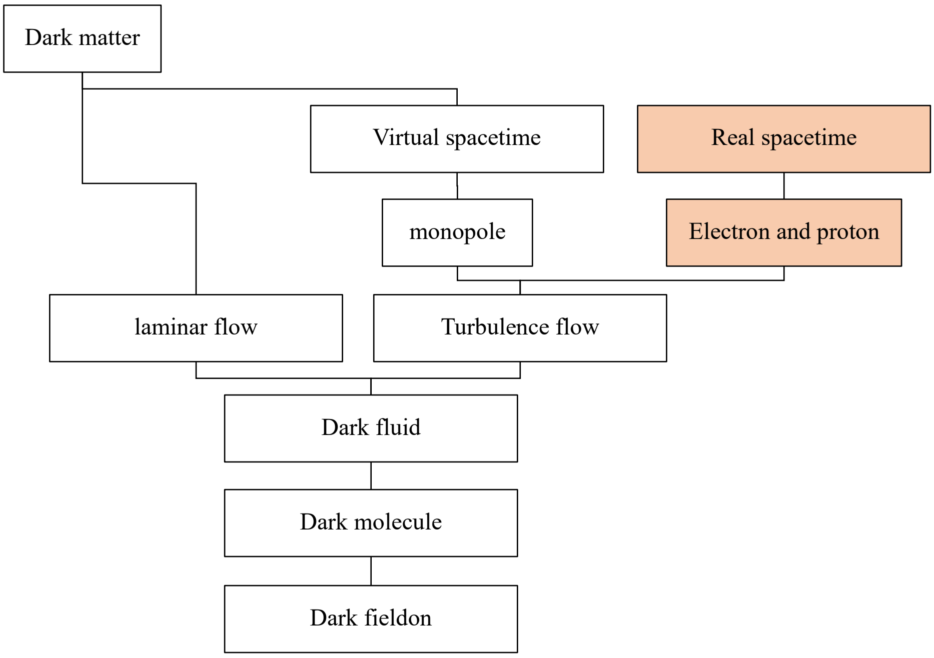

Fig. 3. The level of matter composition of the universe

5 Conclusions

From the above analysis, it can be seen that the structure of the universe may be much more complex than the physics we know now. What we currently know may be just one of many flow modes of dark matter fluids. In fact, from the Maxwell equations based on virtual spacetime, there are dozens of solutions to the wave equation across two space-time [3], which means that we can only observe a few of these oscillation modes, and many more oscillation modes that we cannot observe.

In addition to the turbulence of dark matter fluids caused by the input of energy, dark matter fluids also have the ability of laminar flow. The laminar flow of this dark matter fluid is difficult to observe by Real Spacetime. This also means that there are more dark matter laws that we cannot directly detect. Perhaps on the cosmic scale, the energy transfer methods of these dark matter fluids would produce some observable effect. For example, gravitational lensing of dark matter and other cosmic macroscopic phenomena. But I believe this is still only a very small number of observable effects of dark matter fluids.

If we consider the structure of dark matter fluid molecules. Just like the elementary particles, atoms, and molecules in our real spacetime matter world, the molecular structure of dark matter fluids has a hierarchy. This means that on bottom of our existing particle physics, there may be a dark matter particle physics. Dark matter particle science will contain knowledge that completely surpasses all of our current theoretical physics. It is believed that faster-than-light is a very common phenomenon in it, which also makes it possible for us humans to communicate quickly with the wider cosmic world.

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