Dark matter fluid interpretation of quantum entanglement

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Abstract

This paper explains the transmission of quantum entanglement information by establishing a completely new theoretical model of quantum entanglement. This model is based on the cosmic dark matter fluid model. In this model, we consider that the vortex tube that forms positive and negative magnetic monopoles or positive and negative charges is not limited by electromagnetic interaction. This will cause the exchange and movement of the vortex tubes to reach 1 million times the speed of light. The transmission of quantum entanglement information is based on the high-speed exchange and movement of this vortex tubes. The contribution of this paper is to construct a completely new theory that can be used to explain the phenomenon of quantum entanglement, and this theory can be used to replace the previous theory of hidden variables.

1 Introduction

According to the dark matter fluid model, the entire universe is filled with dark matter fluids. Dark matter fluids have a viscosity coefficient, which leads to turbulence during the flow of dark matter fluids. The emergence of this turbulence phenomenon means that a dissipative structure of energy appears in dark matter fluids. This energy dissipation structure is a direct result of the emergence of countless vortex tubes. Each Vortex tube is connected with positive and negative charges or positive and negative magnetic monopoles. In Real Spacetime, the Vortex tube connects positive and negative charges, corresponding to proton-electron pairs. Positive and negative magnetic monopoles appear in imaginary spacetime.

Due to the limitations of Dirac's quantization conditions, this means that the Vortex tube does not produce observable physical effects in either Real Spacetime or Imaginary Spacetime. This means that the rotation, movement, etc. of the vortex tube will not cause energy absorption and consumption. This also means that the motion of the Vortex tube is a phenomenon unique to dark matter fluids. Its interaction is not related to electromagnetic interactions, but to dark matter interactions. If the intermediary of the interaction of the vortex tube is dark matter waves, the motion speed of this vortex tube will reach very high speeds. According to my other research results [1], this dark matter wave may travel up to a million times faster than electromagnetic waves. Such a high speed means that the vortex tube of the dark matter fluid may also move a million times faster than the speed of light.

The reason why the Vortex tube can move so fast is because the Vortex tube is not directly involved in electromagnetic interactions. The vortex at both ends of the vortex tube will participate in electromagnetic interactions, so the speed of the vortex will be limited by the speed of light.

To form positive and negative charges or positive and negative magnetic monopoles at both ends of the vortex tube, there must be a special interface to form. This is like a vortex in a fluid, and only on the surface or at the bottom of the water interface will a special vortex structure be formed. In dark matter fluids, in order to obtain vortex structures at both ends of the vortex tube, there must be a relatively special interface. This interface may be the interface of the container in which the dark matter fluid is located, or it may be formed by the interaction of photons or other electrons or protons. This could explain why there is a problem of wave function collapse in quantum mechanics. That is, once the measurement occurs, the wave function collapses and the position of the particle is determined. If the vortex tube encounters photons or other particles that interact, the vortex tube of the dark matter fluid forms a vortex structure. This vortex structure is a particle.

2 Interactions between Vortex tubes

2.1 vortex tube exchange

The Vortex tube is combined with positive and negative charges or positive and negative magnetic monopoles. Figure 1(a) shows a pair of electron proton. The electron proton pair is ended by an electron vortex and a proton vortex. In the middle is the vortex tube that connects electron to proton vortices. Since they are connected to both ends of a tube, the spins of electron and proton are observed from different directions, and the spin directions of the two particles may be opposite. However, if you find it inconvenient to assume that such an assumption, you can also assume that the spin direction of the two particles should be the same. This is mainly due to the difference in the method of choosing the reference frame of different particles.

Figure 1(b) shows two pairs of electron proton. One of the pairs is electron proton pair 12 formed by electron 1 and proton 2, where the vortex tube is called the 12 vortex tube. The other electron proton pair is 34. The spins of electrons 1 and 3 are the same, so the spins of protons 2 and 4 must also be the same. When the vortex tube is connected between them, two pairs of electron protons are formed, as shown in Figure 1(c), two vortex tubes, 14 and 32, respectively. In Figure 1(c), the positions of electrons 1,3 and protons 2,4 do not change, but the vortex tube is exchanged to become 14 vortex tube and 32 vortex tube. But since the vortex tube does not produce observable physical effects, this exchange of the vortex tube does not cause a change in the physical state of the two pairs of electron proton. Of course, Vortex tubes 14 and 32 can continue to separate, which becomes the state of Figure 1(d). At this point, the 14 and 32 vortex tubes no longer cross together.

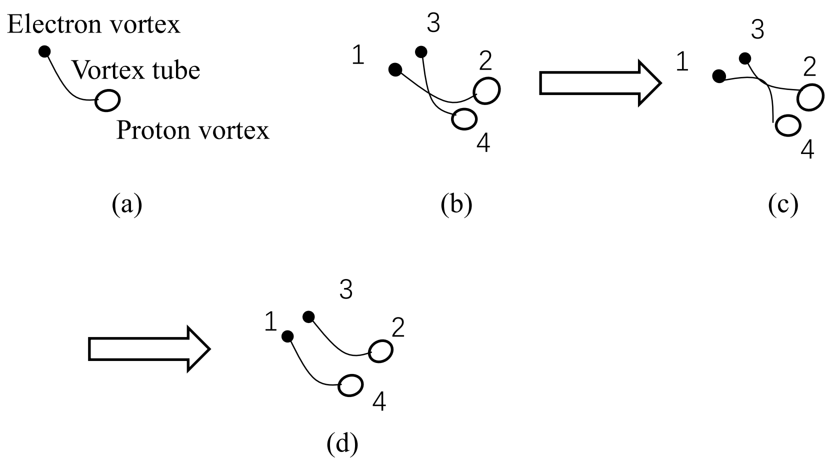

Fig. 1 The exchange of vortex tube

In Figure 1(c), we can also think that because the conduction speed of the Vortex tube exchange is very fast, electron 1 moves to position 3. Although such particle position exchange consumes energy in a macroscopic sense and produces observable physical effects, but at the microscopic scale, since electrons 1 and 3 are identical in state and are homogeneous particles, the exchange of positions between them does not produce observable physical effects.

If the spin direction of the two electrons is different, the vortex tubes can also be exchanged with each other in the same way as shown in Figure 2.

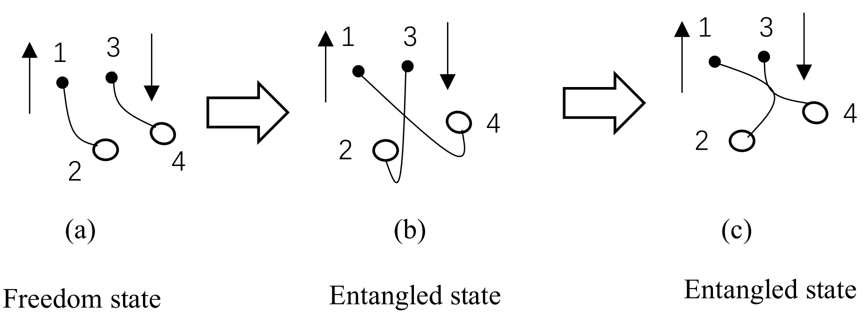

Fig. 2 The exchange of vortex tube with different particle spin

Figure 2(a) shows two pairs of electron proton, but the spin direction of the electrons is different, and of course the spin direction of the corresponding protons is also different.

If the two Vortex tubes want to exchange with each other, they only need to connect the Vortex Tube from the other end of the proton. This is shown in Figure 2(b). This is because if the vortex is seen as a ring, the spin direction seen from above and below the ring is exactly the opposite.

After forming the state of Figure 2(b), the vortex tube can be further exchanged to form the state of Figure 2(c). In the state of Figure 2(c), the vortex tube reconnects the upper end of the proton, ensuring that the spin direction of the electron proton pair is reversed.

The time required for the exchange of the Vortex tube is very short. Therefore, we can also think that electrons or protons move teleportarily to another location with the exchange of the vortex tube. But because the Vortex tube itself does not produce an observable effect, this movement makes it appear as if it moves from one position to another in an instant. This instantaneous effect can be used to provide a theoretical basis for the interpretation of the probability of the wave function. Because the movement and exchange of the vortex tube has a lot of randomness, and the position is not deterministic, the position results of the particles measured at different times are also uncertain.

2.2 Entangled state

If two Vortex tubes cross each other. For this state of vortex tube crossing, we can call it the entangled state. In the entangled state, the state of the two electrons can be described by a wave function:

$$|\psi > = \sum A_{ij} \left| \psi_i \, \psi_j > \right.$$

ψ_i or ψ_j is the wave function of two independent electrons.

If two electrons are entangled, the states of the two electrons will be related to each other, for example, if two electrons have the same spin, then the two electrons can be in the state of all spins up $|00>$ or the state of all spins down $|11>$.

Thus the wave function of the electrons in these two entangled states can be described

$$|\psi > = A_{00}|00 > + A_{11}|11 >$$

where 0 and 1 represent the spin direction up and down, respectively. Considering that the probability of spin up and spin down is the same, the above equation can also be written

$$|\psi > = \frac{1}{\sqrt{2}}(|00 > + |11 >)$$

In Figure 2(a), since the two Vortex tubes do not cross each other, this also means that the two Vortex tubes can be distinguished from each other. This is called the free state.

In Figure 2 (b) and (c), the vortex tube can be freely exchanged without affecting the state of the particle, so this state is called the entangled state.

Of course, even if the two Vortex tubes do not cross each other, it is possible that with the movement of the particles, the Vortex tubes will cross together at a certain moment, which can also form an entangled state. That is, the change from Figure 2(a) to Figure 2(b) or (c).

For two electrons with different spins in an entangled state, if the vortex tube corresponding to one electron is transferred to the other electron, then the other end of the vortex tube must be transferred from the corresponding proton to the other proton. For another vortex tube, the same effect. In this way, after the exchange of the vortex tube, it means that the state of the two electrons remains unchanged without observable physical effects.

3 Quantum entanglement

From the above analysis, we can see that in an entangled system, two electrons can be described by a wave function. So when the state of one electron changes, we can predict the change in the state of another electron.

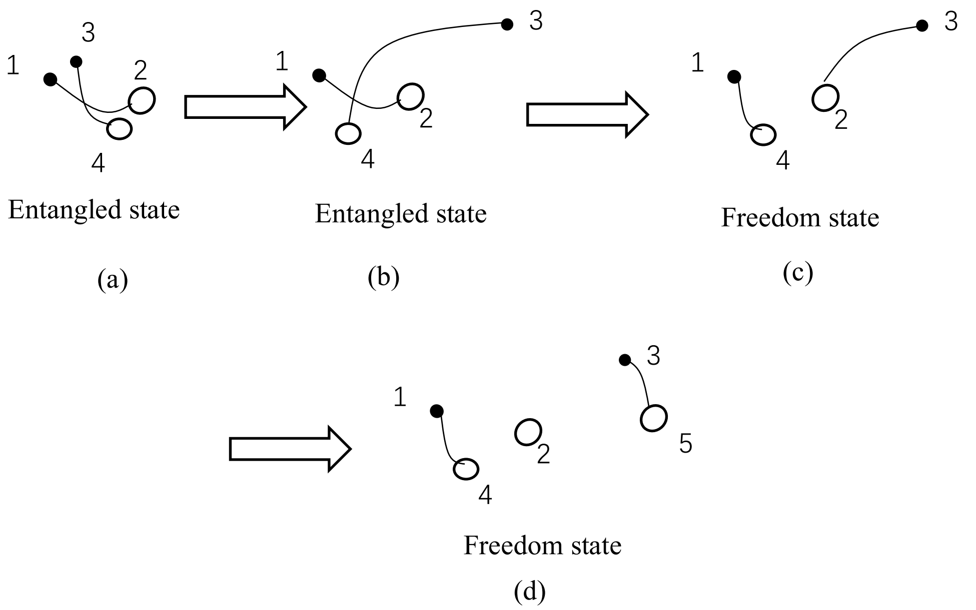

Fig. 3 Communication principle of quantum entanglement

In Figure 3(a), where the electron-proton pairs 1-2 and 3-4 are entangled, electrons 1 and 3 can be described by a wave function. Figure 3(b) shows electron 3 moving away from electron 1, and remaining in this entangled state if the vortex tube is not exchanged. The motion of electron 3 is limited by the speed of light. But the state of electrons 1 and 3 is determined by the connected vortex tubes 12 and 34. That is, a change in the state of electron 1 necessarily leads to a change in the state of electron 3.

Figure 3(c) shows that the two vortex tubes, 12 and 34, begin to exchange to the 14 and 32 vortex tubes and the entangled state disappears. In this way, the two vortex tubes no longer cross or become entangled, and the two electrons 1 and 3 enter a free state. Figure 3(d) shows that if there are other extra protons 5 near electron 3, electron 3 can also connect this new proton 5 by establishing a new vortex tube. This new Vortex tube is shorter in length.

This exchange of vortex tubes takes place in dark matter fluids, and the speed is mainly affected by dark matter waves, so the speed is very fast.

4 Manipulation and communication of entangled states

4.1 Distribution of entangled particles

When two elementary particles, such as electrons or photons, are entangled, the uncertainty of the Vortex tube exchange causes each particle to be in a random state. Therefore, if it is in the state of Figure 3(b), it means that although the two particles have been distributed, they are still entangled. At this time, we only need to manipulate particle 1 so that it is in a certain state, and the state of particle 3 will be determined immediately, and the exchange process between the two vortex tubes will stop. Thus, information is instantly transmitted from particle 1 to particle 3 at the speed of dark matter interaction.

4.2 Speed of Information Dissemination

Because it is in an entangled state, the whole process does not involve the propagation of electromagnetic waves, so the propagation of state information is completely determined by the propagation speed of dark matter waves. This dark matter wave interaction can transmit the state change of one particle to another particle at a speed far faster than the speed of light, so that the information can arrive "instantaneously".

4.3 Time to propagate of quantum entangled information

If the speed of the information transmitted by quantum entanglement is fixed, propagating at the speed of dark matter waves, then it is roughly estimated that its speed may reach 1 million times the propagation speed of electromagnetic waves [1].

According to the propagation path in Figure 3(b), the entire state change involves four particles, so its propagation path includes two vortex tubes. Therefore, the length of the entire propagation is the length of two vortex tubes.

Divide the sum of the lengths of the two Vortex tubes by the propagation speed of the dark matter wave, and we can get the time it takes for the entangled signal to propagate.

However, if the distance between the two particles distributed is relatively long, then this distance will be much greater than the length of the first two vortex tubes distributed, so we can approximate the distance between the two particles to represent the distance of quantum entanglement information propagation.

For example, in the quantum entanglement experiment conducted by the Micius satellite [2], two photons were distributed over a distance of 1,000 kilometers. This also reflects the distance of information transmission of 1,000 kilometers. Then we divide this distance by the speed of dark matter wave propagation $v_d \approx 3 \times 10^{14}\ m/s$ [1], we can get the entire quantum information propagation time.

$$t = \frac{1000 \times 10^3}{3 \times 10^{14}} \approx 3.3 \times 10^{-9}(s)$$

This information transmission time should be very short. If it is the propagation of electromagnetic waves, such a long distance takes 3.3 milliseconds.

Therefore, from the results of this calculation, it can be seen that the time for quantum information to propagate is very short, and it can basically be said that it can be completed “instantly”. This speed is 1 million times the speed at which electromagnetic waves propagate.

Therefore, it is difficult to measure the time of this information propagation using current experimental techniques on Earth. Such a delay can only be measured on the scale of the universe.

5 Conclusions

Quantum entanglement has always been a very controversial topic, but in recent years, due to more and more evidence support, quantum entanglement related research has become more and more in-depth.

However, for such a phenomenon as quantum entanglement, there is still a lack of relevant theories to satisfactorily explain. Physicists, including Einstein, Bohm and others, have also tried to build hidden variable theories, but these theories are more or less flawed in one way or another.

From the results of this paper, if we adopt the idea of Dirac’s charge quantization and build a model of dark matter fluids, the matter in real and imaginary Spacetime is formed by the turbulence of dark matter fluids, then due to the special properties of the vortex tube connecting electron and proton or positive and negative magnetic monopoles, which leads to quantum entanglement can be explained by a new theory of dark matter fluids.

From the analysis results of this paper, because we use the unobservable property of the vortex tube in the idea of Dirac’s charge quantization, it is shown that the vortex tube connecting positive and negative charges does not interact with the electromagnetic waves of the visible matter world, so that it can escape the speed limit of light in relativity. That is to say, the movement of the vortex tube connecting positive and negative charges or positive and negative magnetic monopoles can break through the speed of light. Perhaps it is this superluminal signal that can be transmitted in dark matter that leads to the existence of what Einstein thought was a ghostly action at a distance.

According to this paper and the author's previous research, this quantum entanglement information can be transmitted at a speed of 1 million times the speed of light, which is enough to make the observed particle state information in the matter world achieve the effect of instantaneous transmission.

References

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