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Original Paper

Negation of Equivalence Principle

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Abstract

According to the electric charge and the elastic coefficient of the object independent of the motion of the object, and based on the similar properties of the gravitational field and the electrostatic field, it is concluded that the gravitational mass of the object is a constant independent of the motion of the object. However, experimental results show that the inertial mass of the object is related to the motion of the object. Therefore, it is considered that the principle of equivalence is not satisfied. As the object moves at a low velocity, the principle of equivalence is approximately true, so it is concluded that the general theory of relativity is applicable to all space celestial bodies. When the object is moving at high velocity, the principle of equivalence is not satisfied, so the general theory of relativity is not the truth. According to the principle of force balance, it is concluded that the velocity V of the black hole must be zero. Under the necessary conditions of V = 0, the existence of the black hole cannot be deduced according to the general theory of relativity. Therefore, it is considered that the black hole does not exist in theory. It is also estimated that the density of black hole is more than one million times the neutron density. It is believed that the black hole can never be a real material existence. The principle of black hole observation published on April 10, 2019 was considered theoretically wrong against the common sense of physics. The photos of the black hole halo taken at eight observation points in the world are judged to be untrue.

Keywords

Gravitational mass, inertial mass, electric quantity, gravitational field, electric field, black hole, equivalence principle, general relativity.

1. Introduction

History has proven that scientific theories are derived from certain objective facts, such as the law of inertia, the law of reaction force, or experimental results verified repeatedly and correctly, such as the law of conservation of momentum, the principle of constancy of light velocity. However, the

equivalence principle, one of the important sources of general relativity, lacks both definite objective facts and repeatedly-verified experimental results. This principle is originally only the principle of equivalence derived from the assumption that the gravitational mass and the inertial mass are equal on the basis that the difference between the inertial force and the universal gravitation cannot be felt when taking the elevator.

It can be seen from the above analysis that there is a significant difference between the universal gravitation and the inertial force. First of all, the inertial force must act on the object, and the object will inevitably obtain the kinetic energy equal to the work output by the force. In other words, the inertial force is the energy transmission force, whereas the universal gravitation has nothing to do with the energy transmission. Secondly, the magnitude and direction of the inertial force may be arbitrary, whereas the magnitude and direction of the universal gravitation are closely related to the position of the object. Of course, these significant differences cannot negate the equivalence principle, but meaning that the equivalence principle cannot be confirmed as the truth, suggesting that the authenticity of the equivalence principle must be further analyzed and verified.

How to further analyze and verify the equivalence principle? Obviously, the equivalence principle should be further analyzed and verified from the most significant characteristics of inertial mass or the basic characteristics of gravitational mass. Now we know that, the most significant characteristic of inertial mass is that its magnitude will increase with the increase in the velocity of motion of the object. Facts and theoretical analysis have proved that, the relationship between the inertial mass m and the rest mass mo and the velocity V of the object can be expressed by the Formula $m=mo\sqrt{1-v^2/c^2}$ (C-velocity of light).

Obviously, to verify whether the relationship between the gravitational mass and its rest mass can be expressed by the same formula is to verify whether the equivalence principle is true.

2. The Gravitational Mass of the Object is a Constant Independent of the Motion of the Object, so the Equivalence Principle is not Satisfied

Through the following four examples, it can be determined that the gravitational mass of the object is a constant independent of the motion of the object, that is, for the gravitational mass, there is always m=mo, and the Formula $m=mo\sqrt{1-v^2/c^2}$ certainly does not apply to the gravitational mass. Therefore, it can be concluded that the gravitational mass is not equal to the inertial mass.

2.1 Since the electric quantity of the charged body is a constant independent of the motion of the charged body, it can be determined that the gravitational mass of the object is also a constant independent of the motion of the object.

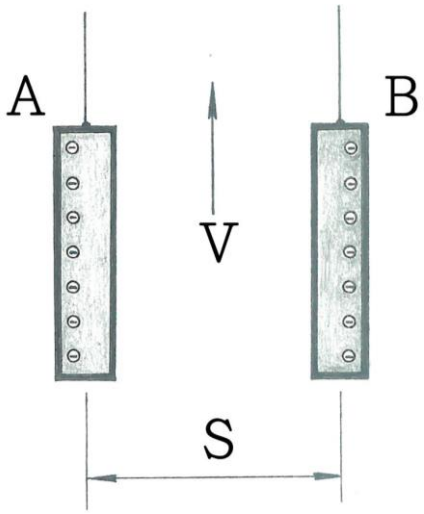

Figure 1. The Universal Gravitation Has the Equal Magnitude as the Electrostatic Repulsion

The two objects A and B suspended in vacuum are shown in Figure 1. The center distance between A and B is expressed by S. Both A and B are massive objects with the equivalent negative charge Q_-. If the electrostatic repulsion generated between the negative charges Q_- of A and B is equal to the universal gravitation between A and B, then the two objects A and B are in equilibrium, and the distance S will not change.

When moving at a velocity V relative to A and B, the observer will inevitably observe that the inertial mass of A and B will increase with the increase in V. If it is equal to the inertial mass, the gravitational mass of A and B will also inevitably increase with the increase in the inertial mass. With the increase in the gravitational mass, the universal gravitation between A and B is bound to increase. However, it has been proved that the electric charge on the object is independent of the motion of the object. That is to say, the electric quantity Q_- of A and B is independent of the motion of A and B, i.e. the electrostatic repulsion between A and B has nothing to do with the motion of A and B. Therefore, the increased universal gravitation between A and B must be greater than the constant electrostatic repulsion. When losing the balance of force between A and B, S will inevitably decrease, and even collide with each other. Obviously, such a result will not happen. Any observer can see that A and B are always in equilibrium. This fact shows that the universal gravitation between A and B is as independent of the motion of the observer as the electrostatic repulsion. The universal gravitation does not change, that is, the gravitational mass remains unchanged. Therefore, it is bound to be concluded that the gravitational mass of the object is a constant independent of the motion of the object.

2.2 Since the elastic coefficient of the spring is independent of the motion of the spring, it can be determined that the gravitational mass of the object is a constant independent of the motion of the object.

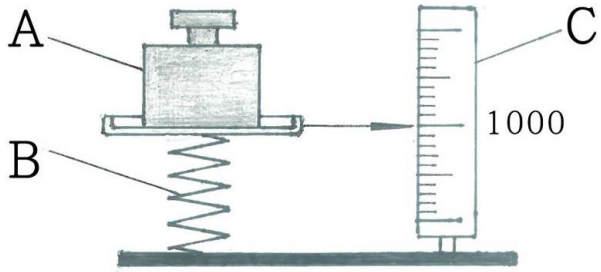

Figure 2. The Deformation of the Spring is Independent of the Motion of the Spring

The schematic diagram of the spring scale is shown in Figure 2. A represents the weight of 1,000 grams; B represents the spring; C represents the spring scale dial. As shown in the figure, when the weight is placed on the tray of the spring scale, the pointer of the spring scale stops in the position of 1,000 grams on the dial. It indicates that, when the universal gravitation of the earth on the weight is in equilibrium with the compressed elastic force of the spring, the pointer of the spring scale will stop in the position of 1,000 grams. Obviously, the observer moving at any velocity relative to the spring scale can see that the pointer of the spring scale stops in the same position of 1,000 grams. That is to say, the magnitude of the spring deformation is independent of the observer's velocity of motion relative to the spring. Since the elastic coefficient of the spring is independent of the velocity of motion of the spring, the only possibility for the spring to stop in the position of 1,000 grams must be that the magnitude of the universal gravitation to the weight applied by the earth is independent of the velocity of motion of the weight, that is to say, the gravitational mass of the weight is not related to the velocity of motion of the weight. The same conclusion can be drawn that, the gravitational mass of the object is a constant independent of the motion of the object.

2.3 Unstable equilibrium between the universal gravitation and the electrostatic attraction

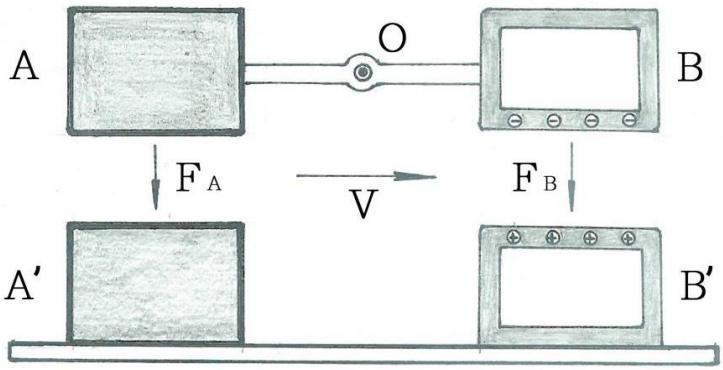

Figure 3. The Universal Gravitation and the Electrostatic Attraction are in an Unstable Equilibrium

When the object or the equipment on which the observer rides is moving at a low velocity, can it be observed that the gravitational mass of the object is independent of the velocity of motion of the object?

The answer is yes, as shown in Figure 3.

As shown in Figure 3, the objects AA 'and BB' are placed horizontally. A and B may revolve around the intermediate fixed axis 0. A and A' represent heavy objects with large mass, while B and B' represent light objects with small mass. B has a negative charge, and B' has a positive charge. The electric charges of B and B' can be adjusted, so that the electrostatic attraction F_B of BB' is exactly equal to the universal gravitation F_A of AA'. So, A and B are in equilibrium. It can be seen that the force balance between A and B is a typical unstable equilibrium. A slight increase in F_A or F_B will inevitably lead to a further rapid increase in the increased force, resulting in an avalanche-type imbalance, until A collides with A' or B collides with B'. It can be inferred that, if the gravitational mass is equal to the inertial mass, and the observer in the car or plane can see that A and B are moving at Velocity V, then the gravitational mass of A will inevitably increase slightly, and FA will inevitably also increase slightly (the gravitational mass of B will inevitably also increase, but relatively slightly relative to A, which should not be considered), resulting in an avalanche imbalance between A and B, finally until A collides with A'. Obviously, such a situation will not happen. This suggests that the gravitational mass cannot be the same as the inertial mass, but that the gravitational mass must be the same as the electric charge of the object, i.e. a constant independent of the velocity of motion of the object.

2.4 According to the properties of the gravitational field, it can be concluded that the gravitational mass is a constant independent of the motion.

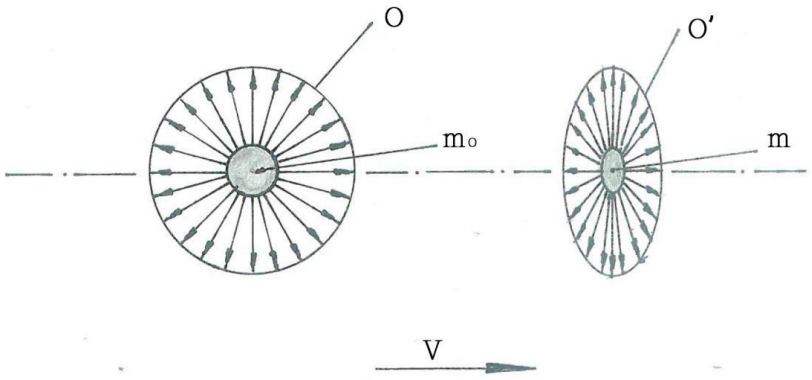

Figure 4. The Flux of the Gravitational Field on the Closed Surface around the Gravitational Mass is Independent of the Velocity

The uniform gravitational field generated by the gravitational mass mo of the stationary object is shown in Figure 4. The gravitational field line is represented by an arrow line as shown in the figure. The smaller the distance between the lines, the greater the intensity of the gravitational field. 0 represents a closed surface surrounding mo. The number of gravitational field lines passing through 0 expresses the intensity flux of the gravitational field passing through 0. Since the distribution of the gravitational field of the gravitational mass is completely similar to that of the electric field of the charged body, following the Gauss theorem of the electric field, the intensity flux of the gravitational

field passing through any closed curved surface should be equal to the total gravitational mass surrounded by the surface. As shown in Figure 4, the intensity flux of the gravitational field passing through the curved surface 0 is equal to the static gravitational mass mo surrounded by the curved surface 0. As shown in the right figure of Figure 4, when the rest mass is moving at high velocity, it is represented by m instead of mo. According to the theory of special relativity, when the length is contracted in the direction of motion, 0 is contracted as 0', and the distribution of gravitational lines is also contracted. However, as can be seen from the figure, although the distribution of the gravitational field of m has changed, the total number of gravitational lines has not changed. It has been shown that the intensity flux of the gravitational field passing through 0' is still the same as that of 0, that is to say, the gravitational mass m surrounded by 0' is the same as the gravitational mass mo surrounded by 0. It has been proven that the magnitude of the gravitational mass of the object is independent of the velocity of motion of the object, i.e. the gravitational mass of the object is a constant independent of the velocity of motion of the object.

The above four facts show that the gravitational mass of the object is indeed a constant independent of the velocity of motion of the object. However, it turns out that the inertial mass of the object is definitely related to the velocity of motion of the object. It has been proved that the gravitational mass of the object cannot be equal to the inertial mass of the object, that is to say, the equivalence principle is not satisfied.

3. When the Object is Moving at Low Velocity, the Principle of Equivalence is Satisfied

We know that there are a lot of laws or principles which are not satisfied, but they are satisfied in a certain local range. For example, it is generally not true that the atmospheric pressure is inversely proportional to the altitude, but it is very nearly true in the range below 1,500m above sea level. For another example, sinA=X, generally speaking, X is not directly proportional to A, but when the angle A is very small, it is very nearly true that X is directly proportional to A. The principle of equivalence is also of this type. It can be seen from the calculations that, when the velocity of motion V of the object is less than one thousandth of the light velocity, i.e. 300m/s, the velocity of motion of the object m=mo $\sqrt{1-v^2/c^2} \approx 1.000001$mo. That is to say, when the velocity of motion of the object is less than one thousandth of the light velocity, there is only millionth difference between the inertial mass and the rest mass of the object. Under such conditions, it can be assumed roughly that m=mo, i.e., the inertial mass m of the object can be very roughly regarded as a constant mo. So, there is no difference between the inertial mass and the gravitational mass. It can be considered that the inertial mass is equal to the gravitational mass. Therefore, the equivalence principle is satisfied.

From our understanding of the universe, regardless of particles, the velocity of motion of all celestial bodies (including meteorites) is far less than 300m/s. That is to say, the inertial mass of all celestial bodies can be considered to be equal to the gravitational mass, i.e., it is argued that the principle of

equivalence is satisfied. There is no doubt that the general relativity should be applied to all celestial bodies.

4. When the Object is Moving at High Velocity, the Principle of Equivalence is not Satisfied, so the Black Hole should not Exist in Theory

It has been shown that the inertial mass is significantly different from the gravitational mass when the object is moving at high velocity, so the principle of equivalence is not satisfied. The equivalence principle is an important theoretical basis of general relativity. If the equivalence principle is not satisfied, the existence of black hole, an important inference of general relativity, may not be true.

In November 2016, I published a paper titled of "*New Principles for Eliminating Defects in Relativity*" in the International Journal of Physics. In this paper, a principle of double equilibrium of universal gravitation was proposed. This principle points out that there are no celestial bodies moving in a straight line but never returning in the universe, and that the celestial bodies in perpetual motion must be in circular motion in cycles, but any celestial body in circular motion will inevitably produce a centrifugal force which must be balanced by the universal gravitation of another celestial body. According to the principle of double equilibrium of universal gravitation, such two (or more) adjacent celestial bodies must achieve the equilibrium of forces. Analysis results show that the two celestial bodies are bound to revolve around a center together, and the distance between each celestial body and the center of rotation is inversely proportional to the mass of the celestial body. Under such conditions, the distance between the two celestial bodies from the center of rotation is inversely proportional to the mass of the celestial bodies. Meanwhile, the rotational centrifugal force of the two bodies is equal to the universal gravitation between them. For example, the distance between the earth and the center of rotation is estimated at 4,687km, so that the rotational centrifugal force of the earth is exactly equal to the universal gravity of the moon on the earth. It has been found by the network search that, this judgment has been verified by accurate astronomical observations. (Since the resultant universal gravitation of the earth and other eight planets to the sun changes from time to time, the center of rotation of the sun also changes from time to time.)

It can be inferred from the above-mentioned principle of double equilibrium of universal gravitation that, if the black hole is a moving celestial body, there will inevitably be another celestial body and black hole revolving around a center together. However, the mass of the black hole is extremely large, and the universal gravitation of the black hole on another celestial body is also tremendous. Therefore, another celestial body must rotate at a very high velocity to produce the centrifugal force to counteract the universal gravitation of the black hole. It can be seen from the simple calculations that such a celestial body is very close to the black hole, and its velocity of rotation should be close to the velocity of light. However, the velocity of motion of all the celestial bodies in the universe is less than one thousandth of the velocity of light. It indicates that no celestial bodies can meet the conditions for co-rotation with the black hole. This means that the black hole has no co-rotating celestial bodies. That

is to say, the black hole cannot be a moving celestial body. If there is a black hole, the velocity of motion of the black hole V=0. However, under the necessary conditions of V=0, the existence of the black hole cannot be deduced at all according to the general theory of relativity. Thus, it is concluded that the black hole doesn't exist in theory.

It is known that all substances are made up of a number of elements among 118 elements. If the black hole is also a substance, what elements are the black hole made up of? It is estimated according to the data on the black hole that, the density of the black hole is more than 10^{21} of the density of the earth. It is calculated according to this density that, the density of the black hole is more than a million times that of the neutron. It is well known that the neutron is a substance with the highest density, and the density of the black hole is more than a million times that of the neutron, suggesting that the black hole cannot be made up of any material element. Physics points out that all objects have a structure of matter, which is a well-known common sense, but the black hole has no a specific structure of matter, which is obviously abnormal. There is no abnormality without a cause. What is the strange reason for the abnormal density of the black hole?

It is known that the black hole is the result of general relativity under the condition that there is no limit on the velocity of motion of the object. It will be analyzed from the motion law of the object.

The length of the object A is set to L_O. When A is moving along the direction of L_O at the velocity V, L_O will be contracted to $L=L_O\sqrt{1-v^2/c^2}$ according to Lorentz's length transformation formula. For example, V=0.866C. Then L will be contracted to Lo/2. Not only A but also the gravitational field around A will be contracted in the same proportion. Such a contraction should be analyzed according to the following three inferences.

1. When the length of A in the direction of V is shortened, the volume of A will inevitably become smaller, and the density of A will inevitably increase. It can be seen that an increase in the density of A is resulted from different Lorentz's transformation length measurement standards. For example, we can see that the length of aircraft in the sky is shortened from more than 100 meters to less than one meter, just as our visual length changes with the distance of the aircraft. When the Lorentz's length changes with the velocity V and our visual length changes, the original appearance of the object will not be changed. For example, when the velocity of motion of the object is close to the velocity of light, the density of the object has increased by more than 10^{21} times, becoming a black hole. The black hole doesn't actually change the original appearance of the object.

2. When the object is moving at high velocity, the length of the gravitational field around the object in the direction of motion is also contracted, but this contraction is different from that of the real object. The real object is only contracted in the V direction, while the gravitational field is not only contracted in the V direction, but also is expanded in the vertical V direction (see Figure 4). The total effect is that the intensity flux of the gravitational field passing through any curved surface surrounding the object is constant, independent of the velocity of motion of the object, that is to say, the gravitational mass of the

object is a constant independent of the velocity of motion of the object, i.e. m=mo.

3. When the object is moving at high velocity, Lorentz's transformation $m=mo\sqrt{1-v^2/c^2}$. Obviously, m is by no means the constant gravitational mass, but only the inertial mass, that is to say, the Lorentz's mass transformation formula is only the transformation formula of inertial mass.

If the velocity of motion of the object is close to the velocity of light, its density can be more than one million times the neutron density, and its inertial mass will be more than 10^{21} times that of mo, so the inertial mass black hole will be produced. However, according to the principle of double equilibrium of universal gravitation, the inertial mass black hole will inevitably produce an extremely-large centrifugal force when it is in circular motion at extremely high velocity. This centrifugal force must be balanced by the universal gravitation produced by another ultra-high gravitational mass, but there is no celestial body with the ultra-high gravitational mass in the universe, so the inertial mass black hole cannot exist.

The above conclusion is drawn that there is neither a static gravitational mass black hole nor an inertial mass black hole in extremely high-velocity motion in the universe.

5. The Observation Principle of Black Hole Released on April 10, 2019 is Theoretically Wrong, and the Black Hole Photos Taken are not Real

On April 10, 2019, the black hole at 55 million light years was observed and photographed at the eight global observation points. The theoretical basis for this observation is that the black hole has a strong universal gravitation attracting the gas around the black hole to hit the black hole violently, thus producing bright light rays. These bright light rays form a halo around the black hole which lies in the middle of the halo. This halo has been photographed at the eight observation points, so that the black hole has been photographed indirectly.

It is well known that there is no any cluster of gas in the vacuum. Practices show that any compressed gases injected into the vacuum will diffuse instantly without a trace, and never gather into a cluster. However, the whole universe is in a vacuum state, and the space around the black hole is no exception. Since there is no gas cluster around the black hole, how can the black hole attract the gas? Even more absurdly, the black hole was observed in 2006. sor far 15 years later, it is still glowing around the black hole, which means that the strong universal gravitation of the black hole has attracted such gases for 15 years. There is no sign that these gases are exhausted at all. Are these gases endless around the black hole? Of course, there are a lot of gases adsorbed around many celestial bodies, such as the earth, Venus, Jupiter, Saturn, etc. However, the black hole could never only attract the gas around the celestial body, but repel the attraction to the celestial body in the gas! Obviously, it is unscientific and wrong to conclude that there are the inexhaustible gases around the black hole, which are attracted by the strong universal gravitation of the black hole to hit the black hole to produce the light.

Other information suggests that the mass of the black hole is 6.5 billion times that of the sun. According to the density of the black hole, the diameter of the black hole can be calculated as only

more than 140km, which is one ninetieth of the diameter of the earth. If there is a halo around the black hole, the diameter of the halo is not as large as that of the earth. Therefore, from the earth at 55 million light years, the angle of view of the halo is very small. The complete picture of the halo can be certainly observed at all observation points. It is absolutely impossible for anyone to observe only a small section in the east of the halo, and for others to observe only a small section in the west, south, north, southeast and so on, and then all sections can be assembled into a complete halo. It's like eight people taking photos of an eight-petal floret in the distance at the same time. It's absolutely impossible for each person to photograph only one petal of this floret. Eight people put the eight petals together into a complete eight-petal floret! However, observers believe that the so-called black hole halo is a real picture taken together at eight observation points, which is obviously against the basic common sense of human beings.

Moreover, anyone with photographic experience knows that, if the angle between two photographing points A and B and 0 ∠A0B is less than 1 degree when photographing the scenery at point 0, there is a very small difference between the photos taken at A and B. If ∠A0B is less than one ten thousandth of a degree, then photos taken at A and B can be said to be completely the same. It is known that the farthest straight-line distance AB between the two points on the earth is 12,800km, while the distance between the earth and the black hole is 55 million light years, i.e. $5.2x10^{19}$ Km. Therefore, ∠ A0B=$1.8x10^{-9}$ degrees, that is less than 0.2 per hundred million degrees. With such a tiny observation shooting angle, it can be considered that the black hole photos taken by the two farthest observers on the earth are exactly the same. The so-called black hole halo photo released should be made up of eight identical photos. This photo can't be a real so-called black hole photo. Of course, because eight parallel beams of light passing through the atmosphere at different places on the earth have different refraction effects, so observers will inevitably create an illusion that the photos are taken from different angles.

6. Summary

It is pointed out that the inertial force is an energy transmission force with the arbitrary magnitude and direction. The inertial force and its magnitude & direction will depend on the obviously different field forces in its place. Especially, the inertial mass of the object determined by the Lorentz's transformation formula will increase with an increase in the velocity of motion of the object. However, it has not been proved that the gravitational mass of the object will also increase with an increase in the velocity of motion of the object. Therefore, there may be an essential difference between the gravitational mass and the inertial mass. Whether the equivalence principle is true or not should be further verified. To consider that the specific analysis of whether the gravitational mass of the object is the same as the inertial mass, which also increases with an increase in the velocity of motion of the object, is a touchstone for judging whether the gravitational mass is equal to the inertial mass. From the facts that the electric charge on the object is independent of the velocity of motion of the object, the elastic coefficient of the spring is independent of the velocity of motion of the spring, a unstable equilibrium

between the universal gravitation and the electrostatic attraction may be formed, especially the distribution of the gravitational field, the distribution of the electrostatic field and the relationship with the velocity have the same geometric characteristics, it can be concluded that the gravitational mass of the object is a constant independent of the velocity of motion of the object. It is proved that the gravitational mass cannot be equal to the inertial mass. This suggests that the equivalence principle is not satisfied in principle. It can be seen from the concrete analysis that, when the velocity of motion of the object is less than one thousandth of the velocity of light, the inertial mass of the object changes very little. It can be considered that the inertial mass is also a constant, so the equivalence principle is approximately true. The velocity of motion of all celestial bodies in the universe is less than one thousandth of the velocity of light. Therefore, for all the celestial bodies in the universe, the principle of equivalence can be regarded as true. The general relativity naturally applies to all the celestial bodies in the universe.

When the object is moving at high velocity, the inertial mass of the object is obviously greater than the gravitational mass, so the equivalence principle is not satisfied, and the black hole derived from the general relativity cannot be true. It can be inferred according to the principle of double equilibrium of universal gravitation that, if there is a black hole, its velocity of motion V must be equal to zero. Under the necessary conditions of V=0, it is difficult to derive the existence of the black hole according to the general relativity. Thus, it is concluded that the black hole doesn't exist in theory. By analyzing the Lorentz's transformation, it is determined that as the length of the object in the direction of motion is shortened, the density is bound to increase. It is obvious that an increase in the density is resulted from the different measurement standards of Lorentz's transformation for different inertial systems, but the different measurement standards will not change the original appearance of the object, that is to say, the black hole formed by the object moving at extremely high velocity has not changed the structure of matter of the object. It is also pointed out that, since the gravitational mass of the object is identically equal to the rest mass of the object, the Lorentz's mass transformation formula $m=mo\sqrt{1-v^2/c^2}$ does not apply to the gravitational mass, but only applies to the inertial mass. It is also concluded that the inertial mass black hole cannot exist because there are no celestial bodies moving at extremely high velocity in the universe.

For the black hole photos released on April 10, 2019, it can be considered that the observation principle is not satisfied, because the universe is basically in a vacuum state in which there is no gas cluster, so it is impossible for the black hole to attract the gas to glow. It is also considered that, since the black hole at 55 million light years is far away from the earth, the complete picture of the black hole can be observed at any observation point on the earth. It is impossible to observe a small part of the black hole at eight different observation points, respectively. It is also pointed out that, since the black hole is very far away, the light rays from the black hole to all the observation points on the earth can be regarded as basically coincident. Therefore, it is considered that the black hole photos taken at the eight observation

points on the earth is an identical picture, and that the released photos are a ring combination of eight identical photos.

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