Original Research Article

4D Space-Time Contraction PK 2D Lorentz Contraction

Abstract

Ignoring the internal structure of moving objects and treating them as rigid bodies is not only out of practice but also inconsistent with the spirit of scientific exploration. To change this status quo, consider the relativistic effects of real object motion. Consider the mass-velocity relationship as an initial mechanism to discuss the effect of velocity on the space around an object and on the volume of the object. A series of new conclusions are obtained, such as "the space distortion of a moving system with mass due to inertial motion at ultra-high speed, and even the generation of neutron like stars or black holes", and the 3D contraction of moving objects due to inertial motion, which can oppose the corresponding old views. This confrontation threatens the status of the theoretical criterion "covariant under Lorentz transformation", and thus has a great impact on the whole field of theoretical physics.

Keywords

Theory of relativity, Rigid bodies, 1D Lorentz contraction, Mass-velocity relation, 4-dimensional relativistic contraction, Space around the mass carrier is distorted by the motion.

Introduction

The obvious problem in the special theory of relativity is the logical contradiction caused by the principle of relativity and the principle of constant speed of light. The authors of this paper and some colleagues have done a lot of work criticizing the special theory of relativity (mainly criticizing the principle of special relativity).The obvious problem in the special theory of relativity is the logical contradiction caused by the principle of relativity and the principle of constant speed of light. The authors of this paper and some colleagues have done a lot of work criticizing the special theory of relativity (mainly criticizing the principle of special relativity).

There are various factors that can cause the volume contraction of moving objects to deviate from the Lorentz contraction. Unfortunately, people also seem to forget to discuss the role of various contraction factors. The consequences of the clock's high-speed movement (even faster than the speed of light) have been discussed by many [1]. However, in the case of ultra-high speed inertial motion, how the volume of the object and the space around the object change is hardly discussed. Around the world, many people have exposed the difficulties of relativity [2-15]. However, before this article, the critics mainly exposed the logical contradictions in the special theory of relativity (as if caught in this quagmire and unable to extricate themselves). I have also demonstrated that space shrinking due to motion is not relative [16-18] and the necessity of establishing theory of relative-absoluteness [18-19]. I seem to have jumped out of this quagmire and discovered a new pattern by filling in the gaps. Looking back at the shortcomings of special relativity, the effect is particularly good.

Reference [17] mentions a factor that affects the stereoscopic contraction of moving objects, and only involves linear contraction and does not discuss the nonlinear changes in space and time. Here we want to expand to multiple influencing factors and discuss the change of mass due to motion, which leads to the change of space-time around the mass.. In this paper, the mechanism and results of the three-dimensional contraction and four-dimensional spatiotemporal changes of the mass system due to high-speed motion will be introduced in detail. For criticizing the theory of relativity and quantum mechanics, many scholars have suffered from aesthetic fatigue, so they ignored the remarks criticizing the pillar theories [20]. Hopefully the reviewers will be shocked and relieved of fatigue when they see this article.

The establishment and promotion process of the special theory of relativity is as follows. The first is to propose the principle of relativity and the principle of constant speed of light (as the basic premise of the theory). The second is to derive the Lorentz transform. Then there are some conclusions and inferences based on the basic premises and the Lorentz transformation. Next is the application and experimental verification. In the process of applying, explaining and verifying the special theory of relativity with experimental methods, there are many default assumptions and viewpoints. These default assumptions and viewpoints mainly include the following. I believe that many also feel that the more they look, the more they feel that these defaults are unreliable (insufficient basis). But without them, the application of special relativity would be impossible. However, these defaults are not derived from practice, but are subjectively conjectured for the needs of explaining and applying the theory of relativity. Their role until now is to obscure (or hide) the problems of special relativity. While they can obscure (or hide) the problems of special relativity, they have serious problems of their own, just very hidden. This is a problem relay phenomenon and one of the methods of sophistry.

Default view 1. The mathematical coordinates in the Lorentz transformation are the real space-time coordinates. Without this clause, special relativity cannot be applied in practice, and can only stay in a purely theoretical state.

Default view 2. A space for movement can be created artificially. Without this, there would be no experimental method to verify the special theory of relativity.

Default view 3. Space shrinks due to motion, causing the length (or volume) of objects embedded in space to shrink due to motion. The equivalent default is that the contraction of space due to motion is equal to the contraction of the length of the object due to motion. Without this one, there would be no inference that the length of the foot is shortened due to movement, and it can only stay on the "space shrinks due to movement".

Default view 4. The observers in the system do not feel any changes in themselves and the objects around them due to movement. This one is required by "there is no absolute stationary system (that is, the principle of relativity is established)". Without it the principle of relativity does not hold.

Default view 5. Objects in motion have no internal composition and structure. If this is not required, the default view 1, default view 3 and default view 4 will not hold. Because, considering the composition and structure inside the object, the increase in the mass of the particles inside the moving object due to the motion will also cause the object to shrink (and even become a black hole, causing space distortion and breaking the special principle of relativity). In this way, the object should have a double contraction in the direction of motion.

Default view 6. Special relativity doesn't talk about the physical mechanism of relativistic contraction (it's an action, not an opinion). In the framework of special relativity, space shrinks due to motion, and there is no complete physical mechanism for objects shrinking due to motion. "Space shrinkage causes objects embedded in space to shrink" is just a small fragment of the physical mechanism of the shrinkage of objects due to motion, not the complete physical mechanism of the shrinkage of objects due to motion, and it does not necessarily conform to the facts.

Most scholars who criticize the special theory of relativity are criticizing the principle of relativity and the principle of the constant speed of light, but rarely criticize these default assumptions and viewpoints. The task of criticizing the default view of special relativity is done by this article.

2. The physical mechanism by which the volume of a non-rigid body shrinks in all directions due to motion

The relativistic mass-velocity relationship is

$$m = \gamma m_0 \,. \tag{1}$$

Here, $\gamma = 1\Big/\sqrt{1-(\upsilon/c)^2}$. There are various derivation methods for Eq. (1), which are not exclusively derived from the theory of relativity [18-21]. Special relativity ignores the internal composition and structure of moving objects and treats it as a quasi-rigid body, and admits that objects traveling very close to the speed of light will shrink into very thin panels. The reason for this change is also believed to be the "contraction of space due to motion" causing the objects embedded in it to contract. However, from Eq. (1) and general relativity, it is easy to see that when an object moves very close to the speed of light, it can become a spherical black hole, and the space around the object is also will bend badly (we will calculate this speed limit in Section 2.3, and the speed greater than this value but less than the speed of light is called super high speed). This means that the space around the mass carrier is bent by the movement of the mass carrier. When the space is curved, the volume of the moving object shrinks, not only in the direction of motion, but also in other directions, and the multiple of shrinkage is not always $\sqrt{1-(\upsilon/c)^2}$ times (the volume of a moving object shrinks, but the space just bends instead of shrinking). This conclusion, which takes into account the mass-velocity relationship of special relativity and the general theory of relativity, is in serious conflict with the special theory of relativity that "space contracts in a single stretching direction due to motion". Previously, the way to avoid this contradiction was to ignore the internal composition and structure of moving objects (obviously ignoring the mass-velocity relationship too), or to ignore general relativity effects of particles inside moving objects (i.e., ignoring gravitational interactions inside moving objects). However, for the discussion of changes in moving objects, there is an overlap between the scope of application of general relativity and that of special relativity. In addition, the set condition is that the mass carrier has ultra high speed motion within the framework of special relativity. In this overlapping area of application, the relativistic effect of 3D velocity still exists even if the concept of 4D velocities is used.

As mentioned above, for the volume of the object describing the motion to shrink due to the motion, the conclusion of the special theory of relativity contradicts the effect of the general theory of relativity obtained using **Eq. (1)**. This contradiction cannot be completely resolved by dividing the speed range and taking an approximation. The Lorentz transformation is widely used by special relativity. Its popular form is as follows:

$$dx = \frac{dx' + \upsilon dt'}{\sqrt{1-\upsilon^2/c^2}},\ dy = dy',\ dz = dz',\ t = \frac{dt' + \frac{\upsilon}{c^2}dx'}{\sqrt{1-\upsilon^2/c^2}} \,. \tag{2}$$

According to it, the expression for the contraction of the ruler moving in the X-axis direction due to the movement is as follows:

$$\left.\begin{aligned} dx' &= dx\sqrt{1-(\upsilon/c)^2} \\ dy' &= dy \\ dz' &= dz \end{aligned}\right\} . \tag{3}$$

The moving ruler does not contract in the Y-axis and Z-axis directions perpendicular to the velocity [1]. For convenience, we call the contraction expressed by **Eq. (3)** "derived from the Lorentz transformation" as the Lorentz contraction (or one-dimensional relativistic contraction or Lorentz length-contraction). If a box is moving, Lorentz contraction means that one side of the box is shortened. Let dxdydz=dV0, dx′dy′dz′=dV, the Lorentz volume-shrinkage formula obtained from Eq. (3) is: $dV = dV_0\sqrt{1-(\upsilon/c)^2} = \gamma^{-1}dV_0$. Under certain circumstances, the definite integral of this formula can be obtained (the integral range is from the origin to the finite value), turn out:

$$V = V_0\sqrt{1-(\upsilon/c)^2} = \gamma^{-1}V_0 . \tag{4}$$

Equation (3) or **Eq. (4)** is obviously a 1D contraction-formula of space. They are completely a mathematical result, and the expressed contraction has no specific physical mechanism (movement is only the theoretical cause of contraction rather than a specific physical mechanism). Einstein seems to have no subjective desire to discuss this physical mechanism (the characteristics of the theory also determine that he cannot discuss it). On the premise of not exploring the physical mechanism of space contraction, the special theory of relativity simply treats moving objects as non-deformable rigid bodies without internal composition and structure. Only in this way can the contraction of the moving object in the direction of movement be attributed to the contraction of space due to the movement (that is, the difference between the three-dimensional contraction of object volume and the one-dimensional contraction of space is erased). However, the relativistic effect of particles inside an object has a clear physical mechanism. Can it be ignored? After reading the discussion about the influencing factors of the volume of moving objects below, we can judge correctly.

2.1. Conservation of orbital angular momentum

The arguments here leave traces of the old quantum theory. The Bohr model of the hydrogen atom in the old quantum theory is partially compatible with modern quantum mechanics. In addition, using Bohr's planetary model makes it easier to understand the physical mechanism of how objects contract due to motion. The key is that the old quantum theory is a better excess theory. As a transition, Bohr model can be used.

When the ground state hydrogen atom moves, the mass m of 1s electron increases according to the law of **Eq. (1)**. The orbital angular momentum of Bohr hydrogen atom is expressed as

$$\vec{L} = m \times \vec{u} \times \vec{r} \cdot \tag{5}$$

For the ground state hydrogen atom, according to the planetary model, we have

$$\frac{Ze^2}{4\pi\varepsilon_0 r^2} = \frac{u^2}{r} m . \tag{6}$$

Here， Z is the effective nuclear charge, and u is the electron orbital velocity. Substituting the scalar form of **Eq. (5)** with $mur=\hbar$ into **Eq. (6)**, we can obtain

$$u=Z\alpha c. \tag{7}$$

Here, α is the fine structure constant, and its value is about 1/137. **Equation (7)** and its derivation process show that when the mass of the electron is changed by the overall motion of the hydrogen atom, the speed of the planetary motion of the electron remains unchanged. As long as the orbital angular momentum of the 1s electron is conserved, when the electron mass m increases, the orbit radius r becomes smaller. Comparing three **Eqs (1)** and (7) and mur=ħ, we have **Eq. (8)**.

$$r = \frac{\hbar}{mu} = \frac{\hbar\sqrt{1-(\upsilon/c)^2}}{m_0\upsilon} . \tag{8}$$

Here， υ — the velocity of the hydrogen atom, L — the orbital angular momentum of the hydrogen atom and m0 — the mass of the electrons in the static hydrogen atom, m — the electron mass with an overall motion on the basis of the electron dynamic mass in the hydrogen atom. Different states of electron mass can be distinguished by adding subscripts: me is the mass of the stationary electron, m0 is the mass of the electron in the stationary hydrogen atom, and m is the mass of the electron in the moving hydrogen atom. If you seek more accuracy, you can use the reduced mass of electrons.

Using the solution of the Schrödinger equation, the more reliable conclusion that "the radius of the moving hydrogen atom decreases" can be obtained. In quantum mechanics, the size of an atom is a constant of its radius. As the atomic radius shrinks, the atomic volume shrinks in three dimensions.

2.2. The mass-velocity relationship and the solution of the Schrödinger equation together determine that the radius of the hydrogen atom decreases as the electron mass increases

Solving the Schrodinger equation of hydrogen atom can get the Bohr radius expression of hydrogen atom.

$$r_{Bohr} = \frac{\varepsilon_0 h^2}{\pi m e^2}. \tag{9}$$

Comparing **Eqs (1) and (9)**, we can obtain

$$r_{Bohr} = \frac{\varepsilon_0 h^2}{\pi \gamma m_0 e^2} = \frac{\hbar \alpha}{\gamma m_0 c}. \tag{10}$$

It can be seen from Eq. (10) that when the hydrogen atom moves, the electron mass increases, the Bohr radius decreases, and the hydrogen atom shrinks in all directions. For the covalent molecule H2, the bond length of the chemical bond is also proportional to the Bohr radius or the size of the hydrogen atom. In this way, a hydrogen ruler composed of hydrogen molecules will also shrink in all directions due to motion. The expression for the relativistic contraction of the volumes of hydrogen atoms and molecules is as follows:

$$\left.\begin{aligned} r_x &= (r_x)_0\sqrt{1-(\upsilon/c)^2} \\ r_y &= (r_y)_0\sqrt{1-(\upsilon/c)^2} \\ r_z &= (r_z)_0\sqrt{1-(\upsilon/c)^2} \end{aligned}\right\}. \tag{11}$$

Here, ri is the radii in the three mutually perpendicular directions of the moving hydrogen atom, and (ri) 0 is the radii in the three mutually perpendicular directions of the stationary hydrogen atom. The volume of hydrogen atom V=(4/3)πr3. Therefore, we have

$$V = V_0\left[1-(\upsilon/c)^2\right]^{\frac{3}{2}}. \tag{12}$$

Here, V0 is the volume of stationary hydrogen atoms or hydrogen molecules, and V is the volume of moving hydrogen atoms or hydrogen molecules. **Equation (12)** shows that the shrinkage of the volume of an object due to motion is not limited by the direction of motion. In the process of deriving **Eq. (12)**, the mass-velocity relation of special relativity and quantum mechanics effect are used but the gravitational effect is ignored. Under the condition that the speed is not particularly high, the general relativity effect is too weak to be ignored compared with the quantum mechanical effect. The Schrodinger equation utilized is a linear equation. Therefore, the shrinkage discussed in **Sections 2.1 and 2.2** is still a linear shrinkage of volume. **Equations (11) and (12)** express the three-dimensional shrinkage of the atomic volume. They are quantitative relationships between volume and velocity that are applicable within a certain range. Previously there was only a one-dimensional Lorentz contraction expression, generally called the length-velocity relationship. Previously only knowledge of Lorentz one-dimensional contractions (commonly called the length-velocity relationship) was known.

Some scholars think that **Eq. (12)** has already existed in textbooks without looking carefully. If you look carefully, it is not difficult to find that **Eq. (12)** is another representation of **Eq. (11)**, and **Eq. (11)** is not in the textbook. The formula in the textbook does not have the exponent 3 in **Eq. (12)**. Qualitatively, **Eq. (12)** describes the three-dimensional contraction law of the volume of moving objects. In textbooks, the one-dimensional Lorentz contraction formula first describes the law of pure space contraction, and then the one-dimensional Lorentz contraction can be compared with the subjective assumption that "objects are embedded in space, and space contraction causes objects to shrink synchronously" The volume of an object changes with movement. In conclusion, **Eqs (11)** and **(12)** are in competition with the one-dimensional Lorentz contraction formula (as the title of this article states, only one of the two descriptions is closer to the truth. The two should be identical in form, but fundamentally different in essence).

Equations (11) and **(12)** are only applicable to spaces filled with matter. For the coordinate frame (or pure space) without matter, there is no motion effect, which cannot be described by **Eqs (11)** and **(12)**, nor does it have the motion effect of time. The movement of the material system also has the effect of time movement. In this way, the motion of the matter system will be a four-dimensional space-time contraction (see Supplementary Material A for details).

For the covalent molecule H_2, the bond length of the chemical bond is also proportional to the Bohr radius or the size of the hydrogen atom. In this way, the hydrogen ruler composed of one hydrogen molecule will also shrink according to the law of **Eq. (12)** due to the movement (the speed of the Hydrogen ruler limited to close to the speed of light and not very close to the speed of light).

2.3. General relativity effects due to inertial motion

It has been experimentally confirmed that the inertial mass of moving particles increases due to motion. Considering that the inertial mass is equal to the gravitational mass, we can be sure that the gravitational force of the moving particle will also increase due to the motion (space around particles can be distorted by motion). As the speed of the object increases, the mass of the particles inside it increases. The first effect that should not be ignored is that the gravitational force between particles in the object increases and the distance decreases (if the speed is lower than this, the interparticle attraction in the atom can be ignored). When the velocity increases again, the distortion of space-time caused by mass becomes more obvious, and even the atom and the object can collapse.

We discuss the quantitative bounds of these two effects using the example of a moving hydrogen atom. The velocity of the hydrogen atom required for the gravitational force between the nucleus and the electrons outside the nucleus to reach 1/100 the electromagnetic force can be calculated. The electrons in it have two levels of motion (except spin motion): Orbital motion of electrons (speed recorded as u); electrons move with the motion of hydrogen atoms (speed recorded as υ). Since $u=Z\alpha c$, the difference between $m_e\big/\sqrt{1-(u/c)^2}$ and me is only 0.3/10000, and the relativistic effect of electron motion at this level can be ignored. According to this condition, we have

$$\frac{e^2}{4\pi\varepsilon_0 r^2}=\frac{10GM_p m}{r^2}\,,\quad \frac{e^2}{4\pi\varepsilon_0}\approx\frac{100Gm_p m_e}{1-(\upsilon/c)^2}\,. \tag{13}$$

Here, G is the gravitational constant, mp is the stationary mass of the proton, $M_p=\gamma m_p$ is the mass of the proton in the moving hydrogen atom, m is the mass of the electron in the moving hydrogen atom, me is the mass of the stationary electron, and υ is the movement speed of the hydrogen atom. Substitute the corresponding constant into Eq. (13), we can obtain

$$\upsilon\big/c=\sqrt{1-0.66\times10^{-30}}\,. \tag{14}$$

This value is 0.999... 9 (there are 30 consecutive “9”). Speeds that reach or exceed this value can be called hyperspeed. When the speed of the hydrogen atom reaches this value, the gravitational force between the nucleus and the electron can obviously affect the size of the hydrogen atom, which should not be ignored (the change of the space-time curvature outside the nucleus should not be ignored). "The size of the hydrogen atom shrinks due to motion" caused by this relativistic effect will obviously deviate from **Eq. (12)**. The velocity expressed by **Eq. (14)** is the lower limit of the velocity of the gravitational force between particles inside the object that should not be ignored, and also the lower limit of the velocity that the space-time distortion effect should not be ignored.

Schwarzschild radius is rg = $2Gm/c^2$. It shows that the mass increases, the event horizon of the black hole increases, and the possibility of a finite mass object becoming a black hole increases. As the mass of each atom continues to increase, the moving object will be compressed to a small volume by gravity. As the horizon determined by the mass of matter within this small volume continues to grow, so that an occupied space containing the entire object can be reached. At this point, the object becomes a standard black hole (Objects collapsed and deformed before reaching the density of a neutron star, and living things died long ago).

The same is true for the conclusion of the quantitative analysis below. By substituting the relativistic mass velocity relationship into the Schwarzschild radius expression, we can obtain

$$r_g=\frac{2Gm}{c^2\sqrt{1-\upsilon^2/c^2}}\,. \tag{15}$$

The speed required for a hydrogen atom to become a black hole with an event horizon radius of the same order of magnitude as the Compton wavelength of a neutron or proton is υ.

$$\frac{\upsilon}{c}=\sqrt{1-0.25\times10^{-76}}\,. \tag{16}$$

This ratio is 0.999... 9 (there are 76 consecutive “9”), *i.e.*, the υ is very close to the speed of light. It is the lower limit of the velocity at which hydrogen atoms collapse due to motion. The situation is similar for other objects moving at high speed. Special relativity just doesn't allow objects to travel up to the speed of light. Therefore, the above very close to the speed of light is still within the allowable range of special relativity. It can be seen that moving rulers or rods or objects cannot be regarded as rigid bodies and ignore the relativistic effects of particles inside them. When the speed of motion of an object is very high, the contraction of its volume due to motion cannot be explained by the contraction of space due to motion.

The mass of one kilogram of matter increases due to motion to reach an event horizon radius of 0.1mm, and the required speed is $\upsilon/c = \sqrt{1-0.55\times10^{-46}}$. This ratio is about $0.999\cdots9$ (there are 46 consecutive "9"). This velocity value is the lower limit on the velocity at which the object collapses due to motion.

In this section, within the framework of the special theory of relativity, as the speed of the object increases, the gravitational interaction (the effect of general relativity) inside the object cannot be ignored. The gravitational effect mentioned here mainly refers to the collapse of the object caused by the ultra-high-speed motion of the object into a neutron star or a black hole, and the curvature of the space around the object. Gravitational contractions caused by objects moving at low speeds can generally be ignored. **Equation (12)** is the standard expression of the relativistic effect of a moving non-rigid body. **Equation (14)** shows that when the speed of hydrogen atom is less than that indicated by **Eq. (14)** (the gravitational force between particles inside the object is much smaller than the electromagnetic force), **Equation (12)** is applicable to atoms, molecules and dense metal substances. "The volume of other substances shrinks due to movement" will deviate from **Eq. (12)**. Although the discussion in this section does not give an expression for the shrinkage of an object due to the non-negligible gravitational force between particles inside, it has been clearly pointed out that such shrinkage exists through quantitative and qualitative analysis. It belongs to the general relativity effect induced by the inertial motion. The reason is that the relativistic effect that has the participation of gravity or the consequence of space-time distortion is the general relativistic effect, and it is a nonlinear relativistic effect. Although the initial inducements of the linear relativistic effects and nonlinear relativistic effects discussed in Section 2 are inertial motions, these two contractions are independent of each other, and they have no logical relationship with the Lorentz contraction. From a qualitative point of view, the closer the speed of an object is to the speed of light, the greater the curvature of the space around the particles inside the object, and the object can even shrink to the extreme—turning into a neutron star structure or collapsing into a black hole.

Although both the special theory of relativity and the general theory of relativity use the changes of space-time to describe the effect of force, for describing specific high-speed moving objects with internal composition and structure, the effect produced by the physical mechanism of general relativity and the effect produced by the mechanism of special relativity are contradictory of: The mathematical conclusion that there is no specific mechanism in the special theory of relativity is that the moving ruler (or space) shrinks only in the direction of motion (1D contraction of space or volume. The space before and after shrinking is linear), and the object will not collapse due to motion; the effect of the mechanism of general relativity is that the inner and outer space of the moving ruler is curved (The contraction of the corresponding object due to motion is also inconsistent with the conclusion of special relativity — it is a three-dimensional contraction of space, and can collapse due to hypervelocity motion. At the same time, the linear space becomes a nonlinear space due to high-speed motion). The contraction mechanism revealed in this section shows that, for the consequences of the mass carrier motion, the speed ranges of "the special relativity 'mechanism' taking effect and the general relativity mechanism taking effect" are completely coincident. Taking approximations can stretch its applicability a bit, but not completely. For example, for hydrogen atoms and solid hydrogen to contract due to motion, the velocity interval where the special relativity effect and the general relativity effect are applicable together is $\left(0.\overbrace{999\cdots9}^{n=30}, c\right)$ (The reason is that, as far as the speed condition is concerned, as long as the speed is not greater than or equal to the speed of light, the theory of relativity applies). Can two types of relativistic effects acting on the same object be superimposed linearly? The gravitational contraction effect, the Lorentz contraction effect and the pure mass contraction effect cannot be superimposed linearly. In this common applicable range, there is a speed interval in which neither the general relativity effect nor the special relativity effect can be ignored. Another contradiction between special relativity and general relativity is that for an accelerating system, within the framework of general relativity there is one system, while within the framework of special relativity there are multiple systems. No matter how much approximation is taken, this contradiction cannot be eliminated.

From the description in this section, it can be seen that within the framework of relativity, considering the motion of real non-rigid bodies, the following conclusions can be drawn. Observer A can observe: when the observer B is accelerated to a state of ultra-high-speed motion, B can become a black hole, and this process cannot be reversible (decelerates to a static state and cannot be restored to the original state), and the change in this process is absolute (not relative). That is, in this case of super-high-speed relative motion, at most one of A and B becomes a real black hole. The other is at best an apparent black hole (i.e. a non-real black hole). This shows that the relativistic effect caused by the motion can only be superficial (we can only choose one between the reality of the relativistic effect and the special principle of relativity). It can be seen that the special principle of relativity is threatened ("when observing each other, the two sides being observed will undergo relativistic changes at the same time" is not true).

2.4. Influence of van der Waals forces

In the case of a ruler made of solid hydrogen, it contracts due to motion, involving changes in the distances between molecules. The van der Waals force between molecules is still an electromagnetic force in nature, and the bonding electrons are also bound electrons. The mass of the bound valence electrons changes while the charge of the electrons and nuclei remains the same, and the distance between the molecules will be shortened.

2.5. Reduced vibrational frequency of ions in ionic compounds

For ionic compounds, the mass of the ions at each lattice point within the crystal increases due to motion. In this way, the vibration frequency of the ion is reduced (the reason is that the vibration of the ion is a reciprocating motion, and the state of motion needs to be changed continuously, and the increase in mass makes it more difficult to change the state of motion), and the volume of the ion and the volume of the crystal will decrease accordingly. The volume of the crystal shrinks in all directions. Molecular thermal activity in liquid and gaseous substances also decreases as the molecular mass increases.

2.6. The entropy of an adiabatic system is reduced by motion

For a closed system, if its volume decreases, its entropy will inevitably increase. On the contrary, its entropy decreases and its volume must decrease. For adiabatic non-solid matter, the mass of its components increases, the mass of particles increases, the thermal motion activity decreases, the degree of disorder of the system decreases, the entropy decreases, and the volume decreases. In short, when the mass of the molecules in the gas or liquid increases due to motion, the thermal motion of the molecules decreases, their entropy decreases, the distance between molecules decreases, and the volume decreases.

Sections 2.5 and 2.6 describe the thermodynamic mechanism of the contraction of matter due to motion. The shrinkage it causes is also three-dimensional volume shrinkage.

To sum up, for objects composed of a large number of molecules or ions to contract due to motion, even though quantitatively there is a difference from **Eq. (12)**, qualitatively they all contract in all directions due to motion. The thermodynamic mechanism in the above contraction mechanism is obviously also a physical mechanism for the lifespan extension of the moving organisms. That is, the physical mechanism by which a moving mechanical clock slows down. These factors (physical mechanisms) act simultaneously on a moving object. It's just that for objects of different natures, different factors play different roles.

3. Problems in the view defaulted by special relativity

Questions about the tacit argument of special relativity are both hard to spot and hard to understand. Therefore, this paper discusses this aspect in a variety of ways. In the previous section, we have already started to discuss the default view problems of special relativity, and highlighted their connection with the quantitative analysis results of Section 3. In this section, we will analyze them one by one against the default views of special relativity introduced in the introduction. The multiple defaults of special relativity are closely related. In the next section we focus on the interconnectedness of these default issues.

The mathematical coordinates (*x*, *y*, *z*, *t* in the Lorentz transformation is the real space-time coordinates (**Anti "Default View 1"**). This tacit opinion was certainly subjective when it was made. After the special theory of relativity was popularized, people looked for evidence in practice or with experimental methods. In the practice of electrodynamics, the default view is that it can indeed solve many practical problems. However, the application of a point of view to one discipline is not a substitute for application to all disciplines. There are local coincidences everywhere. It is possible that the reason for this is that electrodynamic effects happen to be related only to relative motion. The fact that the Lorentz transformation can be used in electrodynamics also does not rule out that "the coordinates in the Lorentz transformation are formal space or apparent (subjective) space [22] ". Section 2.2 introduced that the moving object can shrink due to the mass of the internal particles changing due to the movement. This contraction is independent of the "contraction of space due to motion" caused by the Lorentz transformation. The theory of relativity also admits that "this mathematical contraction of space and time can cause objects embedded in space to be held hostage to shrink synchronously" is true (and has nothing to do with the internal composition and structure of moving objects, and is independent of the shrinkage of the internal composition and structure of objects. mechanism). In this way, a double contraction of the moving object occurs. Since the space coordinate axis in the Lorentz transformation can be extended infinitely, maintaining the default view 1 also needs to admit that "the space in the motion system is infinite, and the space of the system associated with the inertial motion is also infinite". There can be multiple inertial motion objects in the cosmic space (an observer can also observe multiple motion systems at the same time), so there are multiple infinite system spaces, and these infinite spaces are interspersed with each other (in this kind of space) premise). The space that can do interspersed movement without any interaction can only be a static and apparent (subjective) space (it is the space in the subjective consciousness of people, not the real space).

A space for movement can be created artificially (**Anti "Default View 2"**). A typical example provided by relativity scholars for "Default View 2" is that the space inside the carriage of a train moving in a uniform straight line is an artificial motion space. However, this artificial space is more like an apparent (subjective) space. The reason is that one cannot accelerate a piece of vacuum anyway. A space with nothing can not receive the action of any force, nor can it impart the action of force to any matter. Even a space full of virtual particle pairs or fields cannot be accelerated by the container walls (as long as the fields are not emitted by the container walls). Accelerating an object can only cause the object to move (traverse) in space, rather than creating a moving space by the way. In this way, the motion state of the empty space can only be determined by people in their consciousness. As long as there is no God's first push, the void cannot be accelerated by the force of nature, which determines that the void space can only be absolutely static. There is further evidence to support this argument.

"The contraction of space due to motion determines that the length (or volume) of objects embedded in space is shortened due to motion", that is, it lack of evidence that space contraction can hold (entrain) objects in space to shrink synchronously ("Default View 3" lacks evidence). Space cannot be accelerated by force, and without the first push of God, there can be no movement in space. If there is no movement in space, it cannot be said that the space shrinks due to movement. When the vehicle accelerates, the passengers in the car do not accelerate synchronously with the car (If the passenger is in a frictionless wheelchair, the passenger cannot be accelerated by the accelerating carriage at all). This irrefutable fact shows that space cannot hold the objects in it to accelerate and move together. The mechanical performance of objects in the carriage that is always moving in a straight line at a uniform speed has covariance. The phenomenon can be explained by the principle of relativity or by the object conforming to the law of inertia. Choosing the latter interpretation allows the existence of an absolutely stationary system. What's more, Galileo's principle of relativity is approximately established in the low-speed motion system, and the existence of the absolute stationary system is not ruled out (*i.e.*, in the case of low velocity, the approximate covariance of the laws of mechanics cannot rule out the existence of an absolutely stationary system). It can be seen that the space in the car that can be accelerated together with the car and can move together with the car can only be the apparent (subjective) space at most.

The content of the **default view 4** is: the observer inside the motion system cannot feel any changes in the cause of motion of himself and the objects and space around him; when the relative velocity drops to zero, the phenomenon observed by the relatively static observer must be Return to the state when the observed is relatively stationary (*i.e.*, the process of space-time change due to motion is reversible). Any method that can prove that the special principle of relativity does not hold can prove that the default is not true. The conclusion obtained through quantitative analysis in **Section 2.3** is that a very small object can become a black hole as long as its speed is very close to the speed of light. Once an ordinary object becomes a black hole, it will be shredded (especially a living thing, once it moves so fast that it tends to become a black hole, it will be shredded after death). Two observations, A and B, are moving at super high speed. After A observes that B becomes a black hole and is torn apart, "B still feels that he is still alive." It is difficult to understand and imagine. That is, once A observes that B has been torn apart and completely dead, it is impossible for B to return to a normal, alive state by slowing down greatly. Unless the relativistic mass-velocity relationship is apparent (subjective), otherwise, as long as the movement causes the mass of the object to increase and eventually the moving object becomes a black hole, the black hole is still a black hole after it is at rest, and it is impossible to restore its original non-black hole state only by changing the relative speed. Default view 4 has another contradiction. In the above example, after A observes that B becomes a black hole, B should become a small sphere (the reason is (12) and the mass-velocity relationship of relativistic theory).

Real objects have real internal composition and structure. "Default view 5" to ignore the internal composition and structure of moving objects and discuss the theory of relativity would be out of touch with reality. Since relativity is an exact description, it cannot be approximated. Within the framework of the theory of relativity, no matter how hard an object is, it cannot be approximated as a rigid body considering its internal composition and structure. Since it is not true, it is not a suitable occasion for approximation, or it is an incorrect view, theory and behavior.

The special theory of relativity does not talk about the physical mechanism of relativistic contraction, and regards the moving object as a rigid body, while the moving clock does not regard it as a rigid body. This is the default view of special relativity6 (and a theoretical act). Only the apparent (subjective) contraction of empty space-time due to system motion does not require a physical mechanism of contraction. However, the internal particles of real objects change due to motion. However, the internal particles of real objects will undergo real changes due to motion (especially changes determined by the relativistic mass-velocity relationship). This change has a real physical mechanism. Therefore, a theory that does not give a specific physical mechanism for the contraction of an object due to motion (or does not admit that the process has a real physical mechanism) is a theory out of reality. Special relativity ignores the internal composition and structure of an object when it discusses the contraction of an object due to motion. In this way, we cannot discuss and apply the relativistic effect of slowing down the clock of motion. Should a moving clock body be regarded as a quasi-rigid body or should it be regarded as a real object with internal composition and structure?

Default view 6. Special relativity doesn't talk about the physical mechanism of relativistic contraction (it's an action, not an opinion). In the framework of special relativity, space shrinks due to motion, and there is no complete physical mechanism for objects shrinking due to motion. "Space shrinkage causes objects embedded in space to shrink" is just a small fragment of the physical mechanism of the shrinkage of objects due to motion, not the complete physical mechanism of the shrinkage of objects due to motion, and it does not necessarily conform to the facts.

4. The Subjective assumption of special relativity

Implicit assumptions are default premises or arguments. Assumptions without sufficient justification and evidence are subjective assumptions.

Scholars who defend the theory of relativity might say that special relativity does not hold that moving objects are rigid bodies. What I want to say, however, is that Special Theory of Relativity does not take into account composition and structure in moving bodies (*i.e.*, does not take into account the changes in the particles themselves and the interactions between particles that make up the moving bodies as a result of motion) is true. This is to treat moving objects as rigid bodies (Or think of a moving object as a deformable rigid body-like monster with no internal composition and structure. The reason is that a rigid body is be not only non-deformable without internal composition and structure, while a moving object can be deformed, In the following description, we do not distinguish between rigid body freaks and rigid bodies, it is convenient to call them **subjective assumptions 1**). Disregarding the internal composition and knots of an object is detached from practice when approximation is not appropriate. As we all know, a real clock that can work normally is not a rigid body, and a rigid body clock cannot work. Einstein claimed that he placed a working clock at every spatial point of the system. Within the framework of the special theory of relativity, the clock placed by Einstein can only be the clock in the mind or the clock in appearance (not a rigid body clock). Special relativity treats objects as rigid bodies when considering scaling effects, but does not treat clocks as rigid bodies when considering clock slowness effects (The composition and structure of the clock have to be considered. Otherwise, the rigid body clock cannot run and cannot talk about the time recorded by the rigid body clock). In such a contradictory situation, when observing a clock that is moving at a very high speed (it can be an atomic clock, a pendulum clock, or a real clock in the form of various clocks), there is no way to know what to do: Only believe and use the scaling effect under the Lorentz transformation, the clock must be regarded as a rigid body, and such a clock cannot work. The time indicated by the real clock is inconsistent; if the interaction between particles in the clock is considered, the volume change of the clock is equations (11) and (12) independent of the spatial variation, not the Lorentz contraction.

Observers in the motion system cannot feel the changes in themselves and the objects around them due to relative motion. This is a judgment often used by defenders of special relativity. This is also a subjective assumption (recorded as **subjective assumption 2**), and there is no solid basis. If A observes B moving at a very high speed, A can observe that B becomes a black hole (this is the conclusion based on the mass-velocity relationship of special relativity) and the body is torn apart. It is impossible for B's body to be shredded and not shredded. If B does not feel that he is being torn apart, then what A observes can only be apparent. If the relative property enhancement effect is apparent, then one would not be able to observe the result of electrons getting larger due to their motion. It is also difficult for us to guarantee that other relativistic effects are objective. But the fact is that we can observe that the mass of the moving electrons becomes larger, and the moving clock has an accumulating slowdown.

According to the changes of space-time due to motion derived from Lorentz transformation, the first is the change of mathematical coordinate values due to motion. However, experiments on special relativity have only shown that the length of real objects is shortened by motion and that real clocks are slowed down by motion. To turn these experiments into experiments that confirm relativistic inferences based on the Lorentz transformation, one needs to know the following two quantitative relationships: The precise relationship (transformation coefficient) between the change of space coordinates due to motion and the change of real object volume in Lorentz transformation due to motion; The precise relationship (transformation coefficient) between the change of time coordinate in Lorentz coordinate transformation due to the movement of coordinate system and the change of real clock due to movement. The transformation coefficient mentioned here is unknown. The method adopted by the special theory of relativity is that the mathematical space-time in the Lorentz transformation must be the real space-time. A slightly more specific approach is to assume that objects are embedded in space, and the changes in space due to motion cause the volume of objects to change synchronously due to motion. This assumption has no solid basis and is completely conjectured (recorded as **subjective assumption 3**). In fact, there is no practical process to prove that "accelerating objects in space by accelerating space". On the contrary, people's desire to accelerate space has always been realized by accelerating objects (The broadest example is that the desire to accelerate space in the car is all accomplished by accelerating the car, not the other way around). As long as space cannot be accelerated, space cannot move without the first push of God (Without God, space can only be absolutely still at all times. This issue has been discussed several times in this article). As long as space cannot move, it is not a fact that space changes due to movement, and the **subjective assumption 3** does not hold. If the subjective assumption 3 is just in line with the facts, then, the contraction of the object does not require the action of the force of the force, and the internal potential energy is also unchanged. However, when a rapidly moving body falls into a pit of the same size as the body and suddenly stops moving, the body should expand. Please answer whether this expansion can break through the pit? According to the inevitable contraction of the moving object, it is certain that the moving object will expand when it stops moving (There is no reason why the process of taking over due to movement is irreversible). For example, a regular hexahedron becomes a cuboid due to shrinking in the direction of motion, and when such a cuboid stops moving, it must return to a regular hexahedron. Since a moving object stops moving and expands and there is a force, why can't an object contract force because of its motion?

Assumption 2 and Assumption 3 are the consequence of replacing physics with mathematics (over-mathematicalization of physics).If the problems of **subjective assumptions 3** are ignored, the theory of special antithesis cannot be called a rigorous science.

The space that the special theory of relativity says moves with the frame of reference is a mathematical form space [22] (apparent space), a space without any matter; it can be filled with matter but not necessarily filled with matter. Taking such a pure space (*i.e.* the emptiness) as the system, the clock in it does not exist (the clock is also made of matter, and if there is no matter, there is no clock). A clock in a space without matter is a clock installed by scholars with consciousness, and it is not a real clock. When applying the special theory of relativity to practice, the special theory of relativity has no basis to believe that the objects in practice are rigid bodies (that is, the composition and internal structure of the objects are not considered). Both the emptiness and rigid body (or the rigid body freaks mentioned above) are very different from real matter (object). In the framework of the special theory of relativity in pursuit of precise description, approximation is contrary to the purpose of special relativity and should not be used. The special theory of relativity, which is a theory of space-time, holds that space changes due to motion, which causes objects embedded in space to shorten. This is the argument that space shrinking causes objects embedded in space to shrink (a causal order under the framework of relativity). For objects contracting due to motion, the causal order obtained in this paper is the opposite — the contraction of objects due to motion causes the space filled with matter to contract (The particle itself and the interaction between the particles in the moving object change due to the movement, which causes the volume of the object to change). Although the effects of these two descriptions in opposite causal orders are similar, the effects of these two types of effects are independent of each other. In theory, they could work at the same time. However, only one of them can match the truth (only one is correct. Otherwise the moving body has a double contraction in the direction of motion). Experiments to verify the special theory of relativity can only be done with matter (experimental instruments are all real matter), and cannot be done with space-time that has nothing. In this way, experimental results can only give priority to theories that take into account real composition and structure (ie, the second causal order). What's more, in the existing experimental phenomena, it is generally possible to find knowledge points that are inconsistent with the special theory of relativity [3]. From a philosophical point of view, the motion of a system without matter has no meaning [22]. In addition, there is no clear physical mechanism for relativistic effects within the relativistic framework. This is also a manifestation of the fact that special relativity is not intimate.

Perhaps many scholars do not admit that the special theory of relativity always treats moving objects as rigid bodies, and at the same time, they all admit the co-variation relationship between space and object volume, such as "the shrinking of space due to motion causes objects embedded in space to shrink" (**subjective assumption 3**). Scholars who defend the theory of relativity insist that speeding up a small piece of body can speed up an infinite space (or by accelerating a small object can create an infinite void associated with that object) . But both practical and experimental facts show that this is not the case. A specific example is that by accelerating a car, the passengers in the car cannot be accelerated synchronously, and it is difficult to say that the space in the car can be accelerated synchronously. If the passenger's body is embedded in the space in the car, and the space contraction will lead to the contraction of the passenger's body without difference (as long as there is difference, the Lorentz transformation can not accurately describe the contraction of the real object due to motion), then when the car accelerates, the passenger's body will accelerate without difference. Yes, can the train really speed up in the compartment? The answer is No. Because the passengers in the large carriage can feel that when the train accelerates, the body will accelerate in the opposite direction (the acceleration of the passenger's body is not synchronized with that of the carriage). This shows that the objects in the carriage are not embedded in the space in the carriage (space and objects are independent of each other, and moving objects only pass through space, not move together with space). Or that we can't let the pure space with nothing accelerate. Either of these two cases shows that the conclusion that space shrinks due to motion is incorrect, and it is not strictly experimental to verify that the motion of space is synchronized with the motion of objects(Since space cannot be accelerated, how can one design an experiment that can verify "space shrinks due to motion"? People's intuitive experience has always been that "objects move in space and travel through space"). The special theory of relativity assumes that the motion of an object holds the space around it to move with it. It also defaults that the volume of the object shrinks synchronously due to the contraction of the space due to movement (**subjective assumption 3**). The latter is a superficial relativistic shrinkage mechanism that affects the volume of an object. In generalized relativity, it is recognized that objects (substances) affect space rather than space affecting objects (substances). No one can answer the following question: Why is the special theory of relativity inconsistent with the general theory of relativity in terms of who affects the deformation order of space and objects? Since the acceleration of the space in the car (if there is any) cannot hold the passengers in the car to accelerate synchronously with it, how can the contraction of the inner space in the car cause the passengers in the car to shrink in synchronization with it? The results of mechanical experiments in a carriage moving in a straight line at a uniform speed can be explained either by "the carriage and the space in the carriage move together" or "objects obey the law of inertia". Are we justified in denying the latter explanation?

If it is denied that special relativity admits that objects are embedded in space, and the shrinking of space causes objects to shrink together, it must be admitted that special relativity confuses space and volume. Otherwise, it would not be admitted that verifying the contraction of real objects by motion is equivalent to verifying the contraction of space by motion. That is, it will not admit that "it is not the Lorentz transformation that is verified by the instrument (real object), but **Eqs. (11) and (12)** are verified". It is believed that the space contraction described by the Lorentz transformation has been verified by existing experimental phenomena, and two assumptions are required: First, the empty space can move; second, the objects without internal composition and structure are embedded in such space, and expand and contract synchronously with such space. Apparently late, the addition of these two assumptions greatly weakens the credibility of the explanation of the above experimental phenomenon. What's more, "space shrinkage can hold the objects in it and shrink together" has never been verified.

After careful analysis, it is not difficult to see that the space mentioned by the special theory of relativity is only the mathematical coordinate framework in the Lorentz transformation; the clocks that Einstein placed at various points in the space are either the clocks in the mind (or the apparent clocks) or are composed of rigid bodies Clock that doesn't work. There are two serious problems in the "inference of space contraction due to motion": the acceleration of space and the physical mechanism of motion; the physical mechanism of space contraction due to motion.

5. Representation of space-time shrinkage — Two-dimensional Lorentz contraction and four-dimensional space-time contraction

Whether the concept of space-time continuum is used or not, the contraction of space-time of the system under Lorentz transformation due to motion is a two-dimensional contraction (both a spatial coordinate and a temporal coordinate contract due to motion). Since the four coordinate axes in the kinematic system are all shortened due to motion, it is inappropriate to call the contraction of the space coordinate axis shrinkage, and the contraction of the time coordinate axis as time dilation.

If $x_1=x$, $x_2=y$, $x_3=z$, $x_4=\tau=ict$, **Equation (2)** the general Lorentz transformation can be written as

$$x_1=\frac{x'-i\frac{\upsilon}{c}x_4'}{\sqrt{1-(\upsilon/c)^2}},\ x_2=x_2',\ x_3=x_3',\ x_4=\frac{x_4'+i\frac{\upsilon}{c}x_1'}{\sqrt{1-(\upsilon/c)^2}}. \tag{17}$$

It can be seen from the above two Eqs that, measured in the stationary system, the length and time values in the moving system decrease simultaneously (*i.e.*, x_1 and x_4 change in exactly the same direction and way). This is the result obtained according to the Lorentz transformation. The above-mentioned "magnitude reduction" can be referred to as "shrinkage" or "shrinkage" by unifying the caliber. In this way, the Lorentz contraction is a linear contraction of two-dimensional space-time:

$$\left.\begin{aligned} x_1' &= x_1\sqrt{1-(\upsilon/c)^2} \\ x_2' &= x_2 \\ x_3' &= x_3 \\ x_4' &= x_4\sqrt{1-(\upsilon/c)^2} \end{aligned}\right\}. \tag{18}$$

It can be seen unambiguously from the Lorentz transformation that both time and space change due to motion with $\sqrt{1-(\upsilon/c)^2}$ as the denominator. The expression "space shrinks due to movement, time expands due to movement" is easily misunderstood. Expressing the Lorentz contraction as a two-dimensional space-time contraction is somewhat more accurate (*i.e.*, more canonical), as long as the concept of space-time is used.

The main text has demonstrated that the reduction in volume of a moving object (ie, volume contraction) is a three-dimensional contraction. Also take into account that the time value becomes smaller due to movement (ie, contraction). That is, the space-time contraction of the moving material system is the four-dimensional relativistic contraction. The lateral Doppler shift formula that can describe the effect of time motion is $t=t_0\sqrt{1-(\upsilon/c)^2}$. In the same way (compared with the reason obtained from the formula (S3)), in the case where the system speed is not very close to the speed of light, that is, when the gravitational effect of moving particles can be ignored, the volume contraction of atoms and molecules determined by quantum mechanical factors is as follows [Considering Eq. (11) in the text]:

$$\left.\begin{aligned} r_x &= (r_x)_0\sqrt{1-(\upsilon/c)^2} \\ r_y &= (r_y)_0\sqrt{1-(\upsilon/c)^2} \\ r_z &= (r_z)_0\sqrt{1-(\upsilon/c)^2} \\ t &= t_0\sqrt{1-(\upsilon/c)^2} \end{aligned}\right\}. \tag{19}$$

Borrowing the concept of space-time, the time value and the volume value of the object in the motion system decrease due to motion can be represented by (19). In other words, if, like the special theory of relativity, we also regard the space full of objects as an apparent (subjective) four-dimensional space, Equation (19) is the expression of the motion effect of four-dimensional space-time.

6. Conclusion and Outlook

This paper adds a lot of new knowledge to the human knowledge base, which can change part of the human view of nature. First, the volume of real objects shrinks in all directions due to motion, with well-defined physical mechanisms. The relativistic effects of particles (especially molecules, atoms, and electrons) that make up objects should not be completely ignored (when discussing the spatiotemporal variation of the kinematic system). Different objects or the same object move at different speeds, and the laws of their volume shrinking due to movement are not completely consistent. The Lorentz contraction expression in the context of relativity cannot correctly describe the contraction of an object that does not ignore its internal composition and structure due to motion. Second, when a real object moves, the mass of its various parts increases according to the mass-velocity relationship, which will produce a general relativity effect that cannot be ignored—the space bending of the ultra-high-speed moving system (and even the collapse of the object). **T**hird, there is only one real cosmic space, so the space that can move and can be accelerated associated with many moving objects (this is also the space in the Lorentz transformation chosen by the special theory of relativity) can only be a theoretical space or Mathematical space (also called virtual space). It is difficult to speed up infinite space. "In the only real cosmic space, there are many infinite spaces with multiple interlaced motions" has a logical problem. Fourth, the above conclusion that "there is only one real cosmic space" shows that the applicable scope of the principle of relativity is limited. The collapse of an object due to motion cannot be relative. The contraction of an object due to motion cannot be relative.

Equation (11) is theoretical, and it is necessary to design appropriate experiments to verify "whether the moving object shrinks in all directions".

As long as the moving object is not regarded as a rigid body and the Lorentz contraction is considered, there are three kinds of contractions of space-time (or objects) in the moving system: the moving object shrinks in the direction of motion; Space-time in hyper-velocity systems bends and objects can collapse. We must choose between these three relativistic effects (and \ or discuss the conditions under which they arise).

The discussion of this paper is disadvantageous to the well-known "relativity of rod contraction due to motion". We need to search for more evidence in order to reach a final conclusion.

No matter what kind of theory, as long as there is a logical contradiction, it shows that it is imperfect. It's time for a change in treating relativity as the sacred bible, thereby not allowing the inadequacies of relativity to be talked about in influential places.

For the big PK mentioned in the title of this article, if everyone finally agrees that the three-dimensional shrinkage side wins, we have to consider abandoning the principle of relativity and reducing the scope of application of the space-time theory. So there is a lot of work waiting for us to do.

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