Based on the Concept of Absolute Airspace Reference system A Further Discussion on the Physical Principle of the Time-Shift Effect of Special Relativity

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Posted Date: 10 May 2024

doi: 10.20944/preprints202405.0529.v1

Keywords: relativity theory; Space-time concept; Absolute airspace; space-time transformation effect

 doi:10.20944/preprints202405.0529.v1

Article

Based on the Concept of Absolute Airspace Reference System a Further Discussion on the Physical Principle of the Time-Shift Effect of Special Relativity

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Abstract: The paper suggests that the physical priciple of special relativity's space-time transformation effect is wrong, Uniform linear motion without acceleration does not exist objectively, nor does its same reference frames. Therefore, it is inferred that the space-time transformation effect of special relativity is caused by the acceleration of moving objects, special relativity is only a part of general relativity, not a theoretical system that exists independently from general relativity. The corresponding mathematical demonstration and calculation verification are carried out, and the result proves that the inference of the paper is correct. At the same time, it further explains that the concept of absolute airspace is correct. Special relativity has serious errors in the concept of space, the principle of relativity and the physical principle of space-time transformation effect. Therefore, it is necessary to make a series of revisions to the theory of relativity and to reinterpret some related physical problems.

Keywords: relativity theory; space-time concept; absolute airspace; space-time transformation effect

1. Introduction

Einstein's thoughts on space and time in his later years were thought-provoking, he said "I want to show that space-time may not necessarily be regarded as something that can exist independently of the real object of the material world. It's not that matter exists in space, it's that matter is Spatial extensibility." [1](p4). The concept of absolute airspace and its local absolute reference system proposed by the author is very consistent with the concept of space-time in Einstein's later years.

In his paper [2], the author puts forward the concept of absolute airspace, and makes a preliminary analysis and demonstration. In the paper [3], the concept of absolute airspace and its corresponding local absolute reference system are further analyzed and demonstrated. In his paper [4], based on the concept of absolute airspace reference system, the time-shift effect formula of special relativity was revised.

However, under the absolute airspace reference system, special relativity will face a serious problem. It is one of the preconditions for the space-time transformation effect of special relativity that uniform linear motion (a form of motion without acceleration) does not exist objectively, and its same frame of reference does not exist. That is, no matter how the object moves visually or geometrically, there is an acceleration due to motion. But the basic concept of uniform linear motion is that there is no acceleration at all.

The physical basis for the analysis of special relativity should be based on objects moving in horizontal rectilinear uniform relative motion to the surface of the earth. The earth is basically round, and any horizontal linear motion on the earth will be a part of the circular motion from a macroscopic perspective. Therefore, this moving object must generate centripetal acceleration of the Earth's center of mass.

 doi:10.20944/preprints202405.0529.v1

Since uniform linear motion does not exist objectively, then the space-time transformation effect caused by the relative uniform linear motion in special relativity has become a water without a source, a tree without roots. However, many physical experiments and physical phenomena have confirmed the objective existence of the space-time transformation effect of special relativity [5]. Why is that? The only explanation is that special relativity's explanation of the physics of the space-time transformation effect is wrong.

Therefore, the author puts forward a inference that the space-time transformation effect of special relativity is caused by the acceleration of moving objects. That is, the space-time transformation effect of special relativity is actually a part of the space-time transformation effect of general relativity, which is the space-time transformation effect caused by the acceleration of the motion of an object according to the equivalence principle of general relativity. Special relativity and general relativity are united. Special relativity can not be a theory in physical principles alone, and belongs to the general theory of relativity.

Around this inference, this paper makes a series of analysis and demonstration.

In order to facilitate the reader's direct understanding, this paper will briefly explain the absolute airspace reference system and related concepts again. At the same time, the purpose of this paper is to analyze and understand the physical principles; In order to avoid the complex mathematical analysis and derivation process to the understanding of physical principles interference; Therefore, in mathematical analysis, try to take the simplest method; And try to simplify the mathematical derivation process, using the existing, most people are easy to understand the simple mathematical results for analysis.

2. Description of Absolute Airspace Reference System and Related Concepts

2.1. Description of the Concept of Absolute Airspace and Its Reference System

The so-called "absolute airspace" means that every star (or planet, matter) has a local, relatively independent physical properties, spherical absolute (only relative to the star or planet, matter) stationary space coordinate reference system with its center of mass as the origin.

The physical laws of moving physical objects in absolute airspace can only be most accurately described by the absolute airspace reference system. All so-called (inertial) reference systems cannot exist independently of the corresponding absolute airspace, and cannot be equal rights in physical law to the absolute stationary reference system of absolute airspace. But the absolute stationary reference systems between different absolute airspace are equal rights, and their physical laws are the same.

The concept of absolute airspace also shows that space and matter are inseparable objective existence, and the space reference system cannot be separated from the corresponding star (or planet,matter), and is absolutely stationary relative to the star (planet,matter). Because the stars move with each other (planet or matter with each other); Therefore, the spatial reference system is the coexistence of absolute rest within absolute airspace and relative motion between absolute airspace. The universe space as a whole is described as being absolute and relative coexist.

The universe space as a whole is still a huge absolute airspace, but its physical properties are not uniform, each local absolute airspace within the scope of its physical properties have considerable independence, the space is a variety of absolute airspace and their relative relations between various sets.

2.2. Scope of Absolute Airspace

The scope of absolute airspace refers to the space range in which the moving physical object is controlled by absolute airspace according to physical laws. In this spatial range, the physical laws of moving physical objects can be most accurately described only in terms of their absolute airspace reference system. The range of absolute airspace can be expressed by the cosmic escape formula:

$$R_a=2GM/v^2 \quad (1)$$

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R_a is the absolute airspace radius of the star (planet,matter), R_a must be greater than the solid radius of the star (planet,matter); Otherwise its absolute airspace does not exist.

G is the universal gravitation constant;

M is the mass of the star (planet,matter);

v is the absolute velocity of the physical object in the star's(planet,matter) absolute airspace reference system.

It can be seen from formula (01) that the range of absolute airspace is dynamic and closely related to the motion speed of physical objects in the absolute airspace reference system.

Taking the Earth as an example, if an object is moving around the Earth at a speed of 11.2km/s (i.e., the second cosmic speed), then:

R_a=6355.24km

This is basically the radius of the Earth, that is, the true absolute airspace distance is zero. The moving object will leave the control of the Earth's absolute airspace and enter the control of the sun's absolute airspace. This is also the limit of the absolute airspace of the Earth that can control the speed of objects.

Although the speed of control is limited, the influence of the Earth's absolute airspace on high-speed objects still exists within a certain range. In other words, the concepts between control and influence there is a big difference. Similarly, the control of this absolute airspace cannot completely exclude the influence of other absolute airspace, But sometimes the effect is so weak that it can be ignored.

in addition, the (01) formula can also be expressed as:

$$v_a=(2GM/R)^{1/2} \tag{2}$$

v_a is the limit velocity that a moving object can control in absolute airspace at the radius R from the center of mass of a star (planet,matter). For short: absolute airspace limit velocity.

2.3. Time Shift Effect of Special Relativity in the Earth Absolute Airspace Reference System

The Earth rotates in its absolute airspace reference frame, and all velocities referenced by Earth's surface fixations are relative. At this relative speed, the time shift effects calculated according to the time-shift effect formula of special relativity are not accurate, and there will be some errors. Therefore, in the paper [4], based on the absolute airspace reference system, the author derived a revised time-transform effect formula from the time-transform effect relation of special relativity:

$$dt/dt_0=[(c^2-\mathbf{v}^2)/(c^2-\mathbf{v}_0^2)]^{1/2} \tag{3}$$

$$\mathbf{v}_0=\omega R\cos\theta$$

$$\mathbf{v}=\mathbf{v}_r+\mathbf{v}_{r0}$$

t is the time of the clock on the moving object;

t_0 is the time on a stationary clock on the Earth's surface;

$\mathbf{v}$ is the absolute uniform velocity of a moving object in the earth's absolute airspace reference system;

$\mathbf{v}_0$ is the absolute uniform speed of the Earth's surface stationary clock due to the earth's rotation in the Earth's absolute airspace reference system.

ω is the angular speed of the earth's rotation;

R is the Earth radius at the position of the stationary clock;

θ is the latitude of the Earth at the position of the stationary clock;

$\mathbf{v}_r$ is the relative speed vector of the clock of a moving object;

$\mathbf{v}_{r0}$ is the linear velocity vector formed by the rotation of the earth due to the position of the moving object clock on the earth surface;

c is the speed of light.

In formula (03), if an object is moving uniformly in a straight line due west of the Earth's equator and $v_r<2v_0$, then the time of a moving clock will be faster than that of a stationary clock. Because $v=v_{r0}$-

 doi:10.20944/preprints202405.0529.v1

v_r, $|v|<v_0$; Then $(c^2-v^2)>(c^2-v_0^2)$, $dt/dt_0>1$. Therefore, a clock on a moving object will keep time faster than a clock stationary at the equator. And when $v_r>2v_0$, $|v|>v_0$; Then the time of a moving clock is slower than that of a stationary clock. This has been confirmed by the Haffeler-Keating experiment [3].

This is where formula (03) differs from the time-shift effect formula of special relativity. According to the time-shift effect formula of special relativity, it is impossible for a clock in relative motion to time faster than a clock at rest. A clock in relative motion is only slower than a clock at rest. This is one of the main reasons why I think there is something seriously wrong with special relativity.

3. A Simple Statement of the Physical Principle of the Time Shift Effect of General Relativity

General relativity adds to special relativity the principle of equivalence and the principle of general covariance (the principle of general relativity). Its mathematical expression is Einstein's gravitational field equation, but this equation is extremely complex and difficult to solve. At present, there are only a few solutions such as Schwarzschild under certain boundary conditions. However, the basic physics of the time-shifting effect is relatively simple. There are two physical principles of time shift effects:

First is the change in the static acceleration of gravity, resulting in a change in the timing speed of the clock.

In the absolute airspace reference system, the static acceleration of gravity will be different due to the different radial position (distance from the center of mass of the star,planet and matter). The time of the spatial position clock with high static gravity acceleration is slower than that of the spatial position clock with low static gravity acceleration. On the contrary, the time of the spatial position clock with low static gravity acceleration is faster than that of the spatial position clock with high static gravity acceleration. Taking the Earth as an example, the farther the distance from the Earth's center of mass, the smaller the static gravitational acceleration of the earth is. Therefore, a clock at a higher altitude will timing faster than a clock at a lower altitude.

Second, due to the different acceleration of the clock movement, the clock timing speed changes.

That is, under the condition of the same distance from the origin of the absolute airspace reference system, the greater the acceleration of the moving physical object, the slower the time of the clock. That is, a clock with a high acceleration will timing slower than a clock with a low acceleration; Conversely, a clock with a low acceleration will timing faster than a clock with a high acceleration.

Taking the motion clock around the earth as the physical object of analysis, a simple mathematical expression of the above principle is made.

The clock timing of physical objects is referred to as object timing T_n, n represents different physical object clocks, which can be expressed by natural numbers 1,2,3, such as T_1,T_2,T_3..... T_n, etc. The event coordinate time is referred to as coordinate time t for short. The factors that cause the change of the timing speed of the clock due to the change of static gravitational acceleration are referred to as gravitational influence factors, expressed by f_g. The gravitational influence factors of different moving clock objects plus the identifier n, such as f_{g1}, f_{g2}, f_{g3}... f_{gn}, etc.; The factors that form the change in the timing speed of the clock due to the different acceleration caused by the clock movement are referred to as the motion influence factors, expressed by f_a, and the motion influence factors of different moving clock objects are added with the identifier n. Then:

$$dT_n^2/dt^2=1-f_{gn}-f_{an} \tag{4}$$

The physical principle of the expression of the time transformation effect derived from the Schwarzschild metric, however complex, is the same as that of formula (04) in the mathematical expression structure. The key is how to specify and calculate these two timing factors.

4. Analysis and Demonstration of the Inference in This Paper

4.1. Analysis of Special Relativity

The basic expression of the time shift effect of special relativity is:

 doi:10.20944/preprints202405.0529.v1

$$dT^2=dT_0^2(1-v^2/c^2) \quad (5)$$

T is the timing of a relatively linear uniform motion clock;

T_0 is the time of a clock resting on the Earth's surface;

v is the linear uniform speed of the moving clock relative to the stationary clock;

c is the speed of light.

Formula (05) has the corresponding mathematical expression structure of (04), only one factor is missing. Suppose that the factor that causes the timing speed change of the clock in special relativity is f_s, then according to the mathematical structure and corresponding parameters of formula (04), formula (05) can be expressed as:

$$dT_n^2/dt^2=1-f_{sn} \quad (6)$$

$$f_{sn}=v_n^2/c^2 \quad (7)$$

If it can be proved that f_{sn} is exactly equivalent to f_{an} in formula (04) in the absolute airspace reference system of the Earth, then the inference in this paper is mathematically proven.

Based on the absolute airspace reference system of the Earth, an object moving uniformly along the so-called geodesic line on the Earth's surface can be regarded as moving uniformly in a circle around the earth. The resulting centripetal acceleration of the Earth's mass a is:

$$a=v_n^2/R_n$$

$$v_n^2=aR_n$$

Then:

$$f_{sn}=aR_n/c^2 \quad (8)$$

4.2. Analysis of General Relativity

In the absolute airspace reference system of the earth, the time transformation effect expression derived from the simplest and standard Schwarzschild metric is used for the analysis.

Original formula:

$$T_1^2=t^2(1-2GM/c^2R-R^2\omega^2/c^2) \quad (9)$$

Note: Formula (09) is derived from formula [6]p68, (3.297). This formula expresses the mathematical relationship between the timing of a clock stationary on the Earth's equator.

T_1 is the time difference of a clock resting on the Earth's equator;

t is the difference in coordinate time of the event;

G is the universal gravitation constant;

M is the mass of the Earth;

R is the radius of the earth where the clock is located;

ω is the angular speed of the Earth's rotation.

Let's transform equation (09).

because of:

$v_a^2=2GM/R$

$g=GM/R^2$

And the linear speed v of a clock at rest on the Earth's equator due to the Earth's rotation:

$v=R\omega$

Since the stationary clock has a uniform circular motion velocity v in the absolute airspace reference frame of the Earth, the centripetal acceleration a formed by it is:

$a=v^2/R$

In summary, the formula (09) can be converted into a mathematical expression of timing difference around the earth clock with different parameters:

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$$T_n^2=t^2(1-2g_nR_n/c^2-a_nR_n/c^2) \quad (10)$$

And:

$$T_n^2=t^2(1-v_{an}^2/c^2-v_n^2/c^2) \quad (11)$$

In the above two formulas:

g_n is the static acceleration of gravity at the clock position at a distance R_n from the Earth's centroid.

a_n is the centripetal acceleration formed by a constant circular motion clock in the absolute airspace reference frame of the Earth at a distance R_n from the Earth's centroid;

v_{an} is the limit velocity located in the absolute airspace range of R_n from the Earth's centroid (see equation (02) for details);

v_n is the absolute linear speed of a clock in constant circular motion around the Earth at a distance R_n from the Earth's center of mass (absolute speed in the Earth's absolute airspace reference frame).

Then：

$$T_n^2=t^2(1-f_{gn}-f_{an}) \quad (12)$$

$$f_{gn}=2g_nR_n/c^2=v_{an}^2/c^2 \quad (13)$$

$$f_{an}=a_nR_n/c^2=v_n^2/c^2 \quad (14)$$

4.3. Mathematical Analysis

To simplify the analysis, suppose there is a stationary clock T_1 on the Earth's equator; Due to the rotation of the Earth, its absolute velocity in the Earth's absolute airspace reference system is v_1. The moving clock T_2; with a velocity relative to T1, v_{r2} moves uniformly along the equator (due west or due east); has an absolute velocity of v_2 in the Earth's absolute airspace reference system. $R_1=R_2=R$, R is the equatorial radius of the Earth.

Then:

$f_{s1}=a_1R/c^2=v_1^2/c^2$

$f_{s2}=a_2R/c^2=v_2^2/c^2=(v_1\pm v_{r2})^2/c^2$

Where: when T_2 moves due east, take the plus sign; When T_2 is moving due west, take the minus sign.

According to formula (14), it can be obtained:

$f_{a1}=a_1R/c^2=v_1^2/c^2$

$f_{a2}=a_2R/c^2=v_2^2/c^2=(v_1\pm v_{r2})^2/c^2$

Where: when T_2 moves due east, take the plus sign; When T_2 is moving due west, take the minus sign.

$f_{s1}=f_{a1}$

$f_{s2}=f_{a2}$

It is very obvious that based on the absolute airspace reference system of the earth, under the same physical conditions and physical parameters, the influence factors of the time transform effect of special relativity and the motion influence factors of the time transform effect of general relativity are completely equivalent in different mathematical expressions and results. Therefore, it is proved mathematically that the physical principle of the time transformation effect of special relativity is that under the condition of the same distance from the origin of the absolute airspace reference system, due to the different acceleration of the clock motion, the timing speed of the clock changes.

4.4. Comparison Calculation Verification

The comparison standard is the checking calculation of the clock moving around the Earth's equator under the ideal state in [6]. The formula derived from the Schwarzschild metric is:

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$$\delta=(T_2-T_1)/T_1=gh/c^2-v(v+2R\omega)/2c^2 \quad (15)$$

Note: Formula (15) is derived from formula [6] P68-69, (3.298) and (3.299). This formula is omitted and only the lowest order small quantity is retained.

T_1 is the difference between clocks standing still at the equator;

T_2 is the timing difference of clocks flying along the equator at a certain altitude h and relative speed v;

R is the equatorial radius of the Earth, 6,378km;

ω is the angular speed of the earth's rotation, 7.292115×10^{-5} rad/s;

g is the static acceleration of gravity at the Earth's equator, $g=GM/R^2$, $GM=3.986004418\times1014$ (m^3/s^2).

Note: The above data are mainly from [7]p68, Table 2.1.

c is the speed of light, 299792458 m/s.

Let $h=10^4$m; The relative flight speed of the motion clock is v=300m/s for eastward flight, and the calculated value is δ_e; Flying westward v=-300m/s, the calculated value is δ_w.

$$\delta_e=gh/c^2-v(v+2R\omega)/2c^2=1.09025\times10^{-12}-2.05314\times10^{-12}=-0.96289\times10^{-12} \quad (16)$$

$$\delta_w=gh/c^2+v(2R\omega-v)/2c^2=1.09025\times10^{-12}+1.05176\times10^{-12}=2.14201\times10^{-12} \quad (17)$$

In formula (15), it can also be divided into two parts, one is the expression derived from gravitational factors, namely gh/c^2; The second part is the expression derived from the motion factor, namely $-v(v+2R\omega)/2c^2$. After some adjustment with formula (03), replace the second part of the expression (15). According to the above physical conditions and parameters, then carry out step by step calculation, and compare the final calculation results with the results (16) and (17) of the above calculation.

The basic calculation expression is:

$$\delta=(T_2-T_1)/T_1=gh/c^2+\{[(c^2-\mathbf{v}_2^2)/(c^2-\mathbf{v}_1^2)]^{1/2}-1\} \quad (18)$$

$$v_1=R\omega=465.0911\text{m/s}$$

$$\mathbf{v}_{2e}=v_1+v=R\omega+v=765.0911\text{m/s}$$

$$\mathbf{v}_{2w}=v_1-v=R\omega-v=165.0911\text{m/s}$$

$$\delta_e=gh/c^2+\{[(c^2-\mathbf{v}_{2e}^2)/(c^2-v_1^2)]^{1/2}-1\}=1.09025\times10^{-12}-2.05314\times10^{-12}=-0.96289\times10^{-12}$$

$$\delta_w=gh/c^2+\{[(c^2-\mathbf{v}_{2w}^2)/(c^2-v_1^2)]^{1/2}-1\}=1.09025\times10^{-12}+1.05176\times10^{-12}=2.14201\times10^{-12}$$

This calculation is in complete agreement with the results of (16) and (17). At least exactly the same within the 10^{-15} accuracy range. Formula (03) is completely equivalent to the second part of formula (15) after being adjusted according to the mathematical expression format in formula (15).

Through the above comparison and calculation, it is further proved that the inference in this paper is correct.

5. Conclusion

In the introduction of this paper, based on the logical analysis of physical facts, the space-time transformation effect of special relativity is inferred due to the acceleration of moving objects. In order to prove this inference and facilitate readers to understand, the absolute airspace and related concepts are briefly expounded. At the same time, based on the concept of absolute airspace, the physical principle of time transformation effect of general relativity is discussed in different ways. Through mathematical demonstration and comparative calculation verification, It is proved that the inference of this paper on the physical principle of the time-shift effect of special relativity is correct.

 doi:10.20944/preprints202405.0529.v1

The space-time shift effect of special relativity is actually part of the space-time shift effect of general relativity, according to the equivalent principle of general relativity, the space-time transformation effect caused by the acceleration of the motion of an object. Special relativity and general relativity are united. Special relativity can not be a theory in physical principles alone, and belongs to the general theory of relativity.

At the same time, it further explains that the concept of absolute airspace is correct; Based on the absolute airspace reference system, the adjusted special relativistic time transformation relation (i.e., formula (03) in this paper) is also correct. The original time-shift effect relation of special relativity is wrong, as is the principle of special relativity [4]. Therefore, it is necessary to make a series of revisions to the theory of relativity and to reinterpret some related physical problems.

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