Essay

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Based on the Concept of Absolute Airspace Reference System Revision and Unification of Space-Time Transformation Theory

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Abstract: This paper is based on the concept of absolute airspace and its local absolute stationary reference system proposed by the author, on the premise of abandoning space concept and the relativity principle of relativity theory, It is proposed that general relativity and special relativity can be unified into Simple and practical a space-time transformation theory which fully includes other basic physical principles of relativity. And the unified and simple expression of the time transformation effect is proved and deduced. By comparing with the theoretical derivation and checking calculation of Hafele-Keating experiment in an ideal state, It is proved that the expression of time transformation effect proposed in this paper is completely correct. Compared with the theory of relativity, the calculation is simpler and more accurate. The paper also puts forward two checking prediction of physical cases about the time transformation effect, which are left for the capable competent unit or individual to verify in practice.

Keywords: absolute airspace; space-time transformation; relativity theory; spatiotemporal metric

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](p04). The concept of absolute airspace and its local absolute stationary reference system proposed by the author, it is very consistent with the space-time concept mentioned above in Einstein's later years.

In his paper [2], the author proposes that there are serious errors in the space-time concept of relativity theory; At the same time, the different concept of absolute airspace is expounded, and the preliminary analysis and demonstration are carried out. In the paper [3], the concept of absolute airspace and its corresponding local absolute stationary reference system are further analyzed and demonstrated. In his paper [4], he clearly proposed that the principle of relativity is wrong, and based on the concept of absolute airspace reference system, he revised the time shift effect formula of special relativity. In his paper [5], he argued that special relativity and general relativity are unified. In physical principles, special relativity is a part of general relativity, and special relativity cannot be a theory in its own right.

Based on the principle of general covariance (principle of general relativity), the gravity gauge field equation of Einstein's general relativity theory is too complicated and difficult to solve. At present, some solutions such as Schwarzschild and others have been obtained, which are essentially based on the solution and application of absolute airspace reference frame boundary conditions. General relativity can not realize Einstein's dream of a unified theory, in addition to Schwarzschild and other solutions have some practical value, other parts are difficult to find its practical application value in physical reality. The fundamental reason is that the general relativity is too complicated and

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difficult to understand; and the concept of space, the theory of reference system and the principle of covariance are insufficient or wrong.

Since special relativity and general relativity are unified, if we discard the principle of general covariance (principle of general relativity), starting from the concept of absolute airspace and its local absolute stationary reference system, if it's possible to fully unify general relativity and special relativity, and make the mathematical expression of the space-time transformation effects of general relativity as simple and practical as special relativity?

In his paper [5], based on the concept of absolute airspace and its local absolute stationary reference system, a simple mathematical expression of the time transformation relationship between general relativity and special relativity is proposed ([5].formula(04), (06), (10), (11), etc.); And a preliminary demonstration is made. However, in addition to the verification of the revised formula of special relativity time transformation relation (03) in the paper [5], there is no specific case verification of general relativity. Therefore, on the basis of further related derivation and demonstration, this paper deduces the complete relation of time transformation effect (09), and makes a concrete verification demonstration; Prove that the author's assumption is completely correct.

Although this paper only deduces, verifies and demonstrates from the Angle of time transformation effect relationship; However, because space and time are closely related, it is easy to get other corresponding transformation relations such as space from the relationship of time transformation effect. Therefore, the paper completely unifies the special theory of relativity and general theory of relativity, simplifies the very complex general theory of relativity, and can completely replace the general theory of relativity and special theory of relativity, so it is easy for people to understand, more simple and practical and higher precision.

At the same time, the paper also made two checking predictions, in order to wait for further practical test proof.

This paper is a further discussion based on the author's thesis [5]. In order to save space and avoid repetition, some pre-issues are not described in this paper. The reader may need to first read the references [5] and other relevant literature in order to be able to fully understand the discussion of this article.

2. Simple Mathematical Expression Structure of Spatio-Temporal Transformation Effect Relationship

Based on the concept of absolute airspace and its local absolute static reference system, the so-called flat space is not valid, and the principle of relativity is not valid. Therefore, the concept of absolute airspace only recognizes the principle of constant speed of light and the equivalence principle of relativity theory. Secondly, the laws of physics are equalized only between local absolute stationary reference systems of different absolute airspace.

In the paper [5], the author proposed that the physical principles of the space-time transformation effect of relativity (special relativity and general relativity) are two; First, the change of static acceleration of gravity leads to the change of timing speed of the clock. Second, due to the different acceleration of the clock movement, the clock timing speed changes.

Based on the absolute airspace reference system, the basic mathematical expression format of the clock timing transformation effect in different physical environments can be as follows:

$$dT_n^2/dt^2=1-f_{gn}-f_{an} \qquad (01)$$

Where: T_n is the timing of clocks in different physical environments; n represents different physical object clocks, which can be expressed by natural numbers 1,2,3, etc., such as T_1,T_2,T_3... T_n, etc. The event coordinate time is referred to as coordinate time t (the author believes that the event coordinate time is only for the convenience of mathematical expression and conversion, and has no practical physical significance); The factors that lead to changes in the timing speed of the clock due to changes in static gravitational acceleration are referred to as gravitational influence factors, expressed by f_g, gravitational influence factors of different moving clock objects plus identification 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

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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.

$$f_{gn}=2GM/R_nc^2=2g_nR_n/c^2=v_{an}^2/c^2 \quad (02)$$

$$f_{an}=a_nR_n/c^2=v_n^2/c^2 \quad (03)$$

Where, g_n is the static acceleration of gravity at the clock position at the distance R_n from the star's center of mass; a_n is the centripetal acceleration formed by constant circular motion clock around the absolute airspace reference system of the star at a distance R_n from the star's centroid; v_{an} is the limiting velocity in the absolute airspace of a star located at a distance R_n from the star's center of mass (escape velocity, please refer to [5] for the concept of limiting velocity); v_n is the absolute linear velocity of the clock in constant circular motion around the star at a distance R_n from the star's center of mass (the absolute velocity in the star's absolute airspace reference frame).

$$v_{an}^2=2GM/R_n \quad (04)$$

Where: G is the universal gravitation constant; M is the mass of the star(planet).

Substitute (02) and (03) into (01), then:

$$dT_n/dt=(1-v_{an}^2/c^2-v_n^2/c^2)^{1/2} \quad (05)$$

Although the author has omitted many pre-derivation processes and arguments in this paper, the formula (05) is essentially evolved from the basic expression of the time transformation effect derived from the general relativistic gravity gauge field equation and the Schwarzschild metric under the premise of absolute airspace reference system. The mathematical structure of formula (05) looks very similar to that of the time-shift effect relationship in special relativity, and if we assume that v_{an} is zero, formula (05) becomes:

$$dT_n/dt=(1-v_n^2/c^2)^{1/2} \quad (06)$$

Formula (06) is the time-shift effect relation of special relativity. However, according to formula (04), the prerequisite for this to be true must be that R_n is infinite; It is also proved that the space-time transformation relation of special relativity is not valid in physical reality. At least not within certain airspace of the Earth.

There is one parameter in the relation of the time transformation effect, that is, the event coordinate time t; The author believes that the event coordinate time is only for the convenience of mathematical expression and conversion, and has no practical physical significance. However, this time parameter problem is not clear, it is easy to form confusion. At the same time, because the above expressions have this event coordinate time t, these expressions are incomplete. Therefore, it is necessary to clarify the relativity of time measurement standard and further improve the expression relationship of time transformation effect.

3. The Relativity Problem of Space-Time Metric and the Expression of Complete Transformation Relation

The measure of spacetime is relative; In other words, under different physical conditions, the measurement of spacetime is different. **At present, human's measurement of physical events is always based on a physical event with a relatively constant physical law as the standard, and other physical events are compared and measured and described.**

For example, to measure the physical quantity of time one second, the fixed value of the hyfine energy level transition frequency of the ground state of cesium 133 atom is 9192631770Hz to define the second. When the speed of light c in vacuum is expressed in m/s, the fixed value 299792458 is selected to define the meter. That is, the distance traveled by light in a vacuum in 1/299,792,458 second(one 299,792,458 of a second) is one meter. However, in fact, the hyperfine transition frequency of the ground state of cesium 133 atom is variable in different physical environments, resulting in a variable metric of one second of time. As a result, the metric value of the spatial scale is also variable.

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In different physical environments, the physical law of the corresponding transformation relationship of the space-time physical measurement values is expressed mathematically, that is, the so-called space-time transformation effect relationship. This requires first establishing a benchmark clock as the standard value of time measurement, it is necessary to consider the physical environment parameters of this benchmark clock, and at the same time consider the difference between the physical environment parameters of the object clock.

Based on the principle of relativity, special relativity completely ignores the physical environment parameters of the benchmark clock, and only describes its space-time transformation relationship by the relative difference between it and the physical environment parameters of the object clock. This makes the theory of relativity, in a strictly theoretical sense, there can be no anisotropy of space-time. In the case of Earth, according to special relativity, clocks of the same physical precision, although the clocks move in different directions and at different latitudes on Earth, the clock keeps time the same way. If the principle of relativity is true, then the above conclusion will also be true.

However, the Hafele-Keating experiment clearly demonstrated that Earth's physical space-time objectively exists in anisotropy. That is, clocks of the same physical precision, because the clocks move in different directions and at different latitudes on Earth, when other relative physical parameters are exactly the same, the timeing of the clock is not the same [3]. This is enough to prove that there is something seriously wrong with special relativity; The fundamental reason is that the space concept of relativity and the reference system theory are wrong, and the relativity theory thinks that space and the reference system are completely relative is wrong, which also means that the relativity principle is wrong. On the basis of sufficient objective physical experiments and demonstration of physical phenomena, the author puts forward the concept of absolute airspace and its local absolute stationary reference system.

Under the concept of absolute airspace and its local absolute stationary reference system, is there a local absolute space-time metric? According to the formula (05) in this paper, if t is assumed to be the local absolute space-time metric timing in absolute airspace; Then, only under the premise of $dT_n/dt=1$, can the local absolute space-time metric time clock under this absolute airspace be obtained. In other words, v_{an}^2/c^2 must be equal to 0 and v_n^2/c^2 must be equal to 0. Because most of the stars(planets) have spin, and their absolute airspace is local; This means that in objective physical fact, it is impossible to obtain a timekeeping clock with a local absolute measure of time. That is, it is impossible to have a clock that is at an infinite distance from the star's(planet's) center of mass and a local absolute rest in the absolute airspace reference system.

For example, in the absolute airspace of the Earth, to obtain an absolutely stationary clock, it must move in the opposite direction of the Earth's spin (or set the clock at the poles of the Earth's rotation axis); At this point, the absolute speed of this clock in the Earth's absolute airspace reference system is zero. At the same time, it must be infinitely distant from the Earth's center of mass; It can't have the Earth's gravitational pull on the clock, and it can't keep its distance from the Earth's center of mass constant. It will be affected by the gravity of other stars(planets) and do the corresponding motion, and enter the absolute airspace control of other stars(planets). Therefore, this so-called absolute time standard clock within the absolute airspace of the Earth (or stars, planets) cannot exist in objective reality.

The so-called coordinate time of the event is actually the time of the earth's rotation once according to the latitude coordinates of the earth to distinguish, there is an artificial setting premise. Its essential premise should be to use some clock (or set of clocks) stationary on the Earth's surface as a common benchmark for timekeeping. However, clocks stationary on the different Earth's surface have different local absolute velocities and different distances from the Earth's center of mass under the absolute spatial reference system of the Earth. In the absolute airspace reference system, we must consider the different the local absolute velocity of the benchmark clock and the distance from the center of mass of the star(or planet).

Suppose it is accepted that a clock located somewhere on the Earth is the benchmark clock, and its time is t_0; Its absolute velocity in the Earth's absolute airspace reference frame is v_0; Its distance

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from the Earth's center of mass is R_0; The absolute airspace limit velocity of the earth at R0 is v_{a0}. t is the assumed absolute airspace absolute timing time (assumed only for ease of conversion and objectively does not exist). According to formula (05), there is:

$$dt_0=dt(1-v_{a0}^2/c^2-v_0^2/c^2)^{1/2} \quad (07)$$

Set the time of other object clocks to t_n; Its absolute velocity in the Earth's absolute airspace reference frame is v_n; Its distance from the Earth's center of mass is R_n; The limiting velocity of the Earth's absolute airspace at R_n is v_{an}. There is:

$$dt_n=dt(1-v_{an}^2/c^2-v_n^2/c^2)^{1/2} \quad (08)$$

Then:

$$dt_n/dt_0=[(c^2-v_{an}^2-v_n^2)/(c^2-v_{a0}^2-v_0^2)]^{1/2} \quad (09)$$

Formula (09) is a complete expression of the time transformation effect based on the absolute airspace reference system.

4. Verification and Prediction

In order to verify whether formula (09) is correct, this paper takes the calculated results of Hafele-Keating experimental theory in ideal state [6] as the basis for comparison. At the same time, the clock timing of the geostationary earth orbit satellite is calculated and predicted; And the influence of the absolute airspace of the sun on the timing of the stationary clock on the Earth's equatorial surface is also calculated and predicted. These two predictions need to be verified in practice.

4.1. The Theory Calculated Results of Hafele-Keating Experimental in Ideal State Is Compared with the Verification

The so-called Hafele-Keating experimental in ideal state, that is the benchmark clock is stationary on the Earth's equatorial surface, and assume that the Earth's equator is a regular circle (that is, every point on the Earth's equatorial surface has the same radius from the Earth's center of mass); The object clock travels east and west along the equator at the same relative speed (relative to Earth's surface fixations) and at the same height, and each travels a full circle around the Earth.

In the reference [6] of this paper, an assumption of Hafele is adopted: That is, "suppose that the Earth is rotating at an isometric velocity Ω in a non-rotating reference frame Σ" (essentially the absolute spatial reference frame) [3]. And the formula derived according to Schwarzschild metric is as follows:

$$\delta=(T_2-T_1)/T_1=gh/c^2-v(v+2R\omega)/2c^2 \quad (10)$$

Note: Formula (10) is derived from [6] P68-69, formula (3.298) and (3.299). The expression is omitted and only the lowest order terms are kept.

Where: T_1 is the timing difference of the clock at rest on the equator; T_2 is the time 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 acceleration of gravity at the Earth's equator, $g=GM/R^2$, $GM=3.986004418\times10^{14}$ (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 west v=-300m/s, the calculated value is δ_w.

$$\delta_e=gh/c^2-v(v+2R\omega)/2c^2=1.09025\times10^{-12}-2.05314\times10^{-12}=-0.96289\times10^{-12} \quad (11)$$

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

According to the same physical parameters above, check the calculation according to the formula (09) in this paper. Since the mathematical expression structure of formula (09) and formula (10) is

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different, formula (09) is adjusted according to the mathematical structure of formula (10), and its expression is as follows:

$$\delta=(dt-dt_0)/dt_0=[(c^2-v_a^2-v^2)/(c^2-v_{a0}^2-v_0^2)]^{1/2}-1 \quad (13)$$

Note that, unlike relativity, the v and v0 in formula (13) refer to the absolute speed of the clock in the Earth's absolute airspace reference system.

Therefore, the absolute speed of a clock resting on the Earth's equatorial surface is:

$$v_0=R\omega=465.0911m/s$$

The absolute speed of the eastbound clock is labeled v_e:

$$v_e=v_0+300=765.0911m/s$$

The absolute speed of the westbound clock is labeled v_w:

$$v_w=v_0-300=165.0911m/s$$

$$v_{a0}^2=2GM/R=2\times3.986004418\times10^{14}/6378000=124992299.1$$

$$v_a^2=2GM/(R+h)=2\times3.986004418\times10^{14}/6388000=124796631.75$$

$$\delta_e=[(c^2-v_a^2-v_e^2)/(c^2-v_{a0}^2-v_0^2)]^{1/2}-1=$$

$$[(299792458^2-124796631.75-765.0911^2)/(299792458^2-124992299.1-465.0911^2)]^{1/2}-$$

$$1=(89875517748299767.88/89875517748473155.17)^{1/2}-1=-0.9646\times10^{-12} \quad (14)$$

$$\delta_w=[(c^2-v_a^2-v_w^2)/(c^2-v_{a0}^2-v_0^2)]^{1/2}-1=$$

$$[(299792458^2-124796631.75-165.0911^2)/(299792458^2-124992299.1-465.0911^2)]^{1/2}-$$

$$1=(89875517748857877.18/89875517748473155.17)^{1/2}-1=2.1403\times10^{-12} \quad (15)$$

The verification results (14) and (15) are consistent with the comparison results (11) and (12) in the accuracy range of 10^{-14} seconds. At the same time, the comparison calculation formula (10) is omitted; The verification formula (13) does not omit anything, so the accuracy of the verification results should be higher.

Through the above comparison and checking calculation, it is proved that based on the concept of absolute airspace reference system, the formula (09) derived in this paper completely unifies special relativity and general relativity. It can completely replace the time-shift effect formula of general relativity and special relativity, and it is simpler, more practical and more accurate.

4.2. Calculat and Predict of the Clock Timing of the Geostationary Earth Orbit Satellite

The benchmark clock t_0 is assumed to be stationary on the Earth's equatorial surface and the object clock t_s is located on a geostationary orbit satellite. The radius Rs of the geostationary orbit satellite from the Earth's center of mass is 42164173m; The absolute velocity $v_s=R_s\omega=3074.66m/s$ in the Earth's absolute spatial reference system; $v_{as}^2=2GM/R_s=18907067.94$.

$$dt_s/dt_0=[(c^2-v_{as}^2-v_s^2)/(c^2-v_{a0}^2-v_0^2)]^{1/2}$$

$$=[(299792458^2-18907067.94-3074.66^2)/(299792458^2-124992299.1-465.0911^2)]^{1/2}$$

$$=(89875517845321161.9444/89875517748473155.17)^{1/2}=1+5.3879\times10^{-10}$$

Let's say the earth rotates once in dt_0, 86,164 seconds; The timing difference of the clock on the geostationary orbit satellite is:

$$dt_s=86164\times(1+5.3879\times10^{-10})=86164.0000464243s$$

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That is, in cases where the physical accuracy of the benchmark clock and the object clock is exactly the same, for every one rotation of the earth, the object clock on the geostationary satellite is 46424.3 nanoseconds faster than the benchmark clock.

Whether the above calculation forecast is correct remains to be tested in practice.

4.3. Calculat and Predict of the Influence of the Absolute Solar Airspace on the Timing of the Stationary Clock on the Earth's Equatorial Surface

As the Earth rotates and orbits the sun at the same time, the absolute speed of the clock rotating around the sun at the equator of the Earth shows daily periodic fluctuations according to the absolute airspace reference system of the sun. That is, a stationary clock on the Earth's equator that rotates half of the day in the same direction of the Earth's revolution, and the other half in the opposite direction of the Earth's revolution. For ease of calculation, take the average velocity of the two different directions of the revolution according to the Earth's equatorial diameter, v_f is the average velocity in the same direction, v_r is the reverse average speed.

$$v_f=-v_r=12756000/43062=296.224 \text{ m/s}$$

Suppose the average linear velocity of the Earth around the sun is v_s, 29780 m/s; When the clock rotates in the same direction as the Earth's revolution, the speed around the sun is v_{sf}; When the clock rotates in the opposite direction of the Earth's revolution, the speed around the sun is When the clock rotates in the opposite direction of the Earth's revolution, the speed around the sun is v_{sr}. Then:

$$v_{sf}=29780+296.2=30076.2 \text{ m/s}$$

$$v_{sr}=29780-296.2=29483.8 \text{ m/s}$$

The average distance R_s from the Earth to the sun is 1.5×10^{11} meters. The mass M_s of the sun is 1.989×10^{30}kg; Then the limit velocity v_{sa}^2 of the absolute solar airspace at the distance from the sun R_s is:

$$V_{sa}^2=2GM_s/R_s=2\times6.674\times10^{-11}\times1.989\times10^{30}/1.5\times10^{11}=1769944800$$

When the clock rotates in the same direction as the Earth's revolution, the time of the clock is t_f; When the clock rotates in the opposite direction of the Earth's revolution, the time of the clock is t_r. There is:

$$dt_f/dt_r=[(c^2-v_{sa}^2-v_{sf}^2)/(c2-v_{sa}^2-v_{sr}^2)]^{1/2} \quad (16)$$

$$dt_f+dt_r=T=86164 \text{ s} \quad (17)$$

T is the time it takes the Earth to rotate once, 86,164 seconds.

By substituting the relevant parameters into equation (16), we get:

$$dt_f/dt_r=$$

$$[(299792458^2-1769944800-30076.2^2)/(299792458^2-1769944800-29483.8^2)]^{1/2}$$

$$=(89875515199159157.56/89875515234442501.56)^{1/2}=1-1.962901\times10^{-10}$$

According to formula (17) :

$$(1-1.962901\times10^{-10})dt_r+dt_r=86164$$

$$dt_r=86164/(2-1.962901\times10^{-10})=43082.000004228285 \text{ s}$$

$$dt_f=43082.000004228285\times(1-1.962901\times10^{-10})=43081.999995771715 \text{ s}$$

$$dt_r-dt_f=0.0000084511135 \text{ s}=8451.1135 \text{ ns}$$

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To be honest, this was a result that left me incredulous and disturbed. It was not expected that the solar absolute airspace could have such a big effect on the clock within the Earth's absolute airspace. But after repeated checking and thinking, no errors in logic and calculating were found. Therefore, we can only wait for the actual verification to see whether the above prediction results are correct.

Based on the concept of absolute airspace, the purpose of this prediction is to consider the interaction between the relative absolute airspace.

Conclusions

On the basis of the author's thesis [5] and related papers, and on the basis of the concept of absolute airspace and its local absolute rest reference system, the author proposes that general relativity and special relativity can be unified into a simple and practical space-time transformation theory that fully includes other basic physical principles of relativity. A unified and simple expression of the time transformation effect is demonstrated and derived (09). According to this unified time transformation effect relationship, the transformation effect relationship of other spatial and related factors can be easily deduced.

By comparing the results with those derived from Hafele-Keating experimental theory under ideal conditions, it is proved that formula (09) is completely correct, and the calculation is simple and the precision is higher.

In order to further verify the correctness of formula (09) and absolute airspace concept, In this paper, the effects of geostationary orbit satellite clock timing and solar absolute airspace on geostationary clock timing on the Earth's equatorial surface are calculated and predicted. Leave it to competent units or individuals to carry out actual verification.

If the author's concept of absolute airspace and the unified space-time theory and the expression of the time transformation effect are correct, then a series of physical theories related to relativity need to be further adjusted; Some of the physics involved require new explanations.

Based on the concept of absolute airspace, there are still many physical problems to be further studied and discussed, and it is hoped that aspiring colleagues can participate in and jointly research.

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