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On New Space-Time Theory (Part I)

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Abstract

1. Amend the two postulates of the special relativity. 2. Set “the measurement is founded to change the object by destroying the original quantum coherence between the object and its environment” as the third postulate. 3. From the third postulate (new added postulate) educe: the concept of the reference system’s referenced weight and perhaps the reference system’s space is something around the referenced weight; time coordinate should be something as space coordinate there is not the problem to have to synchronize the clocks of the two reference systems before simultaneous time measurement; the essence of Heisenberg Uncertainty Principle; the “actual length” of the same measurement unit in different case is different; it is the reference system’s taking measurement instead of the ether or the object’s motion that changes the being measured object; two reference systems (e.g. Σ and Σa and their relative motion may be uniform or not) taking simultaneously measure of the same object their measurement will disturb each other and “the numerical values before Σ’s unit” ≠ “the numerical values before Σa’s unit” (only when the relative motion speed v=0 or uniform relative speed v=0 can the sign ≠ just turn into =); even in uniform relative motion Σ and Σa still are different for the relative motion and they may have different referenced weight, in taking simultaneously measure of the same speed of relative motion the speed numerical values of Σa is v while of Σ is va11/a44. 4. From the three postulates express the relation between the numerical values of the two reference systems taking simultaneous measurement of the same speed by matrix and the same small moving particle’s mass by the element of the matrix; determine the speed of the photon which come from “in motion” light source by the photon’s speed when light source “in stationary” and the reference systems’ coordinate relation; determine two reference systems’ coordinates relation when reduced the case educe generally there is not the invariant interval, re-reduced the case and re-re-reduced the case then educe the essence of “in motion” time dilate or contract meanwhile space contract or dilate in all directions, moving microparticle’s time to dilate and space to contract in all directions, superluminal photonic tunneling experiment, quasar’s super-luminal expansion and fine structure constant’s lessening, took Michelson-Morley experiment with the light from the sun or quasars or high-speed (close to C) moving micro-particle all obtained zero result, some are for the first time be put forward here never be put forward by any man before.
Keywords: Simultaneous measurements interactional impact; Referenced weight; Go beyond light; Light speed can be changed, “in motion” time dilate or contract space contract or dilate in all directions

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Introduction

From the Special Relativity people hold the opinion “the laws of physics apply in all inertial reference systems, no inertial reference system is special”, “no signal can be transmitted by any means whatsoever, in free space or in a material medium, at a speed faster than the speed of light C”. However, 1965’s discovery 3K background radiation left over from the “big bang” (Nobel prize) [1] and the farther discovery of the blackbody form and anisotropy of the cosmic microwave background radiation (Nobel prize) [2] show us it seems that the reference system of the 3K background radiation left over from the “big bang” should be a special reference system; since 1970 as many as hundred quasars’ apparent superluminal expansions observed in astrophysics [3-4]; since 1993 reports on superluminal photonic tunneling experiments [5-8]; they all set the Special Relativity on trial.

In the past years a number of studious persons had made efforts to amend the special relativity more perfect. Among them such as: In 1949 Robertson proposed a more general transformation [9]. In 1963 Edwards replaced “the universal speed of light (one-way speed of light)” with the “two-way average speed of light” found his “generalized Lorentz transformation” [10]. In 1970 Winnie started from his three postulates (the principle of the same light speed over a closed path, the principle of the same space interval and the same time interval, the principle of linearity) found his “ε-Lorentz transformation” [11]. In 1977 Mansouri and Sexl proposed another more general transformation [12]. After that time, many papers on this topic, such as Bertotti [13], Tan Shu-Sheng [14,15], MacArthur [16], Haugan and Will [17], Abolghasem, Khajehpour and Mansouri [18], Riis et al. [19,20], Bay and White [21], Gabriel and Haugan [22], Krisher, et al. [23], and Will [24] were published. Also there are other form of space-time theory continue to use the invariant interval [25], still other form of generalized Lorentz transformation not educed from basic postulates [26]. But all of them are far from to harmonize Einstein relativity theory and the recent progress in quantum mechanics. As Nobel prize winner Britain physical scientist P. A. M. Dirac said: (to harmonize relativity theory and quantum mechanics) is the main problem of physics in the recent 40-years. A great deal of efforts had made for it, we still cannot find out a way to solve the problem [27].

However, since 1998 many new physics experiments about quantum theory were performed and analyzed at European laboratory for particle physics (CERN). These new experiments associate with John C. Mather and George F. Smoot's discovery of the blackbody form and anisotropy of the cosmic microwave background radiation have laid the foundation to harmonize Einstein relativity theory and quantum mechanics. This paper (book? not also been composed with paper? so we would say paper, the same below) appears: In the light of John C. Mather and George F. Smoot's discovery of the blackbody form and anisotropy of the cosmic microwave background radiation we amend “the principle of relativity”, in the light of the reasonable part in all the studious person's efforts had made to amend the special relativity we amend “the universal speed of light”, in the light of the progress in quantum theory since 1998 we set an new added postulate, reasoning from the three postulates (two amended postulates and a new added postulate) with mathematics as Einstein in the special relativity, we can reduce entirely new conclusion.

Next will be expressed by four steps.

The First Step: Set New Principle of Relativity, New Postulate of Light Speed, New Added Postulate

Set New Principle of Relativity

The first postulate of Einstein special relativity i.e. the principle of relativity: “The laws of physics apply in all inertial reference systems” [28,29]. It can be checked even with the event of everyday life. It makes people firmly believe “no inertial reference system is special, any two reference systems in uniform relative motion are identical for the laws of physics”. It seems to be absolutely right.
However, John C. Mather and George F. Smoot’s discovery of the blackbody form and anisotropy of the cosmic microwave background radiation (2006 Nobel prize) distinctly tell us: "Two reference systems in uniform relative motion are different". Therefore, we have no choice but to amend the principle of relativity to new principle of relativity: “The laws of physics apply in all inertial reference systems, while any two reference systems in uniform relative motion are different” (the different is the data of the two reference systems taking simultaneous measurement of the same physical quantity of the same body are different, please see later in 2.2 and 2.4, while the identical is their using his own measurement data of the physical quantities to build laws of physics the two reference systems are identical). Two reference systems in uniform relative motion are different, in different reference system taking measure of the anisotropy of the 3K background radiation’s radiation temperature is different, being in accord with John C. Mather and George F. Smoot’s discovery. Although as formerly theory when the reference system’s speed relative to the 3K background radiation field is v, because of Doppler effect, this reference system’s measurement data of the background radiation temperature will be $T = \frac{[1-(v/C)^2]^{1/2}}{[1-(v/C)\cos\theta]}$ [30]. Only in the 3K background radiation field reference system v=0, the radiation temperature's anisotropy disappears. However, does this mean that we can take the 3K background radiation field reference system v=0 as an absolute rest system in violation of relativity? Of course not! Because the movement still must be one relative to the other.

**Set New Postulate of Light Speed**

The second postulate of Einstein special relativity i.e. the universal speed of light: “The speed of light in vacuum is the same for all inertial observers, regardless of the motion of the source, the observer, or any assumed of propagation” [28,29]. The speed is the same regardless of the motion of the source or the observer etc is contrary to the common practice. Many studious persons have proposed many amended means before [9,10]. This paper different from Einstein, also different from any persons had made before, we fix the light source on to a reference system. Because “the average speed measured over a closed path is constant C” is a conclusion on a large numbers of experiments [31], and is the reasonable part in all the studious person’s efforts had made to amend the special relativity more perfect, we amend the universal speed of light to new postulate of light speed: “The average speed of any light ray from a stationary light source measured over a closed path in vacuum is always constant $C=3\times10^8$ ms⁻¹. Our amendment is either obeying with the result of the experiments or able to give the light speed more freedom: “the average over a closed path is constant C” allows the local speed of light over each short line segment component which built the closed path may not be C. The “light ray from a stationary light source” and cast off “regardless of the motion of the source, the observer, or any assumed of propagation” set our heart at rest. Our light source is fixed in the reference system, "the light ray come from the source" will be more clear, more unassailable.

Here new postulate of light speed’s “the average speed over a closed path is constant C” while the local speed of light over each short line segment component which build the closed path may not be C, seems to be similar as new principle of relativity’s “using his own measurement data of the physical quantities to build laws of physics the two reference systems in uniform relative motion are identical" while the data of measurement of the two reference systems taking simultaneous measurement of the same physical quantity of the same body may not identical.

**Set New Added Postulate**

The new physics experiments were performed and analyzed at CERN since 1998 relating this paper are: 1)Direct test of wave-particle duality (complementarity) by a “which-way” experiment in an atom interferometer [32,33]. 2) Einstein-Podolsky-Rosen (EPR) experiments were performed in two-photon entangled state to show the violation of Bell inequality under strict Einstein locality conditions [34] or to show [35,36] the quantum correlation over long distance (>10km). Also an EPR experiment was achieved at CERN to test the non-separability of entangled neutral-kaon wave function [37]. 3) First direct observation of time-reversal non-invariance in the neutral-kaon system [38,39]. The experiments 1) and 2) are directly related to reveals the essence of the measurement which can be summarized as three propositions: a) The measurement is founded to change the state of the object. b) The measurement is also quantum in essence. The quantum correlation (i.e. entanglement) between the measurement apparatus (with its reference system) and the object (with its environment) is founded to destroy the quantum correlation (quantum coherence) originally existing in the object and its environment. c) There is not any information (experimental data) existed before the measurement is taken. Now, the “measurement is founded to change the object by destroying the original quantum coherence between the object and object’s environment" is already general knowledge in physics circles [40]. So, this paper set it as one of the basic
postulates: the third postulate (new added postulate after the two amended postulates of the Einstein special relativity).

It must be pointed out that: 1) The “measurement is founded to change” in the third postulate is on both sides. Not only the being measured object been changed by the reference system’s taking measurement, but the reference system in taking measurement also been changed by the being measured object. Because it is the quantum correlation (i.e. entanglement) between the measurement apparatus (with its reference system) and the object (with its environment) been founded that destroys the quantum correlation (quantum coherence) originally existing between the object and its environment, of course it also destroys the quantum correlation (quantum coherence) originally (before the measurement is taken) existing between the reference system and the reference system’s measurement apparatus. 2) If two reference systems (for example Σ and Σa) simultaneously take measure of the same object, because of the third postulate, the simultaneous measurements of Σ and Σa will disturb each other, leading that both the measurement data of Σ and of Σa contain the intertactional impact of simultaneous measurement come one from the other (more precisely the interactional impact is among Σ and Σa and the being measured object three sides come one from the other instead of only between Σ and Σa two sides). 3) If many reference systems (for example Σ, Σa, Σb, Σc et al) joining in simultaneously taking measure of the same object, each reference system’s measurement data will contain all of the interactional impact come from all of the other reference systems’ simultaneous measurement, it is very complex. Of course the first simple case is only one reference system (for example Σ) in measuring, the interactional impact is only between Σ and the being measured object. The second simple case is only two reference systems (for example Σ and Σa) in simultaneously measuring, only two simultaneous measurements of Σ and Σa disturb each other —— or perhaps there are other reference system Σb, Σc et al while Σb, Σc et al do not join to measure with Σ and Σa, or there are Σb, Σc et al joining in simultaneous measurement with Σ and Σa while Σb, Σc et al are far (>>10km) off the place so that the interactional impact of simultaneous measurement from Σb, Σc et al are too weak to be neglected. 4) If two (or more) reference systems are not simultaneously taking measure of, the joining measurement of new reference system (or in simultaneous measurement reference system’s stopping measurement) will change the reference system(s) being in taking measurement and the being measured object by destroying the original quantum coherence between the reference system(s) and the being measured object.

To express simply, in the following Σ and Σa will be always in this case: Σ is moving along the positive direction of the x-axis of itself relative to the Σa, the Σ’s moving speed measured by Σa is constant v (of course the v is not limited i.e. it may be v→0 or v>C or v>C), both the x-axis of Σ and the x-axis of Σa are on the same horizontal line and the positive directions are from left to right, both the y-axis of Σ and the y-axe-axis of Σa are horizontal lines and the positive directions are from the book point to the reader, both the z-axis of Σ and the z-axis of Σa are vertical line and the positive directions are from below to above.

The Second Step: See New Things Certainly Come

See New Things Certainly Come from New Postulate of Light Speed

Considering Σ and Σa are simultaneously measuring the same a horizontal photon from the light source fixed at the Σ’s origin, we fix a glass plate on to the Σ’s x-axis to reflect the photon come from the Σ’s origin back to the Σ’s origin. How long time does it take that a photon to make this trip? The light source is in stationary relative to the Σ and the glass plate on to the Σ’s x-axis is also in stationary relative to the Σ so the light source's mirror image is also in stationary relative to the Σ. Because the light ray pass to and fro through the same path on the Σ’x-axis is a special case over a closed path, as new postulate of light speed, in Σ the average speed of the light ray should be the constant C. Using the absolute value to list the time equation in Σ is x/C+1/C=x/C (assume the Cx is a constant and the Cx may be another constant), Reduced the x it becomes 1/C+1/C=2/C. While in mathematics it always is (C<sub>x</sub><sup>1/2</sup> - C<sub>x</sub><sup>1/2</sup>)<sup>2</sup>≥0 combine it with 1/C<sub>x</sub>+1/C<sub>x</sub>=2/C we get (C<sub>x</sub><sup>1/2</sup>-C<sub>x</sub><sup>1/2</sup>)≥C bring into 1/C<sub>x</sub>+1/C<sub>x</sub>=2/C we can get (C<sub>x</sub>+C<sub>x</sub>)≥2C. It tells us: at least C<sub>x</sub> or C<sub>x</sub> is higher than C, then we can guess: if nobody nearby Σ and Σa it must be that the C<sub>x</sub> and C<sub>x</sub> just are C<sub>x</sub>≥C and C<sub>x</sub>≤C, in mathematics if and only if C<sub>x</sub></sub>=C<sub>x</sub> we can get they are C<sub>x</sub>=C<sub>x</sub>. Of course when Σ and Σa are simultaneously measuring the same a horizontal photon from the light source fixed at the Σa’s origin the Σa’s measurement data of light speed must be C<sub>a</sub>≤C and C<sub>a</sub>≥C (just opposite to C<sub>a</sub>≤C and C<sub>a</sub>≤C). While the C<sub>a</sub>≥C (or C<sub>a</sub>≤C) breaks “C is the maximal and unsurpassable speed”.
Of course in $1/C_\times+1/C_\times=2/C$ the two speed of light $C_\times$ and $C_\psi$ must be: the more the one, the small the other. For example $C_\times$ at maximal is $C_\times\rightarrow\infty$, and then the $C_\times$ must be at lowest $C_\times\rightarrow C/2$, i.e. when light source is “in stationary” the photon’s speed will always between $[C/2, \infty)$.

**See New Things Certainly Come from New Added Postulate**

In 2.1 above, in $\Sigma$ and $\Sigma$'s measuring the same a horizontal photon from the light source fixed at the $\Sigma$’s origin when no other body nearby, the $\Sigma$’s measurement data of the horizontal photon’s speed along the positive direction of the $x$-axis would be $C_\times=\leq C$ and along the opposite direction be $C_\times=\geq C$. As new added postulate, besides experienced the Newtonian universal gravitation and other actions it is originally because the measurement data of $\Sigma$ is disturbed by the simultaneous measurement of $\Sigma$. It is the reference system’s taking measurement (more precisely the quantum correlation (i.e. entanglement) between the measurement apparatus (with its reference system) and the being measured object been founded) instead of the ether or the being measured object’s motion that changes both the being measured object and the reference system itself. It is evident that different $\Sigma$ will bring different disturbing then result in different $C_\times$ and $C_\psi$ only $1/C_\times+1/C_\times=2/C$ being unchanged in form. It is in accord with the new principle of relativity: “The laws of physics apply in all inertial reference systems, while any two reference systems in uniform relative motion are different”.

“Two reference systems in uniform relative motion are different”. Of course the most acceptable difference between two reference systems is the mass rest in the reference systems (more precisely the mass joining in the quantum correlation of taking the measurement). Therefore, we define the mass rest in the reference system (joining in the quantum correlation) as the reference system’s referenced weight, define the center of the mass as the reference system’s origin. Then, as the new added postulate and “the measurement is founded to change” in the new added postulate actually is on both sides, we can consequently get: In taking measure of, the greater the referenced weight a)the stronger the reference system destroys the original (before the measurement is taken) quantum coherence between the being measured object and its environment, b)the less the reference system itself being changed by the being measured object, c)the stronger the reference system disturbs the other reference system’s measurement data of taking simultaneously measure of the same object, d)the less the reference system’s measurement data been disturbed by other reference system’s taking simultaneously measure of the same object; on the opposite, the less the referenced weight, it is just the reversed case of a), of b), of c), of d). Then we can guess: It perhaps that space is not empty the reference system’s space is something around the referenced weight, if there is not referenced weight then saying nothing of the space around the referenced weight, so do the reference system’s time.

As above, for example we (on earth) take measure of a micro-particle, $\Sigma_0$ is our earth’s reference system, while $\Sigma$ is the particle’s reference system (the particle is “stationary” in it and its moving speed measured by $\Sigma_0$ is constant $v$). Compared with our $\Sigma_0$ earth’s mass the $\Sigma$ particle’s mass is infinitely small. Therefore, the $\Sigma$ particle’s taking measure of us disturbs our earth $\Sigma_0$ infinitely small. However, our earth $\Sigma_0$’s taking measure of the particle disturbs the $\Sigma$ particle infinitely great, almost type of deciding the particle’s there be or there not be. Then we educe: In taking measurement of a micro-particle, because the micro-particle’s mass is too small, the “on” or “off” of the quantum correlations (i.e. entanglements) between the micro-particle and the other objects in the environment make the micro-particle’s behaviour uncertainty. Perhaps it is the essence of the uncertainty in the Heisenberg Uncertainty Principle.

**See New Physics Meanings Certainly Come from the New Added Postulate**

About the physical meanings of the Lorentz transformation even Einstein and Lorentz himself each stuck to his own opinion until they past away [30]. In fact, off a physical quantity’s measurement process to discuss its physics meanings is a thing cannot exist without its basis. Therefore, as the new added postulate’s suggestion, we establish the coordinates relation of the two inertial reference systems $\Sigma$ and $\Sigma$ from $\Sigma$ and $\Sigma_0$ (there may be other reference systems $\Sigma_0$, $\Sigma_0$ et al and perhaps some of the $\Sigma_0$, $\Sigma_0$ et al are joining in) simultaneously take measure of the same object’s process of a physics event taking place.

First of all, we stipulate “the definition of measurement unit of $\Sigma$ and of $\Sigma_0$ is the same”. For example one second is the time in which there occur $9192631770$ oscillations of the cesium atom “stationary” in the reference system, one centimeter is $165076373$ wavelengths of red light from Kr$^{86}$ “stationary” in the reference system etc. We suppose the mass rest in the $\Sigma$ is $M_0$, the center of $M_0$ is $\Sigma$’s origin; the mass rest in the $\Sigma_0$ is
M_{a0}, the center of M_{a0} is the Σ_i's origin. Here we must remind you: A) The "actual length" of time of the same cesium atom "stationary" in Σ being measured alone by Σ occur 9192631770 oscillations is not equal to "stationary" in Σa being measured alone by Σ occur 9192631770 oscillations, because M_{a0}≠M_{a0} they are different quantum correlation (i.e. entanglement). As we known, different quantum correlation (i.e. entanglement) is corresponding to different quantum energy level. B) Also because they are different quantum correlation (i.e. entanglement), the "actual length" of time of the same cesium atom "stationary" in Σ being measured alone by Σ occur 9192631770 oscillations is not equal to being simultaneously measured by Σ and Σ, occur 9192631770 oscillations. So do other unit only the measurement unit's "definition" is unchanged, while the measurement unit's "actual length" can change or be changed in different quantum correlation (i.e. entanglement) is different. C) Although the "actual length" of the same unit in different case (for example as above in A) and in B) is different, while the reference system himself is not aware of it using his own unit taking measure of himself cannot obtain his own change, he thinks the "actual length" of his unit is always the same and being unchanged in different case.

Now, we set Σ and Σ, "start his own clock" (t =0 and t_{a0}) at the moment Σ's coordinate axis frames and Σ_i's coordinate axis frames coincide. It must be especially pointed out: Now that the reference systems "start his own clock" and the stipulation "the definition of measurement unit of the two reference systems is the same", time coordinate should be something as space coordinate, each the reference systems is severally using his own clock to determine his own time coordinate in simultaneously measuring the same object's physics process taking place, it must be that there is not the problem to have to synchronize the clocks of the two reference systems before simultaneous time measurement (do you think you need to synchronize the x and x, to y, or y and y, to z, or z and z, to x etc before space coordinate measurement?).

We suppose Σ and Σ, are in the simultaneous measurement of the same object's process of a physics event taking place, the Σ's measurement data are from (0,0,0,0) to (x, y, z, t) and the Σ_i's are from (0,0,0,0) to (x_{a}, y_{a}, z_{a}, t_{a}) . Namely, Σ's time t =0 and Σ_i's time t_{a0} are at the same instant of time, while Σ's time t and the Σ_i's time t_{a0} are at the another same instant of time. It seems that with unit it must be "Σ's t second (i.e. tΣ's one second)=Σ_i's t_{a0} second (i.e. t_{a0Σ_i's one second)" because Σ and Σ, are simultaneously measuring the same object's process taking place; while the numerical value before the unit is "t×t_i" because M_{i0}≠M_{a0} and v≠0, from the new added postulate, the disturbing of Σ and of Σ, in simultaneous measurement are different, leading the "actual length" of time unit to be "Σ's one second ≠Σ_i's one second", though both the definition of "one second" of Σ and of Σ, is the same. No. That is not the case. In fact, even with unit it still is "Σ's t second (i.e. tΣ's one second) ≠Σ_i's t_{a0} second (i.e. t_{a0Σ_i's one second)"; the "actual length" of the same definition of time unit in Σ ≠ in Σ_i because M_{i0}≠M_{a0} the same definition of time's unit in Σ and in Σ, are different quantum correlation (i.e. entanglement). Even v =0 it still will be that the "actual length" of the same definition of time's unit in Σ ≠ in Σ_i because M_{i0}≠M_{a0} the same definition of time's unit in Σ and in Σ, are different quantum correlation (i.e. entanglement). For example, when v =0, Σ and Σ, taking simultaneous measurement of the same time of an object's process of a physics event taking place, it must be that both Σ's measurement data and Σ_i's measurement data are t second, however, Σ_i's one second ≠Σ_i's one second (only the numerical value before the Σ's time unit and the numerical value before the Σ_i's time unit are the same t) because M_{i0}≠M_{a0} the same definition of time's unit in Σ and in Σ_i are different quantum correlation (i.e. entanglement). Of course the space length unit is also something as time unit: the "actual length" of space length unit of Σ's one meter ≠ of Σ_i's one meter, so do other physical quantities' unit.

In fact, from the C) of "we must remind you" before, we can see: We need not to pay attention to the "actual length" of the same definition of an unit in Σ ≠ in Σ_i and in Σ_i's alone measuring ≠ in Σ and Σ_i's simultaneous measuring etc (we have stipulated "the definition of measurement's unit of Σ and of Σ_i is the same") is enough. What we have interest in are: in Σ and Σ_i's simultaneous measuring the same physical quantity of the same object, the numerical value before unit of Σ ≠ of Σ, and what the relation between the numerical value before unit of Σ and of Σ, is? Generally, we suppose the relation about (x, y, z, t) and (x_{a}, y_{a}, z_{a}, t_{a}) is linearity as below:

\[
\begin{pmatrix}
  x \\
  y \\
  z \\
  t
\end{pmatrix} =
\begin{pmatrix}
  a_{11} & a_{12} & a_{13} & a_{14} \\
  a_{21} & a_{22} & a_{23} & a_{24} \\
  a_{31} & a_{32} & a_{33} & a_{34} \\
  a_{41} & a_{42} & a_{43} & a_{44}
\end{pmatrix}
\begin{pmatrix}
  x_{a} \\
  y_{a} \\
  z_{a} \\
  t_{a}
\end{pmatrix}
\]

(why it is linearity? Fuke BA [41] though our definiens and postulates are different from them, while the reasons or principles are analogous). The a_{ij}(i,j =1,2,3,4) of (1)a
In taking measure of the same a stationary space-length or a time-length or a mass when \( v = 0 \): 1) \( \Sigma \) alone (\( \Sigma a \) and other reference system do not join) in taking measure of, the \( \Sigma \)'s measurement changes \( \Sigma \) self and the being measured object in the same scale (for the being measured object is "stationary" in \( \Sigma \), \( \Sigma \)'s measurement data is \( 10 \) or \( 0 \) or \( m0 \) or \( 0 \) or \( m0 \) as \( \Sigma a \) alone taking measure of). 2) \( \Sigma a \) alone (\( \Sigma a \) and other reference system do not join) in taking measure of, the \( \Sigma a \)'s measurement changes \( \Sigma a \) self and the being measured object in the same another scale (for \( M0\neq Ma0 \)). Because a) the definition of measurement unit in \( \Sigma \) and in \( \Sigma a \) is the same, although "\( \Sigma a \)'s measurement changes both \( \Sigma a \) self and \( \Sigma a \)'s being measured object" in 2) is different from "\( \Sigma \)'s measurement changes both \( \Sigma \) self and the \( \Sigma \)'s being measured object" in 1) (for \( M0\neq Ma0 \)), while the \( \Sigma a \)'s measurement data is the same \( 10 \) or \( 0 \) or \( m0 \) as \( \Sigma a \)'s in 1) (Please note: only the numerical values before \( \Sigma a \)'s unit in 2) = the numerical values before \( \Sigma a \)'s unit in 1) while the actual length of \( \Sigma a \)'s unit in 2) ≠ the actual length of \( \Sigma \)'s unit in 1), for \( M0\neq Ma0 \). 3) \( \Sigma a \) joins simultaneous measurement with \( \Sigma \) in \( \Sigma \)'s taking measure of, the \( \Sigma \)'s measurement data will still be the same \( 10 \) or \( 0 \) or \( m0 \) as in 1), although here "\( \Sigma \)'s measurement changes \( \Sigma \) self and the being measured object in the same scale" is different from in 1) for \( \Sigma a \)'s measurement disturbing. It is because \( \Sigma \) and the \( \Sigma a \)'s being measured object are equally changed i.e. are changed in the same scale (because the object being "stationary" in \( \Sigma a \) by the disturbing of \( \Sigma \)'s simultaneous measurement and by the \( \Sigma a \)'s self's measurement. Therefore, although here \( \Sigma \)'s unit and \( \Sigma \)'s being measured object have been changed into not the same as \( \Sigma \)'s alone taking measure of in 1), however, the \( \Sigma \)'s measurement data is still the same as in 1) (please note: only the numerical values before \( \Sigma \)'s unit in 3) = the numerical values before \( \Sigma \)'s unit in 1), while the actual length of \( \Sigma \)'s unit in 3) ≠ the actual length of \( \Sigma \)'s unit in 1), because "\( \Sigma a \) joins simultaneous measurement with \( \Sigma \) " changes \( \Sigma \) and \( \Sigma a \)'s being measured object). 4) In 3) on \( \Sigma a \) hand, because of \( v=0 \), the being measured object also is "stationary" in \( \Sigma a \) as in \( \Sigma \), "\( \Sigma a \) and \( \Sigma a \)'s being measured object stationary in \( \Sigma a \)" are equally changed (i.e. changed in the same scale) by the disturbing from \( \Sigma \)'s simultaneous measurement and by the \( \Sigma a \)'s self's measurement, therefore, although both \( \Sigma a \)'s unit and the \( \Sigma a \)'s being measured object have been changed into not the same as in 2), however, the \( \Sigma a \)'s measurement data is still the same \( 10 \) or \( \tau 0 \) or \( m0 \) as \( \Sigma a \) alone taking measure of in 2). Namely, when \( v = 0 \), whether simultaneous measurement or alone measurement, both \( \Sigma \) and \( \Sigma a \) can accurately get that not only origins be coincident but also any other corresponding points on axis frames be coincident as well, although the "actual length" of the reference system's unit and the being measured object have been changed (dilate or contract) by his own measurement or both by his own and by the disturbing from another reference system's simultaneous measurement, the \( \Sigma \)'s measurement data of the being measured object is always the same and not different from the \( \Sigma \)'s. Represented with (1)a (of course (1)a only represents the measurement data of space and time) it will be stipulation: When \( v = 0 \), the coefficient matrix of (1)a becomes identity matrix (the coefficient element becomes Kronecker symbol \( a_{ij}=\delta_{ij} \) for \( i=j \) i.e. \( a_{ij}=\delta_{ij} \delta_0 \) for \( i\neq j \)).
taking measure of \( m_1 \) #one \( \Sigma \)'s second in \( \Sigma \) alone taking measure of \( m_2 \) if \( m_1 \neq m_2 \) etc. Different measurement will result in different change (dilation or contraction) of the reference system and the being measured object, only the numerical values before \( \Sigma \)'s unit = “the numerical values before \( \Sigma \)'s unit” when \( v = 0 \), namely the axis frames of \( \Sigma \) and of \( \Sigma_a \) only are number axis (not with unit). Of course (1)a is only the space-time coordinates numerical values relation not with unit, (only we have stipulated “the definition of measurement unit of \( \Sigma \) and of \( \Sigma_a \) is the same”). Of course so do other physical quantities. However, it just is the true fact what we see in our real-world. Do you understand? If not, you need to re-think the C of “we must remind you” before, till understand.

In taking measure of the same a stationary space-length or a time-length or a mass when \( v \neq 0 \): 5) The being measured object is stationary in \( \Sigma \) and \( \Sigma_a \) alone (\( \Sigma_a \) and other reference system do not join) in taking measure of, the \( \Sigma \)'s measurement data also will be the same \( l_0 \) or \( t_0 \) or \( m_0 \) as in 1) (there \( v = 0 \)). Because \( \Sigma \) and other reference system do not join, the quantum correlation (i.e. entanglement) between \( \Sigma \) and the \( \Sigma \)'s being measured object is the same as in 1). 6) The being measured object is stationary in \( \Sigma_a \) and \( \Sigma \) alone (\( \Sigma \) and other reference system do not join) taking measure of, the \( \Sigma_a \)'s measurement data will be the same \( l_0 \) or \( t_0 \) or \( m_0 \) as in 2) (there \( v = 0 \)), the same data as the \( \Sigma \)'s in 5) and the \( \Sigma \)'s in 1), also because \( \Sigma \) and other reference system do not join, the quantum correlation (i.e. entanglement) between \( \Sigma \) and the \( \Sigma \)'s being measured object is the same as in 2). 7) The being measured object is “stationary” in \( \Sigma \) and \( \Sigma_a \) join simultaneous measurement with \( \Sigma \) in \( \Sigma_a \)'s taking measure of, the \( \Sigma \)'s measurement data will still be the same \( l_0 \) or \( t_0 \) or \( m_0 \) although this time both the \( \Sigma \)'s measurement unit and \( \Sigma \)'s being measured object have been changed into not the same as in 3) (the quantum correlation (i.e. entanglement) is not the same as in 3) for there \( v = 0 \) here \( v \neq 0 \)). It is because the \( \Sigma \)'s measurement unit and the \( \Sigma \)'s being measured object are equally changed i.e. are changed in the same scale (for the object “stationary” in \( \Sigma \)) by the \( \Sigma \) self's measurement and by the disturbing from \( \Sigma \)'s (as well as and other reference system's) simultaneous measurement. However, this time on \( \Sigma_a \) hand, because of \( v \neq 0 \) the \( \Sigma \)'s being measured object is “in motion” (with \( \Sigma \)) in \( \Sigma_a \), therefore, this time the \( \Sigma_a \)'s unit and the \( \Sigma_a \)'s “in motion” being measured object in \( \Sigma \) are not equally changed (i.e. are changed not in the same scale) by the \( \Sigma \) self's measurement and by the disturbing from \( \Sigma \)'s (or \( \Sigma \) and other reference systems' simultaneous) measurement in \( \Sigma_a \)'s angle of view! Therefore, this time the \( \Sigma_a \)'s measurement data will not be the same \( l_0 \) or \( t_0 \) or \( m_0 \) as \( \Sigma \)'s in 6)! 8) The object “stationary” in \( \Sigma_a \) and \( \Sigma \) (or \( \Sigma \) and other reference systems) join(s) simultaneous measurement with \( \Sigma \) in \( \Sigma_a \)'s taking measure of, the \( \Sigma_a \)'s measurement data is the same \( l_0 \) or \( t_0 \) or \( m_0 \) as in 3) on \( \Sigma_a \) hand (there \( v = 0 \) here \( v \neq 0 \)), although different measurement state result in different change (dilation or contraction) of the reference system and the reference system’s being measured object, however, here \( \Sigma \)'s measurement unit and \( \Sigma_a \)'s being measured object are equally changed or changed in the same scale (for the object “stationary” in \( \Sigma_a \)), therefore, \( \Sigma_a \)'s measurement data still be the same \( l_0 \) or \( t_0 \) or \( m_0 \) as in 3), in 2), in 6) on \( \Sigma_a \) hand. However, this time on \( \Sigma \) hand, because \( \Sigma_a \)'s being measured object is “in motion” in \( \Sigma \), the \( \Sigma \)'s measurement unit and the \( \Sigma \)'s being measured object are not equally changed (i.e. are changed not in the same scale) by the \( \Sigma \) self's measurement and by the disturbing from \( \Sigma_a \)'s (or \( \Sigma \) and other reference systems’ simultaneous) measurement in \( \Sigma \)'s angle of view, therefore, this time the \( \Sigma \)'s measurement data of the same being measured object’s physical quantity, the object “in motion” is different from “in stationary”, two reference systems’ simultaneous measurement is different from one reference system’s alone measurement. Namely when \( v \neq 0 \) in \( \Sigma \) and \( \Sigma_a \) taking simultaneously measure of the same a physical quantity, the numerical value before \( \Sigma \)'s unit ≠ the numerical value before \( \Sigma_a \)'s unit, both \( \Sigma \) and \( \Sigma_a \) can accurately get that at the two axis frames coincide moment (\( t = 0 \) and \( t_a = 0 \)) only \( \Sigma \)'s origin and \( \Sigma \)'s origin coincide while any other corresponding points on axis frames do not coincide (though the two axis frames coincide)! Namely “when \( v \neq 0 \) the coefficient matrix of (1)a is not identity matrix”.

From above we can see: When \( v = 0 \), the reference system taking measure of a stationary object cannot see that his measurement have changed both himself and the being measured object, cannot see that he and another reference system’s simultaneous measurement disturb each other, for the numerical value before \( \Sigma \)'s unit = the numerical value before \( \Sigma_a \)'s unit (though the measurement data of the same being measured object “in motion” is different from “in stationary”). If and only if \( v \neq 0 \), can the simultaneous measurement of \( \Sigma \) and \( \Sigma_a \) disturbing each other be seen by \( \Sigma \) and \( \Sigma_a \) themselves —— the \( \Sigma \)'s measurement data different from the \( \Sigma_a \)'s, the difference on the space-time coordinates between \( \Sigma \) and \( \Sigma_a \) (there may be other reference systems \( \Sigma_b \), \( \Sigma_c \) etc. al and perhaps some of the \( \Sigma_b \), \( \Sigma_c \) et al are joining) in simultaneously taking measure of the same object’s
process of a physics event taking place as shown in (1)a, the coefficient matrix of (1)a is not identity matrix when v≠0.

Now, we can see: In explaining the Heisenberg Uncertainty Principle in ending of 2.2, the uncertainty must occur and only occurs in taking measure of the "in motion" micro-particle. We also can see: In taking measure of an “in motion” micro-particle, our simultaneous measurement disturb the micro-particle infinitely great is of course measurable phenomenon ourselves, while the micro-particle himself is not aware of it (using his own unit taking measure of itself cannot get his own change). We still can see: When v≠0, only if v→0 is the difference between the simultaneous measurement data (numerical value before unit) of Σ and of Σ₂ close to zero (actually only v =0 can we get “the measurement data (numerical value before unit) of Σ = of Σ₂”).

Of course whether or not v =0 and v≠0, one can compare the same physical quantities of his own reference system, for example, compare the speed of a light ray from a stationary source to some direction with to the opposite direction. If the light speed in this direction is greater than in the opposite direction, he can guess: from the stationary light source to some not far away place in this direction there may be a big mass object. Or comparing the speed of a light ray from a stationary source to the same direction in different time, if the speed is increscent (more and more great), he can object. Or comparing the speed of a light ray from a reference system, for data (numerical value before unit) of Σ and of Σ₂ take simultaneous measurement of the same speed of relative motion. Actually, it reminds us again: Σ and Σ₂ take simultaneous measure of the same speed’s measurement data. As light speed’s "the average over a closed path is constant C" while the local speed of light over each short line segment component which build the closed path may not equal to C, “the Σ and Σ₂ are identical for taking his own measurement data to build laws of physics” while may not identical for each the component physical quantity which build the laws of physics (of course physics law is built by the physical quantities such as distance, time interval, speed etc.) in Σ and Σ₂ simultaneously taking measure of the same physical quantity of the same object, the measurement data of Σ and of Σ₂ are different and Σ and Σ₂ are different for M≠M₀ and v≠0, being in accord with John C. Mather and George F.’s discovery, while in using his own measurement data of the physical quantities to build laws of physics Σ and Σ₂ are identical (therefore the laws of physics apply in all inertial reference systems, while any two reference systems in uniform relative motion are different).

The Third Step: Get Three Basic Physical Quantities in Mechanics Under (1)b

As known in 1.3 and 2.3, the element of (1)b coefficient matrix also depends on the being measured object’s state. If the being measured object is in stationary in Σ we denote the element $a_{ij}(i,j=1,2,3,4)$ of (1)a by $a_{ij}$, stationary in Σ₂ we denote $a_{ij}(i,j=1,2,3,4)$ of (1)a by $a_{ij}$, in motion in both Σ and Σ₂ we denote $a_{ij}(i,j=1,2,3,4)$ of (1)a by $a_{ij}$, it of course is $p_{ij}q_{ij}$ (because they are different quantum correlation (i.e. entanglement)). As 2.2 only if the mass of the being measured object is small enough.
can the reference system (taking measurement) been changed by the being measured object be slight enough, can the reference systems’ measurement data been changed by the reference systems themselves simultaneous measurements interactional impact become main part, will it be \( a_i = p_i = q_i \) approximately be \( a_i = p_i = q_i \) (of course the more the mass of the being measured object close to zero and two reference systems origins in a more short way off, the more the \( a_i = p_i = q_i \) accurate). To reduce the case, in the following we will only consider the mass of the being measured object is sufficiently small and two reference systems origins in a sufficiently short way off, it always approximately is in \( a_i = p_i = q_i \) except particular explanation. (Special remind: here “the \( \Sigma \)’s moving speed measured by \( \Sigma \) is constant \( v \) the \( v \) is not limited, it may be \( v \to 0 \) or \( >C \) or \( >C \).

**The Numerical Value Relation of \( \Sigma \) And \( \Sigma_a \)’s Measurement Data in Simultaneously Measuring the Same “Time-Length” and “Space-Length” Stationary in \( \Sigma \) or \( \Sigma_a \)

In \( \Sigma \) and \( \Sigma_a \) (there may be other reference systems \( \Sigma_b \), \( \Sigma_c \) etc al and perhaps some of the \( \Sigma_b \), \( \Sigma_c \) et al joining in) taking simultaneous measurement of a radiate element’s half-life, considering “stationary” at \( \Sigma \)’s origin and then their measurement numerical value must be \(( 0,0,0,0) \) in \( \Sigma \) and \(( x_a, 0, 0, \alpha ) \) in \( \Sigma_a \) (in \( \Sigma \) the radiate element is “in motion” we sign”→”at the right up corner of its numerical value, the same below). Bring them into (1)b we get “(1)b \( \Sigma \) origin”

\[
\begin{pmatrix}
0 \\
0 \\
\tau
\end{pmatrix} =
\begin{pmatrix}
a_{11} & 0 & 0 & (-v)a_{11} \\
a_{22} & 0 & 0 & 0 \\
a_{41} & 0 & 0 & a_{44}
\end{pmatrix}
\begin{pmatrix}
x_a \\
0 \\
0
\end{pmatrix}
\]

(1)b \( \Sigma \) origin

From the 1st row and the 4th row of “(1)b \( \Sigma \) origin” we get \( 0 = a_{11}(x_a → - v x_a →) \) and \( \tau = a_{41} x_a → - a_{44} \tau x → \), we solve these two simultaneous equations get

\[
\tau_a → = \frac{1}{(a_{44} + va_{41})} \cdot \tau
\]

(2)

If stationary at \( \Sigma_a \)’s origin and then their measurement numerical value must be \(( x →, 0, 0, \tau → ) \) in \( \Sigma \) (in \( \Sigma \) the radiate element is “in motion” and \(( 0, 0, 0, \tau a ) \) in \( \Sigma_a \). Bring into (1)b we get “(1)b \( \Sigma_a \) origin”

\[
\begin{pmatrix}
0 \\
0 \\
\tau
\end{pmatrix} =
\begin{pmatrix}
a_{11} & 0 & 0 & (-v)a_{11} \\
a_{22} & 0 & 0 & 0 \\
a_{41} & 0 & 0 & a_{44}
\end{pmatrix}
\begin{pmatrix}
x_a \\
0 \\
0
\end{pmatrix}
\]

(1)b \( \Sigma_a \) origin

From the 4th row of “(1)b \( \Sigma \) origin” we get

\[
\tau → = a_{44} \tau_a
\]

(3)

(It must be pointed out: actually the \( a_{44} \) in (3) ≠ the \( a_{44} \) in (2) etc, it only approximately is \( a_i = p_i = q_i (=a_4) \) for the mass of the being measured object is small enough, as we have expressed at the front and the same below without explanation).

In taking simultaneous measurement of a piece of space-length, if stationary on the \( \Sigma \)’s x-axis, their measurement numerical value must be \(( l, 0, 0, t ) \) in \( \Sigma \) and \(( l_{x →}, 0, 0, 0 ) \) in \( \Sigma_a \) (in \( \Sigma \) the piece of space-length is “in motion”, we must take measure all parts of it at one instant of time of \( \Sigma_a \)). Bring into (1)b we get “(1)b x-axis”

\[
\begin{pmatrix}
l \\
0 \\
t
\end{pmatrix} =
\begin{pmatrix}
a_{11} & 0 & 0 & (-v)a_{11} \\
a_{22} & 0 & 0 & 0 \\
a_{41} & 0 & 0 & a_{44}
\end{pmatrix}
\begin{pmatrix}
l_{x →} \\
0 \\
0
\end{pmatrix}
\]

(1)b x-axis

From the 1st row of “(1)b x-axis” we can get \( l → a_{11} l_{x →} \) i.e.

\[
l_{x →} = \frac{1}{a_{11}} \cdot l
\]

(4)

If stationary on \( \Sigma_a \)’s xa-axis their measurement numerical value must be \(( l →, 0, 0, 0 ) \) in \( \Sigma \) (in \( \Sigma \) the piece of space-length is “in motion” we must take measure all parts of it at one instant of time of \( \Sigma_a \)) and \(( l_{x a →}, 0,0,t_a ) \) in \( \Sigma_{x a} \). Bring into (1)b we get “(1)b xa-axis”

\[
\begin{pmatrix}
l \\
0 \\
t
\end{pmatrix} =
\begin{pmatrix}
a_{11} & 0 & 0 & (-v)a_{11} \\
a_{22} & 0 & 0 & 0 \\
a_{41} & 0 & 0 & a_{44}
\end{pmatrix}
\begin{pmatrix}
l_a \\
0 \\
0
\end{pmatrix}
\]

(1)b xa-axis

From the 1st and the 4th row of “(1)b xa-axis” we get \( l = a_{11} l_{x a →} \) and \( 0 = a_{11} l_a + a_{44} l_a \). We solve these two simultaneous equations get
If stationary on the $\Sigma$'s y-axis vertical the reference system moves, it must be $(0, l, 0, t)$ in $\Sigma$ and $(0, l_y \rightarrow 0, 0)$ in $\Sigma_a$ (in $\Sigma_a$ the piece of space-length is in motion, we must take measurement all parts of it at one instant of time of $\Sigma_a$). Bring into (1) we get “(1) y-axis”

$$l \rightarrow = \frac{a_{11}}{a_{44}}(a_{44} + va_{41}) \cdot l_y$$

(5)

From the 2nd row of “(1) y-axis” we get $l = a_{22}$. i.e.

$$l \rightarrow = \frac{1}{a_{22}} \cdot l$$

(6)

If stationary on y axis instead of y-axis it must be $(0, l_y \rightarrow 0, 0)$ in $\Sigma$ (in $\Sigma$ the piece of space-length is in motion, we must take measurement all parts of it at one instant of time of $\Sigma$ and $(0, l_y, 0, t)$ in $\Sigma_a$. Bring into (1) we get “(1) y-axis”

$$l \rightarrow = \begin{vmatrix} a_{11} & 0 & 0 & (-v)a_{11} \\ 0 & a_{22} & 0 & 0 \\ 0 & 0 & a_{33} & 0 \\ 0 & 0 & a_{44} & l_a \end{vmatrix}$$

(1) y-axis

(7)

From the 2nd row of “(1) y-axis” we get

$$l \rightarrow = a_{22} \cdot l_a$$

(7)

Analogous getting (6) and (7) we can get

$$l \rightarrow = \frac{1}{a_{33}} \cdot l$$

(8)

$$l \rightarrow = a_{33} \cdot l_a$$

(9)

The Numerical Value Relation of $\Sigma$ And $\Sigma_a$'s Measurement Data in Simultaneously Measuring the Same A Mass

The equations (1)-(9) have not involved all of the three basic physical quantities in mechanics. All of involved only space-length or time-length, the mass quantity not being involved. Suppose the results of $\Sigma$ and $\Sigma_a$ simultaneously measuring the same a mass particle’s momentary velocity, measurement data of $\Sigma$ to be $u=(u_x, u_y, u_z)$ and of $\Sigma_a$ to be $u_a=(u_{ax}, u_{ay}, u_{az})$. For approximately $a \approx p^e = m^e = a^e$ i.e. $a$ is constant as $v$, the differentiation of (1)a’ are: the 1st row gives $dx = a_{11} \cdot dx + a_{44} \cdot dt_a$ the 2nd row gives $dy = a_{22} \cdot dy$, the 3rd row gives $dz = a_{33} \cdot dz$, the 4th row gives $dt = a_{44} \cdot dz + a_{44} \cdot dt_a$. Then we can from the quotient get

$$u_x = \frac{dx}{dt} = \frac{a_{11} \cdot dx + a_{44} \cdot dt_a}{a_{44} \cdot dt_a} = \frac{a_{11} + a_{44} \cdot l_a}{a_{44} \cdot l_a}$$

(1st be divided by 4th)

$$u_y = \frac{dy}{dt} = \frac{a_{22} \cdot dy}{a_{44} \cdot dt_a} = \frac{a_{22} \cdot l_a}{a_{44} \cdot l_a}$$

(2nd be divided by 4th)

$$u_z = \frac{dz}{dt} = \frac{a_{33} \cdot dz}{a_{44} \cdot dt_a} = \frac{a_{33} \cdot l_a}{a_{44} \cdot l_a}$$

(3rd be divided by 4th)

Either all of the sages even Einstein or contemporary celebrities (e.g. [30,42,43] etc) are just so above. No body (apart from me) think that in fact we can compose the above with the matrix of (1)a’ as below:

$$\begin{pmatrix} u_x \\ u_y \\ u_z \\ l_a \end{pmatrix} = \begin{pmatrix} a_{11} & 0 & 0 & a_{44} \\ 0 & a_{22} & 0 & 0 \\ 0 & 0 & a_{33} & 0 \\ 0 & 0 & 0 & a_{44} \end{pmatrix} \begin{pmatrix} u_{ax} \\ u_{ay} \\ u_{az} \\ l_a \end{pmatrix}$$

(10)

The first row of (10) is the (1st be divided by 4th), the second row of (10) is the (2nd be divided by 4th), the third row of (10) is the (3rd be divided by 4th) and the 4th row of (10) is identity 1=1. However, with the (10) we can make the discovery of the results of $\Sigma$ and $\Sigma_a$ taking simultaneously measurement of the same a mass: Taking note of that simultaneously measuring the same a mass, as known in 2,3, no matter $v=0$ or $v \neq 0$ the mass is stationary in $\Sigma$ or stationary in $\Sigma_a$, the measurement data of the stationary mass is the same $m_0$. So, we multiply the (10) by $m_0$ get “$m_0$”
Now that the same mass is stationary in $\Sigma$ or in $\Sigma_a$ the measurement data is the same $m_0$, however, when $v \neq 0$, being stationary in one reference system and it’s measurement data must be $m_0$ in this reference system, what the other reference system’s measurement data is? It of course must be not $m_0$ because it is “in motion”. In simultaneously measuring the same mass particle’s momentary velocity, when $u=u(0,0,0)$ in $\Sigma$, $m_0(10)$ must go to

$$m_0 = m_0 \left( \begin{array}{ccc} a_{11} & 0 & 0 \\ 0 & a_{22} & 0 \\ 0 & 0 & a_{44} \end{array} \right) \left( \begin{array}{c} u_x \\ u_y \\ u_z \end{array} \right)$$

where

$$m_0 = m_0 \left( \begin{array}{c} a_{11} \\ 0 \\ 0 \end{array} \right) = \frac{m_0}{0} \left( \begin{array}{c} a_{11} \\ 0 \\ 0 \end{array} \right)$$

From the 1st row of (10) we get $C_{ax}=a_1[\alpha_{ax}^{+}\alpha_{ax}^{-}]=(v)^{(1/2)}$. As (1) $a_{11} = 0$ in 2.3, when the particle’s momentary velocity is $v$, the (11) will go to $m_0=[a_{44}(0)+a_{33}(0)] \ i.e. \ m_0 = m_0/0 \left( \begin{array}{c} a_{11} \\ 0 \\ 0 \end{array} \right)$ i.e. $m_0$ is just the right result. Here (11) is deduced from the coordinates relation (1)b instead of from a particular collision [30,42,43,44]. In 2.1, it must be $C_{ax}=C_{ax}$, actually be $v \rightarrow 0$ in 4.3 (the (1) just becomes Lorentz transformation). It perhaps that G. N. Lewis and R. C. Tolman etc have to from a particular collision [30,42,43,44] get the mass particle’s mass is because they all (even Einstein) don’t know to compose the differentiation quotient of (1)a’ with the matrix of (1)a’ left over from all of them to let no sagacious no handsome me pick up the bargain to discover (10) and (11).

The Fourth Step: Determine the (1)B Coefficient Matrix’s Element

The Numerical Value Relation of $\Sigma$ And $\Sigma_a$’s Measurement Data in Simultaneously Taking Measure of the Speed of the Same A Horizontal Photon Coming from the Light Source Stationary in $\Sigma$ Or $\Sigma_a$

In simultaneously taking measure of the speed of the same a horizontal rightward photon coming from the light source being stationary in $\Sigma$, the measurement data, of $\Sigma$’s must be $(C_{\Sigma x},0,0)$ and of $\Sigma_a$’s must be $(C_{ax},0,0)$ in $\Sigma_a$ the light source is “in motion”). Because $\Sigma_a$’s speed measured by $\Sigma$ is constant $v$ on $x_a$-axis, it must be $x=x_a(x_a v t_a)$ and hence $a_{14}=(-v)a_{11}$, bring them into (10) we get (10)Rp1

$$\begin{pmatrix} C_x \\ 0 \\ 1 \end{pmatrix} = \left( \begin{array}{ccc} a_{11} & 0 & 0 \\ 0 & a_{22} & 0 \\ 0 & 0 & a_{44} \end{array} \right) \left( \begin{array}{c} (-v)a_{11} \\ 0 \\ 0 \end{array} \right)$$

From the 1st row of the (10)Rp1 we get $C_x = a_{11}[\alpha_{ax}^{+}\alpha_{ax}^{-}]$ i.e.

$$\begin{pmatrix} C_x \\ 0 \\ 1 \end{pmatrix} = \left( \begin{array}{ccc} a_{11} & 0 & 0 \\ 0 & a_{22} & 0 \\ 0 & 0 & a_{44} \end{array} \right) \left( \begin{array}{c} (-v)a_{11} \\ 0 \\ 0 \end{array} \right)$$

If the light source being stationary in $\Sigma_a$ the measurement data must be $(C_{ax},0,0)$ in $\Sigma$ (in $\Sigma$ the light source is “in motion”) and $(C_{ax},0,0)$ in $\Sigma_a$. Bring into (10) (please note $a_{14}=(-v)a_{11}$) we get (10)Rp2

$$\begin{pmatrix} C_x \\ 0 \\ 1 \end{pmatrix} = \left( \begin{array}{ccc} a_{11} & 0 & 0 \\ 0 & a_{22} & 0 \\ 0 & 0 & a_{44} \end{array} \right) \left( \begin{array}{c} (-v)a_{11} \\ 0 \\ 0 \end{array} \right)$$

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From the 1st row of the (10)Rp2 we get

$$C_x^{-} = \frac{(C_{ax} - v)a_{11}}{(a_{44} + C_{ax}a_{41})} \quad (13)$$

In simultaneously taking measure of the speed of the same a horizontal leftward photon coming from the light source being stationary in $\Sigma$, the measurement data must be $(-C_x,0,0)$ in $\Sigma$ and $(-C_{ax},0,0)$ in $\Sigma_a$ (in $\Sigma_a$ the light source is “in motion”). Bring them and $a_{14}=-v/a_{11}$ into (10) we get (10)Lp1

$$\begin{pmatrix}
-C_{-x} \\
0 \\
0 \\
1
\end{pmatrix} =
\begin{pmatrix}
a_{11} & 0 & 0 & (-v)a_{11} \\
0 & a_{22} & 0 & 0 \\
0 & 0 & a_{33} & 0 \\
a_{41} & 0 & 0 & a_{44}
\end{pmatrix}
\begin{pmatrix}
-C_{-ax} \\
0 \\
0 \\
1
\end{pmatrix}
\begin{pmatrix}
1 \\
0 \\
0 \\
1
\end{pmatrix}
= \begin{pmatrix}
1 \\
0 \\
0 \\
1
\end{pmatrix}
= \begin{pmatrix}
a_{11} + C_{-ax}a_{44} \\
0 \\
0 \\
a_{44} - C_{-ax}a_{41}
\end{pmatrix}$$

Using the 1st row of the (10)Lp1 we get

$$-C_{-x} = a_{11}(-C_{-ax} - v)/(a_{44} - C_{-ax}a_{41}) \quad \text{i.e.}$$

$$C_{-ax} = \frac{-va_{11} + C_{-ax}a_{44}}{a_{11} + C_{-ax}a_{41}} \quad (14)$$

If the light source being stationary in $\Sigma_a$ the measurement data must be $(-C_{-x},0,0)$ in $\Sigma$ (in $\Sigma$ the light source is “in motion”) and $(-C_{ax},0,0)$ in $\Sigma_a$. Bring them and $a_{14}=-v/a_{11}$ into (10) we get (10)Lp2

$$\begin{pmatrix}
-C_{-x} \\
0 \\
0 \\
1
\end{pmatrix} =
\begin{pmatrix}
a_{11} & 0 & 0 & (-v)a_{11} \\
0 & a_{22} & 0 & 0 \\
0 & 0 & a_{33} & 0 \\
a_{41} & 0 & 0 & a_{44}
\end{pmatrix}
\begin{pmatrix}
-C_{-ax} \\
0 \\
0 \\
1
\end{pmatrix}
\begin{pmatrix}
1 \\
0 \\
0 \\
1
\end{pmatrix}
= \begin{pmatrix}
1 \\
0 \\
0 \\
1
\end{pmatrix}
= \begin{pmatrix}
a_{11} + C_{-ax}a_{44} \\
0 \\
0 \\
a_{44} - C_{-ax}a_{41}
\end{pmatrix}$$

From the (10)Lp2’s 1st row we get

$$-C_{-x} = [a_{11}(-C_{-ax}) + (-v)a_{11}]/(a_{44} - C_{-ax}a_{41}) \quad \text{i.e.,}$$

$$C_{-ax} = \frac{(v + C_{-ax})a_{11}}{a_{44} - C_{-ax}a_{41}} \quad (15)$$

Taking note of that as 2.2, if you ask that how much the “interactional impact of simultaneous measurement” in these two groups data of measurement of photon is? We can only answer that we don’t know, but we can confirm: From the new added postulate in 1.3 we can confirm that they should be direct ratio of each other! The horizontal rightward photon the quotient of photon 1’s speed $C_{ax}^{-} (\Sigma/\Sigma_a)$ should be equal to of photon 2’s $C_{ax}^{-}/C_{ax} (\Sigma/\Sigma_a)$. When (12) and (13) are placed in $C_{ax}^{-} = C_{-ax}^{-}/C_{ax}$ we get

$$\frac{C_x(a_{11} - C_xa_{41})}{(va_{11} + C_xa_{44})} = \frac{(C_{ax} - v)a_{11}}{(a_{44} + C_{ax}a_{41})} \quad (16)$$

Analogously the horizontal leftward photon the quotient of photon 1’s speed $(-C_{-x})/(-C_{-ax}) (\Sigma/\Sigma_a)$ i.e. $C_{ax}^{-}/C_{-ax}^{-}$ should be equal to of photon 2’s $(-C_{-x})/(-C_{-ax}) (\Sigma/\Sigma_a)$ i.e. $C_{ax}^{-}/C_{ax}$ When (14) and (15) being placed in $C_{ax}^{-} = C_{-ax}^{-}/C_{ax}$ we get

$$\frac{C_{-x}(a_{11} - C_{-ax}a_{41})}{(-va_{11} + C_{-ax}a_{44})} = \frac{(v + C_{-ax})a_{11}}{(a_{44} - C_{-ax}a_{41})} \quad (17)$$

Taking $a = C_{ax}$, $b = C_{ax}$, $c = C_{ax}$, $d = C_{ax}$ as known quantities, $f = a_{14}/a_{11}$ and $\phi = a_{44}/a_{11}$ as unknown quantities, we can solve the simultaneous equations (16) and (17) and get the two unknown quantities $f = a_{34}/a_{11}$ and $\phi = a_{44}/a_{11}$ (please see appendix I):

$$f_{\phi}^1 = \frac{v}{ac}, \quad f_{\phi}^2 = \frac{v}{bd}, \quad f_{\phi}^3 = \frac{(bc - ad) - v(c + d)}{cd(a + b)} \quad \text{; } \phi_{\phi}^1 = \frac{abc - v(ac + bd)}{abcd}, \quad \phi_{\phi}^2 = \frac{abd + v(ac + bd)}{abcd} \quad \text{; }$$

$$\phi_{\phi}^3 = \frac{ab(c + d)(bc - ad) - vbcd}{c + d} \quad \text{and } \quad \phi = \frac{\sqrt{v^2bd + v^2ac}}{bd} \quad \text{for } \phi_{\phi}^3 \text{ close to } M_{\phi} \text{ i.e. } \Sigma = \Sigma_a \text{ can we find out the element } a_{i} \text{ of (1)k?}$$

**Determine the (1)k Coefficient Matrix’s Element when $\Sigma = \Sigma_a$**

Please note in (18) $f = a_{41}/a_{11}$ and $\phi = a_{44}/a_{11}$ are only quotients, $a_{22}$ and $a_{33}$ still are undetermined. If adding $M_0$ close to $M_{\phi}$ i.e. $\Sigma = \Sigma_a$ can we find out the element $a_{ij}$ of (1)k?

In 3.1 $\Sigma$ and $\Sigma_a$ take simultaneous measurement of a radiate element’s half-life: stationary at $\Sigma$’s origin obtained (2), at $\Sigma_a$’s origin obtained (3). As the new added postulate the results of “stationary” in $\Sigma$ and “stationary” in $\Sigma_a$...
in Σ are the same τ₀ i.e. both τ on right side of (2) and τ₀ on right side of (3) are equal to τ₀. Still now as Σ=Σ₀ thus τ⁻→ on left side of (3) and τ⁺⁻→ on left side of (2) are equal to each other. We divide (2) by (3) i.e. τ⁺⁻→ / τ⁻→ = 1/[a_{44}(a_{44} + va_{41})](τ/τ₀). Bring τ⁺⁻→ = τ⁻→ = τ₀ into it we get 1=1/ [a_{44}(a_{44} + va_{41})].

In 3.1 Σ and Σ₀ take simultaneous measurement of the same a piece of space length: “stationary” on Σ’s x-axis obtained (4), “stationary” on Σ₀’s x₀-axis obtained (5). As the new added postulate the results of “stationary” in Σ and “stationary” in Σ₀ are the same l₀ i.e. both l on right side of (4) and l₀ on right side of (5) are equal to l₀. Still as now Σ=Σ₀, then l⁻→ on left side of (5) and l⁺⁻→ on left side of (4) are equal to each other. We divide (4) by (5) i.e. l⁻→ / l⁺→ = 1/[a_{44}/(a_{44} + va_{41})²][l₀/l₀]. Bring 1=1 l⁻→ and l = l₀ = l₀ into it we get 1=1/ [a_{44}/(a_{44} + va_{41})²] .

In 3.1 Σ and Σ₀ take simultaneous measurement of the same a piece of space length: “stationary” on Σ’s y-axis obtained (6), “stationary” on Σ₀’s y₀-axis obtained (7), both l₀ on right side of (6) and l₀ on right side of (7) are equal to l₀, l⁻→ on left side of (6) and l⁺→ on left side of (7) are equal to each other. We divide (6) by (7) i.e. l⁻→ / l⁺→ = 1/(a_{22})²(l₀/l₀); for l⁻→ = l₀, l = l₀ = l₀ we get 1=1/ (a_{22})² ; analogously get 1=1/ (a_{33})².

From 1=1/ (a_{22})² and 1=1/ (a_{33})² we can get a_{22}=1 and a_{33}=1 (abnegate the negative root). From simultaneous equations 1=1/ [a_{44}(a_{44} + va_{41})], and 1= a_{44} /[a_{44}+ va_{41}][a_{11}] we get a_{11}=a_{44} and a_{44}=v⁻¹(a_{44}⁻¹−a_{44}) (abnegate the negative root). Bring a_{22}=1, a_{33}=1, a_{11}=a_{44} and a_{44}=v⁻¹(a_{44}⁻¹−a_{44}) into (1b) we get

\[
\begin{pmatrix}
  x \\
  y \\
  z \\
  t
\end{pmatrix}
= \begin{pmatrix}
  a_{44} & 0 & 0 & 0 \\
  0 & 1 & 0 & 0 \\
  0 & 0 & 1 & 0 \\
  v⁻¹(a_{44}⁻¹−a_{44}) & 0 & 0 & a_{44}
\end{pmatrix}
\begin{pmatrix}
  x_a \\
  y_a \\
  z_a \\
  t
\end{pmatrix}
\]

(1c)

Under (1c): ① from f₁= v⁻¹(a_{44}⁻¹−a_{44})/a_{44} abnegating the negative root we can get a_{44}|f₁|=1+v²/(C_{ax}C_{ax})⁻¹/²; ② from f₂= v⁻¹(a_{44}⁻¹−a_{44})/a_{44} abnegating the negative root we can get a_{44}|f₂|=1+v²/(C_{ax}C_{ax})⁻¹/²; ③ from f₃= v⁻¹(a_{44}⁻¹−a_{44})/a_{44} we get a_{44}|f₃|=1+v(C_{ax}C_{ax}−v(C_{ax}C_{ax}))/[C_{ax}C_{ax}C_{ax}C_{ax}(C_{ax}C_{ax})]⁻¹/² (we abnegate the negative root). As Σ=Σ₀ it must be C_{ax}=C_{ax} and C_{ax}=C_{ax} then a_{44}|f₃|=a_{44}|f₃| and a_{44}|f₃| is reduced to a_{44}|f₃|=1+v(C_{ax}C_{ax}−v)/(C_{ax}C_{ax})]⁻¹/². Abnegating a_{44}|f₃| and a_{44}|f₃|’ bring a_{44}|f₃| into (1)c’ we get the (1)c’ goes to

\[
\begin{pmatrix}
  x \\
  y \\
  z \\
  t
\end{pmatrix}
= \begin{pmatrix}
  1 & 0 & 0 & 0 \\
  v(C_{ax}−C_{ax}−v) & 1 & 0 & 0 \\
  C_{ax} & 0 & 1 & 0 \\
  C_{ax} & 0 & 0 & 1
\end{pmatrix}
\begin{pmatrix}
  x_a \\
  y_a \\
  z_a \\
  t
\end{pmatrix}
\]

(1c)

In (1)c the variables of C_{ax} and C_{ax} are M₀, m₀, m₁₀, m₂₀, ..., v, u_a, u_{2a}, u_{2a}, ... a₁₀, a₁₀, ... actually, m₀ is the rest mass of the being measured object (i.e. the photon coming from the Σ’s origin or Σ₀’s origin), m₁₀, m₂₀, ...are the other objects’ rest mass (including the rest mass of referenced weight of other reference systems joining simultaneous measurement or not joining simultaneous measurement but joining quantum correlation (i.e. entanglement) with Σ and Σ₀) and u_a, u_{2a}, u_{2a}, ...are the corresponding speed of m₀, m₁₀, m₂₀, ... measured by Σ₀ while a₁₀, a₁₀, ...are variable representing the simultaneous measurements’ disturbance and the other action. Here C_{ax}≤C and C_{ax}≥C (just opposite to C_{ax}≤C and C_{ax}≤C please see the ending of 2.1). Although the numerical value of the determinant of the coefficient matrix of the (1)c is 1, however, the coefficient matrix of (1)c is not orthogonal matrix. Because its’ transpose matrix is not its’ inverse matrix. When C_{ax}=C_{ax} (as known in 2.1 it must be C_{ax}=C_{ax}=C, actually be v→0 please see later in 4.3) the (1)c just becomes Lorentz transformation.

Here (1)c although the determinant value of the coefficient matrix of (1)c is 1, it is not orthogonal matrix. When for short we denote (C_{ax}−C_{ax}−v)/(C_{ax}C_{ax}) with ρ we can rewrite (1)c into
(1)c α

\[3 = A \begin{pmatrix} x_a \\ y_a \\ z_a \\ t_a \\ v \end{pmatrix} \]

We denote the matrix with \(A\). Here any row of \((1)c\) is actually \((1)c\) while its coefficient matrix \(A\) of orthogonal matrix for \(A = A^{(1)}\), so we can get the formula \(x^2 + y^2 + z^2 + t^2 \gamma = \) \(x^2 + y^2 + z^2 + t^2 \gamma / (v/p)\). Although here the equal mark's left equal to the equal mark's right, however, we cannot regard it as the same as Einstein special relativity's invariant interval, for the numerical value of \((v/p) = vC ax = (C ax - C ar - \nu)\) is not as the invariant interval's constant \((C^2)\) i.e. generally there is not the invariant interval.

**Determine the \((1)b\) Coefficient Matrix’s Element when we Re-Reduce the Case**

A little generally it may be \(M_0 \# M_{00}\) on right side of (2)'s \(\tau\) and of (3)'s \(\tau\) are the same \(\tau_0\) but on left side of (2)'s \(\tau^*\) and of (3)'s \(\tau^*\) it may be \(\tau^* \neq \tau^*\) we cannot get

\[1 = 1 / (v(C ax + na c1)); \] on right side of (4), (6), (8)'s \(I\) and (5), (7), (9)'s \(I\) are the same \(I_0\) but on left side of (4)'s \(I^*\) and (5)'s \(I^*\) it may be \(I^* \neq I^*\) we cannot get

\[1 = 1 / (C ax + na c1), (6)'s I^*\] and (7)'s \(I^*\) may be \(I^* \neq I^*\) we cannot get \(1 = 1 / (C ax + na c1), (8)'s I^*\) and (9)'s \(I^*\) may be \(I^* \neq I^*\) we cannot get \(1 = 1 / (C ax + na c1), (10)'s I^*\) i.e. a little generally (need not to say generally) we cannot get an (1)c. It must be pointed out that \(I^*\) and \(I^*\) is not analogous to \(\Sigma\) and \(\Sigma_a\)'s simultaneous measurement of the same distance between two reference system's origins i.e. measurement data of \(tv(a_{11}/a_{44})\) and \(tv\). Because the rest length of \(I^*\) and \(I^*\) are the same "stationary" length \(l_0\) \((= l_0 = l_0)\), while \(tv(a_{11}/a_{44})\) and \(tv\) are the same "in motion" length——of course the "in stationary" length of \(tv(a_{11}/a_{44})\) and of \(tv\) are impossible the same. Therefore, \(I^*/I^*_a\) is not equal to \(tv(a_{11}/a_{44})/(tv)\). So, taking \(I^*/I^*_a = tv(a_{11}/a_{44})/(tv)\) as an added equation is a wrong idea. So, generally the equations (2)~(9) are useless to determine the element of \((1)b\)'s coefficient matrix. Generally determining the element of the \((1)b\)'s coefficient matrix is very very difficult or impossible. We have no more better choice to re-reduce the case (we have reduced the case since 3): if nobody nearby \(\Sigma\) and \(\Sigma_a\) (i.e. except \(\Sigma\) and \(\Sigma_a\) any other Newtonian universal gravitation and simultaneous measurements' disturbing being neglected), the object being measured only are photon coming from the light source stationary in \(\Sigma\) or \(\Sigma_a\), both \(M_0\) and \(M_{00}\) close to zero only keeping \(\sigma = M_0/M_{00}\) as an arbitrary constant had been determined like \(v\), i.e. all the Newtonian universal gravitation even from \(M_0\) and \(M_{00}\) would be reduced, it seems that only the interactional impact of simultaneous measurement of the reference systems \(\Sigma\) and \(\Sigma_a\) becomes main part. It must be: at anywhere except the two infinitely small regions (one infinitely small region contains the \(\Sigma\)'s origin, the other contains the \(\Sigma_a\)'s origin) the \(\Sigma\) is a constant and the \(C_a\) is another constant, the \(C ax\) is some constant and the \(C ax\) is some another constant; \(C ax = C ax = C ax\) and \(C ax = C ax = C ax\).

Therefore, it must be \(a_{23} = a_{33} = a\) in this case (whether \(C\) \(j = C ax = C ax = C ax = C ax\) or \(C ax = C ax = C ax = C ax\) and whether \(a_{23} = a_{33} = a = 1/0\) we can only answer that we don't know, but we can confirm that when \(\sigma = M_0/M_{00} = 1\) it must be \(C ax = C ax\) and \(C ax = C ax\) when \(v = 0\) it must be \(a_{23} = a_{33} = C ax\) or \(a_{23} = a_{33} = C ax\) and \(C ax = C ax\) or \(C ax = C ax\) anywhere except the two infinitely small regions (of course only when \(M_0\) or \(M_{00}\) or both \(M_0\) and \(M_{00}\) not close to zero and then \(C ax\), \(C ax\), \(C ax\), \(C ax\) are not constants). Can we find out the element of the \((1)b\)'s coefficient matrix in this case?

**\(\Sigma\) And \(\Sigma_a\) Simultaneously Taking Measure of the Same Wave Front Surface of Light Emitted from \(\Sigma\)'s Origin:**

At first let us take simultaneous measure of the same wave front surface of light emitted from the \(\Sigma\)'s origin: In \(\Sigma\) we set some stationary glass plates on to the points at appropriate angle to reflect the light ray come from the \(\Sigma\)'s origin back to the \(\Sigma\)'s origin, it can change the light ray's direction from \(\Sigma\)'s origin into from any other point of \(\Sigma\)'s stationary light source (we neglect the two infinitely small regions one contains the \(\Sigma\)'s origin and the other contains the \(\Sigma_a\)'s origin because in the two infinitely small regions the Newtonian universal gravitation cannot be neglected): From the \(\Sigma\)'s origin along the x-axis' positive direction to the stationary point x and then along the opposite direction back to the \(\Sigma\)'s origin (as in 2.1 the light source fixed at the \(\Sigma\)'s origin), on this a closed path, as **new postulate of light speed**, in \(\Sigma\) the average speed of the light ray should be the constant \(C\). Using the absolute value to list the time equation in \(\Sigma\) we get

\[x/C x + x/C x = 2x/C,\]

reduced the x it goes to

\[
\frac{1}{C x} + \frac{1}{C ax} = \frac{2}{C} \tag{19}
\]
As known in the ending of 2.I the two speed of light \( C_x \) and \( C_y \) in (19) must be: the more the one, the small the other e.g. \( C_x \), at maxilal is \( C_x = \infty \), and then the \( C_y \) must be at lowest \( C_x = C_y / 2 \). However, does this mean that the photon’s speed will always between \( (C_x / 2, \infty) \) cannot be zero? Of course not! Here photon’s speed is always between \( (C_x / 2, \infty) \) is because the light source is “in stationary”. When the light source is “in motion” it will be not the case. Please see later the discussion after (23) and (24) under (25) and (26) under (29). Although when \( v < C \) the \( 1/C_x^{-1} + 1/C_y^{-1} \) (or \( 1/C_x^{-1} + 1/C_y^{-1} \)) always is equal to \( 2/(C_x) \approx 2/C \) almost as \( 1/C_x + C_y = 2/C \) (or \( 1/C_x + 1/C_y \)) because it always is \( \lambda = 1 \), while when \( v \) is sufficiently great, in (24) the \( C_x^{-1} \) may be \( \rightarrow 0 \) or \( = 0 \) or \( < 0 \) (meanwhile \( C_y^{-1} \) may be \( \infty \) or \( > C \) when \( \sigma = M_0 / M_0 > \) \( > 1 \) or \( \infty \) in taking measure of the light come from a quasar please see later in (34)\( \sigma = \infty \)); in (28) the \( C_y^{-1} \) may be \( \rightarrow 0 \) or \( = 0 \) or \( < 0 \) (meanwhile \( C_x^{-1} \) may be \( \infty \) or \( > C \) when \( \sigma = M_0 / M_0 < \) \( < 1 \) or \( \infty \) in our (on earth) taking measure of the light come from a small mass particle please see later in (34)\( \sigma = \infty \)).

From the \( \Sigma \)'s origin along the \( r \)'s positive direction to the stationary point \( p \) and then along the opposite direction back to the \( \Sigma \)'s origin on this a closed path, as \textit{new postulate of light speed}, in \( \Sigma \) the average speed of the light ray should be the constant \( C \). Using the absolute value to list the time equation in \( \Sigma \) we get

\[
\frac{r}{C_x} + \frac{r}{C_y} = \frac{2r}{C} \quad (20)
\]

From the \( \Sigma \)'s origin along the \( r \)'s positive direction to the stationary point \( p \) and then along the \( z \)-axis 'opposite direction, the \( y \)-axis 'opposite direction, the \( x \)-axis 'opposite direction back to the \( \Sigma \)'s origin. As \textit{new postulate of light speed}, using the absolute value to list the time equation in \( \Sigma \) we get

\[
\frac{r}{C_x} + \frac{z}{C_z} + \frac{y}{C_y} = \frac{r + z + y + x}{C} \quad (21)
\]

From the \( \Sigma \)'s origin along the \( x \)-axis' positive direction, the \( y \)-axis' positive direction, the \( z \)-axis' positive direction to the stationary point \( p \) and then along the \( r \)'s opposite direction back to the \( \Sigma \)'s origin. As \textit{new postulate of light speed}, using the absolute value to list the time equation in \( \Sigma \) we get

\[
\frac{x}{C_x} + \frac{y}{C_y} + \frac{z}{C_z} = \frac{x + y + z + r}{C} \quad (22)
\]

Now, from (21) minus (22) plus (20) (please note \( C_x = C_y \) and \( C_x = C_y \)) we get

\[
\frac{2r}{C} + \frac{r}{C_y} = \frac{2r}{C} \quad (23)^n
\]

Although in different octant (21) and (22) will change while (23)^n is always unchanged in form (please see appendix II). Bring (19) into (23)^n (please see appendix III) the (23)^n will go into

\[
C_x = \frac{C}{1 + (C_x - C_y) \cos \alpha} \quad (23)^n
\]

Here (23)^n appears: If \( C_x \) and \( C_y \) have been determined, \( C_x \) will have been determined, and on the \( x-y \) plane \( \alpha = \pi/2 \) \( C_x \) will be \( C_x | \alpha = \pi/2 = C \).

If we do not only bring (19) as above but bring (19) and \( r = (x^2 + y^2 + z^2)^{1/2} \), \( r/C_x = t \) into (23)^n, the (23)^n will turn not into (23)^n, but into (please see appendix IV) (23):

\[
\left[ \frac{x - t(C_x - C_y)}{2} \right]^2 + \frac{y^2 + z^2}{t^2 C_x C_y} = 1 \quad (23)
\]

Of course (23)^n and (23)^n and (23) all are \( \Sigma \)'s result of taking measure of the same wave front surface of light emitted from the \( \Sigma \)'s origin at \( t \) instant of time of \( \Sigma \) in three different angle of view. The (23) is an ellipsoid and as known in 2.I here \( C_x - C_y < 0 \). Analytic geometry tells us: the \( \Sigma \)'s origin (light source) is just on the right focus of the ellipsoid (23). While the \( \Sigma \)'s origin, as 2.I may on the ellipsoid’s two focus join-line (when \( M_0 > M_0 \) the \( M_0 \) being in motion) in \( \Sigma \) with speed \((-\omega_{11}/a_{11}) \) please see 2.4), \( \Sigma \)'s light be disturbed greater by \( M_0 \) than by \( M_0 \) self so that two focus join-line longer than two origins join-line, great mass object \( M_0 \) being wrapped in (23)); \( \Sigma \) may on the ellipsoid’s two focus join-line’s leftward extended line out of the two focus join-line but still being wrapped in (23) (when \( M_0 ^< M_0 \) and \( M_0 \) is with not great enough speed \((-\omega_{11}/a_{11}) \) \( \Sigma \)'s light be disturbed lighter than \( M_0 \) self so that two focus join-line shorter than two origins join-line i.e. with the speed not

great enough the small mass object at $\Sigma$'s origin is still being wrapped in (23)); ③ may on the (23)'s two focus join-line's leftward extended re-extended even out of the ellipsoid (when $M_0 < \gamma M_0$ and $M_0$'s speed $(-v_{11}/a_{11})$ is great enough i.e. with high speed small mass object $\Sigma$, may not being wrapped in (23)). —— In $\Sigma$ we can see: If the speed (or kinetic energy) is great enough, a small mass object can go beyond the light which coming from the light source being stationary in a big referenced weight reference system.

Since it is $\Sigma$ and $\Sigma$ take simultaneous measurement of the same wave front surface of light emitted from the $\Sigma$'s origin, the $\Sigma$'s measurement result is (23). What result the $\Sigma$'s is? (Note in $\Sigma$ the light source is "in motion"). Bring (1)b and $a_{22} = a_{33} = a$ into (23) we get (please see appendix V and VI)

$$
\frac{(C_{ax}^+ - C_{ax}^-)}{2} \left[ x_a - t_a \left( \frac{C_{ax}^+ - C_{ax}^-}{2} \right) \right]^2 + \frac{y_a^2 + z_a^2}{t_a^2} \left( \frac{C_{ax}^+ + C_{ax}^-}{2} \right)^2 = 1 (24)
$$

(where $C_{ax}^+$ is shown in (12) and $C_{ax}^-$ is shown in (14)). Since (23) and (24) are $\Sigma$ and $\Sigma$ take simultaneous measurement of the same wave front surface of light emitted from the $\Sigma$'s origin, the $\Sigma$'s measurement result (23) is that the light source is on the right focus of the ellipsoid (23), the principle of relativity pledge: it must be that the $\Sigma$'s measurement result (24) is also that the light source is on the right focus of the ellipsoid (24)!

Consequently it must be

$$\frac{a_{11}^2}{a^2} = 1 (25)$$

Because only (25) can let the half minor axis' square of (24) become $t_a^2 \left( C_{ax}^+ - v \right) \left( C_{ax}^- + v \right)$, let the (24) become

$$
\frac{(C_{ax}^+ - C_{ax}^-)}{2} \left[ x_a - t_a \left( \frac{C_{ax}^+ - C_{ax}^-}{2} \right) \right]^2 + \frac{y_a^2 + z_a^2}{t_a^2} \left( \frac{C_{ax}^+ + C_{ax}^-}{2} \right)^2 = 1 (24)_{\text{under(25)}}
$$

then from the $t_a \left( C_{ax}^+ + C_{ax}^- \right)/2 = t_a \left[ \left( C_{ax}^+ - v \right) \left( C_{ax}^- + v \right) \right]/2$ can the analytic geometry pledge: The $\Sigma$'s measurement result also is that the $\Sigma$'s origin (light source) is just on the right focus of the ellipsoid (24) as (23); while the $\Sigma$'s origin, ① may on the (24)'s two focus join-line, ② may on the left drawn-out line out of the two focus join-line but still being wrapped in the wave front surface (24) of the light emitted from the $\Sigma$'s origin, ③ may on the left re-drawn-out line even out of the (24), analogically as the $\Sigma$'s measurement result (23).

Please note that the $(24)_{\text{under(25)}}$ is still different from (23) for $v \neq 0$, being in accord with the new principle of relativity"The laws of physics apply in all inertial reference systems, while any two reference systems in uniform relative motion are different". Special remind —— as Einstein special relativity $\Sigma \Sigma$, the $(24)_{\text{under(25)}}$ covariant into (23) i.e. besides $a_{11}^2 / a_{22}^2=1$ it must be $(C_{ax}^- - v) = C_{ax}^- \quad \text{and} \quad C_{ax}^+ = (C_{ax}^- + v)$ i.e. $\Sigma$'s origin and $\Sigma$'s origin just on each one of the same ellipsoid's two focus. It only is in a very special case: not only $M_0/M_0 = 1$ and nobody nearby $\Sigma$ and $\Sigma$, but also the simultaneous measurements of $\Sigma$ and $\Sigma$ disturb each other just right. Generally we can only conclude: Taking simultaneous measure of the same wave front surface of light emitted from the $\Sigma$'s origin, the measurement results of $\Sigma$'s origin and $\Sigma$'s origin are different as Einstein's origin, ① may on the ellipsoid's two focus join-line, ② may on the left drawn-out line out of the two focus join-line, ③ may on the left re-drawn-out line even out of the ellipsoid.

From (25) we do get that analytic geometry pledges: both (23) and (24), $\Sigma$ and $\Sigma$ taking simultaneous measurement of the same wave front surface of light emitted from the $\Sigma$'s origin, are that the $\Sigma$'s origin (light source) is on the right focus of the ellipsoid. However, from (25) we also do get $a=a_{11}$ (abnegate the negative root) and hence $a_{11}=a_{22}=a_{33}=a$ and then we know: If the space length contract it must contract in all directions (instead of Einstein special relativity's only contract in the direction of motion)! Of course if dilate it will dilate in all directions, as quasars' apparent superluminal expansion observed in astrophysics (Blandford RD [3], Cohen MH [4]).

$\Sigma$ And $\Sigma$, Simultaneously Taking Measure of the Same Wave Front Surface of Light Emitted From $\Sigma$'s Origin: In taking simultaneous measurement of the same wave front surface of light emitted from the $\Sigma$'s origin,
analogically as in 4.3.1 we install some stationary glass plates on to the points at appropriate angle to reflect the light ray come from the Σ^i’s origin back to the Σ^i’s origin, with the absolute value we list the time equation in Σ, we can get:

1) Being analogous as","...from x/C_x+x/C_x=2x/C reduced the x we get (19)" in 4.3.1, in Σ we can get

\[ \frac{1}{C_{ax}} + \frac{1}{C_{-ax}} = \frac{2}{C} \] (26)

2) Being analogous as","...from (21) minus (22) plus (20) we get (23)" in 4.3.1, in Σ, we get

\[ 2r_a C_{ax} + x \left( \frac{1}{C_{-ax}} - \frac{1}{C_{ax}} \right) = 2r_a C \] (27)

3) Being analogous in 4.3.1, bring (26) into (27)', the (27)’ can be turned into

\[ C_{ar} = \frac{C}{1 + \left( \frac{C_{ax} - C_{-ax}}{C_{ax} + C_{-ax}} \right) \cos \alpha} \] (27)'

(Special remind: as known in 2.1, here (C_{ax}-C_{-ax})>0 is just opposite to (C_{ax}-C_{-ax})<0 of (23)’). Analogously, here (27)’ appears: If C_{ax} and C_{-ax} have been determined, it must be any C_{ar} will have been determined; and on the y_a-z_a plane (a=π/2) the C_{ar} will be C_{ar}|_{a=π/2}=C. Analogously if we do not only bring (26), but bring (26) and \( r_a=(x_a^2+y_a^2+z_a^2)^{1/2} \) and \( r_a/C_{ar}=t_a \) into (27)', the (27)’ will not go to (27), but go to

\[ \left[ x_a - t_a \frac{(C_{ax} - C_{-ax})}{2} \right]^2 + \frac{y_a^2 + z_a^2}{t_a^2 C_{ax} C_{-ax}} = 1 \] (27)

Of course (27)’ and (27)’ and (27) all are Σ’s result of taking measure of the same wave front surface of light emitted from the Σ’s origin at to instant of time Σa in three different angle of view. Being analogous (23) in 4.3.1, here (27) is an ellipsoid and analytic geometry tell us: The Σ’s origin (light source) is just on the left focus of the ellipsoid (27). While the Σ’s origin, may on the ellipsoid’s two focus join-line (when \( M_{ax} < M^- \) (the M^- is "M_0 being in motion" in Σ with speed v), Σ’s light be disturbed greatly by M^- so that two focus join-line longer than two origins join-line), may on the rightward extended line out of the two focus join-line (when \( M_{ax} > M^- \) and M^- is in not great enough speed v, Σ’s light be disturbed lighter by M^- than by M_0 itself so that two focus’ join-line is shorter than two origins join-line i.e. with the speed v not great enough the small mass object at Σ’s origin is still being wrapped in (27)). may on the rightward extended line re-extended even out of the ellipsoid (when \( M_{ax} > M^- \) and M^- is in great enough speed v, i.e. with high speed small mass object Σ may not being wrapped in (27)) —— In Σ, we also can see: If the speed (or kinetic energy) is great enough, a small mass object can go beyond the light which coming from the light source being stationary in a big referenced weight reference system, it is as similar as in 4.3.1 in Σ, while it just can explain the reports on superluminal photon tunneling experiments [5-8] since 1993.

Being analogous in 4.3.1, since it is Σ and Σ, taking simultaneous measurement of the same wave front surface of light emitted from the Σ^i’s origin, the Σ^i’s result is (27). What result the Σ’s is? (please note in Σ the light source is "in motion"). Bring (1)b(-1) in 2.4 and \( a_{22} = a_{33} = a \) into (27) we get (please see appendix VII and VIII)

\[ \left[ \frac{1}{2} (C_{ax} - C_{-ax})^2 \right] + \frac{1}{2} (C_{ax} + C_{-ax})^2 \]

\[ i^2 \left( \frac{a_{44} C_{ax} a_{44} C_{-ax} a_{44} - a_{44} C_{ax} a_{44} C_{-ax} a_{44}}{a_{44} a_{44} a_{44} a_{44} + a_{44} a_{44} a_{44} a_{44}} \right) (C_{ax} + C_{-ax})^2 \]

\[ = 1 \] (28)

(where \( C_{ax}^2 \) is shown in (13) and \( C_{-ax}^2 \) is shown in (15)). Analogously as 4.3.1, since (27) and (28) are Σ and Σ, taking simultaneous measurement of the same wave front surface of light emitted from the Σ’s origin, the Σ’s measurement result (27) is that the light source (Σ’s origin) is on the left focus of ellipsoid (27), the principle of relativity pledge: It must be that the light source (Σ’s origin) is also on the left focus of ellipsoid (28). Consequently it must be

\[ \frac{(a_{44} + a_{44} C_{ax})(a_{44} - a_{44} C_{-ax})(a_{44} + a_{44} C_{ax})(a_{44} - a_{44} C_{-ax})}{a_{44} a_{44} a_{44} a_{44} + a_{44} a_{44} a_{44} a_{44}} \]

= 1

(29)

Because only (29) can let the half minor axis’ square of (28) be \( i^2 (C_{ax} - va_{11}/a_{44}) \cdot (C_{-ax} - va_{11}/a_{44}) \), and then let the (28) become
\[
\left[ x - t \left( \frac{C_{x} - C_{x_s}}{2} \right) \right]^2 + \left( \frac{y^2 + z^2}{2} \right) = 1
\]

\[
t^2 \left( \frac{C_{x} - C_{x_s}}{a_{44}} + \frac{a_{11}}{a_{44}} (C_{z_s} - v / a_{44}) \right) = \frac{1}{2} \left( C_{x} + C_{x_s} \right)
\]

then from

\[
 t \left( \frac{C_{x} + C_{x_s}}{2} \right) / 2 = \frac{1}{2} \left( \frac{C_{x} + C_{x_s}}{2} \right) / 2 ,
\]

can analytic geometry pledge: The Σ’s measurement result also is that the light source (Σ’s origin) is on the left focus of ellipsoid (28). While the Σ’s origin, 1 may on the ellipsoid two focus join-line, 2 may on the rightward extended line out of the two focus join-line but still being wrapped in the wave front surface (28) of the light emitted from the Σ’s origin, 3 may on the rightward extended line re-extended even out of the ellipsoid (28), analogically as the Σ’s measurement result (27).

Please not that the (28) under (29) is still different from (27) for \( v=0 \), being in accord with the new principle of relativity: “The laws of physics apply in all inertial reference systems, while any two reference systems in uniform relative motion are different”.

Bring (13), (15) into (29), we solve the equation get \( a_{44}(a_{11} / v)|[(a/a_{11}) - 1] \) (please see appendix IX). As it approximately is \( a_{44} = a_{11} \) in 4.3.1 to \( a_{44}(a_{11} / v)|[(a/a_{11}) - 1] \) in 4.3.2, leading \( a_{44} = 0 \). Bring \( a_{44} = 0 \) and \( a_{11} = a_{22} = a_{33} = a \) into (1)b we get (1)b become

\[
\begin{bmatrix}
    x \\
    y \\
    z \\
    t
\end{bmatrix} =
\begin{bmatrix}
    a_{11} & 0 & 0 & 0 \\
    0 & a_{11} & 0 & 0 \\
    0 & 0 & a_{11} & 0 \\
    0 & 0 & 0 & a_{44}
\end{bmatrix}
\begin{bmatrix}
    a_{11} \\
    0 \\
    0 \\
    t
\end{bmatrix}
\]

The Numerical Value Relation Of Σ And Σ’s Measurement Data Of Σ And Σ’s Simultaneously Taking Measure of the Same Focus-Length of the Wave Front Surface of Light Emitted from Σ’s Origin and Σ’s Origin on Σ’s Position: Considering on Σ’s position, besides simultaneously measuring the same photon coming from the source stationary at Σ’s origin we also simultaneously measuring the another same photon coming from the source stationary at Σ’s origin: As the third postulate, if there is not measurement, both the wave front surface of light emitted from the Σ’s origin and from the Σ’s origin must be radius \( r_{0} = t_{0}C \) sphere (because not been destroyed by measurement, so, both are radius \( r_{0} = t_{0}C \) sphere ——otherwise the measurement data of the light source’s being “in motion” must be different from “in stationary”) merely the centre of the \( r_{0} = t_{0}C \) sphere from the Σ’s origin is at the Σ’s origin while the centre of the \( r_{0} = t_{0}C \) sphere from the Σ’s origin is at the Σ’s origin being “in motion” with Σ on Σ’s position. When there are simultaneous measurement of Σ and Σ, the wave front surface of light emitted from the Σ’s origin being changed by the simultaneous measurement of Σ and Σ, the wave front surface radius \( r_{0} = t_{0}C \) sphere is changed into ellipsoid (27) (the centre of the sphere from the Σ’s origin is rightward divided another focus of the ellipsoid please note the distance between the two focuses of Σ’s measurement data is \( 2c_{0} \) of the (27) i.e. \( 2c_{0} = t_{0}(C_{ax} - C_{ax}) \); analogously the wave front surface of light emitted from the Σ’s origin (the wave front surface radius \( r_{0} = t_{0}C \) sphere when there is not measurement on Σ’s position) is changed into ellipsoid (24) under (25) (the centre of the sphere from the Σ’s origin is leftward divided another focus of the ellipsoid (24) under (25) please note the distance between the two focuses of Σ’s measurement data is \( 2c_{0} \) of the (24) under (25) i.e. \( 2c_{0} = t_{0}[C_{ax} + v](C_{ax} - v)] \). On the other hand, on Σ’s position the mass center of the two referenced weights \( M_{0} \) and \( M_{0} = M_{0}(a_{44} / v)|[(a/a_{11}) - 1] \) is on the length of \( t_{0}v \) (the Σ’s measurement data of the distance between the two origins in Σ and Σ simultaneous measurement) and incises the length of \( t_{0}v \) to I and (\( t_{0}v - \)), where \( I \) is the distance between the \( M_{0} \) (at Σ’s origin) and the mass center of the \( M_{0} \) and \( M_{0} \). The Σ see Σ’s sphere centre being leftward divided another focus and Σ self’s sphere centre being rightward divided another focus, are only because the simultaneous measurements of Σ and Σ (nobody nearby and both \( M_{0} \) and \( M_{0} \) close to zero). If you ask that on Σ’s position how much the interactional impact of the simultaneous measurements of Σ and Σ is? We can only answer that we don’t know, but we can confirm: From the new added postulate in 1.3 we can confirm that Σ’s measurement data of the two focuses’ \( 2c_{0} \) and \( 2c_{0} \) show the magnitude of the interactional impact of simultaneous measurement of Σ and Σ on Σ’s position! Although in 3.2 we have known we can consequently get”s a), b), c), d) and the reversed case of a), b), c), d), however, whether it is \( “2c_{0} \) is in inverse ratio of the Σ self’s referenced weight \( M_{0} \) and in direct ratio of the Σ’s referenced weight \( M_{0} \), \( “2c_{0} \) is in direct ratio of the Σ’s referenced weight \( M_{0} \) and in inverse ratio of the Σ self’s referenced weight \( M_{0} \) or \( “2c_{0} \) is in inverse square ratio of the Σ self’s referenced weight \( M_{0} \) and in direct square ratio of the Σ’s referenced weight \( M_{0} \), \( “2c_{0} \) is in direct square ratio of the Σ self’s referenced weight \( M_{0} \) and in inverse square ratio of the Σ self’s referenced weight \( M_{0} \)
we do not know. From the new added postulate in 1.3, and from 3.2 we have known “we can consequently get” s a), b), c), d) and the reversed case of a), of b), of c), of d), on Σ’s position we can only confirm “M0 and M” who is bigger, the mass center of the M0 and M will drift off from the middle of the tν to whom, whose measurement data will be disturbed less, whom’s ellipsoid two focus length will be less” i.e. on Σ’s position the simultaneous measurements of Σ and Σa disturb shown in 2c0 and 2c0′ should be in accord with 2c0/2c0′= I/( tν−I). If on Σ’s position the mass center of M0 and M must be in accord with I( M0+ M) = ( tν)·M− i.e. I( tν)= M−/M0, then we get 2c0/2c0′= I/( tν−I) = M−/M0. When 2c0= t0(Cax-Cax), 2c0′−=t0[( C−ax+v)( C−ax+v)] (12), (14) and M−=M0/(a4+(vaxa)) being placed in 2c0−= M−/M0, under (1)d we get (please see appendix X)

\[
\frac{(C_{ax} - C_{ax})a_{11}}{(C_{x} - C_{x})} = \frac{M_0}{M_{00}}
\]

(30)

**Determine The Element of (1)B Coefficient Matrix when we Re-Reduce The Case**

However, taking (30)′ as an added equation to f2=0, (19), (26) as four simultaneous equations to determine C. ax C00, C0, C0 is a not good idea, for (30)′ contains unknown quantity a11 (please note: adding a3=ax+a7/a11 will add more unknown quantities a11, a3). Although having gone through reduce the case since 3, only when Σ=Σa can we get (1)c. A little generally it may be M0#M00 we cannot get (1)c, even re-reduce the case since 4.3, we still cannot find out the element of (1)b coefficient matrix, we can only confirm: 1)The light source is just on one focus of the wave front ellipsoid surface of light. 2)If the speed (or kinetic energy) is great enough, a small mass object can go beyond the light which comes from the light source being stationary in a big referenced weight system. 3)In this case it must be a3=ax+2a11 and a11=0 in (1)b i.e. (1)b becomes (1)d and then we know: If the space length contract it must contract in all directions (instead of Einstein special relativity’s only contract in the direction of motion) and if it will dilate in all directions as quasars’ apparent superluminal expansion observed in astrophysics (Blandford RD [3], Cohen MH [4]).

It must be pointed out that the Lorentz transformation of the special relativity is merely an approximate formula of the (1)c ignore the new added postulate to assume C. ax C00. Please note although t = (tν+x0)/((1+v)−1/2) in (1)c while the factor (1+v)−1/2 i.e. −v/C2 is infinitely small when v<<C. So, the Lorentz transformation of the special relativity is not contrary to (1)c, not contrary to the a11=0 of (1)d.

It also must be pointed out that in general the referenced weight mass may be not a particle the reference system’s origin is on the center of the referenced weight mass, there are other objects and other reference systems joining simultaneously to measure with Σ and Σa, the speed of a photon from a stationary light source is associated with all of the mass’ space distribution and all of the reference systems joining to measure with Σ and Σa leading the a0(aj =1,2,3,4) are the function of not only M0, M0, m0, m0, m20,…… the corresponding speeds 0, v, u02, u03, u04,…… in Σ0, ω,ξ,ψ,…… variable representing the simultaneous measurements’ disturbance, but also x0, y0, z0, t0 and x, y, z, t, there is not “it approximately is α= β= γ= η= a0” the a and a11 in 4.3.1 the a and a11 in 4.3.2, we cannot "bring a=a11 in 4.3.1 into a11 = (a11/v) [(a/a11)−1] in 4.3.2 leading a11=0", (please see the explanation after (3) in 3.1).

Therefore the relation about (x, y, z, and t) and (x0, y0, z0, t0) generally is (1)a, and the a11 of (1)a may be analogous the a11=ρ(1+vp)−1/2) in (1)c, the t in (1)a may be analogous the t = (tv+x0ρ)(1+vp)−1/2) in (1)c might go to time-reversal in some case, as the observation of time-reversal non-invariance in the neutral-kaon system published by CERN in 1998 [38,39]. But we still believe that (1)a will still not disobey the conclusions “If the speed (or kinetic energy) is great enough, a small mass object can go beyond the light which comes from the light source rest in a big referenced weight reference system” and “If the space length contract it must contract in all directions instead of Einstein special relativity’s only contract in the direction of motion” etc educed from 4.3.1 and 4.3.2, though determining the a0(aj =1,2,3,4) of (1)a is very difficult or impossible.

Please note in 4.1 because two reference system’s origins are in a short way off then (16) and (17) are in action, there a11=0 (i.e. f1=a11/a11=0), the v is not limited i.e. it may be v->0 or >C or >>C. While usually it may be v <<C or v->0 but v=0 leading f2=0 and f2=0, only f1 can allow f2=a11/a11=0. Therefore, in the ending of 4.2 abnegating a3≠f2 and a4≠f2 adopt a3≠f2 to get (1)c is right. The physical meanings of f2=α1/a11 to 0 i.e. Ca0Ca−C0−Ca0=α−v/C2 is clear. However, with f2=0, (19) and (26) three simultaneous equations we still cannot determine C, Ca0, C0, C0 four unknown quantities (please note: adding a3=a11/a11 will add more unknown quantities a11 and a4). Now, the Cax Cax Cax Cax and a11 a4 of the (1)d still are unknown quantities. ——If
we re-reduce the case: adding $v << C$, can we find out the $C_{ax} C_{ax} C_{x} C_{x}$ and $a_{11} a_{44}$ of the (1)d?

Taking note of that only both the time length in motion dilate and the space length in motion contract are in action, can we be able to completely explain the Michelson-Morley experiment [30] and almost all of these experiments are taken under $v << C$. So, under re-reduce the case (i.e. adding $v << C$), we can from (2) and (4) get

$$a_{11} = \frac{\alpha}{a_{44} + v \alpha a_{41}} \quad (31)$$

(or from (3) and (5) it must be $(a_{44} + v \alpha a_{41})a_{11}/a_{44} = a/a_{44}$ i.e. $(a_{44} + v \alpha a_{41})a_{11} = a$). Here $\alpha$ is a constant waiting to be determined. From (31), $\varphi_{3} = a_{44}/a_{11} = a_{44}^{2}/\alpha$ we get $a_{44} = (a_{0}/a)^{1/2}$, $a_{11} = a_{44} = (a_{0}/a)^{1/2}$. Because when $v = 0$ it must be $a_{11} = a_{22} = a_{33} = 1$ (please see (1)a/0 in 2.3) and $C_{ax} = C_{x} = C_{x} = C_{x}$, then $\varphi_{3} = a_{44}/a_{11} = [C_{ax} C_{ax} C_{x} C_{x}]/[C_{ax} C_{x} C_{x} C_{x}] = 1$, so must be $\alpha = 1$. Bring $\alpha = 1$, $a_{11} = (a_{0}/a)^{1/2} = (a_{0})^{1/2}, a_{44} = (a_{0}/a)^{1/2}$ into (1)d, (1)d goes to

$$\begin{pmatrix} x \\ y \\ z \\ t \end{pmatrix} = \begin{pmatrix} 1/\sqrt{\varphi_{3}} & 0 & 0 & (-v)/\sqrt{\varphi_{3}} \\ 0 & 1/\sqrt{\varphi_{3}} & 0 & 0 \\ 0 & 0 & 1/\sqrt{\varphi_{3}} & 0 \\ 0 & 0 & 0 & \sqrt{\varphi_{3}} \end{pmatrix} \begin{pmatrix} x_{0} \\ y_{0} \\ z_{0} \\ t_{0} \end{pmatrix} \quad (1)e$$

In (1)e the element of the coefficient matrix of (1)e is completely determined by $\varphi_{3}$. Bring $a_{11} = (a_{0}/a)^{1/2}$ into (30)', then the (30)' goes to

$$\frac{(C_{ax} - C_{ax})\sqrt{\varphi_{3}}}{(C_{ax} - C_{ax})} = \frac{M_{0}}{M_{0}} \quad (30)$$

(Where $\varphi_{3}$ is shown in (18)). Please note that with $a_{44} = 0$ i.e. $f_{3} = 0$ the $\varphi_{3}$ can be reduced (please see appendix XI).

Now, in mathematics, with four simultaneous equations $f_{3} = 0$, (19), (26), (30), we can determine four unknown quantities $C_{ax}, C_{ax}, C_{x}, C_{x}$, and then from (18) get $\varphi_{3}$ (actually it is with $f_{3} = 0$), (19), (26), (30), $\varphi_{3} = a_{44}/a_{11}$, and (31) i.e. $(a_{44} + v \alpha a_{41})a_{11} = a_{11}$ six simultaneous equations we can determine six unknown quantities $C_{ax}, C_{ax}, C_{x}, C_{x}, a_{11}, a_{44}$.

However, when we stand $C_{ax} = y$ with $f_{3} = 0$, (19), (26), (30), (31) three simultaneous equations, we get $C_{ax} = \gamma C/(2y - C)$. $C_{ax}$...
From (32) we can see: when $v << c$ the $C_{xx}$, $C_{xx}$, $C_{xx}$, $C_{xx}$, $C_{xx}$, $C_{xx}$ are in accord with: greater referenced weight reference system’s measurement data be disturbed less (be changed less away from $C$), less referenced weight reference system’s measurement data be disturbed greater (be changed greater away from $C$) as known in 2.2. Please note the (1)f and (32) are deduced from that nobody nearby $\Sigma$ and $\Sigma_o$, both $M_0$ and $M_{oo}$ close to zero only keeping $\sigma = M_0/M_{oo} = 0$ as a arbitrary constant had been determined like $v$ and the being measured object only are photon coming from the source stationary in $\Sigma$ or $\Sigma_o$, the more the constant $v$ close to zero and two reference system’s origins in a more short way off, the more (1)f and (32) accurate. However, we can roughly take both $M_0$ and $M_{oo}$ as arbitrary mass or even in space distribution only the center at the $\Sigma$ and $\Sigma_o$’s origin, there are other bodies in the world besides $\Sigma$ and $\Sigma_o$, $\Sigma$ and $\Sigma_o$’s origin may be in a long way off etc, then deduce rough conclusion as follow:

a). Under (1)f, if $M_0 > M_{oo}$, e.g. we (on earth) $\Sigma_o$ take measure of the light come from any a quasar $\Sigma$ (2’s moving speed measured by our $\Sigma_o$ is the constant $v)$ is just in a small referenced weight reference system take measure of the “in motion” bigger referenced weight reference system’s thing (it is said that the mass of any quasar is far more bigger than the sun need not to say our earth), in (32) $M_0 > M_{oo}$ i.e. $\sigma = M_0/M_{oo} \rightarrow \infty$ therefore $\phi_3 > 1$ and then $a_{41} > 1, a_{11} < 1$ in (1)f. Then (2), (4), (6), (8) in 3.1 become

$$\Phi_a = \frac{\tau}{(a_{44} + va_{44})} \approx \frac{\tau}{a_{44}} =$$

$$\frac{\tau}{\sqrt{1 + (\sigma - 1)(\Phi/C)^2} \sqrt{1 + (v/C)^2}} \approx \frac{\tau}{(a_{44} + va_{44})} \approx \frac{\tau}{a_{44}} =$$

$$l_{ax} = \frac{l}{a_{11}} = l \cdot \sqrt{1 + (\sigma - 1)(\Phi/C)^2} = l \cdot \sqrt{1 + (v/C)^2} \rightarrow l$$

$$l_{ay} = \frac{l}{a_{11}} = l \cdot \sqrt{1 + (\sigma - 1)(\Phi/C)^2} = l \cdot \sqrt{1 + (v/C)^2} \rightarrow l$$

$$l_{az} = \frac{l}{a_{11}} = l \cdot \sqrt{1 + (\sigma - 1)(\Phi/C)^2} = l \cdot \sqrt{1 + (v/C)^2} \rightarrow l$$

It appears: On earth (small referenced weight reference system $\Sigma_o$) take measure of the other “in motion” quasar (bigger referenced weight reference system $\Sigma$), will see that the “in motion” quasar’s time contract and space dilate in all directions. Perhaps the light speed in the quasar $\Sigma$ is constant $C = 3 \times 10^8$ ms$^{-1}$. But $l_0 = 3 \times 10^8$ m is the quasar $\Sigma$’s measurement data while our (on earth) $\Sigma_o$’s measurement data is $l_0 \rightarrow l_0$, time $t_0 \rightarrow 1$s is the quasar $\Sigma$’s measurement data while our (on earth) $\Sigma_o$’s measurement data is $t_0 \rightarrow 1$s, then it is obvious that the light speed of our’s (earth $\Sigma_o$’s) measurement data is quotient $C_{ax} = l_0/t_0 > l_0/t_0$ (it’s numerator greater than $l_0 = 3 \times 10^8$ m and denominator less than $l_0 = 1$s) even being more precisely till $(v/C)^5$ (please see appendix XI) we take $\phi_3 = 1 + [(\sigma - 1)/(\sigma + 1)](v/C)^2 + 0 + [\sigma(1+\sigma-\sigma^2)/(\sigma+1)^2](v/C)^4 + 0$. Therefore, our (on earth) astronomical observatory discover the quasars’ super-luminal expansion [3,4]. In addition, in 2.4 we have known $\Sigma$ and $\Sigma_o$ take measure of the same speed of relative motion, the $\Sigma_o$’s measurement data is $v$ while the $\Sigma_o$’s measurement data is $(\sqrt{v_{a_{11}/l_{44}}})$. As above our $\Sigma_o$’s is $v$ while the quasar’s measurement data is $va_{11}/l_{44}v = (1+(v/C)^2)^2 < v$ taking measure of the same speed our earth $\Sigma_o$’s measurement data is greater than that of the quasar $\Sigma_o$’s: Perhaps the light speed in the quasar $\Sigma_o$’s is $3 \times 10^8$ ms$^{-1}$, however, our $\Sigma_o$’s measurement data will be greater than $3 \times 10^8$ ms$^{-1}$ also can explain our (on earth) astronomical.

Discussion and Conclusions

(1)
observatory discover the quasar’s super-luminal expansion. And our \( \Sigma \)'s measurement data of the speed of the light from quasars to be greater than \( 3 \times 10^8 \text{m/s} \) will result in our \( \Sigma \)'s measurement data of the fine structure constant \( \alpha = \frac{e^2}{(2 \pi \hbar c)} \) of the quasar lessening; Because \( e \) and \( \hbar \) as well as \( c \) are “stationary” quantities’ numerical value before unit (being the same in different reference system), only \( C \) express the photon “in motion”. Here quasar \( \alpha \)’s lessening can explain J. K. Webb et al.’s results [46] (they said: “we find no systematic effects which can explain our results”). Here time contract and space dilate in all directions (instead of only in the direction of motion) is just on the contrary to Einstein special relativity. Meanwhile the (3), (5), (7), (9) are:

\[
\tau_\alpha = \tau_\alpha a_{44} = \tau_\alpha \sqrt{1 + \frac{(\sigma - 1)}{(1 + \sigma)} (\frac{v}{C})^2} = \tau_\alpha \sqrt{1 + \frac{(\sigma - 1)}{(1 + \sigma)} (\frac{v}{C})^2} \]

\[
l_\alpha = a_{44} \frac{l_0}{a_{44} + 44 v a_{44}} \approx \frac{l_0}{a_{44} + 44 v a_{44}} = \frac{l_0}{\sqrt{1 + \frac{(\sigma - 1)}{(1 + \sigma)} (\frac{v}{C})^2}} < l_0 (5)_{\text{under (1)f and } \sigma \to \infty}
\]

\[
l_\alpha = a_{44} \frac{l_0}{a_{44} + 44 v a_{44}} \approx \frac{l_0}{a_{44} + 44 v a_{44}} = \frac{l_0}{\sqrt{1 + \frac{(\sigma - 1)}{(1 + \sigma)} (\frac{v}{C})^2}} < l_0 (7)_{\text{under (1)f and } \sigma \to \infty}
\]

\[
l_\alpha = a_{44} \frac{l_0}{a_{44} + 44 v a_{44}} \approx \frac{l_0}{a_{44} + 44 v a_{44}} = \frac{l_0}{\sqrt{1 + \frac{(\sigma - 1)}{(1 + \sigma)} (\frac{v}{C})^2}} < l_0 (9)_{\text{under (1)f and } \sigma \to \infty}
\]

It appears: in a bigger referenced weight reference system \( \Sigma \) take measure of the other “in motion” small referenced weight reference system \( \Sigma \), will see that the small referenced weight reference system’s time length to dilate (the same time “stationary” in \( \Sigma \) and “stationary” in \( \Sigma \) are the same \( \tau_0 \) i.e. \( \tau = \tau_0 \) in \( \Sigma \)) the small referenced weight reference system’s space contract in all directions, i.e. here b)'s (2), (4), (6), (8) be similar as the a)'s (3), (5), (7), (9) both are from bigger referenced weight reference system to take measure of the other “in motion” small referenced weight reference system’s things. For example, we (on earth) take measure of a particle, \( \Sigma \) is our earth’s reference system (the earth is “stationary” in \( \Sigma \) and \( \Sigma \) is the particle’s reference system (the particle is “stationary” in \( \Sigma \) and \( \Sigma \)’s moving speed measured by \( \Sigma \) is constant \( v \)) here \( M_0 < M_{a0} \) i.e. \( \sigma = M_0 / M_{a0} \to 0 \) then (2), (4), (6), (8) will be

\[
\tau_\alpha = \frac{\tau}{a_{44}} \approx \frac{\tau}{a_{44}} = \frac{l_\alpha}{a_{44}} \approx \frac{l_\alpha}{a_{44}} = \frac{l_\alpha}{a_{44}} > l_\alpha (2)_{\text{under (1)f and } \sigma \to 0}
\]

\[
l_\alpha = \frac{l}{a_{44}} \approx \frac{l}{a_{44}} = \frac{l}{a_{44}} = \frac{l}{a_{44}} < l (4)_{\text{under (1)f and } \sigma \to 0}
\]

\[
l_\alpha = \frac{l}{a_{44}} \approx \frac{l}{a_{44}} = \frac{l}{a_{44}} = \frac{l}{a_{44}} < l (6)_{\text{under (1)f and } \sigma \to 0}
\]

\[
l_\alpha = \frac{l}{a_{44}} \approx \frac{l}{a_{44}} = \frac{l}{a_{44}} = \frac{l}{a_{44}} < l (8)_{\text{under (1)f and } \sigma \to 0}
\]

Even we take \( \varphi_0 = 1 + \varphi_1 + \varphi_2 + \varphi_3 + \varphi_4 \) in (1)f. Then (2), (4), (6), (8) in 3.1 are in bigger referenced weight reference system to take measure of the other “in motion” small referenced weight reference system’s things:

\[
\tau_\alpha = \frac{\tau}{a_{44}} \approx \frac{\tau}{a_{44}} = \frac{l_\alpha}{a_{44}} \approx \frac{l_\alpha}{a_{44}} = \frac{l_\alpha}{a_{44}} > l_\alpha (2)_{\text{under (1)f and } \sigma \to 0}
\]

\[
l_\alpha = \frac{l}{a_{44}} \approx \frac{l}{a_{44}} = \frac{l}{a_{44}} = \frac{l}{a_{44}} < l (4)_{\text{under (1)f and } \sigma \to 0}
\]

\[
l_\alpha = \frac{l}{a_{44}} \approx \frac{l}{a_{44}} = \frac{l}{a_{44}} = \frac{l}{a_{44}} < l (6)_{\text{under (1)f and } \sigma \to 0}
\]

\[
l_\alpha = \frac{l}{a_{44}} \approx \frac{l}{a_{44}} = \frac{l}{a_{44}} = \frac{l}{a_{44}} < l (8)_{\text{under (1)f and } \sigma \to 0}
\]
while what in distinction from Einstein special relativity is here (4) under [1e] and $\sigma < 0$, (6) under [1e] and $\sigma < 0$, (8) under [1e] and $\sigma > 0$ show the space contract in all directions instead of only in the direction of motion. Meanwhile the (3), (5), (7), (9) are
taken
\[
\tau = a_{44} \tau_0 \leq \tau_0 \text{ (3)} \text{ under [1f] and } 0 < \sigma < 1
\]
\[
l_x = \frac{a_{11} (a_{44} + v a_{41}) v \approx a_{11} l_0 \approx l_0}{\sqrt{1 + \frac{(\sigma - 1) (v/C)^2}{(1 + \sigma)}}} > l \quad \text{(5) under [1f] and } 0 < \sigma < 1
\]
\[
l_y = a_{22} \cdot l_y = a_{11} l_0 > l \quad \text{(7) under [1f] and } 0 < \sigma < 1
\]
\[
l_z = a_{33} \cdot l_z = a_{11} l_0 > l \quad \text{(9) under [1f] and } 0 < \sigma < 1
\]

It appears: in a small referenced weight reference system $\Sigma$ take measure of the other “in motion” bigger referenced weight reference system $\Sigma_x$ will see that the bigger referenced weight reference system’s time length contract and space dilate in all directions! i.e. here b)’s (3), (5), (7), (9) be similar as the a)’s (2), (4), (6), (8) both are from small referenced weight reference system to take measure of the other “in motion” bigger referenced weight reference system’s things. Now we know: under (1)f, what the see from $\Sigma$ to $\Sigma_x$ is just opposite to what the see from $\Sigma_x$ to $\Sigma$. ——What the see from small referenced weight reference system to “in motion” bigger referenced weight reference system is just opposite to what the see from bigger referenced weight reference system to “in motion” small referenced weight reference system, no matter $M_0 > M_{ax}$ or $M_0 < M_{ax}$ (no matter $\sigma > 1$ or $\sigma < 1$). The b) ($\sigma < 1$) is not in violation of the a) ($\sigma > 1$).

c). As the new postulate of light speed it is the average speed of “in stationary” light source’s light ray over a closed path is constant $C$ while “in motion” light source’s light ray should not be? Considering in $\Sigma$ and $\Sigma_x$ taking simultaneous measurement of the same wave front surface of light emitted from the $\Sigma$’s origin, we in $\Sigma_x$ are making Michelson-Morley experiment with Michelson interferometer at somewhere on $\Sigma_x$’s (the light ray comes from an “in motion” source) $x_x$-axis, the glass plate is stationary in the Michelson interferometer with us. We suppose the light ray past from the right end of the line segment $\Delta x_0$ to the left end of the $\Delta x_0$ will must cost time $\Delta x_0 / C_{ax}$ (the light ray’s direction opposite to the light source’s speed $v$). How long time does it take that the reflected light ray past from the left end of the line segment $\Delta x_0$ to the right end of the $\Delta x_0$? Taking note of that the light source’s mirror image is “in motion” with speed ($-v$) on $x_x$-axis, also is in the light ray’s direction opposite to the light source’s speed, it should be that we replace the variable $v$ of the $\Delta x_0 / C_{ax}$ by ($-v$) or replace the ($-v$) in the $\Delta x_0 / C_{ax}$ by $v$ i.e. $\Delta x_0 / C_{ax}$. We also can think: as the glass plate is stationary on $x_x$-axis, the same photon come from “in motion” light source with speed $C_{ax}$, after being reflected, should with speed $C_{ax}$ (of course when the light source stops, the photon’s speed will be $C_{ax}$ and after being reflected becomes $C_{ax}$). Then the totalize time cost will be ($\Delta x_0 / C_{ax} + \Delta x_0 / C_{ax}^*$) = $\Delta x_0 (1 / C_{ax} + 1 / C_{ax}^*)$. Bring (12) and (14) into it and neglect more higher order infinitely small than $(v/C)^6$ we get

\[
\frac{1}{C_{ax}} + \frac{1}{C_{ax}^*} = \frac{(a_{11} + C_{ax} a_{41})}{(-v a_{11} + C_{ax} a_{44})} + \frac{(a_{11} - C_{ax} a_{41})}{(v a_{11} + C_{ax} a_{44})} = \frac{1}{-(v + C_{ax}) a_{41}} + \frac{1}{v + C_{ax} a_{11}} = \frac{C_{ax} + C_{ax} a_{11}}{C_{ax} + C_{ax} a_{11}} \frac{(C_{ax} + C_{ax} a_{11})}{(v + C_{ax}) a_{11}} = \frac{(C_{ax} + C_{ax})}{C_{ax} + C_{ax}} \frac{(v + C_{ax}) a_{11}}{(v + C_{ax}) a_{11}} = \frac{(v + C_{ax})}{C_{ax} + C_{ax}} a_{11} = \frac{2}{C_{ax}} \frac{1}{\lambda}
\]

where
\[
\lambda = \frac{(v + C_{ax})}{C_{ax} a_{11}} a_{11} = \frac{1}{\lambda} = \frac{1 + \left(\frac{v}{C}\right)^2}{2} + \frac{1}{8} \left(\frac{v}{C}\right)^4 + \frac{1}{16} \left(\frac{v}{C}\right)^6 + \cdots
\]
\[
\approx 1 + \left(\frac{28 + 40 \sigma - 105 \sigma^2 - 54 \sigma^3 + 116 \sigma^4 + 6 \sigma^5 - 39 \sigma^6}{8(1 + \sigma)^6}\right) \left(\frac{v}{C}\right)^6
\]

(to count the $\lambda$ please see appendix XII). It is obvious that $\lambda \approx 1$ when $v < C$. For example, neglecting other body, taking the sun as $\Sigma$ and our earth as $\Sigma_0$ not only nobody nearby $\Sigma$ and $\Sigma_0$ but also $v < C$ (please note $v$ is $\Sigma$’s speed measured by $\Sigma_0$), bring $M_0 = 3.29 \times 10^9 M_{au}$ (i.e. $\sigma = M_0 / M_{au} = (3.29 \times 10^9) \to \infty$) into $\lambda$ we get
\[
\lambda \approx 1 - \frac{3}{8} \left(\frac{v}{C}\right)^6 \quad (34) \text{ at } \infty
\]
Then $C\lambda$ for neglected more higher order infinite small than $(v/C)^6$ in (33), then the $(1/C_{ax}^{-1} + 1/C_{ax}^{-1})$ will be $2/(C\lambda)^2$ almost as the $C_{ax}$ and $C_{ax}$ in (26). This is why R. C. Tolman adopted the light from the two ends of the equator diameter of the sun took Michelson-Morley experiment obtained zero result [47]. The sun’s rest mass $M_0 = 3.29 	imes 10^3 M_\odot$ is far bigger than our earth’s rest mass $M_\odot$ [please note that R. C. Tolman’s experiment precision is only $(v/C)^2$]. It obviously is that the $C\lambda$ of a quasar is more close to $C$ because the rest mass of a quasar is far more bigger than of the sun.

d). Why we take Michelson-Morley experiment with the light from high-speed (e.g. $v \rightarrow C$) moving particles but still obtained zero result? Taking Michelson-Morley experiment with Michelson interferometer we have known in c): When we (on earth) take measure of the photons coming from an “in motion” micro-particle i.e. $\Sigma$ is the particle’s reference system (the particle is “stationary” in it and its moving speed measured by $\Sigma$, is constant $v$). Bring $\sigma = M_0/M_{\odot} \rightarrow 0$ into (34) we get

$$\lambda \approx 1 + \frac{28}{8} (v/C)^6 (34)|_{\sigma \rightarrow 0}$$

Compared here $(34)|_{\sigma \rightarrow 0}$’s (28/8) with the before $(34)|_{\sigma \rightarrow a}$’s (39/8), we can see the $\lambda$ here in (34)|$_{\sigma \rightarrow 0}$ is less away from 1, while in (34)|$_{\sigma \rightarrow a}$ is a greater away from 1, i.e. micro-particle’s $2/(C\lambda)$ is more close to $2/C$ than the sun’s or quasar’s $2/(C\lambda)$. This is why T. Alvager et al took Michelson-Morley experiment with the light from high-speed (v→C) moving particle still obtained zero result [48]. Although the (34) is educed from $v < C$ (instead of $v << C$ because in Appendix XII the $x$ in the (1± $x^2$) $\rightarrow 1$ $\gamma x + x^2y/(\gamma + 1)/2 \gamma \cdots$ where $\gamma < 0$ and $|x| < 1$ instead of $|x| < 1 =\gamma$, however, its’ precision even until $(v/C)^6$ and (28/8)<(39/8), need not to say the precision of the T. Alvágier et al’s experiment only is $(v/C)^2$.

As we known above, under (1) if we can either explain our (on earth) astronomical observatory discover the quasars’ super-luminal expansion, quasar’s lessening, or explain why we take Michelson-Morley experiment with the light from high-speed (even v→C) moving particles still obtained zero result, and (1) if be in accord with the new physics experiments were performed and analyzed at CERN since 1998 etc e.g. time-reversal non-invariance in the neutral-kaon system [38,39] (please see the ending of 4.4).

Now, we sum up the conclusions:
1. We should amend the principle of relativity to new principle of relativity: “the laws of physics apply in all inertial reference systems, while any two reference systems in uniform relative motion are different” (the different is the data of the two reference systems taking simultaneous measurement of the same physical quantity of the same body are different while using his own measurement data of the physical quantities to build laws of physics the two reference systems are identical, it is in accord with John C. Mather and George F. Smoot’s discovery of the blackbody form and anisotropy of the cosmic microwave background radiation) (please see 1.1).

2. We should amend the universal speed of light to new postulate of light speed: “the average speed of a light ray from a stationary light source measured over a closed path in vacuum is always constant $C \approx 3 \times 10^8 m/s$” (it lets “the light ray come from the source” be more clear, more unassailable and lets we know that the speed of any photon from stationary light source will always between ($C/2$, $\infty$) i.e. may be $< C$ or $> C$) (please see 1.2 & 2.1).

3. We should set the “measurement is founded to change the object by destroying the original quantum coherence between the object and object’s environment” as one of the basic postulate——the third postulate (new added postulate) (in accord with the new physics experiments were performed and analyzed since 1998). Then we can reduce: ①The “measurement is founded to change” in the third postulate is on both sides not only the being measured object been changed by the reference system’s taking measurement, but the reference system in taking the measurement also been changed by the being measured object. It is the reference system’s taking measurement (more precisely the quantum correlation (i.e. entanglement) between the measurement apparatus (with its reference system) and the being measured object been founded) instead of the ether or the motion of the being measured object that changes the being measured object. Only the measurement unit’s “definition” is unchanged while the measurement unit’s “actual length” can change or be changed in different quantum correlation (i.e. entanglement) is different (note the reference system himself is not aware of it using his own unit taking measure of himself cannot get his own change and he thinks the “actual length” of his unit is always the same and unchanged in different case). The measurement data of the same object’s physical quantity in a reference system the object “in motion” is different from “in stationary”, while stationary in different reference system, different reference system’s measurement data of the same stationary physical quantity are the same,
although the “actual length” of the same unit in different reference system is different. (2) The mass stationary in the reference system (more precisely joining in the quantum correlation) is the reference system’s referenced weight; perhaps space is not empty and the reference system’s space is something around the referenced weight, there is not referenced weight saying nothing of the space around the referenced weight. In reference system’s taking measurement, the greater the referenced weight a) the stronger the reference system destroys the original (before the measurement is taken) quantum coherence between the being measured object and its environment, b) the less the reference system-self being changed by the being measured object, c) the stronger the reference system disturbs the other reference system’s measurement data of taking simultaneously measure of the same object, d) the less the reference systems itself’s measurement data be disturbed by other reference system’s simultaneously taking measure of the same object; on the opposite, the less the referenced weight, it is just the reversed case in a), in b), in c), in d) (therefore the micro-particle’s uncertainty must be that because the micro-particle’s mass is too small then the “on” or “off” of the quantum correlations (i.e. entanglements) between the micro-particle and the other objects in the environment make the micro-particle behaviour uncertainty) (please see 2.2). (3) Two reference systems (e.g. Σ and Σ₁ and their relative motion may be uniform or not) taking simultaneously measure of the same quantity of the same object their measurement will disturb each other and “the numerical values before Σ’s unit” ≠ “the numerical values before Σ₁’s unit”, if and only if their relative motion speed v ≠0 can the simultaneous measurement of Σ and Σ₁ disturbing each other been seen by Σ and Σ₁ themselves the Σ’s measurement data is different from the Σ₁’s (note when v ≈0 or uniform relative speed v =0 it must be “the numerical values before Σ’s unit” = “the numerical values before Σ₁’s unit” although they may have different referenced weight, so, the micro-particle’s uncertainty must occur and only occurs in our taking measure of the “in motion” micro-particle). Even in uniform relative motion Σ and Σ₁ still are different for a) the relative motion (taking one as in stationary then the other must be in motion), b) they may have different referenced weight; for example taking simultaneously measure of the same speed of relative motion, the speed of Σ moving along x₃-axes measured by Σ₃ is v while the same speed of Σ₁ moving along x-axes measured by Σ is (-va₁₁/a₄₁) instead of (-v) (please see 2.4), however, in using his own physical quantities’ measurement data to build laws of physics the two reference systems in uniform relative motion are identical (therefore the laws of physics apply in all inertial reference systems, while any two reference systems in uniform relative motion are different) (please see 1.1 & 2.4).

4. From the definition of the unit of time we can reduce: The reference system’s time coordinate should be something as space coordinate, each the reference systems severally using his own clock to determine his own time coordinate in simultaneously measuring the same object’s physics process taking place, it must be that there is not the problem to have to synchronize the clocks of the two reference systems before simultaneous time measurement (please see 2.3).

5. Different quantum correlation (i.e. entanglement) will result in different a_{ij}(i,j =1,2,3,4), generally determining the element of the (1)b coefficient matrix is very difficult or impossible. Only when the mass of the being measured object is sufficiently small and two reference systems origins in a sufficiently short way off, it always approximately is in o=v_p=q_0 (=a_{ij}), and M_0=M_{a₀} (i.e. Σ =Σ₀) can we get (1)c. a) ln(1) c the C_{ax}≡C and C_{ax}≡C and the v is not limited (i.e. v may be→0 or >C or >C), b) When C_{ax}=C_{ax} (it must be C_{ax}≡C please see 2.1, actually is v→0 please see 4.3), the (1)c just becomes Lorentz transformation i.e. the special relativity’s Lorentz transformation is merely (1)c been reduced when C_{ax}=C_{ax} (please see the ending of 4.2). c) A little generally it may be M_0≠M_{a₀}, even nobody nearby Σ and Σ₁ each the M_0 and M_{a₀} is mass particle stationary at Σ’s and Σ₁’s origin, both M_0 and M_{a₀} close to zero only keeping σ =M_0/M_{a₀} as an arbitrary constant had been determined like v and the being measured object only are photon coming from the source stationary in Σ’s or Σ₁’s origin, we still cannot find out the element of (1)b coefficient matrix (please see 4.3), we can only confirm: (1) The light speed can change or be changed and be allowable to be exceeded a small mass object can go beyond the light which coming from the light source being stationary in a big referenced weight reference system (i.e. although the speed of a photon from stationary light source will always between (C/2, ∞) while when light source being in motion photon’s speed may be→0 or=0 or <0 if light source’s speed sufficiently great), however, the average speed of the light ray from an “in motion” source like the sun or a quasar or even a high-speed (v→C) moving particle measured over a closed path in vacuum is C while usually it always is λ≈1, the light source is just on one focus of the wave front ellipsoid surface of light. (2) In this case it must be a_{33}=a_{22}=a_{11} and a_{41}=0 in (1)b i.e.
(1)b becomes (1)d, then we know: *If the “in motion” space length contract it must contract in all directions instead of Einstein special relativity’s only contract in the direction of motion (of course if dilate it will dilate in all directions)* (please see 4.3.1). Under (1)d and from adding \( v < c \) then we can think the conditions which let us be able to slowly explain the Michelson-Morley experiment, then we can find out the \( a_{11} \) and \( a_{44} \) in (1)d mathematics theory, actually we only approximately get (1)e. From (1)e and considering the observation of time-reversal non-invariance in the neutral-kaon system [38,39] and given attention to Lorentz transformation we educe (1)f (please see 4.4).

From (1)f we can explain that “moving micro-particle’s time to dilate and space to contract, taking superluminal photonic tunneling experiment, quasar’s super-luminal expansion and fine structure constant’s lessening, took Michelson-Morley experiment with the light from the sun or quasar or high-speed (close to C) moving micro-particle all obtained zero result” is: Between two reference systems, in the greater referenced weight system measuring the other “in motion” less referenced weight system will see that the less referenced weight system’s time length dilate and space length contract in all directions, while in the less referenced weight system measuring the other “in motion” greater referenced weight system will see the reversed case; in taking simultaneously measure of the same object’s speed, the greater referenced weight system’s measurement data less while the less referenced weight system’s measurement data greater (please see 5); because the \( a_{11} \) of (1)f is \( \rightarrow 0 \) but \( \neq 0 \) so in some case can get time-reversal.

6. Generally from the three postulates (two amended postulates of the special relativity and one new added postulate (the third postulate)) by mathematicas as Einstein in special relativity because \( o_i \neq p_j \neq q_j \) (see 4.), (1)a cannot go to (1)b, (1)c, (1)d, (1)e or (1)f but may go to time-reversal in some case(1)f does not disobey the conclusions shown in 1), in 2), in 3), in 4), in 5). Of course generally the “in motion” system’s space length may contract or dilate (while the time length dilate or contract) may not uniformly at anywhere, generally determining the element of the (1)a coefficient matrix is very difficult or impossible (please see 4.4). Only having gone through many “reduce the case” and then we can reason out the (1)c and (1)f. When \( M_0 = M_{\infty} \) more precise than the Lorentz transformation is (1)c, when \( M_0 \neq M_{\infty} \) more precise than Galilean transformation is (1)f.

Some a gentleman thinks: a check on the transformation given in (1)a, (1)b, (1)c, (1)d, (1)e, (1)f shows that the group properties are not satisfied, and he said: “However, to have group property is a strong physical requirement”. We answer: Lorentz transformation is accurate formula under Einstein special relativity’s two postulates, whether or not there are other reference systems \( \Sigma_{\text{b}}, \Sigma_{\text{c}}, \Sigma_{\text{d}}, \Sigma_{\text{e}} \) et al joining simultaneous measurement with \( \Sigma \) and \( \Sigma_{\text{a}} \) do not disturb the measurement data of \( \Sigma \) and \( \Sigma_{\text{a}} \). While in our (1)a, (1)b, (1)c, (1)d, (1)e, (1)f not only are between \( \Sigma \) and \( \Sigma_{\text{a}} \) but also any other reference system (for example \( \Sigma_{\text{b}} \))’s joining simultaneous measurement with \( \Sigma \) and \( \Sigma_{\text{a}} \) will disturb \( \Sigma \) and \( \Sigma_{\text{a}} \) (of course if the being measured object is “in stationary” in \( \Sigma \) the numerical values before the unit of the measurement data of \( \Sigma_{\text{b}} \)’s will not be changed by any disturb being so called “proper quantity” in the special relativity please see the content after (1)a in 2.3, so does “in stationary” in \( \Sigma_{\text{b}} \) or other reference system). So, the group properties are not satisfied with (1)a, (1)b, (1)c, (1)d, (1)e, (1)f.

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