A BASIC LAW IN THE BACKGROUND OF SPECIAL THEORY OF RELATIVITY, AND THE EXISTENCE OF THE SECOND SPACE

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A rocket flies through the space at a high speed and sends signals to the earth, notifying time on the clock inside the rocket. If the time is delayed as taught by the special relativity theory, then we cannot help but believe that this delayed time is a fact. Conversely, it is also right to say that the clock on the earth should likewise be delayed as it is observed from the rocket because the movements are relative. There is no one who can explain this paradox. I have found a key to this mystery, which existed behind the Lorentz equations of transformation. I believe that the real cause of mystery is derived from the existence of another space behind our space.

The concepts of time and distance are mysterious when they are taught in the special relativity theory. (For an observer on a stationary system, it looks as though the lapse of time is lagging in a fast moving rocket, and when the rocket speed comes close to the speed of light, time would seem to have almost stopped passing. The length of a fast moving object shrinks in the moving direction, and when its speed comes close to the speed of light, the object would look as though its length has almost shrunken to zero.) Time and length in such a state are well expressed by the famous Lorentz equations of transformation. Einstein's views of time and space in these equations have been occupying a fundamental and absolute position for as long as nearly a century. In 1948, I happened to take new views of time and space from a different angle. Our long-standing belief has been that we can completely observe all the phenomena occurring in the space, through our senses and scientific devices. However, it is possible to say that we observe the space from the electromagnetic side, because the electrons with which all substances are constructed mediate all the observations. For instance, the depth of space is perceived when electrons on the retinas perceive light; the sense of touch works when the electrons with which the skin is constructed perceive the contact. If we pay attention to the fact that this principle also applies to the observation instruments, the real space we feel is not a mathematical space, but can be regarded as a space of phenomenon, which may be called the light space or the

electromagnetic space. Based on this understanding of space, I have come up with a complex electromagnetic concept of space, recognizing that there is a new, different, light or electromagnetic space that can be expressed in an imaginary number to compensate for the asymmetry of electromagnetic laws. In a word, it is a world in which Fleming's rule of right hand and left hand are reversed. As for the possibility of second-space existence, I would like to introduce, for the reference, a paragraph in the last portion of W.Heisenberg's paper 1 which he touched to this problem in 1958. " Finally we did not discuss the problem raised by Lee and Yang whether besides our actual world one could imagine a second conjugated world in which "left" and "right" are exchanged against our own world." I think that his idea fits in quite well with mine.

Special time does not flow on the moving system

Since then, I have been slowly taking steps forward, trying to apply the new concept originally to the principle hidden in the Lorentz equations of transformation, without being bound to Einstein's idea. Recently, I became convinced that I could have the right understanding about Lorentz equations of transformation and had finally arrived at a very simple law existing in the background of these equations.

It was believed in the past that, when an observer checked time with a clock that was distant by x centimeter from the observer, he or she would be able to check the past time obtained by deducting x/c second from the time known with a clock kept at hand, wherein c indicates the speed of light. When we observe, for example, a clock on the moon from the earth, by the TV screen, it has been considered that time on the screen will be seen deducted by 1.3 seconds, as compared with the clock at hand . In a word, the conclusion I have reached is that this time lag is not a real number but an imaginary number, which must be expressed in ix/c. This is the basic law existing hidden in the background of Lorentz equations of transformation. It does not imply that special time passes in the object moving at a high speed. It just looks so mysterious to the observer because the change of x/c found with that movement is added as an imaginary number time ($i \cdot \Delta x/c$). I would like to describe below what I have attained at, trying to be as easy to understand as possible.

Now let us assume that the identical time runs in the whole universe and that all the clocks are ticking time in the same way over there. In other words, it is assumed that precisely synchronized clocks are placed throughout the universe, ticking time in the

same way. Of course, such a clock is also put in a high-speed flying object, such as the rocket. However, according to the past special relativity theory (hereinafter referred to as the theory of relativity), the lapse of time should look lagging inside the high-speed flying object from the eyes of an observer at the stationary system. Rockets were a means for Thought Experiments in Einstein's times. Nowadays, experiments with space probing rockets are actually feasible. Space rockets have a speed of only several kilometers or several tens of kilometers per second. But, since their flights continue for more than a year, the small effect of Lorentz transformation would be added up to a value that is no longer negligible. Assuming that the experiments on the probing rockets reported that the time measured was identical with the lagging time taught in the theory of relativity, then it is natural for the observer on the earth to tend to conclude that the time lag is not apparent but real. This is because the observer on the earth is absolutely confident that, when he observes the clock that is distant by (x), he is precisely observing the past time that is behind the present time by minus x/c second, now that electro-magnetic wave has the speed of light. I believe that the study on this problem cannot be terminated simply by the remarks that, the time lag is relative in the theory of relativity and that in appearance, it is reasonable for the time lag to be observed in such a way. At this point, I suspect that the key to the problem may be hidden in this time of x/c. I hereby would like to make the following proposal for the problem as I have described above: How about replacing the past time lag of (−x/c), i.e. a real number, with an imaginary time of (−ix/c)?

Lorentz equations of transformation comprise two pairs of equations to be solved in terms of t and x and also in terms of t' and x', as shown below.

$$t=(t'+vx'/c2)(1-v2/c2)\text{-}1/2 \qquad (1')$$

$$x=(x'+vt')(1-v2/c2)\text{-}1/2 \qquad (2')$$

$$t'=(t-vx/c2)(1-v2/c2)\text{-}1/2 \qquad (1'')$$

$$x'=(x-vt)(1-v2/c2)\text{-}1/2 \qquad (2'')$$

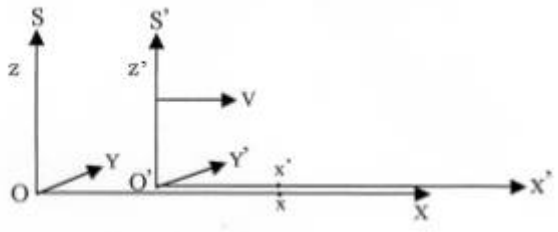


Figure 1

As shown in figure 1, xyz-axes represent an S system, and x'y'z'-axes represent an S' system. For convenience's sake, the S system is used as the stationary observation system. Both systems overlap entirely at t=t'=0. Let us assume that the x'-axis of the S' system moves along the x-axis in the positive direction with velocity (v). Based on the traditional special relativity theory, Einstein gave special interpretations that (t) represented the time shown with the clock on the observation system, while (t') represented the time shown with the clock that ticked time running in the S' system. In my opinion, (t) represents the time that can be observed when the observer looks at the clock on the x'-axis in the S' system from the origin of the S system. Primarily, the coordinate transformation equation for distance is used to show how distant a point on another coordinate is when the observer looks at the point from his or her coordinate origin. The coordinate transformation equation for time has certainly appeared for the first time in the special relativity theory, and therefore, Einstein might have given such special interpretations. However, in this case, too, it is natural to deal with time on the criteria of the coordinate transformation equation for distance, isn't it? That is, the problem here is how we can observe the time of the clock on the x'-axis in the moving S' system from the origin of the stationary system. Assuming an observer in the S system, we use the pair of (1') and (2') for the Lorentz transformation.

Some people may raise an objection against the utilization of (2') for the observation from the S system. This is because Einstein adopted (2") under this condition . But the doubt will be resolved if we consider the basic points of the equation from the beginning. For instance, if a point P is at a distance of (a) from the origin, then the equation is given as x=a. This indicates that the point P exists at a distance of (a) from the origin of the x-axis. This principle applies also to the coordinate transformation equations. Therefore, Einstein was wrong when he used the equation (2") with (x') on the left side of the equation, in order to assume that he makes observation from the S system. Rather, he should have used correctly the equation (2') with (x) on the left side. In (2'), the velocity (v) has the plus sign, while in (2"), the velocity has a minus sign. If the S' system goes along the x-axis in the positive direction as looked from the S system, then the velocity (v) should have the plus sign. From this point, we should be right in adopting the equation (2'). In equations (1') and (2'), we can assume x'=0 because the rocket length is negligible. Thus, we obtain the following equations:

$$t=t'(1-v2/c2)\text{-}1/2 \qquad (1)$$

$$x=vt'(1-v2/c2)\text{-}1/2 \qquad (2)$$

We assumed in the beginning that identical time passed in the whole universe and that all the clocks were ticking time in the same way wherever we were in the universe.

The time (t') in the equation (1) represents such a common time. Traditional special relativity theory takes (t') as a special time running in the S' system. But we assume here that (t') represents the same time running commonly in any place of the universe. So, the clock owned by the observer, the clock in the ultrahigh-speed rocket, and the clock on a stationary star far from the earth are all ticking the same time, (t'). Here I would like to give an explanation for the observed time. When the clock is distant by (x) from the observer existing at the origin of the S system, the time ticked on that clock is not seen as

$$(t'-x/c)$$

Instead, according to the assumption I proposed, it is seen as

$$(t'-ix/c)$$

If this absolute value is represented by(τ), then we obtain the following equation:

$$\tau = (t'2 + x2/c2)1/2 \qquad (3)$$

Since this τ is the time observed when the observer in the S system looks at the clock concerned, it should be regarded as an observed time.

Now let us assume that a rocket leaves the observer on the earth at the time of t=t'=0 with a velocity (v). (Because S overlaps entirely with S', the observed time, t, is equal to t'.) The rocket reaches the point (vt=x) in (t) seconds. The time, (t), is used here instead of t' because the rocket speed (v) is a result of observation made by the observer. Therefore, this (v) forms a pair with the observed time (t). The clock in the rocket indicates (t'), as assumed above, but it looks like a value of (t'−ix/c) to the eyes of the observer on the earth. As stated above, its absolute value is similarly given by the following equation:

$$\tau = (t'2 + x2/c2)1/2$$

Meanwhile, the same equation is obtained when vt=x, i.e., v=x/t is substituted for the equation (1), as follows.

$$t = (t'2 + x2/c2)1/2 \qquad (4)$$

After all, (t) is equal to (τ), and (t) is found to be the observed time. However fast the rocket flies, the time shown on the clock in the rocket is represented by (t'). Because the observer on the earth is as distant as (x) from that clock, the time merely looks like (t'2 + x2/c2)1/2, which is the absolute value for (t'−ix/c). If the clock is near the observer, we can assume x=0, thus giving t=t'. The time (t) is the observed time, i.e., the time observable to the observer who is at the origin of coordinates. It is an absolute value of a complex number and not merely a real number. Conventionally, (t) was defined as the time running on the observation system in Lorentz transformation

equations. Basically, coordinate transformation should indicate how a point on a coordinate system looks like from another system of coordinates. In the case of time transformation, the equation should indicate how a clock on the moving coordinate system is observed from the observation coordinate system. It is quite unnatural, therefore, to interpret (t) as the time shown on the clock of the observation system. The time (t) should rather be interpreted as an observed time.

The observed time (t) is an absolute value of the complex time, but since it is identical with the time shown on the clock near the observer, there was no problem from a numeral point of view even when it was regarded as the time on the observation system. The equation (4) is a relational expression for the stationary system because it does not include (v). This equation always shows that (t) is equal to, or larger than, (t') even on the stationary system. The more distant the two systems are, the larger difference there is between (t) and (t'), and the more lagging the time (t) looks. On the other hand, in the case of the moving system such as a rocket, time on it looks lagging, with variations caused by the distance to the rocket, (x), and the displacement from rocket speed (Δx) being added as imaginary numbers, the clock in the rocket shows an even larger time lagging. Thus, to the stationary system's observer, the time looks as shown in the following equation:

$$t' - i(x/c + \Delta x/c) = t' - i(x/c + v\,\Delta t/c)$$

Since the observed time (t) and velocity (v) are to be used as a pair, as mentioned above, vΔt is used instead of vΔt'. When we look at a short distance phenomenon, there are cases where vΔt/c becomes effective rather than x/c if (v) is close to the speed of light. For example, in the case where x/c is roughly equal to zero and also v=0.8c,

$$t' - i0.8c\,\Delta t/c = t' - i0.8\,\Delta t$$

If Δt is set at a unit time of 1 second, then 0.8 second turns out to be an imaginary time. The real time is given by: $(12-0.82)1/2 = 0.6$ sec.

In that case, (t') looks lagging by 40%. Thus, even in a short distance phenomenon, time looks as if it is lagging if velocity is close to the speed of light. For example, when a high velocity elementary particle is observed in a fog chamber, it seems to have a longer life than usual. In this case, the direct observer in charge of measuring the life is a super-cooled vapor. For the vapor, the high-speed movement of the elementary particle looks as though time is lagging and it looks as though the particle has a longer life (or it reacts for a longer time). But the point is that it just looks like that. I will describe this problem in more details again later.

The more distant the stationary object is, the more lagging the time looks, because (t) gets larger than (t'), i.e., t>t', under the effect of x/c. This is the reason why a farther

heavenly body looks redder than a near one. I believe that we do not need the big bang, the hypothesis of expanding universe, to explain the red shift of stars.

Difference between Conceptual time and Physical time on the clock

Both sides of the equation (4) are squared to give the equation (5)

$$t2=t'2 + x2/c2 \qquad (5)$$

The equation (4) was obtained by the substitution of v=x/t for the equation (1). Naturally enough, the equation (5) can also be led when the velocity (v) is eliminated arithmetically from the equations (1) and (2) of Lorentz transformation. Since the equation (5) has no relationship with velocity, it represents a basic relationship between time and distance for the observation system. Thus, it is an equation showing the relationship between the time on the clock that is distant by (x) from the observer and its observed time.

As shown in Figure (2), the equation (5) can be expressed as a right triangle, with (t) representing the slope, and (t') and (x/c) being situated on both sides of the right angle. These three concepts of time are in a vector relationship with one another, thus teaching that (x/c) is an imaginary time.

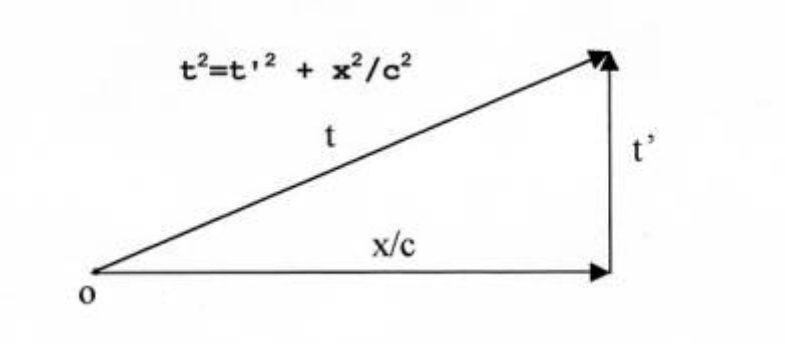


Figure 2

The Lorentz transformation equations therefore teach us from the first that (x/c) is an imaginary time and that the clock distant by (x) from the observer looks like (t'−ix/c) in the stationary system, too. These equations tell us that even when (x) represents a flower in front of us, the flower is a past existence expressed in (t−ix/c) and that the space surrounding us is a space of light where distance is tightly bound with the time owned by light. Now, what is the reason why the time expressing the past, (x/c), must be an imaginary number? We have imagined and simply believed that time runs from the past through the present to the future. But what I have described above about time and space may indicate that such time does not exist physically in the nature.

The time running from past to future is literally an imaginary and conceptual time not proven by observation. Only present time exists for certain. When I put the initial assumption, I described that the identical time passes in the entire universe. It is not the right way of description. It is more precisely expressed in such a way that identical clocks are placed in various parts of the universe. On the other hand, the flow of time (t') expressed on the clocks is different from this imaginary time. It is a physical time that takes shape as a result of the observation on the flow of a phenomenon or energy shown in the mechanism of the clocks. Time in this case is a sum of the lengths of quantum time, which appear by way of Planck's constant ħ under the control of the equal sign in the equation for uncertainty principle, $\Delta t \Delta \geqq \hbar/2$. This is the real time (t') expressed in the equation (5). This real time is not limited to the time on the clock, but it appears in the observation of all phenomena. It is an idea proposed by late Tutomu Miyauchi.

The proposal for the concept of Complex Electro-Magnetic Space

In 1960, I reported the basic concepts of a complex, electro-magnetic space at a convention of the Institute of Electrical Engineers of Japan. From 1972 onward, with the progress of my studies based on these concepts, I have come to understand the mechanism in which the Lorentz equations of transformation had the contractive effect on time and space. I wrote several articles for "Telepathy "magazine with a small circulation and "Psi Sciencc" magazine of THE PSI SCIENCE INSTITUTE OF JAPAN. My basic idea was to pay attention to the fact that all things in the universe are observed by using electrons as a medium. The medium should likewise be electrons even when time lag is observed for an object in its relative motion. However, according to my explanation, electrons that make observations in their relative motions dive into the imaginary space created by the light that comes from the object. Because of such behavior, the electrons themselves are affected by the imaginary quantum time that has appeared, thus causing time lag in the real time. My description of the electrons that dive into the imaginary space had to face much of objections because I had to depend only on the hypothesis of imaginary space of light at that time. In this report, however, I explained and proved that the time (x/c) was an imaginary number. I suppose I could have set a well-grounded argument for my theory that the imaginary time appears when an object makes a relative motion in the direction of (x).

The above-described idea is based on the existence of a complex, electro-magnetic space, including an imaginary space that lies behind the real space. I described above

that complex, electromagnetic laws exist to compensate for the asymmetry of electromagnetic laws. This idea is explained below in more details.

According to electromagnetics, the flow of electromagnetic energy density is expressed as a Poynting vector S. This S is a vector product of an electric field E and a magnetic field H and is expressed as $S = E \times H$. The direction of S is perpendicular to the plane formed by E and H that are at right angles to each other, and is under a right-handed screw rule, as it goes clockwise from E to H. This very simple law applies to all the flows of electromagnetic energy without exception, including D.C., A.C., electromagnetic waves, rays of light, and γray. When we observe the world or the space, what we observe is actually the flows of electromagnetic energy, and we observe them through electrons. In this sense, we can say that the space is a world complying with the Poynting vector law, which is a right-handed screw rule. In his textbook of electromagnetics, Max Planck, known as the father of quantum theory, deductively obtained the Maxwell equations, i.e., a basic law of electro-magnetics, from the right-handed Poynting vector law. This fact, in my view, puts the Poynting vector law at a symbolic position in the classical electromagnetism. Therefore, I think it also possible to say that actual electromagnetic laws are under the right-handed screw rule.

As well known, the Maxwell equations in the Gaussian unit system are as follows:

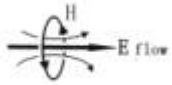
$$\varepsilon\, \partial E/\partial t + 4\pi j = c\, \mathrm{rot} H \qquad (6)$$

$$\mu\, \partial H/\partial t = -c\, \mathrm{rot} E \qquad (7)$$

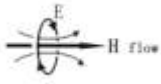
$$\mathrm{div} E = 4\pi \rho \qquad (8)$$

$$\mathrm{div} H = 0 \qquad (9)$$

where E represents an electric field; H, a magnetic field; ε, a dielectric constant; μ, a magnetic permeability; and ρ, an electric charge. Under vacuum, the above equations turn out to be as follows:



$$\partial E/\partial t = c\, \mathrm{rot} H \qquad (10) \qquad A$$



$$\partial H/\partial t = -c\, \mathrm{rot} E \qquad (11) \qquad B$$

$$\mathrm{div} E = 0 \qquad (12)$$

$$\mathrm{div} H = 0 \qquad (13)$$

Electromagnetic wave equations are expressed as follows:

$$\partial\ 2\,E/\partial\,t\,2 = \nabla\ 2\,E \qquad (14)$$

$$\partial\ 2\,H/\partial\,t\,2 = \nabla\ 2\,H \qquad (15)$$

where E is on the y-axis; H, on the z-axis; and the wave goes along the x-axis. So the electromagnetic wave proceeds as shown in Figure (3). At that time, the x component of wave equations is expressed in the following equations:

$$\partial\,E\,x/\partial\ x = 0\ 、\ \partial\,H\,x/\partial\ x = 0 \qquad (16)$$

Therefore, the wave equations have no component in the proceeding direction . The waves are completely transverse wave, and they proceed from E to H under the right-handed screw rule. Figure (3) shows the Poynting vector law in which electromagnetic waves proceed along the x-axis.

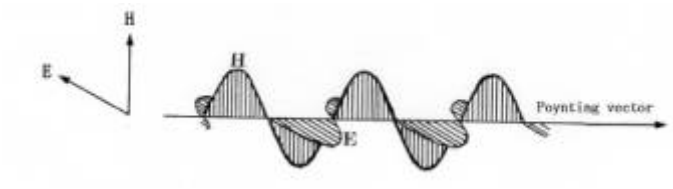


Figure 3

Like the illustration (A), (B), the equations (10) and (11) show the features of the electromagnetic laws that lead the electromagnetic waves. From these laws I understand that the rotating rings of electric and magnetic components are linked mutually, with the rotations being symmetrical under the left- and right-handed screw rules. Therefore, I'd like to think of electromagnetic waves as a chain of the links in which two components appear alternately, as the drawing shown in Figure (4).

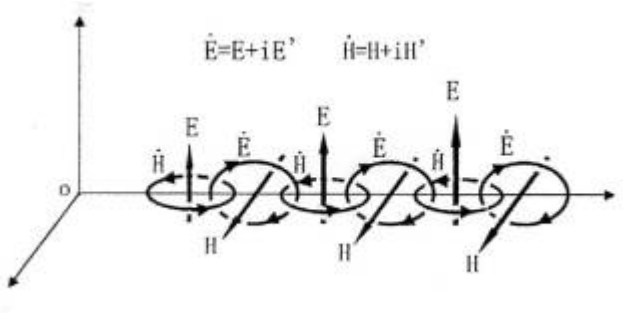


Figure 4

Unexpectedly, however, these waves are transverse waves that proceed in such a way that E and H vibrate perpendicularly to each other and only on the planes that are perpendicular to the proceeding direction of wave, with no vibrating component in the

proceeding wave direction. So, we look at the world from the vibrating planes of E and H, the two components of light. From the above point of view, we know that the direction of wave proceeding is related with the imaginary number. Let us now assume that, originally, E and H are the complex vectors of E+iE' and H+iH', respectively. Then, there appears an imaginary component in the direction of wave proceeding. Thus, the drawing shown in Figure (4) can be regarded as the wave that proceeds when the rotating complex components of E+iE' and H+iH' are linked alternately. It is considered, therefore, that E and H in Figure (3) represent only the real components of the complex electro-magnetic wave. If we take up a vector product of iE and iH, we will see that it goes on like a left-handed screw 's rule. Thus, it is possible to consider a new Poynting vector of the left-handed screw's law. Because nature should originally be symmetrical, it is reasonable to assume that there exists a Poynting vector law of the left-handed screw's rule that rotates counterclockwise. Through the introduction of this new law of imaginary number, we can think of the second conjugated world of new light. It is the world of reversed electromagnetic fields. And it exists sitting back to back with, and crossing orthogonally with our actual space, as the conjugated aspect of the complex electromagnetic space.

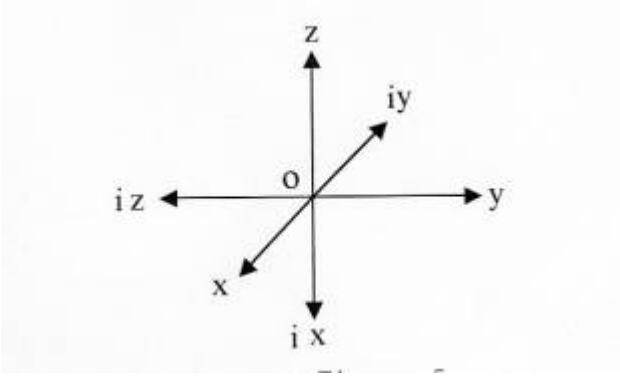


Figure 5

A complex space can be shown on such coordinates as given in Figure 5. These coordinates have no minus direction. For the convenience of explanation, let's take up x-axis. For the electron existing at the origin, the plus direction on the x-coordinate is determined when this electron reacts with a photon coming from the plus direction on the x-coordinate. The minus direction can only be observed when this electron reacts with another photon coming from the minus direction, and the coordinate in such a direction is new different coordinate in the plus direction. If there is an iso-electron at the origin, then an imaginary axis is determined when this iso-electron interacts with an imaginary light. I will take up this iso-electron, later in this report. Since the real

axis and the imaginary axis are in a right-angled relationship, Figure 5 suitably shows such a relationship. The real coordinates x, y, and z are based on the right-handed system, then the imaginary coordinates ix, iy, and iz are automatically based on the left-handed system. The real and imaginary electromagnetic laws therefore can be expressed in a symmetrical mirror image. The real time t and the imaginary time it' correspond to real and imaginary coordinates respectively. I believe that above explanation is enough to understand the concept of a complex, electromagnetic space.
The second space thus exists side by side with and orthogonally balanced with the real space. This complex electromagnetic space can be expressed in a symbolic drawing shown in Figure 6 where a figure 8 is put for each wavelength along a lateral line, as in something like 888888888. The upper halves of figure eights belong to the real world, and the lower halves, to the second space. If the upper half of each 8 is drawn clockwise, and the lower half, counter-clockwise, then the figure 8 can be used to symbolize the two Poynting right-handed and left-handed worlds. Both worlds are drawn symbolically with one line because the complex space is continuous.

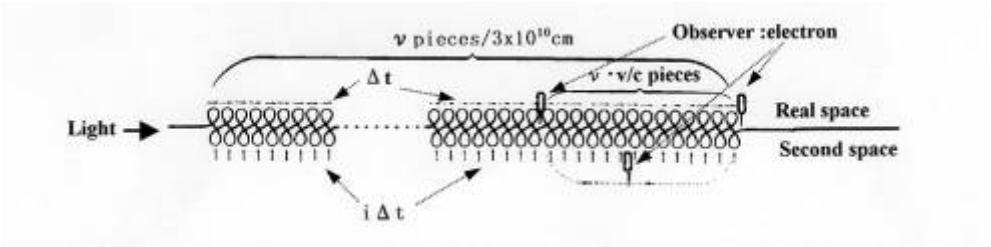


Figure 6

In their genesis, electrons should have an inner electromagnetic structure because they have been reborn from gamma ray. Electrons therefore are very reactive with electromagnetic waves as both are under the same screw rule. The gamma ray, too, has a complex electromagnetic aspect. When an electron pair is created, a total of 4 particles must actually be created because a counter-electron corresponding to the electron, and a counter positron corresponding to the positron, are likely to be created in the second space, as drawing shown figure 7.

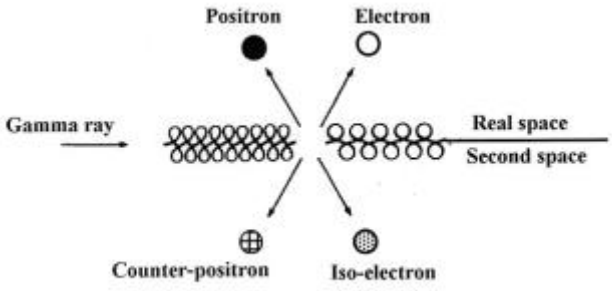
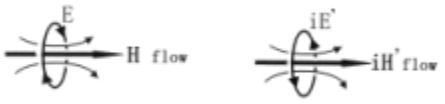


Figure 7

I suppose that this counter-electron is a neutral electron in an iso-spin state, as opposed to electron with its charge state, like in a relationship similarly found between proton and neutron. Because the term "counter-electron" may be mistaken for "antiparticle", I'd like to call it "iso-electron" from now on. This iso-electron is difficult to discover since it does not interact with the ordinary electromagnetic field, as it is under the reverse screw rule. Just as electrons play a leading role in this world, so the iso-electrons lead the second space. The electrons comprising our eyes perceive the space in the presence of light. It is my speculation that in a similar manner, the iso-electrons may perceive the expanse of the second space that comprises an imaginary light. An iso-electron is thus like the shadow of an electron, and plays a leading role in the second space. Just as the term of current in Maxwell's electromagnetic equations is a flow of electrons, the imaginary electromagnetic equation contains an imaginary current term, which is a flow of iso-electrons. Therefore, a new electromagnetic equation will be obtained by replacing time and all other elementary letters used in Maxwell's equations, i.e. t, E, H, B, D, j, and ρ ith t, E, H, B, D, j, and ρ which are considered to be complex numbers, respectively. Then we have new symmetrical equations as follows.

$\varepsilon \partial E/\partial t + 4\pi j = c\ \mathrm{rot} H$ （１７）



$\mu \partial H/\partial t = -c\ \mathrm{rot} E$ （１８）

$\mathrm{div} D = 4\pi \rho$ （１９） $\mathrm{div} B = 0$ （２０）

$$E=E+iE',\quad H=H+iH',\quad j=j+ij',\ \varepsilon=\varepsilon+i\varepsilon',\ \mu=\mu+i\mu',\ \rho=\rho+i\rho'$$

$$D=\varepsilon E,\qquad B=\mu H$$

Along with this replacement, the equations (16), too, can be complexified to give $\partial E_x/\partial x=0$、$\partial H_x/\partial x=0$

In these equations, E and H proceeding in entanglement with each other like a chain can be expressed as shown in figure 4, because the imaginary parts of E and H are in charge of the components proceeding in the direction of the electro-magnetic wave.

These equations cannot be expected to develop as far as time is regarded as linear, just as it has been so regarded in the past. If, however, unit time τ is a periodic function that can be expressed by $t=\tau e^{i\omega t}$ and an angular velocity of $\omega=2\pi\nu$, then it is possible for us to think of an instant when real time stops, and thus the phenomenal space can be closed. In that case, I think that we can express a photon having a frequency of ν, which is a particle and at the same time, is a wave. Based on a classic electromagnetic equation, we could not have expressed such a photon. This unit time τ can be regarded as the internal time characteristic of the wavelength for each photon. I believe that this concept of time mediates with between classical theory and modern quantum theory.

Using a drawing such as shown in figure 6 as a model, I explained the time lag that has appeared in the relativity theory, and wrote an article in 1972 for the "Telepathy" No28, a magazine with a small circulation. That article is outlined below. When an object made a movement in a space, it was simply considered in the past that the object moved through the space to which the object belonged. In the complex space, however, if this space is compared to a chessboard, pieces are in a situation that they cannot advance to the next place unless they dive into the backside of the chessboard. This backside refers to an imaginary space, which exists under the figure-8 line shown in Figure 6. The relativity theory deals with how time goes on in a moving system. This is a problem of relative movements of the light emitted from the moving system and the observer at a fixed point in the observing system; or, in other words, it is a problem of relative movements of light and electrons since the electrons are the observer of the light. It is assumed here that the observing system and the observed system are near to each other and that the clock in the observed system brings time quantum of a number ν in every second along with the light energy, where ν represents the frequency

of light. This time quantum, suddenly taken up with my apologies, is better regarded as a complex unit indicating the time progress on the clock. The idea of time carried by light can be described from another aspect. As well known, when an object flying at a high speed comes close to the speed of light, it looks as though time does not go on or has stopped. If such time is considered from the side of light, it is also possible to consider that light carries the stopped time or a point of time. It is described in details in the "Psi Science" Vol 18, 1983 .

If there is no movement, the observer, who is electron, interacts with the time quantum in a number of vper sec. In that case, electrons are situated on the real space side of the complex space, and time is found to go on normally on the electron. But if there is a relative displacing movement, the electrons are correspondingly forced to dive into the imaginary space for each wavelength of the light. At this time, there appears the imaginary time quantum. If v represents the relative velocity, then the number of this imaginary time quantum isvv/c. Now let n represent the number of real time quantum to be observed by electrons. Since the imaginary time quantum and the real time quantum are at right angles with each other, the following equations are obtained:

n2 +v2v2/c2 =v2
n = (v2 –v2v2/c2)1/2
= ν (1 －v2/c2) 1/2

Therefore, the time on the clock in the moving system looks as if it is delayed by (1－v2/c2) 1/2 times. And this delayed time agrees with the value from Lorentz equations of transformation. Because an object moving at a relative speed close to the speed of light dives into the imaginary space, the object in the real world is rarefied in its existence, and the so-called Lorentz contraction takes place. It does not mean that the object actually contracts. Rather, I think it better to express this phenomenon as the Lorentz rarefaction effect.

When elementary particles are accelerated in the electromagnetic field, they also dive into the imaginary space. Therefore, the efficiency of acceleration decreases, and it looks as though the elementary particles have increased in their mass. In the experiments of collision between elementary particles by means of a collider, the particles collide with one another at a speed close to the speed of light and dive into the imaginary space. In that case, the probability of collision may be lower than expected.

Common ground between Quantum theory and Special Relativity theory

T. Miyauchi was interested in this concept of the space. He combined this concept with

the observation theory of the quantum theory and also used Heisenberg's matrix theory to explain the delayed time. This means that the special relativity theory falls under the category of the observation theory. At that time, Miyauchi was trying to elucidate the phenomenon of Nen-graphy discovered by Dr. T. Fukurai in 1910, from his standpoint of contemporary physics. By this phenomenon, it is meant that, when an image is sent by mind power, the image can be exposed to light and produced on the photographic film. It is beyond my abilities to explain Miyauchi's matrix works in details. I can only try to give my own explanation for his idea.

Photons have the energy of hν. Through the interaction with electrons, there appear not only the photon energy Δε but also time Δt on the side of electrons. Concurrently, photons disappear and the interaction comes to an end. At this time, Δt appears through ħ under the condition of $\Delta t \Delta \varepsilon = \hbar/2$. Therefore, it can be said that electrons have also observed time during the interaction with photons. If the distance from light source is constant, then Δt and Δε are also constant, and the total of individual fragments of time Δt is the ordinary flow of time. If electrons have a speed relative to the light source, it means that electrons have a higher level of energy than when they are stationary. Therefore, Δt decreases with the increase in Δε. Thus, there is a decrease in the total time as observed by electrons, and there is a delay in the observed time. Here is a common ground between the relativity theory and the quantum theory. Let me explain in more details, in my own way, the mechanism in which time is observed by electrons. The Planck constant, h has a dimension of action, and is used to express the microscopic moving step in the nature. It is also an index on the boundary between classic mechanics and quantum mechanics. The action is a product of energy and time, as expressed by the dimension of ML^2T^{-1}. This, too, is a dimension of angular momentum. Meanwhile, Poynting vector shows the density of energy flow. As described above, time, too, flows together in the direction of this vector. Since the product of energy and time is in the dimensions of angular momentum, I think that Poynting vector S is an existence essentially near Planck constant h. Quantization of S should be related with this h. Macroscopically I put emphasis on Poynting vector, but microscopically I imagine that energy flow may actually be based on this angular momentum or pseudo-vector ħ as the unit. Light is generally considered as particles of hν.

If we look at light from a complex electromagnetic point of view, the real aspect of hν appears as particles in the actual world of real number. On the other hand, the imaginary aspect of hν appears likewise as particles in the rear-side world. In both

aspects, hν flows in the above-described pattern of a set of figure eight (88888….). From the relation to Poynting vector, we can imagine this state as that observed when a unit complex vector of h/2π= ħ goes on rotating at a ν times per second. We can also imagine that photons are independent vibrating bodies having the complex, rotating time of τeiωt as their inherent internal time and that we can put them aside from the classic image of electromagnetic waves.

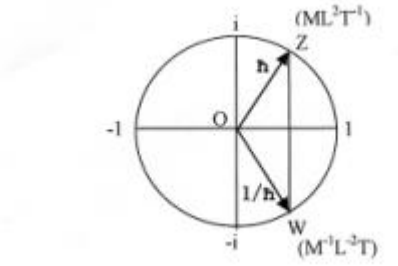


Figure 8.

A unit circle is drawn on the complex plane, and the central point is set at 0. If W represents the conjugate point for the point Z existing on the circumference in the first quadrant, then the following equation is obtained: 0W=1/0Z. If we regard the vector ħ on the unit circle as the unit vector, its conjugate vector is expressed as a reciprocal number. So the dimension, too, becomes a reciprocal dimension as (ML2T-1) turns into (M-1L-2T). This indicates that rotations of the vector ħ on the complex plane cause the dimensional reversion with the shift in the phase. Meanwhile, from the origin of electrons, we can imagine that the energy of gamma rays is confined in quite a small area as the rotating energy. In other words, this energy is the rotations of the energy vector E(ML2T-2). Here, too, (M-1L-2T2) appears because of the reversed dimensions. When these two rotating vectors ħ and E interact with each other, it follows that (ML2T-1) x (M-1L-2T2) = (T). It is considered, therefore, that there appear the time dimensions (T) and (T-1) and the rotating time quantum. I described above that, when electrons interact with photons, the electrons observe time through h. This is merely a rough explanation of the time appearing from a dimensional point of view.

In about 1975, late Tsutomu Miyauchi clarified the mechanism of energy conversion by deriving Hamilton equation that dealt with time and energy conversion with h standing in between. (I own the English paper, which Mr. Miyauchi has written in 1978. If anyone wants to read it, contact me by e-mail.)

Incidentally, the mass dimension M seems to be secondary to L and T, as a basic element of nature. In trying to elucidate the essence of nature, the two of us had a lot of discussion about the possibility of replacing the dimension M with the dimensions L

and T. Later, Miyauchi was successful in deriving Hamilton equation expressed in mass m and angular velocity ω. He clarified that the mass dimension M can be converted to the angular velocity L2T-1. The inertial mass refers to the resistance to a force that acts to move matter. If a force is applied to the axis of a spinning top, the resistance to the force works so as not to change the direction of the spinning shaft. This resistance is created because complex rotations follow the spin of each particle, with which matter is configured when the matter moves through a complex space. I think that a sum of such resistance appears as the inertial mass. This view is endorsed by the fact that, when the gamma ray is born as electron pair, there develops the mass.

This is because electrons are generated when gamma rays are confined in a micro-space and also because we can predict that spinning is generated in the micro-space, where angular velocity ω is concentrated . If there is mass, then a gravitational field is created. If we give consideration to the fact that the gravitational field passes through substances and acts on them, this field may be an imaginary field. I believe, therefore, that complex electro-magnetic equations have a potential of unifying all the fields.

In 1967, Sakharov proposed a theory that the gravitational field was not independent in its existence, but was essentially the zero-point fluctuation (ZPF) itself, from which Van der Waals force or Casimir force is derived. H.E. Puthoff confirmed by calculation that this energy was generated from ZPF of the electromagnetic field. In his 1989 paper, Puthoff pointed out that this idea may lead to a possibility of a unified field theory based on the electromagnetic field. 4 I believe that the gravitational field is a phenomenon occurring in the imaginary field under the inverse square law, which corresponds to the inverse square law applied to electric charges in the classical electromagnetic field. In his 1987 paper, 5 Puthoff' clarified from the stochastic electro-dynamic formulation that the orbit is maintained stably when orbital electrons of the hydrogen atoms in their ground state are supplied by the energy of this zero-point electromagnetic fluctuation. It can be said, therefore, that the enormous energy of the whole universe supplied to prevent the collapse of the atom has its source on the side of the second space. When this energy wells up into the real electromagnetic space, the phenomenon is called the zero-point fluctuation.

A trial for experimental verification for the existence of second space

The above detailed explanation should help understand that the traditional special relativity theory has offered a very biased view that failed to see the essence of time and space. The relativity theory was certainly right in denying the absoluteness of time

and distance, but this theory can be explained properly for the first time when we understand that there is another space behind the real world. However, people will not easily believe the existence of the second space. The Lorentz equations of transformation have been verified for these effects, and can be used as evidence. But, we have long been wishing to have something new to prove experimentally the existence of the second space. More than 20 years ago, I started studying on quartz balls, believing that they might be the channels scientifically connecting between the two spaces. Later, I devised four coaxial cavity resonators combined with one another in a cross shape, with a quartz ball (11 mm) being set at the center. Using this device, I repeated many experiments gropingly. In the fall of 1998, at last I was successful in creating a phenomenon that should be referred to as a new type of S-letter resonance, in which the resonance caused by ordinary electric current was combined with that caused by an imaginary current. It took place during an experiment when I was trying to adjust the phase of each resonator to suit the phase of vibrations caused by high order resonance frequency (113 MHz) of the quartz ball, using signal generator . It continued only for a short period of 1 or 2 sec, but there happened a burnout damage to the input stage in one of the four oscilloscopes. This damaged oscilloscope was connected through a 20-db attenuator to the resonator but with no protection by diode. Probably there must have been electric power of more than several hundreds of watts. I believe that this phenomenon has occurred when the crystal ball resonates the in the imaginary space with above-described enormous electromagnetic radiation energy of the second space and when this resonance is induced into real world.

Later, I resumed experiments after I had devised an instrument to change the resonance frequency of cavity resonators, in order to stop the phenomenon instantly and to protect the oscilloscopes from the high voltage. This device worked and I observed the phenomenon three times one after another in about a half-year since the first success. At that time, three incidents of the phenomenon occurred during the time when I was attempting to induce the resonance with the ball to occur, by adjusting the length of a portion where the imaginary resonance current was supposed to pass through. The phenomenon did not occur when that portion was not in a suitable length, when connection was cut off halfway. As shown in figure 9 that portion is the carbon fiber flux running through the central conductor pipe of each coaxial resonator, one end of which comes in contact with the ball, with the other end being connected to another resonator and back to the ball. Usually, when pipe is used as the central conductor for coaxial resonators, any electric current does not flow through the inside of this pipe even at the state of resonance. But actually, this phenomenon happened

probably because a vector potential had focused on this portion. I believed that an imaginary electric current by iso-electrons should flow through this portion, and used carbon fibers to organize the resonance circuits for the imaginary electric current because in my own judgment, carbon fibers were considered to be a good conductor for such a current. It was thus possible to confirm the existence of an imaginary electric current.

Unfortunately, for 2 years ever since that day, reproduction of the phenomenon was not successful. It may be that the best conditions have not yet been found. Under these circumstances, I know I am not in a position to report on the verification experiments for the imaginary electric current. Nevertheless, it is a fact that very strong and clean power has been generated from the crystal ball, and hopefully, this phenomenon may contribute to solve the future energy problems. Because of these reasons, I have gone ahead to describe what I think is a useful phenomenon. Figurre 9 shows the basic structure and a photograph of the instrument I have devised.

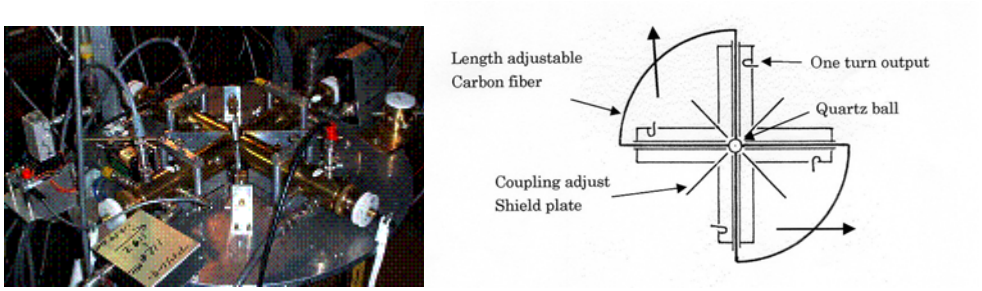


Figure 9

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2. C.MφLLER. THE THEORY OF RERATIVITY Publisher: Oxford University Press, London, 1952.

3. Einfuehrung in die Theoretische Physik. Von Dr. Max Planck

4. H.E.Puthoff. Gravity as a zero-point-fluctuation force. Phys. Rev. A Vol, 39 2333-2342 (1989)

5. H.E.Puthoff. Ground state of hydrogen as a zero-point-fluctuation determined state. Phys. Rev. D. vol.35. 3266-3269 (1987)

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