Einstein's theory of relativity in new physical model or theory of the matter and the parallel worlds (spaces).

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Abstract.

These parts of the work with help of the model of an elementary mass (it may be the Higgs boson) unveils internal essence of nature of time; the forces of Newton, and corrects understanding of the nature of gravitational force. The model explains the physical nature of the postulates of special relativity, and shows that the physical frames of reference are obeyed to the Lorentz transformation of coordinates and time because of the existence of matter of our world in a "special" wave form.

Introduction.

Currently special theory of relativity in physics exists as a standard theory. Although the theory has internal own contradictions its mathematical results are extensively used in physics because of their correctness. The results were based on mathematical Lorentz transformation for coordinates and time, which is correct and it was checked with help lot of physical experiments. However, in special theory of relativity inner contradictions still exist. At present, many scientific works try to remove the defects of special relativity because recent observations and experiments in nature of matter and space are hard to explain in terms of Einstein's theory. Such theoretical works are needed for science because special relativity has a fundamental importance for physics. Any new fundamental correction of this theory can create a strong impact on the whole of physics in general. However, sometimes, many new mathematical models don't get the Lorentz transformation in full, and they have no future in physics. The authors of such works don't understand the inner essence of the Lorentz transformation, the principle of relativity for frames of reference thus they stimulate the growth of resentment and neglect for these works by followers of Einstein's theory. But history of development of fundamental physics has the repeated instances when fundamental laws had subjected for serious adjustments. For example, in the twentieth century Einstein's relativity theory got a strong influence on the laws of classical physics. Now, we are approaching the time when the theory of relativity has to be modified, too.

To eliminate some of the internal contradictions, which exist in the special theory of relativity and in order to unite the followers of Einstein's theory and the followers of absolute space (ether), this work is suggested for you. This work can explain the physical nature of time and the postulates of special theory of relativity. In addition, the work reveals the nature of the existing forces - force of Newton, electromagnetic forces, gravity, etc. In contrast to the theory of special relativity, the work is based on other physical model. The general solution is based on the promotion of the ideas of de Broglie (the wave properties of matter) and a new understanding of time. In this model, the time is associated with the energy coming from the parallel space. In our world, this energy gives an opportunity of existence for material micro-objects and the time of their development, or in other words "the time of their life." As the matter of our world is made up by micro-objects, then we can say that whole matter exists due to energy flows that are passing out of parallel space. They can be called by flows of time.

At first, the analysis will be performed on the model of the elementary mass (such as the Higgs boson). Thus, you will learn nature of time of elementary mass and you learn how the elementary mass creates the Newton's force and gravitational force. But for a proper understanding of the proposed model, I strongly recommend reader to start study of the work with help of the third part of the work. In the third part there is analysis of the principle of relativity for inertial frames of reference that obey Lorentz transformation. The analysis is performed in detail and it is easy for understanding. Its presentation is associated with the proposed model here.

Since the model is based on further development of the ideas of de Broglie for wave nature of matter, description is reduced to a physical-geometric model. It is very simple and clear to understand too. Any reader can read and study description of this model. Such a model is consistent with the general trend in modern physics, when purely mathematical models replace the physical processes taking place in the nature of the world around us. It is convenient for the development of abstract models. But such approaches, unfortunately, hamper the development of physics. This proposed work follows the general trend in physics, but this is the first step before a printing of purely physical model, which can explains easily the next things.

- Model explains natural essence of electrical field and action of electromagnetic forces. Under this, it implies the next thing: what source can generate electrical field and how, the electrical field acts for creation of counteraction force.

- Model can explain natural essence of action of nuclear forces.

- It can explain reason because of which the electrons do not fall to nucleus of atom.

- This model corrects the balance of energy for weak interaction of neutral masses. It is important to remove existing problem of searching of the hypothetical particles.

- The model explains the cause because of which exists asymmetry of the matter of our world, i.e. model explains why positive charged atomic nucleus and negative charged electrons exist. Thus, the model explains why our world consists of matter but not of antimatter.

- The model explains laws of thermodynamics. For example, why is energy flows from a higher temperature to a lower temperature (heat flow) or why is the energy flows from a higher pressure to a lower pressure (expansion), and so on.

At the first time, the materials of this work were published in the book: "Новая модель окружающего физического мира, раскрывающая природу действия законов теории относительности Эйнштейна". Минск, Белорусский комитет "Дзеці Чарнобыля". **2001** year. ISBN 985-6486-06-8.

The part 1.

“Uncovering internal essence of nature of time; forces of Newton; correction of understanding of nature of gravitational force.”

Table of contents

1 The part 1

To the reader.

This is the part 1. It is designed to open the inner essence of time and to prove the Lorentz transformation for the time as the natural property of matter in our world. The proof will be carried out without any artificial introduction of affine coordinate or another kind of frames of reference. It will be based on the further development of de Broglie's ideas about the wave nature of matter, models of parallel spaces, inversion motion of material bodies into parallel space and hidden essence "development time" matter of our space. At the end of this part it will be shown and mathematically proved that the light in the "normal conditions" in all inertial reference systems has the same speed. For this reason, in "normal" conditions it is useless to conduct any experiments to test own "movement" relative to an absolute space.

Note: Dear reader, all the materials that are published in electronic form here were first published in a book "New model of the physical world revealing the nature of the laws of Einstein's relativity theory". [4]

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Description of parallel space and input of a concept of time.

Before proceeding further the description, it highlights the following. This model will be considered in a vacuum, where the processes are linear and uniform, and analyzed objects are elementary neutral particles whose dimensions are small compared with the distance between them. These elementary neutral particles are similar to neutral Higgs boson and this part describes one of its properties.

We now proceed to a preliminary description of the physical model. Let's choose a frame of reference (**X, Y, Z**) at rest and we set two neutral micro-objects onto **X**-axis. They will be displayed on the axis by the black dots ● . First micro-object is placed in the center of the frame of reference. The second micro-object has a shift relative to the first micro-object in the positive direction of X-axis. Let's assume that from the center of first micro-object, the light beam is emitted to the positive direction of X-axis direction. It is depicted in Figure 1 by yellow color.

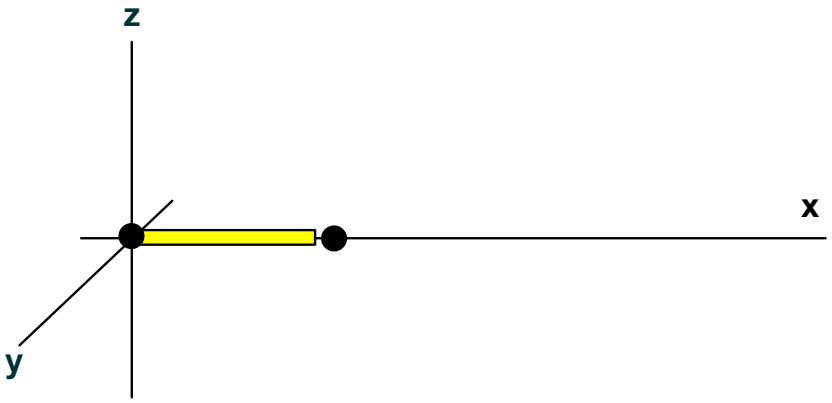


Figure.1

As it can be seen from Figure 1, the light propagates along the X-axis. Axes Y, Z are not necessary; therefore, one of the axes may be removed. For example, it may be axis Z. Instead, we will consider the spatial axis out of parallel space. It is denoted by the symbol .. **ξ .**

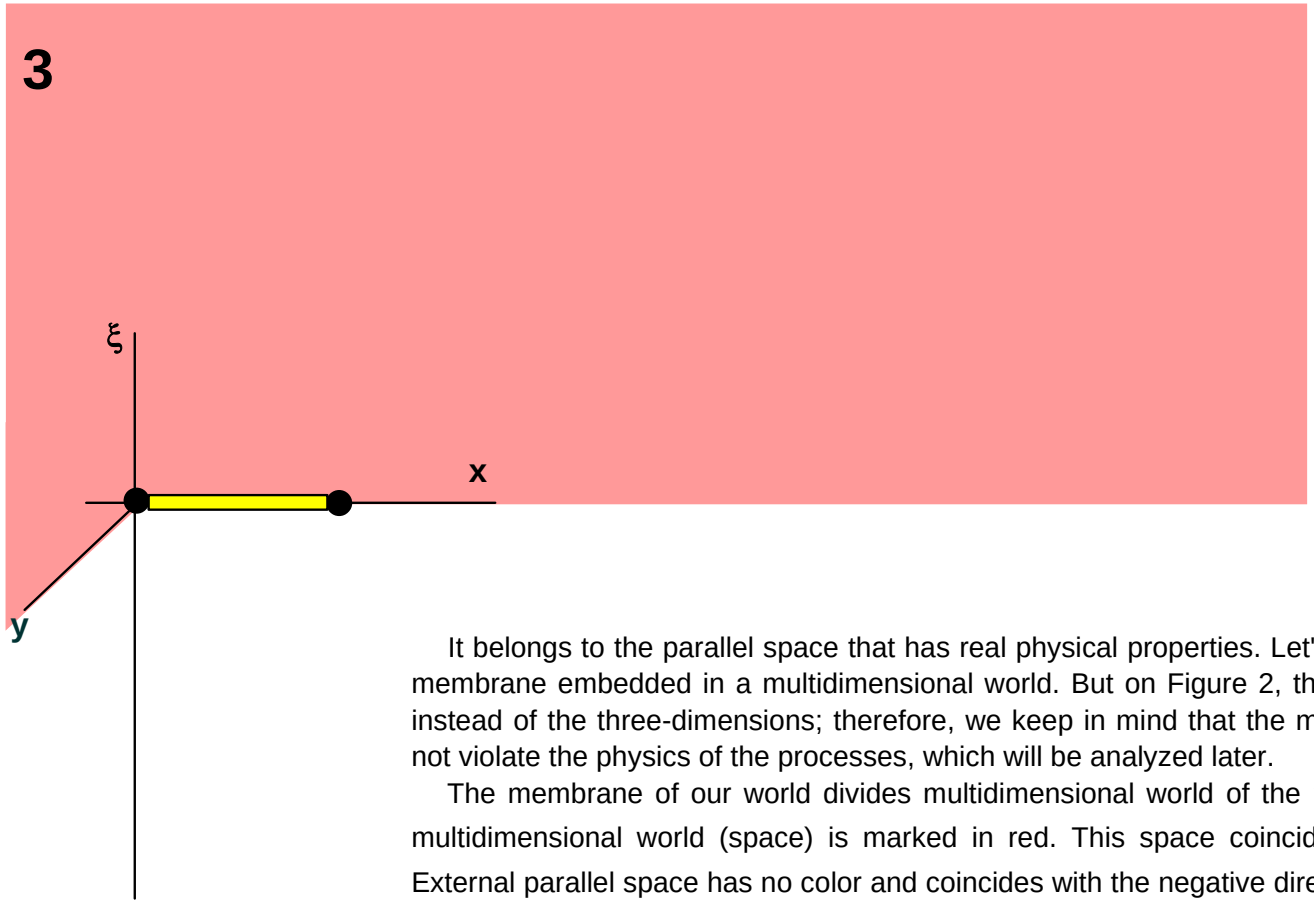


Figure.2

Now, one of the dimensions of parallel space is marked with help of a normal axis to the plane **X, Y**. See Figure 2 and ξ-symbol. The plane (**X, Y**) is our world space. Three-dimensional parallel space in full cannot be displayed together with the three-dimensional space of our world in a single picture. Because of this, it uses the long known method of removing unwanted spatial axes or, in our case, we remove a single axis. Then we obtain a three-dimensional model, which is already possible to be analyzed. However, we keep in mind that one of the coordinate axes belongs to the parallel space. But this axis isn't a normalized time axis (**ct**), which is used in the "special theory of relativity."

It belongs to the parallel space that has real physical properties. Let's assume that our world is a three-dimensional membrane embedded in a multidimensional world. But on Figure 2, there is only plane out of two-dimensions (X, Y) instead of the three-dimensions; therefore, we keep in mind that the membrane is a two-dimensional too. But it does not violate the physics of the processes, which will be analyzed later.

The membrane of our world divides multidimensional world of the parallel space into two parts. Inner part of the multidimensional world (space) is marked in red. This space coincides with the positive direction of the axis (ξ). External parallel space has no color and coincides with the negative direction of the axis (ξ). Internal parallel space has pressure of ether existing towards to our world and the external parallel space. Conditional red color for upper parallel space reflects this fact with help of an art form. This color will not appear in the next presentation. On figure 2, it helps visually to see the space that has pressure and here its function ends.

Ether of inside part of the parallel space isn't coming out into the outer part of the parallel space through the space of our world. This is due to the properties of space of our world. For the interpretation to the figure 2 it can be said that the upper part of the parallel space exists as an isolated from the lower parallel space (it is lower part of ξ-axis) by plane of our world. But don't forget that the upper part has a pressure. The whole model is created by me in detail but here, the multidimensional space model is used as a postulate. I introduce the conditional membrane for perception of this model. In reality, our world is not the membrane. It is one of the many of parallel spaces (worlds). Everything is much more complicated and interesting.

It is well known that any elementary body with a mass exists as a complex structure. But if we analyze this structure in general for its action or a property, the elementary body can be considered as a point object without an analysis of its internal structure. This approach is used for the elementary mass in this model. It is model of "black box". It is sufficient in order to obtain a general theoretical result. In a particular case, all applications can be detailed.

So, let's pass to essence of the hidden properties of the elementary mass, elementary charge, etc. These properties will allow to assert that "relativistic effects" in our world take place because of matter in our world. Here, these properties are postulated. To understand them, let's recall the known facts. You know that nature has the symmetry properties between light quantum and elementary matter. Quantum of light has wave and particle properties but any elementary particle has properties of wave and particle, too. However, complete similarity between them is not. For example, the quantum of light in a vacuum is always moving at the speed of light. As opposed to it, any elementary object may be motionless. If we are assuming that material objects have movement with some constant speed then at least, we could state this fact. But, no one of physical experiments has fixed anything like that. Because of it, this model is not using a direct motion for matter. Instead of it, the model is using presence of inverse and hidden form of a motion of material bodies that takes place relative to parallel space. Here, under the understanding of the inverse movement, I mean the following the material objects of our world do not move in a parallel space. Instead of this motion, the parallel space (aether) passes through the material micro-objects of our world, forming streams and it is giving them a hidden form of wave for movement. Of course, this model is used to long-lived micro-objects. Motion of the parallel space always has the same speed. It is equal to the speed of light. This speed will be stabilized by the internal structure of a micro-object. Such a stable, long-lived micro-object is a single wave of energy focus or aggregate of such focuses, united together. All our matter is a special energy in the waveform. In contrast to the light quanta, the movement of matter is capsized and gone between two parallel spaces. These parallel spaces are inner space and external space. Micro-objects of our world cannot move in the parallel spaces, as they belong to our world. Because flows run through the micro-objects, then we have to use the term "micro-flows". Micro-flows give micro-objects existence in our world, so if the pressure space (ether) will disappear in the parallel space, in this case, micro-flows are disappeared too and micro-objects of our world will disintegrate, fabric transforms to a clean forms of waves.

Naturally, since the parallel space (aether) is under pressure and the wave energy focus of any micro-object stabilizes passage of the aether then there are interactions between the energies of the wave focus and the parallel space. This interaction gives the reaction force in our world when there is acceleration of mass, etc. For example, this model can easily explain all of Newton’s laws. Besides any wave energy focus has constant exchange energy between itself and the parallel space, and one exists in time due to this exchange. Therefore, I am postulating the following statement: the existence of matter in our world is connected with the time of energy transfer from a parallel space.

This exchange takes place in portions and it gives quantization of "time." Process becomes a clear after the analysis of time of micro-object at rest and micro-object that moving uniformly. If there does not introduce the concepts of unit (quantum of time), then we don't get the Lorentz transformation for time under this model.

If there is no energy absorption then "wave energy focus" turns to wave, which is similar to frozen not time-varying wave propagating in an ideal environment without attenuation and dispersion. Its shape, internal state, etc. will be frozen in time like the image. For easier and right understanding term the "wave energy focus", I take the liberty and repeat again the main possible states of the "wave energy focus".

First, matter is active substance in time and develops over time. In this case, its micro-objects exist as "the wave energy focuses" that are able to absorb or return energy to the parallel space. In this case, the speed of passage of parallel space is equal to the speed of light and matter exhibit effects of counteraction to acceleration of movement in our world.

Second, the matter (fabric) cannot develop in time and has a frozen state. In this case, the "wave energy focuses" are not absorbing energy out of parallel space. Focuses do not stabilize speed micro-flows out of parallel space. Speed of any micro-flow is not equal to the speed of light. Matter in the ideal case isn't counteracting to the acceleration and curvilinear motion, does not transmit impulse. But the "wave energy focus" of micro-object is not destroyed because there is the micro-flow passing through "wave energy focus."

The third, the micro-flow out of parallel space is stopped and "focus energy wave" is destroyed and turning into the wave that is propagating in space.

In addition to the above, in the framework of this model, physics of "relativistic contraction" of matter in the direction of movement becomes an understandable. For example, I can easily predict that relativistic effects of matter will disappear, when energy focuses lose the properties of counteraction to the acceleration (second state of matter). For neutral physical bodies this condition will occur when the body mass is reduced to zero. In this case the body is not able to transmit movement impulse. In present such a state of matter isn't created artificially in pure form. But we could try to explore the liquid helium in the state of superconductivity, whether it has "relativistic" compression movement? If not, then in this case we would have a navigational instrument that can show the absolute motion in space, our speed, direction of motion. It will be done without stars or their Doppler spectrum shift. We would have known motion of our Earth, the solar system, our galaxy inside space. Many questions about the "Big Bang" can be removed.

We now turn to the conclusion of formula Lorentz transformation for time in the framework of this model.

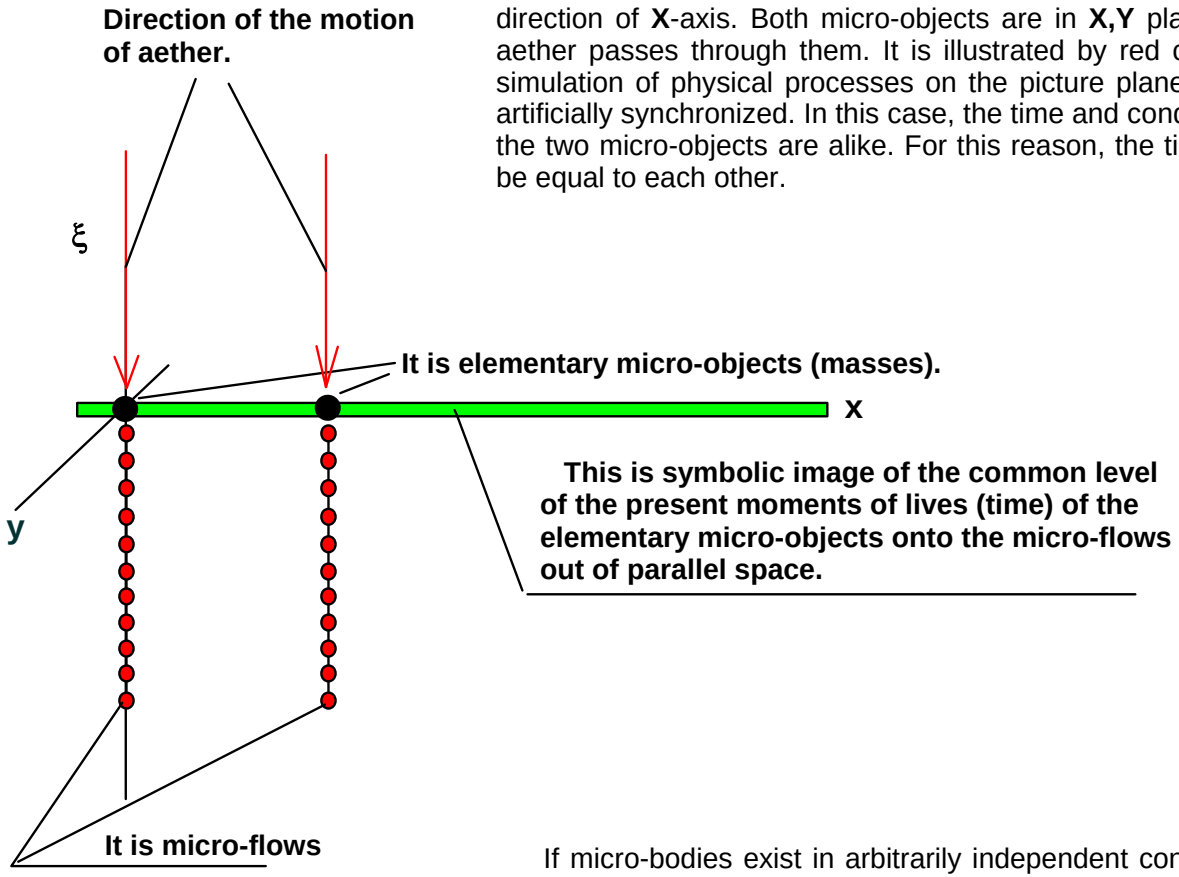


Figure.3

To do this, consider Fig. 3 In it we see two identical elementary micro-objects shown as black dots. One is located in the center of the frame of reference the second is located at some distance from it in the positive direction of **X**-axis. Both micro-objects are in **X,Y** plane of our world and are at rest. From parallel space aether passes through them. It is illustrated by red circles that are joined by black thread. This is my art simulation of physical processes on the picture plane. Hope it is clear. In this figure, passage of aether is artificially synchronized. In this case, the time and conditions for the transfer of energy from a parallel world to the two micro-objects are alike. For this reason, the time of development for these micro-objects will always be equal to each other.

If micro-bodies exist in arbitrarily independent conditions in this case, passage of aether through micro-objects can be independent from each other. From this it follows that the times of micro-objects in nature are local.

Both the micro-objects are developing over time in the opposite direction relative to motion of the ether. From the point of view of the frame of reference of micro-objects a process of passage of parallel space can be considered as an imaginary movement in parallel space. Time of life any of micro-objects depends on the length of the ether flow of parallel space that passes through a micro-object. Let's prove this.

To do this, we will consider one of micro-objects and we will find the time of energy transfer to it. This will be time of life of the micro-object, or if it may be said by words in commonly understanding: it is own natural time of micro-object in its own frame of reference. Of course, as I mentioned for further conclusion we will need to compare the time unit. For this purpose, let's consider the absorption of unit of energy from the micro-flow that goes out of the parallel space. We assume that a micro-flow gives this energy to the micro-object during its passage through the micro-object if the micro-flow has unit length ($L_{push_0}=L_0$).

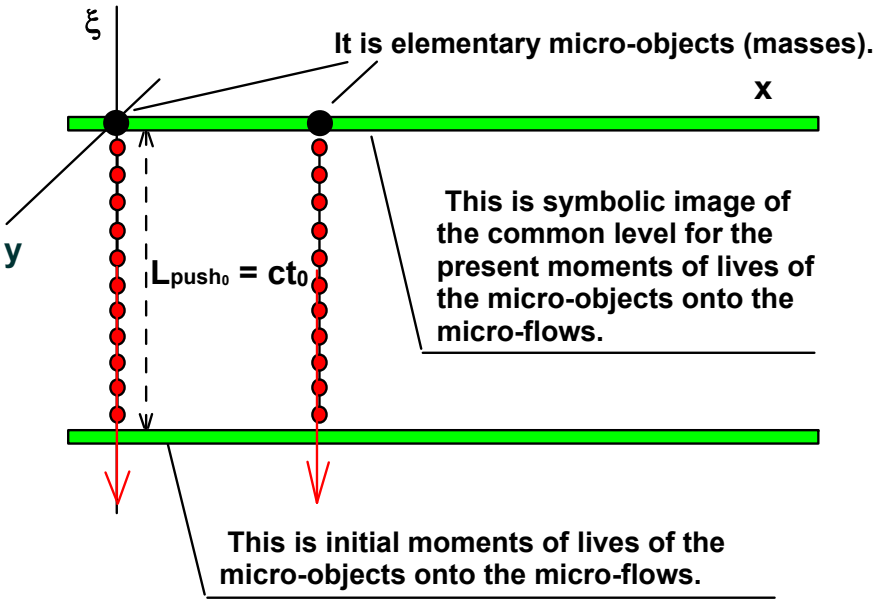


Figure.4

The notice. The symbols introduced here are used only in this part of the work.

See Figure **4**. We denote this energy unit by symbol: E_0. This energy is equal to:

$$E_0=k* F* L_0 \text{ or } E_0=k* F* t_0* V_{push}.$$

Here, the symbol t_0 is a unit of time and V_{push} is speed of passage of micro-flow from the parallel space. Symbol **F** denotes a force of the micro-flow. It doesn't change in time and direction its action coincides with the direction of movement of the micro-flow. Symbol **K** is absorption coefficient of energy by micro-object. From the two equations we obtain

$$t_0 = \frac{L_0}{V_{push}}$$

The last expression shows that the time is determined by the ratio of the length (L_0) of micro-flow unit for transmitting energy and speed (V_{push}) of micro-flow passing through micro-object. As it can be seen from the result, the absorption coefficient **K** does not affect the energy transfer time. In following, it will be omitted.

Addition. To understand the physical nature of the wave lifetime, consider the following simple example. Let at time zero the gun is shot. Suppose that air is homogeneous and there is no wind. Then, the time of life of the sound wave of the gun shot is the ratio of the distance travelled by the wave divided by the speed of propagation of sound wave in the air. The same result was obtained for the expression of the time of life of the elementary micro-object.

Let's remember that in normal conditions micro-objects are similar to quanta of light. They are being passed through itself aether of the parallel space at a speed which is equals to the speed of light in vacuum. We denote it by symbol **c**. Therefore for micro-objects in Figure 4, the velocity is equal to $V_{push}=c$ and hence the time is equal to $t_0=L_0/c$. For the general case when the length of a micro-flow can be arbitrarily long, time is equal to $t=L_{push}/c$. Here, the length L_{push} is equal to $L_{push}=N* L_0$, **N** is number of units (L_0), which are placed within a segment of micro-flow of arbitrary length L_{push}. In the above case, the direction of the force of the aether pressure out of parallel space coincides with the direction of motion of micro-flows through the micro-objects. Therefore, as it will be seen below, the metric of length micro-flow in order to transfer energy unit has a minimum length and coincides with the physical metric of the micro-flow. In general, this case will not take place. Also note the following important point.

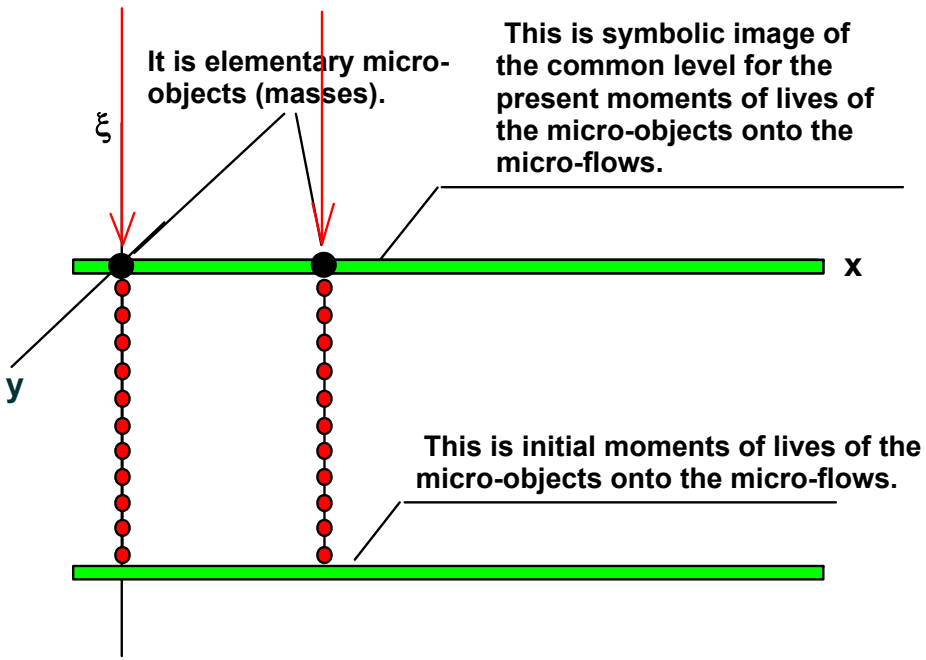


Figure.4

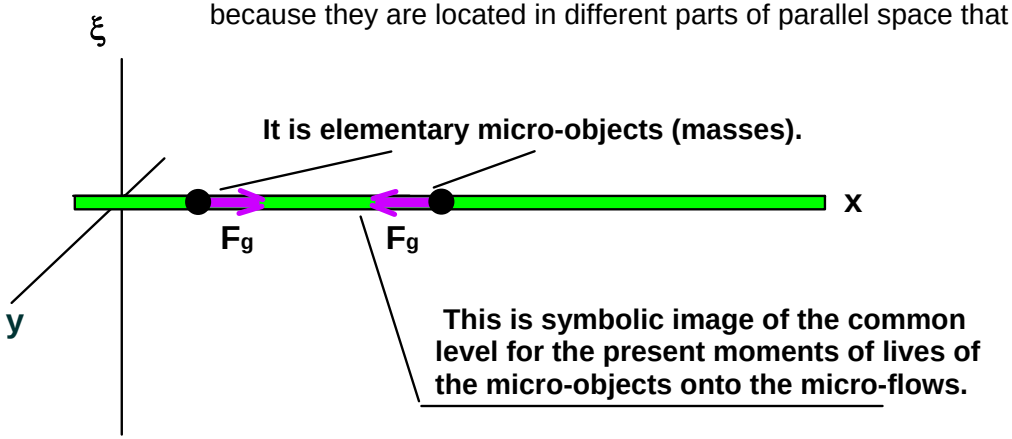
In equality $t=L_{push}/c$ the time t is a function only of the length of L_{push}. Denominator has the speed of light and it has a constant value. From the perspective of its impact it is like a constant conversion factor. Therefore, to simplify the perception of physics of processes the similar speed coefficients in the denominator can not be analyzed. After all, they are constant. But for the transition to a precise mathematical analysis they need to be restored. Here we have defined a time for micro-object at rest inside own frame of reference.

The considered mathematical analysis leads to the next conclusion. The material bodies of our world exist only in the present moment of time. Moving bodies into the past or the future time of the universe is impossible. Therefore, if we take a hypothetical, infinitely small time interval between two events, then for these events any physical experiment cannot record in one physical location the same material body from a present time and past time. It takes place, because the past and the future time do not exist. We all exist only inside of present moment of time. This model can be compared with a model in which time flows through any physical body. So any physical body exists always inside of a real moment of life, and I think this is consistent with the nature of the world. Space-time does not exist. Four-dimensional model of space-time in relativity theory is inaccurate. In this work, I do not want raise all issues of general relativity.

But as an example, in following description, I will say in the form of introduction, what there is actually the nature of gravitational field. As for the mathematical conclusions of the special theory of relativity, they are true, as they were based on mathematical developments of formula of Lorentz transformation.

We now turn to a brief analysis of the mass consisting of several elementary micro-masses (micro-objects). And we will see that these masses will have the same time that the elementary micro-mass has. For simplicity, let's assume that the total mass consists of homogeneous elementary micro-masses, i.e. **M = p*m** here is **p=1,2,3....** . In example that is in Figure.5 the value of **p** is equal to **p=2**.

In this model, if we consider any elementary micro-mass, its structure implies presence of entrance for tunnel of micro-mass. The entrance is located in upper part of parallel space. This part has pressure of aether. In addition, the micro-mass has an exit for tunnel. The exit is located in lower part of the parallel space. It has no pressure. Therefore, entrance of tunnel of any elementary micro-mass is not able to capture an exit of tunnel of another micro-mass. It takes place because they are located in different parts of parallel space that are separated by membrane of our space.



Therefore, a connection of micro-flows following one another for mass does not take place. Micro-flows are accumulated into parallel flows. They increase power of the flow volume into the lower part of parallel space without changing the development time of the total mass. A rough analogy to the above, it is a sieve with a lot of holes in the bottom. If you try to quickly fill it with water you will see that through all the holes on the bottom of the sieve, the water flows in parallel with the same speed and the flow time of water will be the same for all holes. See Figure 5. There you will see the first step. This is merger of two identical micro-masses by gravity. They form a double mass after as they were bound together.

Figure.5

Let's visually verify that the total mass has development time (existence time) or in other words, own time of reference that coincides with time any of elementary micro-masses.

Here in Figure 5, you can see the movement of micro-flows through two micro-masses. Their channels are merged with one another, but they remain independent from each other. Because of this reason, the lengths of the micro-flows aren't changed, and conditions for action of the force out of parallel space also remain unchanged. As a consequence, we have the following conclusion: any material body of arbitrary mass has the same time of life what has an elementary micro-mass if they all exist under equal conditions. Therefore, in order to get the Lorentz transformation for time, we have to analyze the time of micro-mass at motion inside its frame of reference. This is enough for it. The conclusion will be valid for all bodies that have a mass.

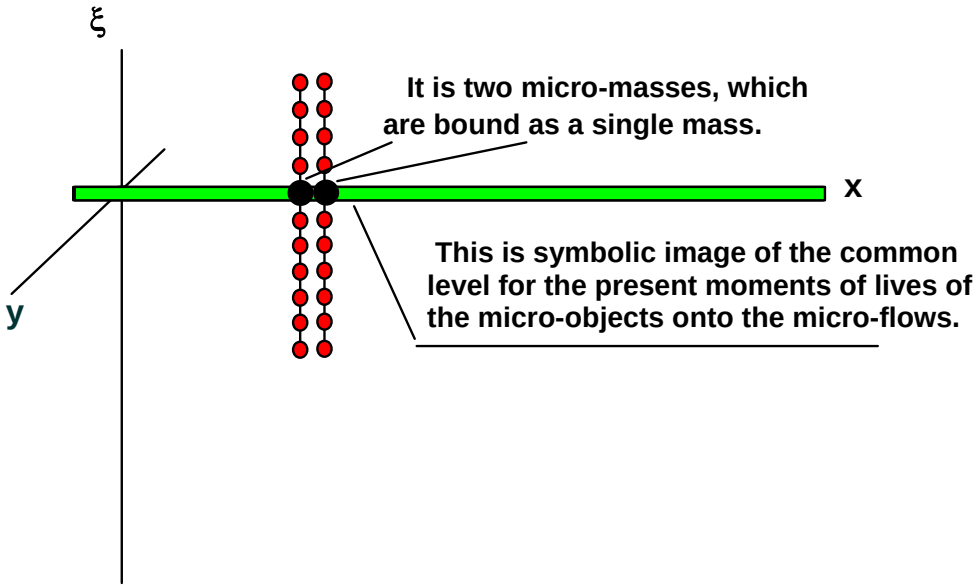


Figure.5

Addition 1. The essence of the gravitational field. Antigravity.

Since the interpretation of the essence of the gravitational field in theory of relativity seems unconvincing, here I will make a small digression to explain the nature of this field. Explanation will be made without the math, but it will show the physical nature of the gravitational field.

To view the addition 1, see the page 10a.

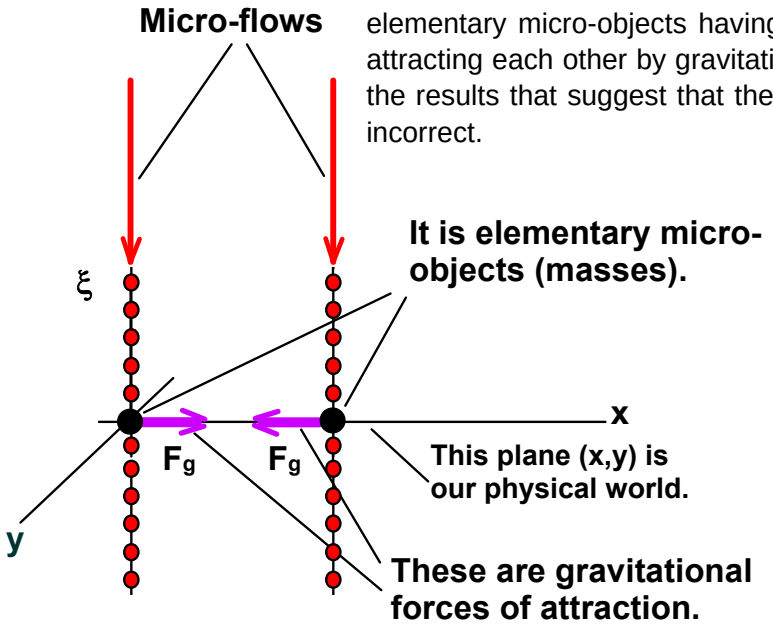
Addition 2. Explanation of the nature of the forces of Newton.

Here you are invited to explanation of the nature of the laws of Newton and electromagnetic forces. As it is well known, Newton's laws are postulated at present and their physical essence now is unclear. It is unclear, from where force of counteraction appears at acceleration of mass, why energy need to spend to accelerate the material bodies of our world, the nature of the action of inertia force of mass is unclear too and etc.

The inertia force is manifested when a physical body changes own speed. This force doesn't give an opportunity to make instant acceleration, braking and has enormous destructive power. For example, when we watch disaster on the track, action of this force is shocking. Something mystical appears and begins to destroy and destroy the car when the car hurtling at high speed, dramatically slows down because of the accident. The origin of this invisible energy is not clear to understanding. For example, at explosion we can watch propagation of a blast wave that there is a carrier of destruction energy. In opposite, at action of inertia force we don't see energy carrier.

Addition 1. The essence of the gravitational field. Antigravity.

The main principles of nature consist of conservation of symmetry forms of matter and symmetry of main principles of actions of the fundamental laws of physics. In this model, it will also apply to the nature of electric, magnetic and gravitational forces. Look at Figure 10a at the bottom right. In figure 10a, there are two conductors. Two direct currents flow in the same direction through these conductors. These currents create magnetic fields around the conductors. The conductors are attracting each other. Now look at Figure 10a at the bottom left. It depicts two elementary micro-objects having mass. Out of parallel space the micro-flows flow through them. Micro-objects are attracting each other by gravitational forces. Similarity of cause and effect of these forces is obvious. I have received the results that suggest that the nature of the gravitational force proposed in Einstein's special theory of relativity is incorrect.



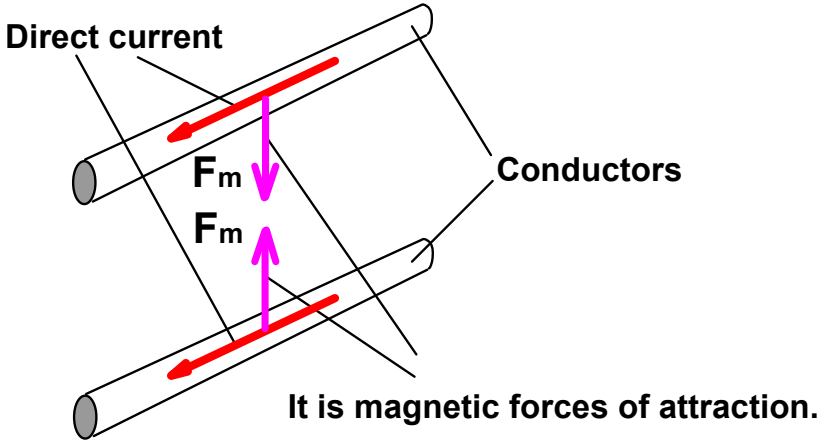


Figure.10a

10b

For example, the model shows that it is possible to create an anti-gravity field. To understand this possibility, look at Figure 10b down, at right it is showing two colliding direct currents flowing in the two conductors. They create a magnetic field repelling the conductors. By analogy with the magnetic field, we can create a local anti-gravity field. It can be created by motion backward of a micro-flow that is flowing through elementary micro-object having mass. See Figure 10b at the bottom left. It depicts two micro-objects with micro-flows. These micro-flows flow in the opposite directions. The micro-objects must be repelled with help of anti-gravity forces. That's all.

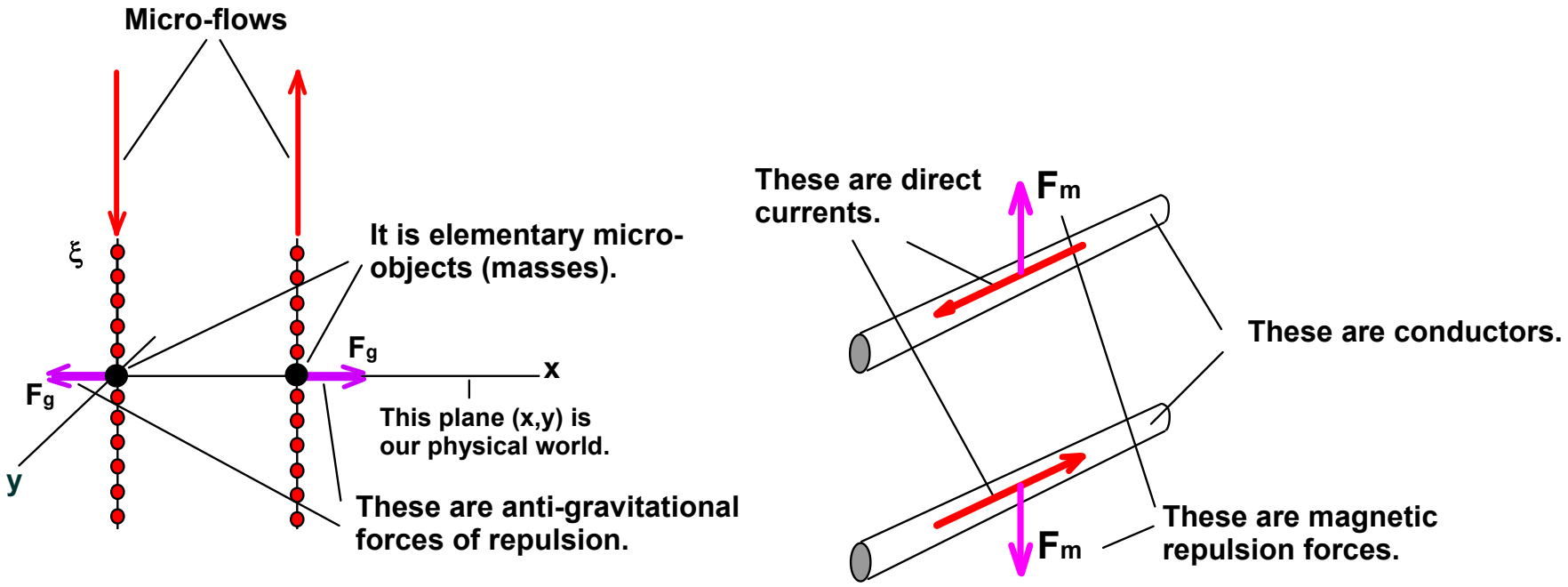


Figure. 10b

We can only see an effect of the force that appears at changing speed. Motion at a constant speed gives you condition at rest. It seems that there is "mechanism tracking" for changing of the speed of motion of material bodies. But we know nothing about this "mechanism tracking".

Newton's laws describe in mathematical form the outward manifestation of the processes taking place in our world. However, is there a physical reason that is described by Newton's laws? Does the intrinsic reason of this phenomenon exist in nature of our world? Until now, we have no clear idea of the nature of these laws. But if you want to know their inner nature, look the further "**Addition 2**". There also you will learn about the conditions under which the micro-object won't obey to the laws of Newton and the postulates of special relativity. In the presentation, all the explanation will be done as in "**Addition 1**" without the math, but the explanation will show the physical essence of Newton's laws and counter-forces of an electromagnetic field.

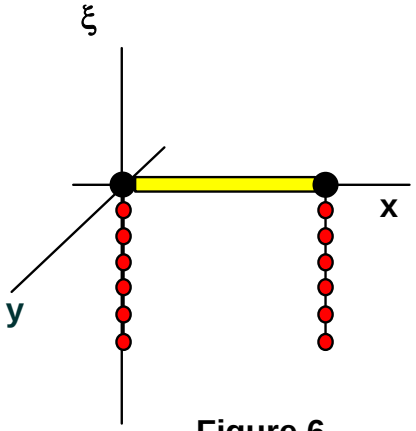


Figure.6

To view the **Addition 2**, see the page 11a.

To further understand the physics of light speed constancy in inertial frames of reference, we need to understand the following physical consequence which naturally occurs in this model. For visual perception of the physics of this consequence we turn to Figure 6.

It depicts two micro-objects that are at rest. The micro-object that is located in the center emits beam of light in direction to the second micro-object. Beam of light is depicted with help yellow color. The Figure 6 shows that beam light has traveled path, which is always equal to length of the micro-flow out of parallel space that is transmitting energy to the micro-objects. In Figure 6, the micro-objects are at rest, so each of micro-flows of micro-objects is transmitting energy by entire length. However, if the micro-objects are moving uniformly and rectilinearly, for example, in the positive direction of x-axis, the light path is reduced. But in this model there is a natural reduction in the length of the micro-flow. The length of this micro-flow will be also equal to the path traveled by light. Therefore, in frame of reference for time of right micro-object, speed of light does not change. If beam light has reflected from the right micro-object and it returns to the left micro-object, for this case the length of common path of the light forth and back will be equal to the length of micro-flow of central micro-object. And it also happens as a natural property of the body. At the end of the presentation you will see visually what has been said and will also be able to analyze a mathematical proof of this property. Therefore, I argue that all attempts to find motion relative to the ether are useless if physical bodies are being existed under normal condition. This motion can be detected only by removing the wave nature of matter. In this case, own time and sizes of material body aren't obeyed to Lorentz transformation.

11a

Addition 2. Explanation of the nature of the forces of Newton.

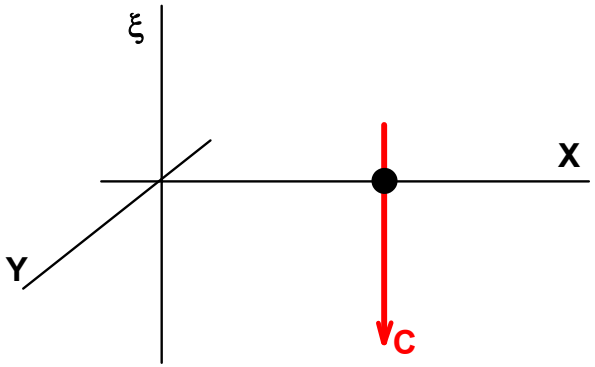


Figure.11a

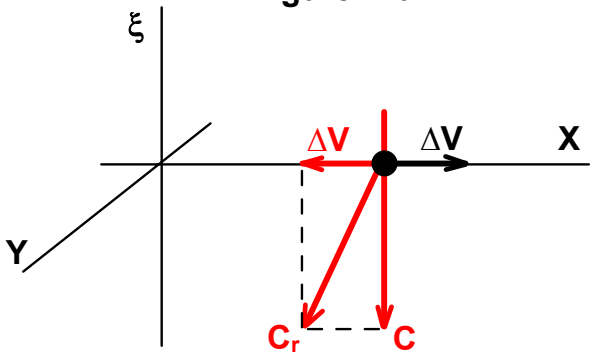


Figure.11b

To reveal the nature of the forces of Newton we first consider hypothetical "ideal" wave focus of micro-mass at rest. See Figure 11a. The term under expression of "ideal" wave focus of the micro-mass implies the following. First, the focus is concentrated in an infinitesimal point and it passes through itself aether of parallel space at the speed of light **C**. Second, the speed of passage of aether through the wave focus is ideally equal to the speed of light and can never be changed or is reversed. The name "wave" is used for the focus because of passage through the focus of aether at a speed that is always equal to the speed of light. It is property of wave. Besides, there is an analogy between the internal structure of the wave focus and the structure of quantum of light. In this part and in the next part, inner vortex structure of the focus will not be considered. If we consider wave focus as a physical focus point this is sufficient for explanation of the nature of the physical laws. See modeling techniques using the model of "black" box.

Let's try to accelerate such "ideal wave focus" up to some arbitrary low speed. In particular, let it will be speeded along the positive direction of half-axis **X**. Assume that we able to accelerate it up to speed $\Delta\mathbf{V}$. See Figure 11b.

Then, because of the oncoming influx of aether from parallel space this "ideal" wave focus must push through itself the aether at a speed equal to

$$C_r = [C^2 + (\Delta V)^2]^{1/2} \qquad \textbf{(a)}$$

This must occur because any wave type, even the "ideal" wave focus must exist in the carrier medium. Wave object of aether is this aether itself. Therefore, there was additional movement of aether, which influences on the wave object too. But we have introduced initially strict conditions for the velocity of the "ideal" wave focus. It requires that wave focus is pushing out aether through itself with speed that is always equal to the speed of light. But then, we have a contradiction, since the speed of the general passage of the aether through the wave focus is faster than light. See equation (**a**). This conclusion follows from the contradiction. The "ideal" wave focus cannot be accelerated. It must always be at rest because "ideal" wave focus has volume of mass that is equal to infinity. But in reality, in our world the material objects have masses with value limited and they can be accelerated under action of force. And in order to accelerate any material object of our world, we must expend energy for work that accelerates this material object. How do these physical phenomena can occur in this model of wave energy focus? Let's consider this question, in detail.

11b

The answer is simple. Model does not require entering of additions in order to disclose the nature of action of these phenomena. We need to adhere to the initial conditions for the wave properties of focus and re-examine the possibility of acceleration it in our world.

To do this, let's go back to the figure **11a** and we trying again to accelerate this focus up to some arbitrary low speed $\Delta\mathbf{V}$. Naturally, acceleration must occur at maintaining by the focus of the wave speed of light for the overall speed of passing aether through itself. To fulfill this condition, you need to make a small addition that takes into account the velocity $\Delta\mathbf{V}$. This addition is following. The sum of total speed, which has two components, must be equal to the speed of light always. These components are: additional passage of aether along the **X** - axis and the motion of the aether along the ξ-axis. To fulfill this condition the additional aether velocity along the **X**-axis must be compensated by braking speed of aether along ξ-axis. After the braking the speed of aether along ξ-axis must be equal to $\mathbf{C_a = [C^2-(\Delta V)^2]^{1/2}}$. For this case, the resulting speed of passage of aether will not change with the speed $\Delta\mathbf{V}$ along the axis **X** and will be equal to $\mathbf{[C^2-(\Delta V)^2+(\Delta V)^2]^{1/2}=C}$. See Figure 11c.

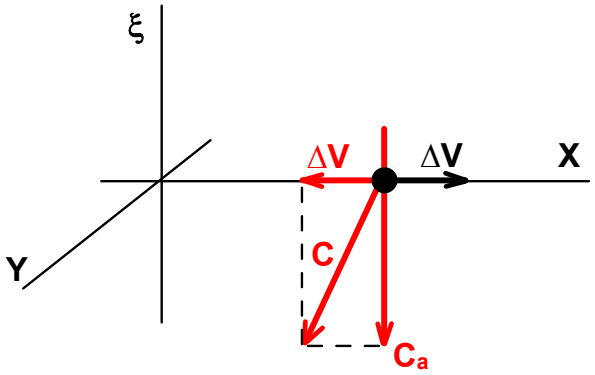


Figure.11c

But braking of aether out of parallel space is possible when there is a superposition of two opposing flows of aether. Old aether flow that is coming with the light speed **C** and a new flow of aether coming from opposite direction at a speed, which is equal to $\mathbf{C - [C^2-(\Delta V)^2]^{1/2}}$.

Resulting speed of flow is equal to

$$\mathbf{C_a = C - \{C - [C^2-(\Delta V)^2]^{1/2}\} = [C^2-(\Delta V)^2]^{1/2}}.$$

Then, if this condition is satisfied for each moment of time at accelerating of wave focus, the resulting speed will always be equal to

$$\mathbf{\{(C - [C - (C^2-\Delta V^2)^{1/2}])^2 + \Delta V^2\}^{1/2} = C}.$$

But the internal parallel space exists under pressure. Because of this, to create a counter-flow of aether there is required an execution of a work. But no one of wave focuses has energy for such work. Nevertheless, acceleration is possible, if the wave focus inherently is able to execute energy exchange between our world and parallel spaces. This exchange gives existence of forces of Newton in our world.

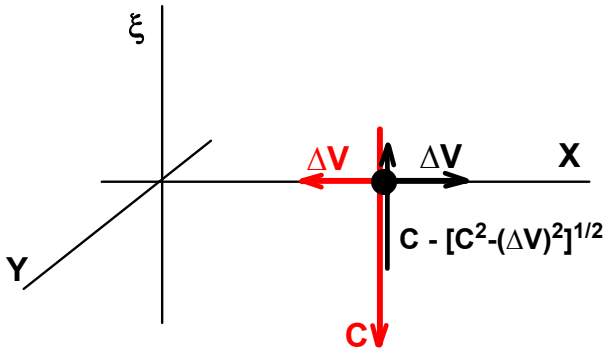


Figure.11d

That's the main reason why in the name of the "wave focus" is applied the prefix "energy."

Consider the physics of this exchange in more detail. Let's suppose that in our world in a vacuum without the gravitational field we are trying to accelerate the material object that is an elementary mass. But elementary mass will not be accelerated. In order to accelerate the mass, it should do a job for braking of own aether flow out of parallel space. Because of it, you apply a force to the elementary mass. This force executes a work that the wave focus like the "transformer" uses to create effort to brake the flow of aether out of parallel space.

11c

Because of this, when mass is accelerated the counteracting force will act at once against force of acceleration. Physics of the transition process and the time that is required for the reaction of the wave energy focus on the acceleration is very small and will not be discussed. This simplification makes it possible to get an explanation of the nature of action only Newton's laws without unnecessary complications. After acceleration of the wave energy focus of elementary mass, direction of aether passing through the focus gets the turn of flow. The total flow speed through the focus is stabilized by the focus itself and it will be equal to the speed of light. Action force from our world is not required longer. Movement of elementary mass by inertia will be supported with the pressure of aether, and the speed of the elementary mass is constant due to stabilization of its speed by the wave energy focus. After wave energy focus has braked passage of aether under pressure it will have unused energy of the aether. If the elementary mass slows down its motion, the velocity $\Delta\mathbf{V}$ decreases. In this case, the wave energy focus of mass to keep the overall passage speed of aether through itself that must be equal to the speed of light, slightly open your channel for the passage of aether of parallel space out of internal part to the external part of parallel space. And aether out of parallel space with a force will be to push elementary mass forward without letting it to be slowed down in our world, creating a counter-force to a braking force from elemental mass. That is why the moving mass possesses inertia momentum of motion and mass may have the destruction energy, which is depending on the speed and value of mass. It's all energy aether out of parallel space. But, as the aether never passes through the neutral mass into of our world, we get invisible actions out of parallel space in the form of inertia forces of bodies that obey Newton's laws. Such is the nature of the forces of Newton. Knowing some of the physical parameters of the elementary mass, such as dimensions of the elementary mass, the work spent on the acceleration of mass, etc., we can make an assessment of the aether pressure out of parallel space.

In the analyzed model of wave focus there were considered two of it variants: "ideal" wave focus and energy, wave focus. In a first variant, in our world the shift of wave focus is impossible due to its ideal properties. In the second variant, wave focus may move but with a limited speed not exceeding the speed of light. This property has an energy wave focus due to its ability to stabilize the flow of aether flowing through it. When the focus is accelerating or is braking, the exchange of energy between our world and the parallel world goes through the focus. Energy exchange through the focus gives it non-zero mass and inertial properties.

But this model assumes the existence of a third variant of the passage of the aether out of parallel space that is passing through micro-object of our world. Such a micro-object must not have stabilization of aether stream like a wave.

It must be some spatial tube. This is not the focus of the wave. He does not have wave properties. Micro-object must pass through itself aether with velocity **U**, which will be determined by the size of the channel of micro-object and a viscosity of aether. See Figure 11e. Perhaps it is approximately equal to the speed of light but the speed of passage aether through the micro-object must be not depending on the motion of a micro-object in our world.

What are the characteristic of physical properties that the micro-object must get?

First, its properties should not depend on movement and should not be subject to the Lorentz transformations. In particular, its local time depends little on the movement in our world. In ideal, hypothetical case, for this micro-object a speed of time is not changing and is subject to slight variations.

11d

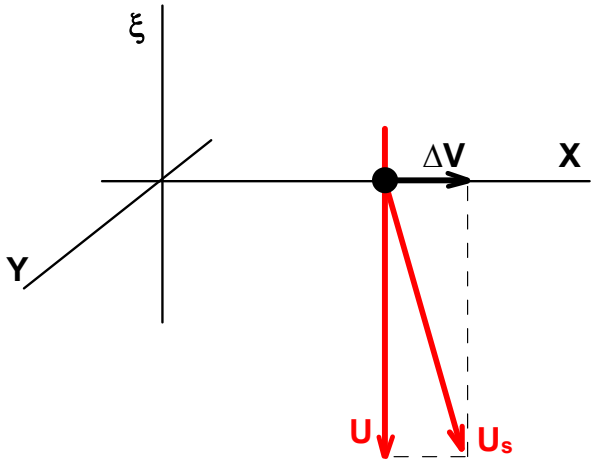


Figure.11e

Secondly, such a micro-object has no physical properties for the exchange of energy between our world and the parallel world, so its mass should be zero. As a consequence, the micro-object must not have interaction with other material objects. But, in spite of value of the mass is equal to zero, micro-object can be at rest and not move at the speed of light.

Third, as this was explained, any of micro-objects with mass can accelerate up to a speed of light only due to existence of the wave focus (or waves of focuses) inside its structure. The last model for a micro-object has no wave properties. For this reason, in theory, a micro-object can travel faster than the speed of light. Movement at such a speed is possible if movement takes place without the resistance of aether or other factors. For example, under normal conditions, we cannot accelerate the micro-object with help of force of decay or another force, if this force has a propagation velocity less than or equal to the speed of light, etc.

Neutrino most closely fits the micro-object that is described with this model. But the neutrino has a small amount of mass. But the presence of a specific mass suggests that neutrino incorporates wave focus, which can limit the maximum speed up to speed of light. But, nevertheless, this assertion is disputed and there is of interest for various neutrino accelerations in extreme conditions. For example, we can speed up neutrino that moves at almost the speed of light with help lateral acceleration.

In the case, when the lateral acceleration of neutrino will have sufficiently high energy there must be an energy threshold. Beyond it, neutrino will move faster than light or neutrino will be destroyed due to the fragility of the internal wave focus.

In addition, this model provides fundamental corrections of some long-established concepts in classical physics. For example, it concerns how the energy of masses is distributed at inelastic collision of two masses at small velocities. Existing the classic analysis of this collision isn't comprehensive. He argues that the missing part of the kinetic energy is converted into heat, but it's not quite accurate explanation. Part of the energy goes into parallel space. See [4].

Or there is particularly interesting physical conclusion for relativistic force to accelerate the mass at relativistic speeds. It shows theoretically that inside of parallel space there exists possibility to create conditions for the acceleration of the mass with smaller force. May be it seem incredible but a theoretical way in this direction exist. See [4]

With regard to the ability of electric charges generate an electromagnetic field, which is counteracting to acceleration, the nature of this phenomenon is similar to the second property of the energy, wave focus that was described. It is all, the "Addition 2" is over.

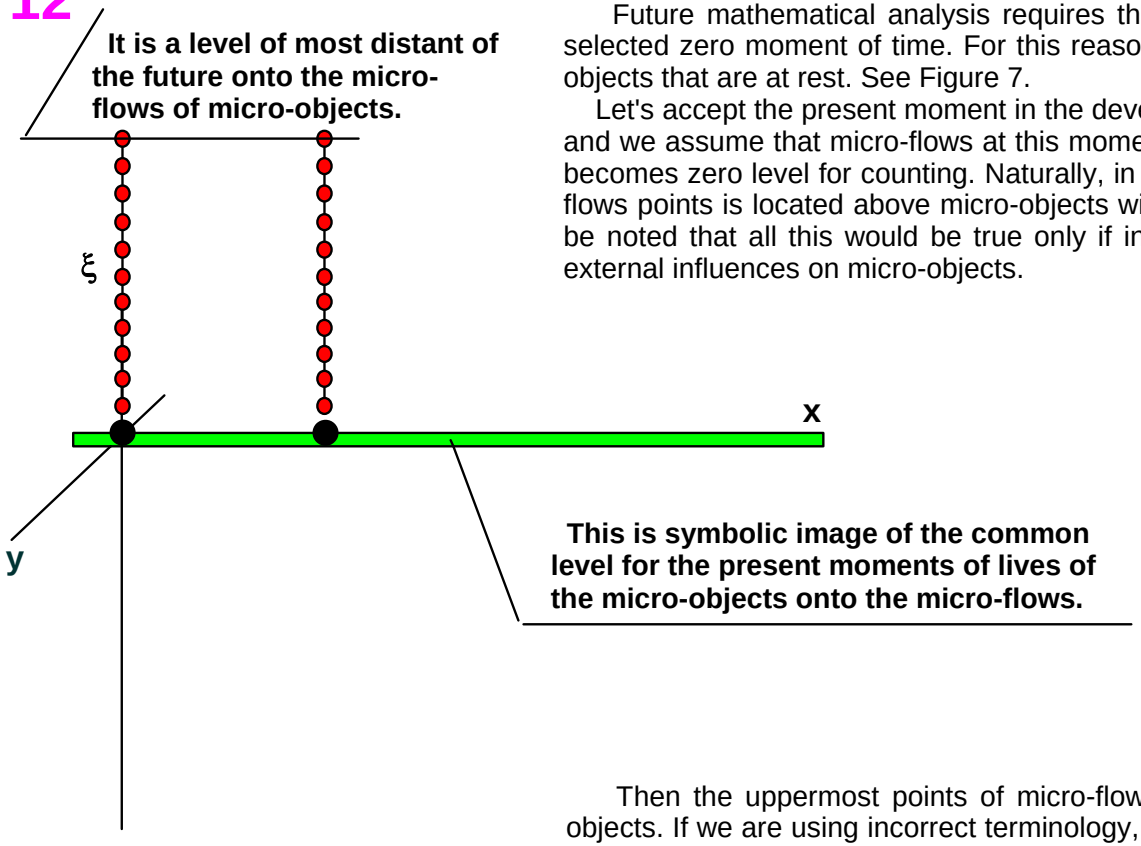


Figure.7

Future mathematical analysis requires the definition of time polarity for micro-objects relative to a selected zero moment of time. For this reason, we again return to the analysis of micro-flows of micro-objects that are at rest. See Figure 7.

Let's accept the present moment in the development of micro-objects in time as a zero moment of time and we assume that micro-flows at this moment have stopped their movement. Green line on the **X**-axis becomes zero level for counting. Naturally, in the case of downward movement of micro-flows, all micro-flows points is located above micro-objects will determine the future state of micro-objects. But it should be noted that all this would be true only if in the above example, we do not take into account any of external influences on micro-objects.

Then the uppermost points of micro-flows will determine the most remote future states of micro-objects. If we are using incorrect terminology, it can be said this is "a future" for the micro-objects on the micro-flows. If we use the same terminology for micro-flows, they can be called by flows of time passing through all the long-lived micro-objects of our world. Since all matter in our world is made up of microscopic objects, it is also truth relative to us; we can say that we live in this world in time because of time flows, which are passing through us at the speed of light.

In Figure 8, we see parts of micro-flows that have defined the micro-objects in the past time. They are below the green level and have already gone through micro-objects. Therefore, in Fig. 8 red balls located at a short distance relative to the green line are coinciding with the recent past. Red balls are on a farther distance from the green line coincide with the more past time of micro-objects.

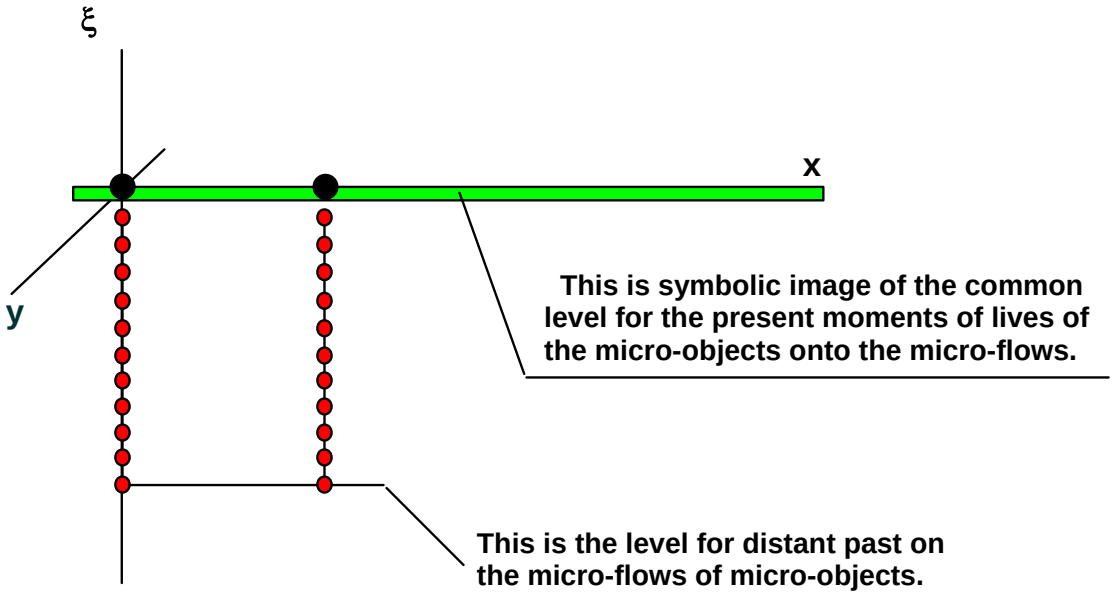


Figure.8

Consequently, the motion of micro-flows to down, as it shown in Figure 9, gives development micro-objects in the direction of the future time. This motion gives a positive time value since in this case the micro-objects have a positive absorption of energy out of the micro-flows.

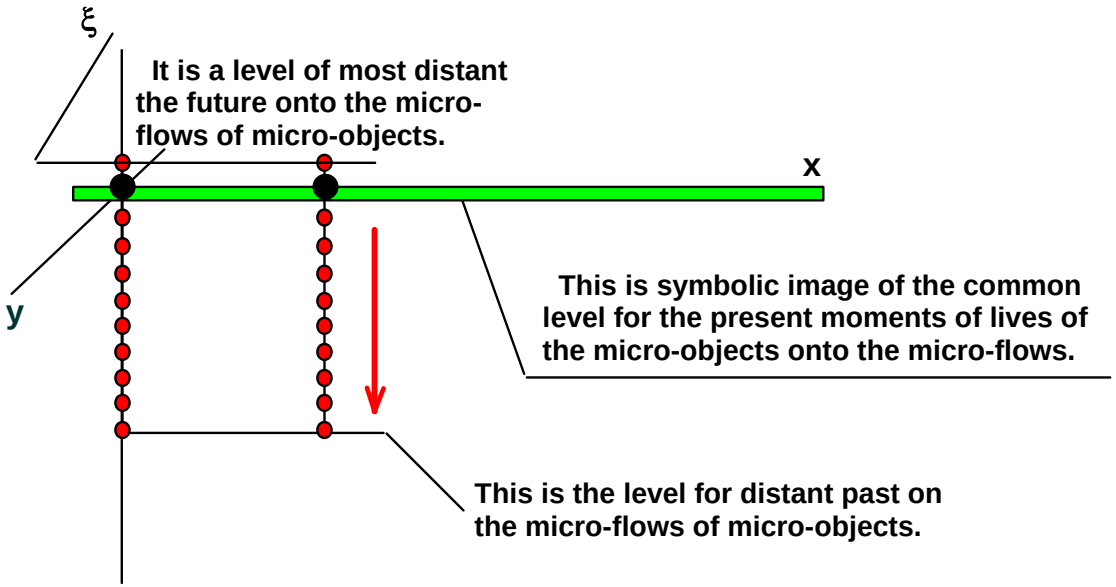


Figure.9

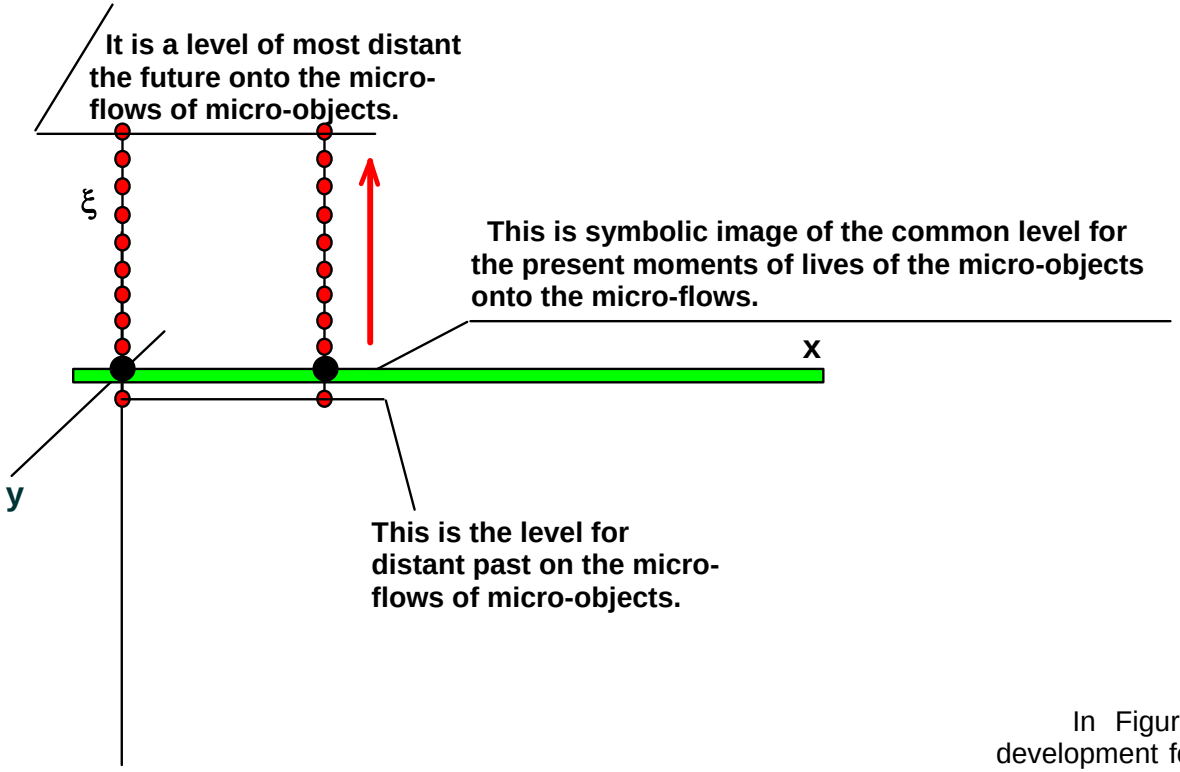


Figure.10

In Figure 10, the upward movement of micro-flows gives development for micro-objects in the direction to the past time. This movement gives a negative amount of time, because micro-objects have negative absorption of energy that is given from micro-flows.

Here we come to the beginning of the presentation of the main part of the study. We shall analyze a time of life for the same micro-objects speeded in our world up to speed **V<C**. The motion of the micro-objects takes place in positive direction of the axis x. Figure 11 clearly shows how time each of two micro-objects, which are equal to each other at the beginning, becomes individualized for each of micro-objects. Let's explain in a few words the physics of this phenomenon. After speeding up, every of micro-flows has incline relative to axis **x**. It takes place because of motions of micro-objects along axis **x**. In order to keep the speed (**c**) of ether, passing through micro-object, the speed ether along axis ξ has to decrease. This speed has to equal to $(c^2 - V^2)^{1/2}$. In this case, the total speed of ether does not change, and it is equal to $c = \{[(c^2 - V^2)^{1/2}]^2 - V^2\}^{1/2}$.

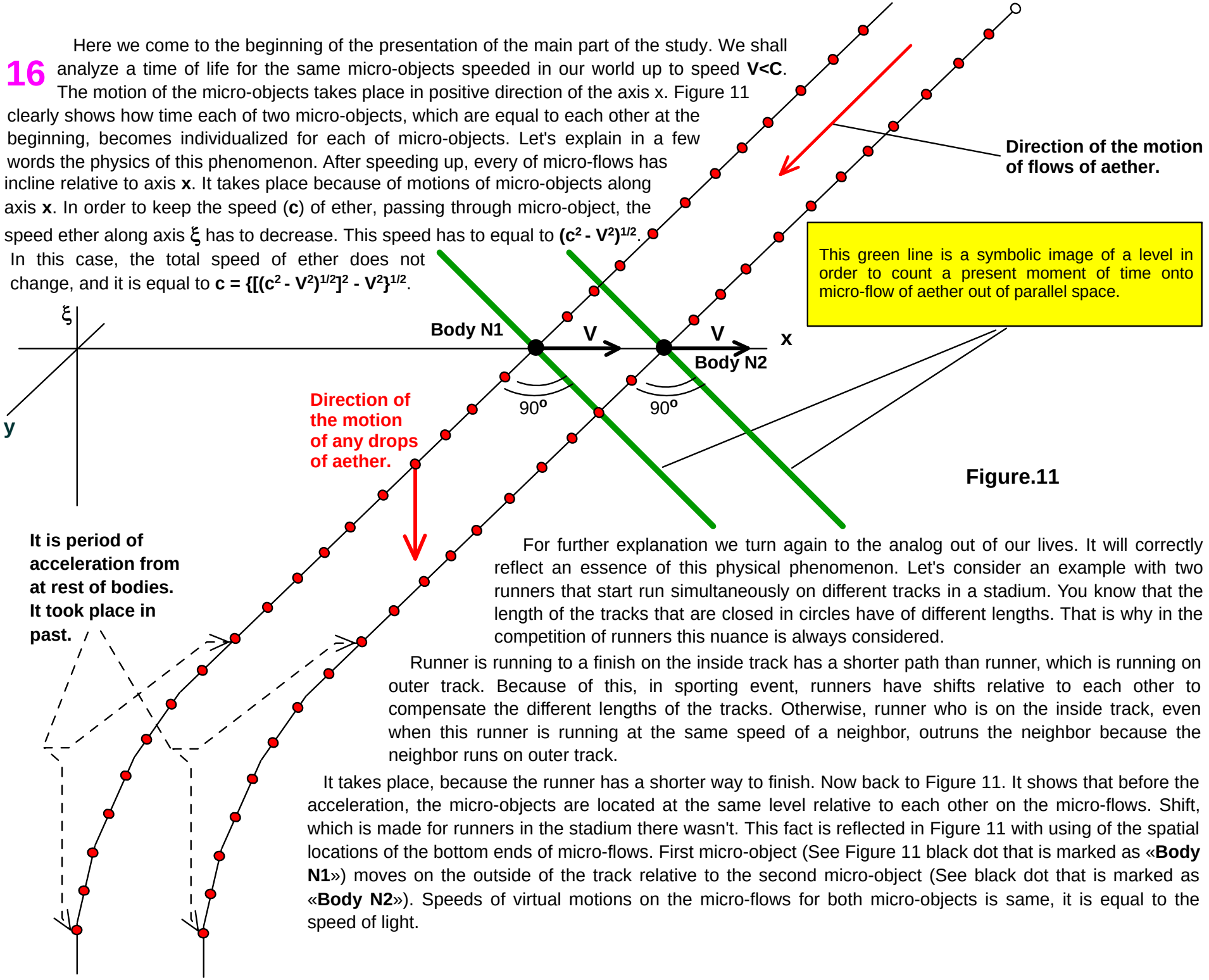


Figure.11

For further explanation we turn again to the analog out of our lives. It will correctly reflect an essence of this physical phenomenon. Let's consider an example with two runners that start run simultaneously on different tracks in a stadium. You know that the length of the tracks that are closed in circles have of different lengths. That is why in the competition of runners this nuance is always considered.

Runner is running to a finish on the inside track has a shorter path than runner, which is running on outer track. Because of this, in sporting event, runners have shifts relative to each other to compensate the different lengths of the tracks. Otherwise, runner who is on the inside track, even when this runner is running at the same speed of a neighbor, outruns the neighbor because the neighbor runs on outer track.

It takes place, because the runner has a shorter way to finish. Now back to Figure 11. It shows that before the acceleration, the micro-objects are located at the same level relative to each other on the micro-flows. Shift, which is made for runners in the stadium there wasn't. This fact is reflected in Figure 11 with using of the spatial locations of the bottom ends of micro-flows. First micro-object (See Figure 11 black dot that is marked as «**Body N1**») moves on the outside of the track relative to the second micro-object (See black dot that is marked as «**Body N2**»). Speeds of virtual motions on the micro-flows for both micro-objects is same, it is equal to the speed of light.

The micro-object «**Body N2**» moves on the inside track, because of this motion it outruns the micro-object «**Body N1**». This occurs despite of the fact that the lengths of micro-flows, ejected by each of micro-objects, are equal to each other. Therefore, with respect to each other, each of micro-objects exists in different times. That's it. And as it will be proved further, this shift of time in mathematical form corresponds exactly to Lorentz transformation.

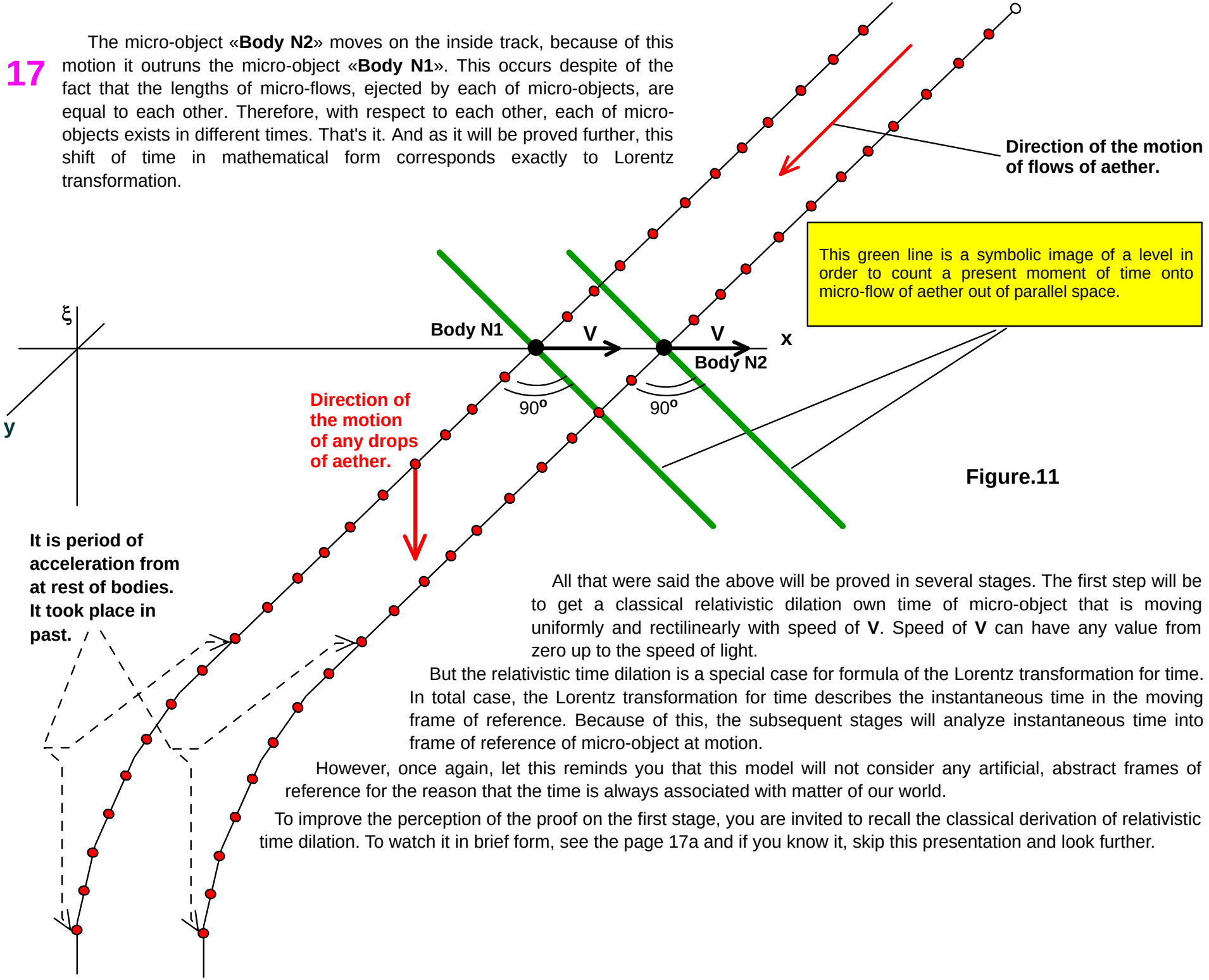


Figure.11

All that were said the above will be proved in several stages. The first step will be to get a classical relativistic dilation own time of micro-object that is moving uniformly and rectilinearly with speed of **V**. Speed of **V** can have any value from zero up to the speed of light.

But the relativistic time dilation is a special case for formula of the Lorentz transformation for time. In total case, the Lorentz transformation for time describes the instantaneous time in the moving frame of reference. Because of this, the subsequent stages will analyze instantaneous time into frame of reference of micro-object at motion.

However, once again, let this reminds you that this model will not consider any artificial, abstract frames of reference for the reason that the time is always associated with matter of our world.

To improve the perception of the proof on the first stage, you are invited to recall the classical derivation of relativistic time dilation. To watch it in brief form, see the page 17a and if you know it, skip this presentation and look further.

It's derivation of relativistic time dilation out of Lorentz transformations.

To calculate the delay time according to the Lorentz transformation for time, let's turn to the moving frame of reference. Let it moves uniformly without rotation in the positive direction of **X**-axis of frame of reference at rest. Suppose that its velocity is equal to the velocity, which can take values from zero up to the speed of light. Time and coordinates of space of moving frame of reference are connected to frame of reference at rest according to the Lorentz transformation:

$$x' = \frac{x - vt}{\sqrt{1 - (v/c)^2}}; \qquad t' = \frac{t - (v/c^2)x}{\sqrt{1 - (v/c)^2}}; \qquad y' = y; \quad z' = z$$

Due to the fact that in the considered variant the Lorentz transformations depend only on **X** and time **t**, the coordinates **Y,Z** in the sequel will not be considered.

Let's analyze in the moving frame of reference period T', which started at time t_1' and ending time is t_2'. Obviously, it is equal to $T' = t_2' - t_1'$. Period T' will be measured for point at rest in the moving frame of reference. Suppose it is in arbitrary place on the positive half of X'-axis. Then, if we consider the time t_1', then it corresponds to the position of the point with the coordinate x_1'. For the time t_2', strictly speaking, the spatial position must correspond to the coordinate x_2'. But because we are considering a point at rest in the moving coordinate system, then $x_1' = x_2'$. In the frame of reference at rest, the period $T = t_2 - t_1$. The magnitude of the link between periods T' and T is unknown. Point at rest inside of the moving frame of reference has motion in frame of reference at rest with speed **v.** This is speed of moving frame of reference. Therefore, at moment of time t_1 the point that is at rest in the moving frame of reference in the frame of reference at rest has the coordinate position x_1. And at time t_2 it has position x_2. Now we find the period T'. To do this let's use the Lorentz transformation for time. It is equal to

$$T' = t_2' - t_1' = \frac{t_2 - (v/c^2)x_2}{\sqrt{1 - (v/c)^2}} - \frac{t_1 - (v/c^2)x_1}{\sqrt{1 - (v/c)^2}} = \frac{(t_2 - t_1) - (v/c^2)(x_2 - x_1)}{\sqrt{1 - (v/c)^2}} \quad (1)$$

We calculate the difference $x_2 - x_1$. It may be defined out of the equality: $x_1' = x_2'$. If for this equality we use the Lorentz transformation, then we obtain

$$\frac{x_1 - vt_1}{\sqrt{1 - (v/c)^2}} = \frac{x_2 - vt_2}{\sqrt{1 - (v/c)^2}}$$

After grouping of homogeneous members we finally find

$$x_2 - x_1 = v(t_2 - t_1)$$

Substituting the difference $x_2 - x_1$ in equation **(1)** we get

$$T' = t_2' - t_1' = \frac{(t_2 - t_1) - (v/c^2)(x_2 - x_1)}{\sqrt{1 - (v/c)^2}} = \frac{(t_2 - t_1) - (v/c^2)v(t_2 - t_1)}{\sqrt{1 - (v/c)^2}} =$$

$$= \frac{(t_2 - t_1) - (v^2/c^2)(t_2 - t_1)}{\sqrt{1 - (v/c)^2}} = \frac{(t_2 - t_1)[1 - (v/c)^2]}{\sqrt{1 - (v/c)^2}} = (t_2 - t_1)\sqrt{1 - (v/c)^2}$$

Taking into account that $T = t_2 - t_1$ is the period in frame of reference at rest, we find the necessary result, which gives the relativistic time of dilation in the moving frame of reference:

$$T' = T\sqrt{1 - (v/c)^2}$$

This proof was made for an arbitrary synchronization of time of frames of reference and their relative position with respect to each other along the axis **X**. In order to simplify of physics of processes in the proposed model, the initial moments of time will be taken zero, i.e. $t_1 = t_1' = 0$ and the values of x_1',x_1 would also take zero.

The physics of relativistic time dilation of elementary mass (micro-object).

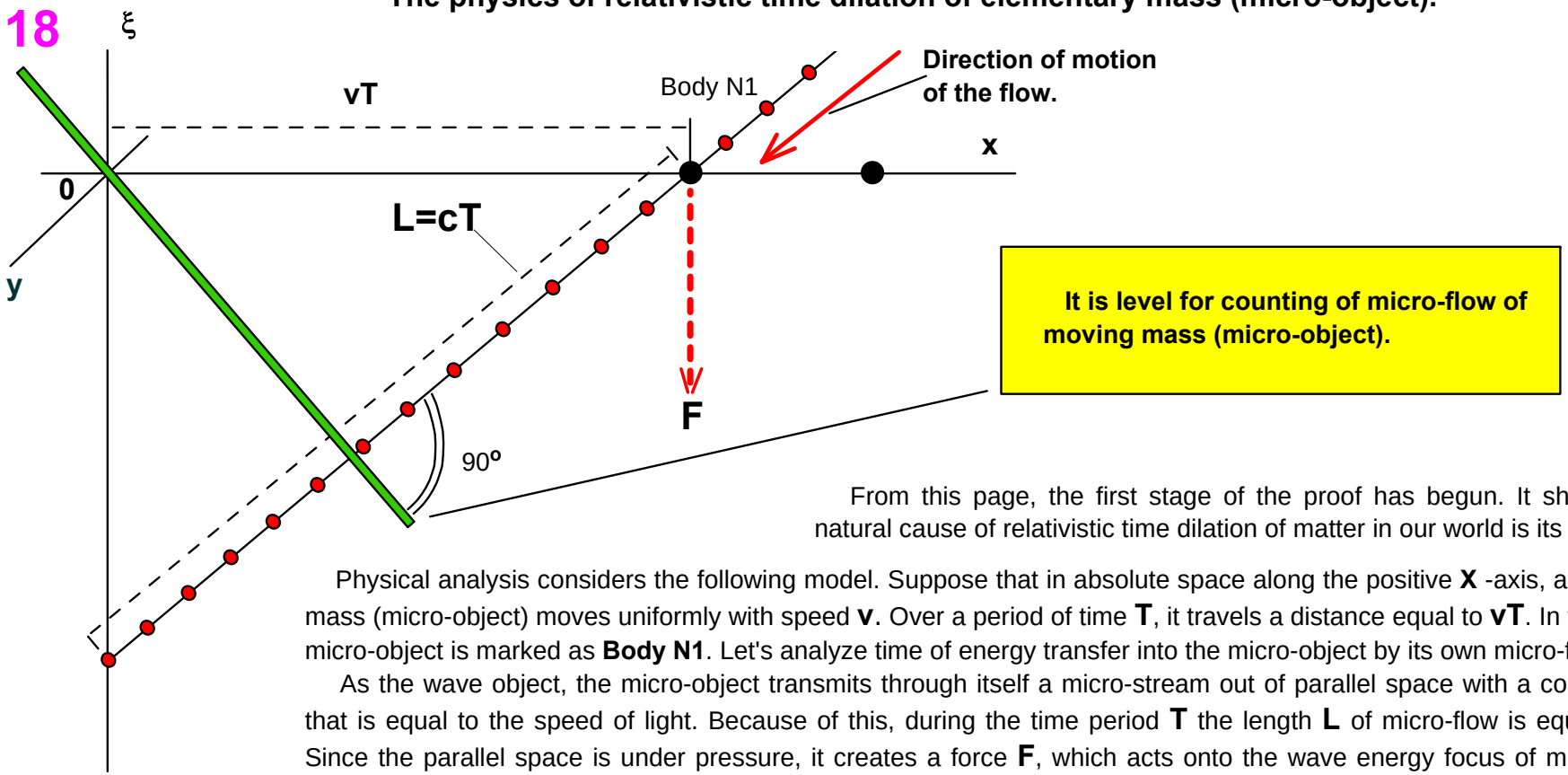


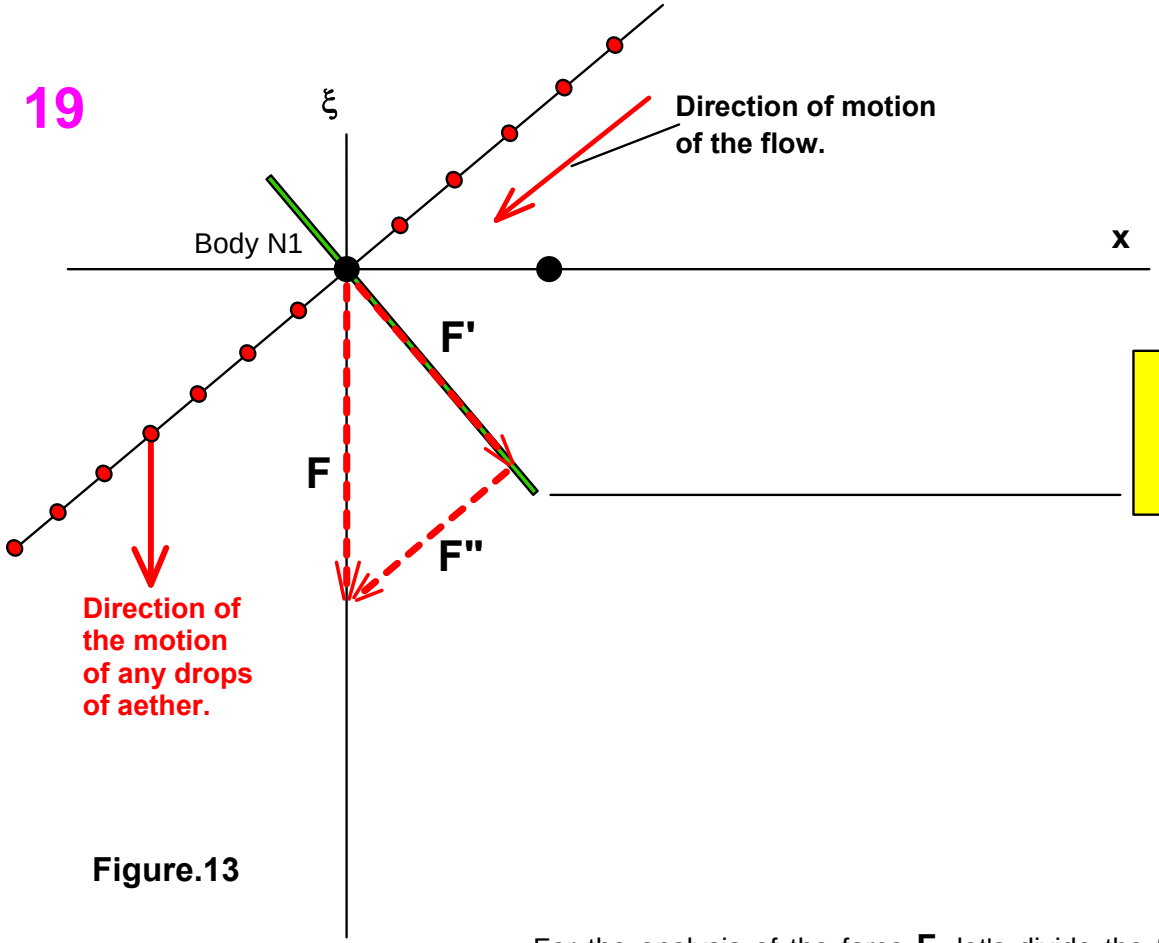
Figure.12

From this page, the first stage of the proof has begun. It shows that the natural cause of relativistic time dilation of matter in our world is its wave nature.

Physical analysis considers the following model. Suppose that in absolute space along the positive **X** -axis, an elementary mass (micro-object) moves uniformly with speed **v**. Over a period of time **T**, it travels a distance equal to **vT**. In figure 12, the micro-object is marked as **Body N1**. Let's analyze time of energy transfer into the micro-object by its own micro-flow.

As the wave object, the micro-object transmits through itself a micro-stream out of parallel space with a constant speed that is equal to the speed of light. Because of this, during the time period **T** the length **L** of micro-flow is equal to **L=cT.** Since the parallel space is under pressure, it creates a force **F**, which acts onto the wave energy focus of micro-object. It occurs because of action of micro-flow. Direction of this force is orthogonal to the space of our world, and the force has exactly same value with which force acted on elementary mass (micro-object) at rest. See analysis that was made on page 7. And since our space is shown in Figure 12 with help of the plane **X,Y**, then this force is perpendicular to the plane **X,Y**. On Figure 12, see flashing red vector that is pointing down. From figure 12 it is also clear that the process occurs only in the plane **ξ,X**, because of this reason, the **Y**-axis is not necessary and we can remove it in further analysis. We will analyze the time of energy transfer out of micro-flow into micro-object from a fixed moment of time. In particular, we begin to consider the time from moment when micro-object was located in the center of the frame of reference. The level for counting of the micro-flow, in this case, must pass through the center of the frame of reference and be a perpendicular to the micro-flow. Figure 12 shows it with help of the green segment.

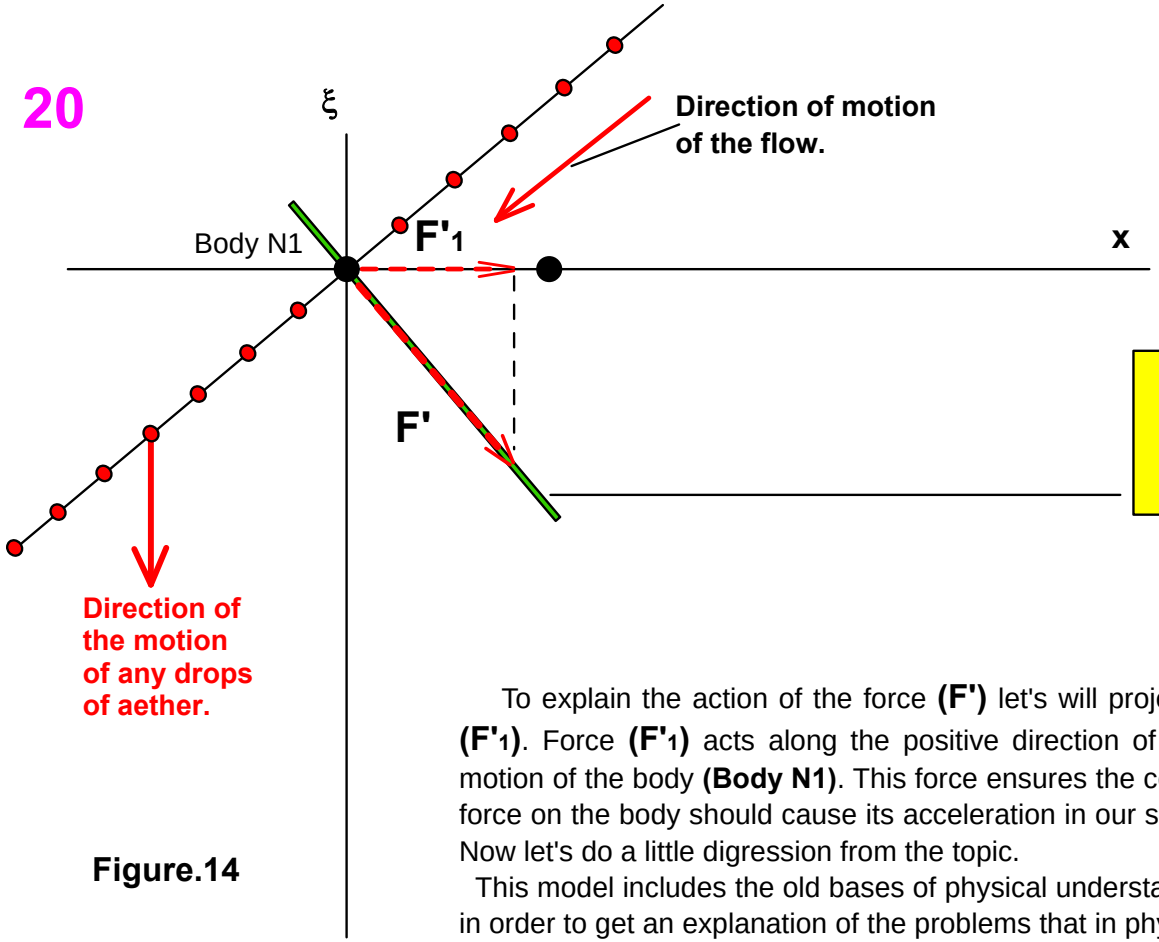
Let's analyze an action that is created by force **F**. This action is divided into two parts. The first action turns into movement of micro-object in our space. The second action is a transmission of energy to the micro-object.



It is level for counting of micro-flow of moving mass (micro-object).

Figure.13

For the analysis of the force **F**, let's divide the force into two components. See Figure 13. Let the first component of the force is acting along the reference level. It is marked by the symbol **(F')**. The second component of the force **F** is acting along the micro-flow. In Figure 13, it is marked with **(F")**. At the beginning let's consider the action of the force **(F')**.



It is level for counting of micro-flow of moving mass (micro-object).

Figure.14

To explain the action of the force **(F')** let's will project this force on the **X**-axis. On Figure 14, it is marked with **(F'1)**. Force **(F'1)** acts along the positive direction of the **X**-axis and its direction coincides with the direction of motion of the body **(Body N1)**. This force ensures the constant movement of the body. But the constant action of the force on the body should cause its acceleration in our space. Why the body is not accelerating, we will discuss later. Now let's do a little digression from the topic.

This model includes the old bases of physical understanding of the world and complements them with new add-ons in order to get an explanation of the problems that in physics the old model could not explain. In particular, before the advent of the theory of relativity, in physics the model of absolute space for our physical world was widely used. But this model was associated with many contradictions. For example, one of the biggest challenges has been the problem associated with resistance aether. So, in the nineteenth century, scientists had realized that if they recognize existence of the absolute aether for our space, then it would make impossible inertial motion of physical bodies. This problem they could not overcome under existing model aether. In this model there could not be inertial motion due to the fact that aether of our space should have resistance. It must stop inertial motion of any of physical bodies in a vacuum.

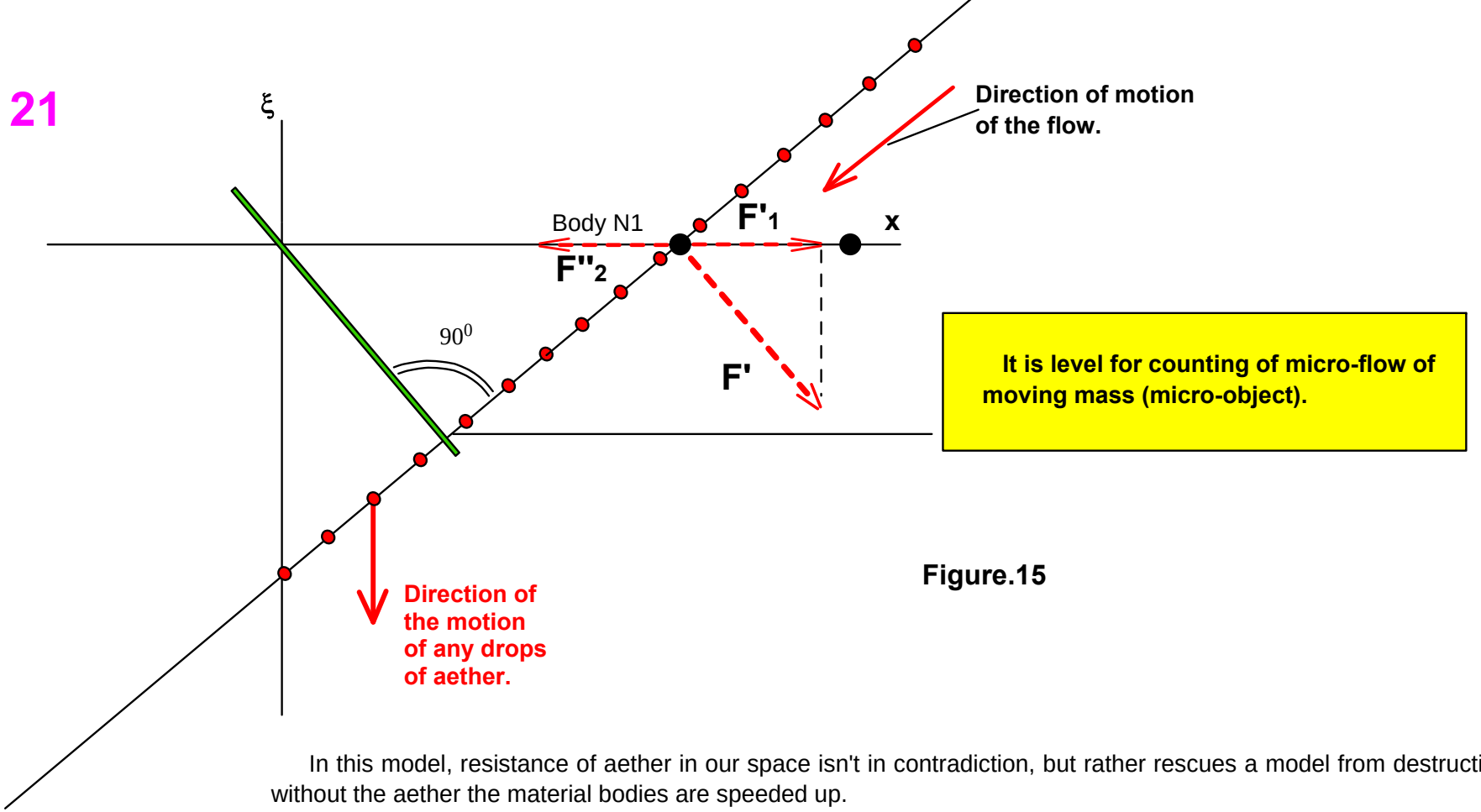


Figure.15

In this model, resistance of aether in our space isn't in contradiction, but rather rescues a model from destruction because without the aether the material bodies are speeded up.

Now, refer to Figure 15. It shows that the force (**F'₁**) is compensated by **reaction force from wave focus** of micro-object and by the force of resistance aether of our space. The sum these forces is the force (**F"₂**). The balance of forces shown in Figure 15 doesn't give acceleration. It gives inertial motion of material bodies of our world.

This kind of movement exists thanks to the energy out of the parallel space. It allows to move material objects of our world at inertia. Naturally that at motion, only remaining part of the energy micro-stream out of parallel space can support existence for focus of the micro-object. Because of this, the velocity of flow of life of a micro-object is slowing down, as its wave energy focus is required more time to obtain the same amount of energy (quantum of energy) out of parallel space. The wave focus needs this quantum of energy in order to be able to move from one state to another in time.

Look carefully to figure 15. It shows that the aether out of parallel space has moved downwards. Movement of micro-flow through micro-object can be divided into two components, which together provide the initial motion. The first component of the micro-flow motion will move micro-object in our world. In our simplified version of the presentation, this is occurred along the **X**-axis. The second component will transmit energy into micro-object. To improve the readability further explanation, the Figure 15 is rotated so that the green level will be a horizontal.

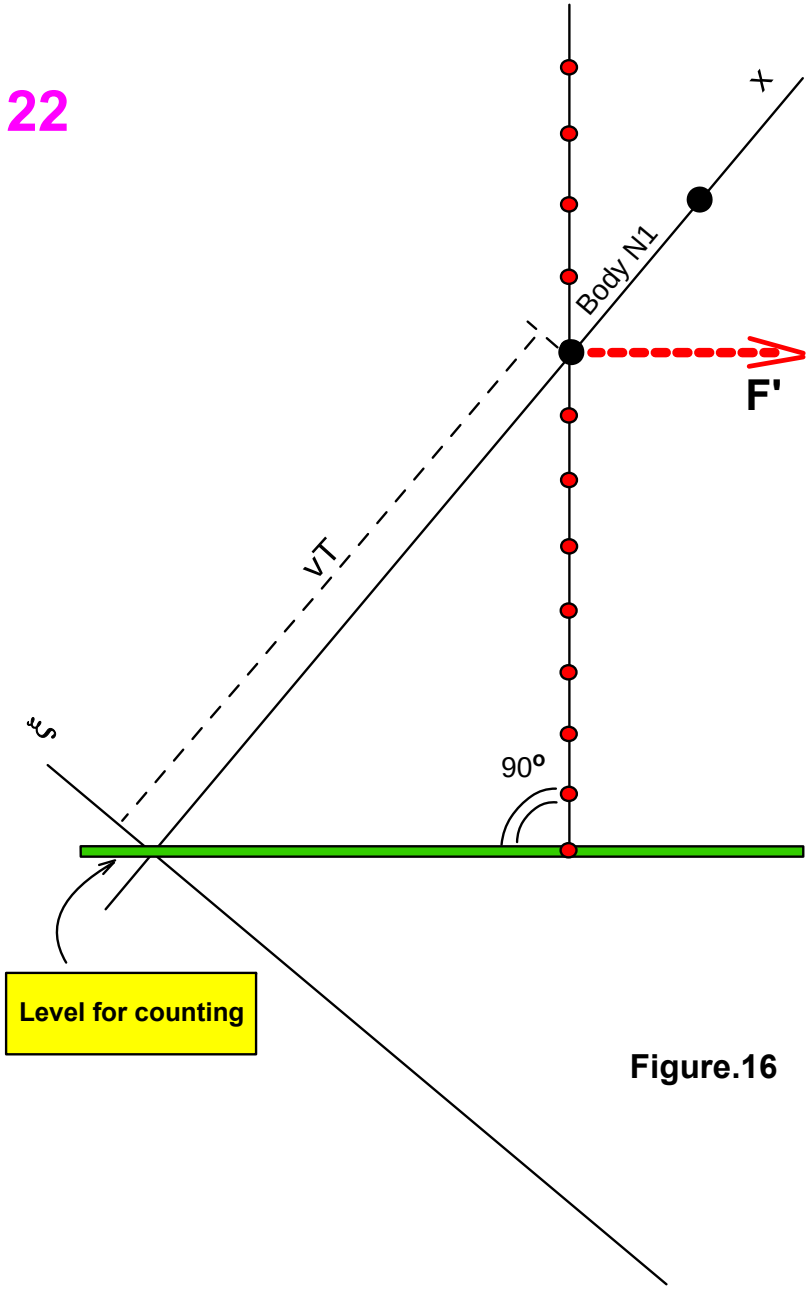


Figure.16

In Figure 16 you see motion of the first component of micro-flow. Micro-object (**Body N1**) moves along the **X**-axis under action of the force of micro-flow. Note that the first component of the micro-flow travels along the reference level and is not falling over the other side of level down. The energy of this component is used to the physical movement of micro-object in our world.

As a rough comparison, here you can make an analogy with the motion of a sailing ship on the water. Imagine that Figure 16 is a plan view of the movement of a sailing vessel. Vessel corresponds with the micro-object «**Body N1**». Force vector is shown with help of red vector. Wind blows from the left to the right. Then figure 16 will reflect the movement of sailing vessel under the influence of crosswind. A detailed analysis of the physics for this movement in this part of the work will not be performed. The aim of this work is different. It is analysis of energy that is transmitted to a micro-object for development in time. Now we come back again to the division of micro-flow force out of parallel space.

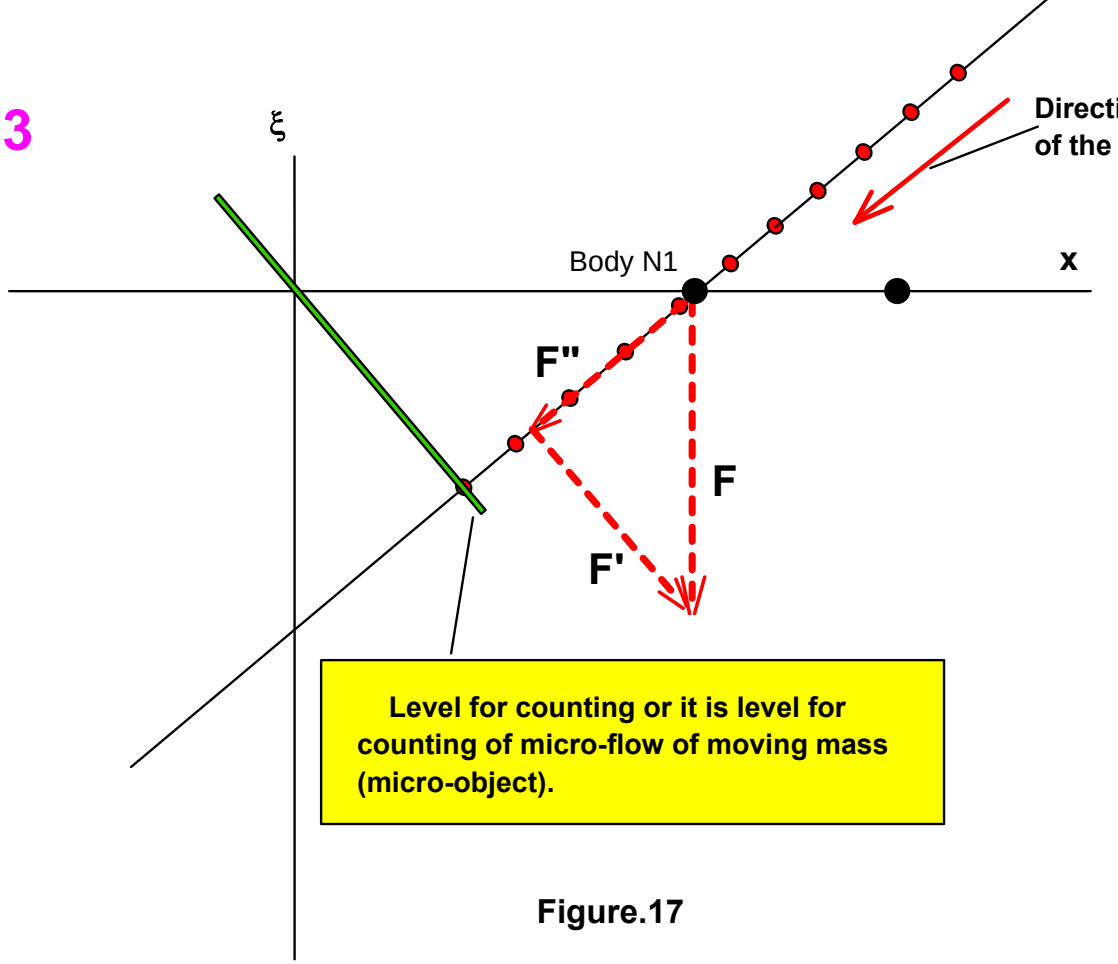


Figure.17

We have to analyze the effect of force **(F")**. See Figure 17. The direction of this force coincides with the direction of movement the micro-flow through micro-object. To view the process of the action of the force, the next drawing will be rotated counterclockwise in order to have horizontal level for counting.

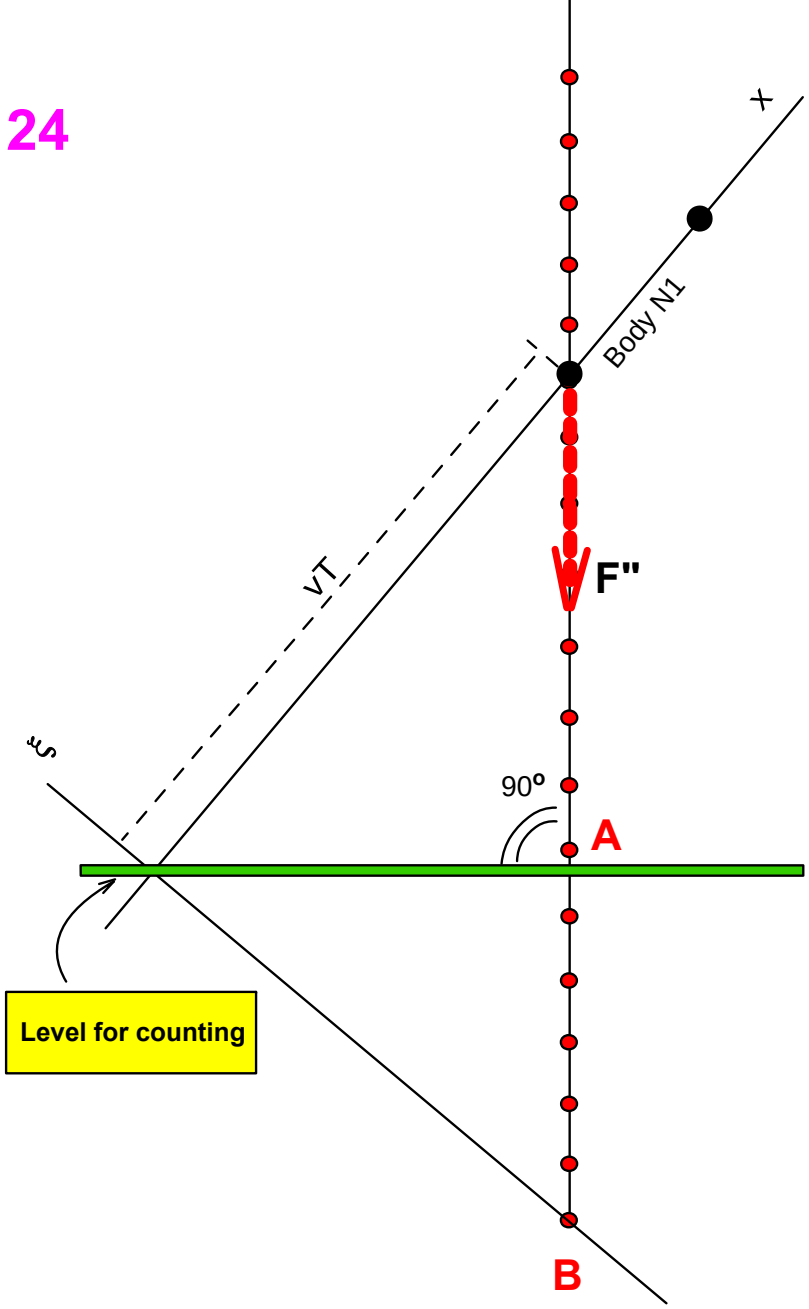


Figure.18

Figure 18 shows that micro-object (**Body N1**) is at rest but micro-flow moves downwards due to the force **(F")** and transmits its energy to the micro-object. This process is similar to the energy transfer from the micro-flow to micro-object that is at rest. See page 7. Difference exists only for lengths of the micro-flows here and there. In Figure 18, the length is shorter and it is equal to **AB**. This means that micro-object receives minimal development time because the micro-flow has a shorter length. And moreover, the force **(F")** is only part of the force of parallel space. These two factors don't give micro-object quickly get the full quantum of energy that is required to move it into the same state of time, which micro-object at rest has already had. Because of this, the micro-object at motion has delayed development of own time. Further we consider factor that reduces transmission of energy out of micro-flow to micro-object at motion. It occurs due to the fact that the force **(F")** is part of the force out of parallel space. It can calculate with help of different mathematical approaches, which will give the same result. In this work it is introduced through changes in metrics of energy activity of micro-flow. The proof will be done by analysis of action of force out of parallel space.

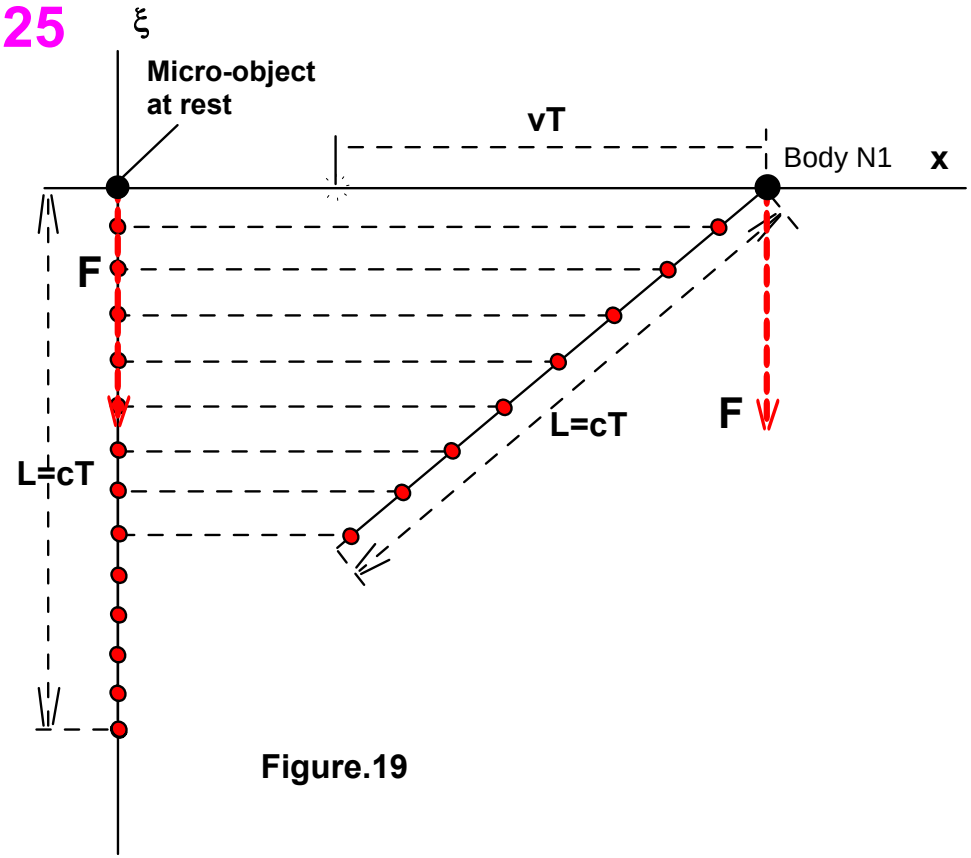


Figure.19

To understand the process, see Figure 19. There are two micro-objects. One of these is at rest. It is located left. Second micro-object (**Body N1**) is moving with velocity **v<c**, and it begins to move from an arbitrary point selected on the **x**-axis. For the period **T** each of micro-objects passes through itself micro-flow with length that is equal to **L=cT**. For micro-object at rest, force action out of parallel space coincides with the direction of motion of the micro-flow. In this case, the effect of the force is a maximum, and activity of energy of metric of the micro-flow is a minimally shortest and coincides with the spatial metric.

For micro-object at motion (**Body N1**), direction of movement of the micro-flow doesn't coincide with the direction of the force **F** out of parallel space. Therefore, the activity of energy of micro-flow has decreased. See Figure 19. In figure 19 dotted lines mark equal levels of transmissions energy from micro-flows to any of the micro-objects. These levels indicate that they mark more elongated segments on the micro-flow of micro-object, which has a motion. It takes place if we compare the vertical micro-flow of micro-object at rest with micro-flow of micro-object at motion. Therefore, when micro-object at rest passes through itself micro-flow with length **L=cT**, then this micro-object has thirteen of energy levels. At the same time, the micro-object at motion has only eight levels which are located on the same length of the micro-flow. Because of this the length of micro-flow of the micro-object at motion becomes shorter in the new metric of energetic activity. In general, the length of the micro-flow in the new metric of energetic activity becomes equal to

$$L' = L * [1 - (V/c)^2]^{1/2}$$. (**c** - is speed of light and **L** is equal to **L=cT**).

To see the mathematical proof, look at the page 25a.

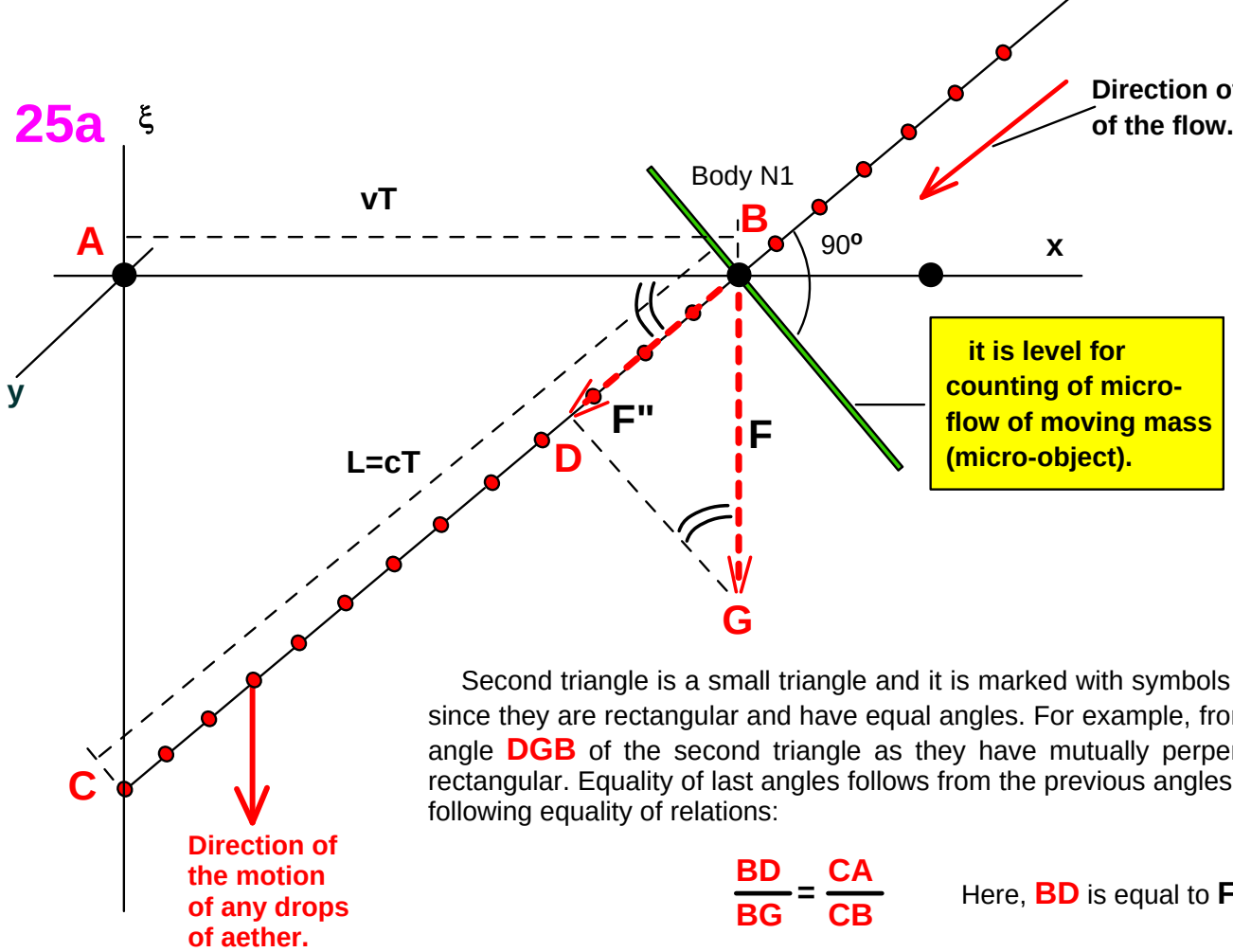


Figure.20

Getting the formula $L' = L * [1- (V/c)^2]^{1/2}$ is the goal of this proof.

Here, **c** is speed of light and **L=ct**. Value (**L'**) is the length of the micro-flow (**L**) in the new metric of activity of energy. Since the energy depends on the force **F"** of the micro-flow, let's find its value. This force can be determined from the two triangles. See Figure 20. First triangle is the big triangle, it is marked with symbols **ABC**.

Second triangle is a small triangle and it is marked with symbols **DBG**. These triangles are similar to each other, since they are rectangular and have equal angles. For example, from the first triangle the angle **ABC** is equal to the angle **DGB** of the second triangle as they have mutually perpendicular sides. Next angles of the triangles are rectangular. Equality of last angles follows from the previous angles. From similarity of triangles, we can consider the following equality of relations:

$$\frac{BD}{BG} = \frac{CA}{CB}$$

Here, **BD** is equal to **F"**, **BG** is equal to **F.**

The length **CB** is equal to **L=cT**. See the Figure **20**. The length **CA** can be found from the triangle **ABC**. It is equal to $CA = [(CB)^2 - (AB)^2]^{1/2} = cT[1 - (V/c)^2]^{1/2}$. If we use all these values, then it is found

$$\frac{BD}{F} = \frac{cT*[1 - (V/c)^2]^{1/2}}{cT} \quad \text{or} \quad BD = F\ [1 - (V/c)^2]^{1/2} = F".$$

The last expression defines the value of the force **F"**.

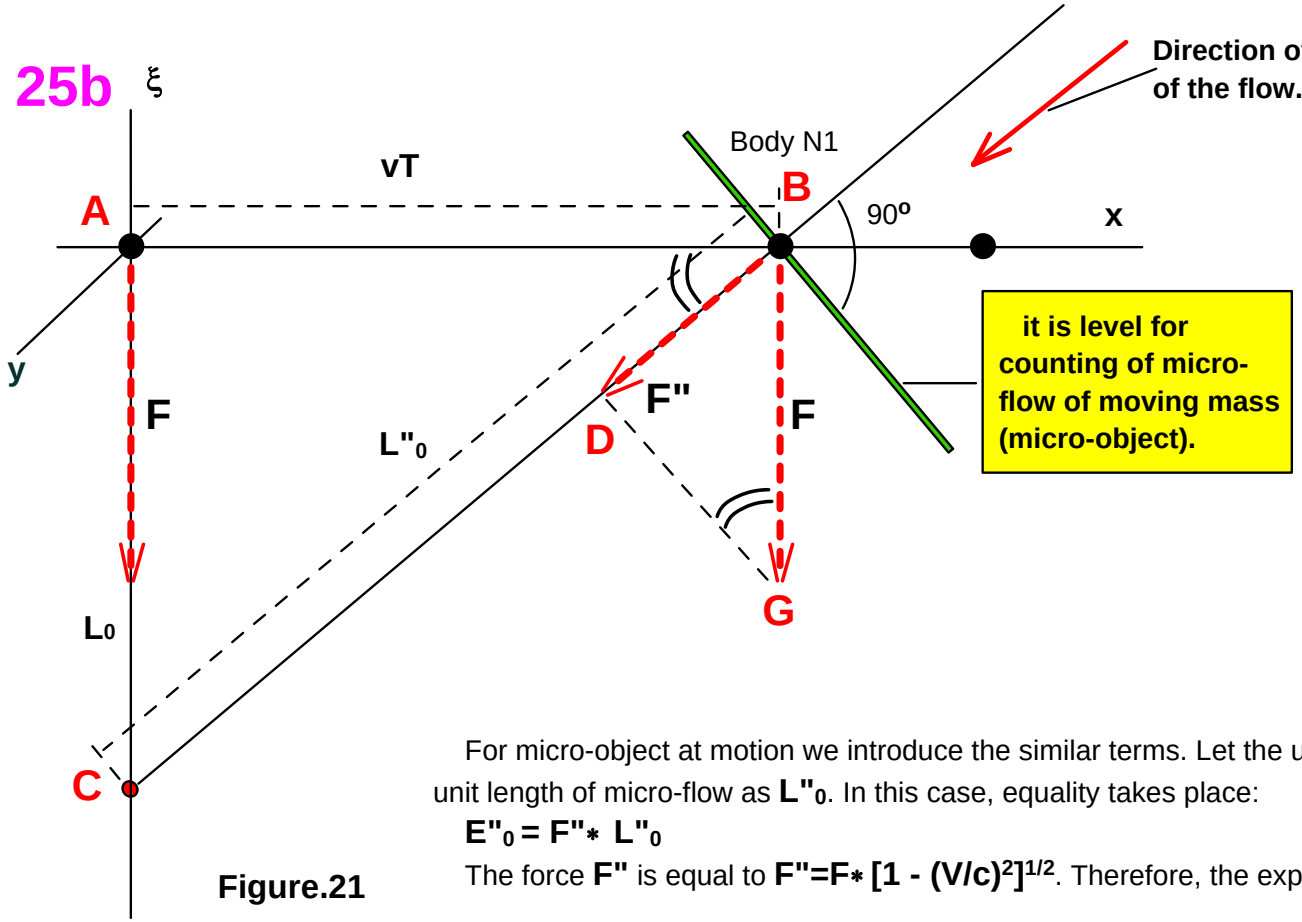


Figure.21

Knowing the force **(F")**, we can determine the energy that is transferred into micro-object out of micro-flow of any length. Using this, let's find the relations between lengths of micro-flows, which are capable to transmit units of energy into micro-objects at rest and at motion.

Let's denote by symbol E_0 a unit of energy transmitted out of micro-flow of micro-object that is at rest. This energy is transmitted micro-flow a fixed length. Take it as a micro-flow unit length and denote as L_0. Then we have the equality:

$$E_0 = F * L_0.$$

For micro-object at motion we introduce the similar terms. Let the unit of energy is denoted as $E"_0$. Let's denote a unit length of micro-flow as $L"_0$. In this case, equality takes place:

$$E"_0 = F" * L"_0$$

The force **F"** is equal to $F"=F * [1 - (V/c)^2]^{1/2}$. Therefore, the expression for the unit of energy will be equal to

$$E"_0 = F * [1 - (V/c)^2]^{1/2} * L"_0$$

Equating the two units of energy to each other $E_0 = E"_0$ let's define the relationships between the units of length micro-flows.

$E_0 = F * L_0 = E"_0 = F * [1 - (V/c)^2]^{1/2} * L"_0$ or it can be written $F * L_0 = F * [1 - (V/c)^2]^{1/2} * L"_0$. From this equation we finally obtain the necessary relation for units of micro-flows:

$$L"_0 = \frac{L_0}{[1 - (V/c)^2]^{1/2}}$$

Relationships between units of the micro-flows we can clearly see in Figure 21.

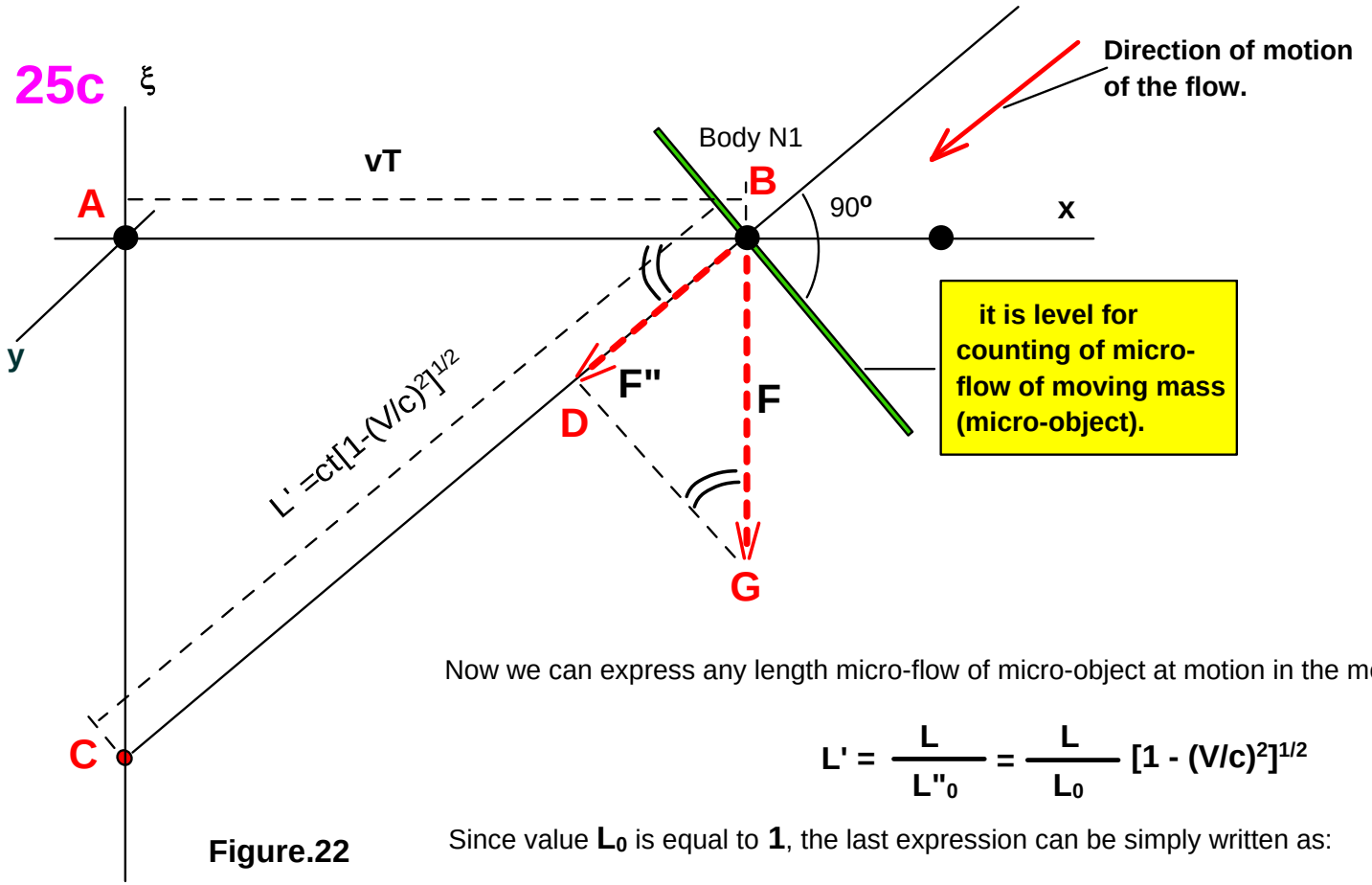


Figure.22

Now we can express any length micro-flow of micro-object at motion in the metric of energetic activity. It is equal to

$$L' = \frac{L}{L''_0} = \frac{L}{L_0}\,[1 - (V/c)^2]^{1/2}$$

Since value L_0 is equal to **1**, the last expression can be simply written as:

$$L' = L * [1-(V/c)^2]^{1/2}.$$

The last expression is to be proved. It can be used to translate any length **L** in the new metric **L'** without repetition of the similar mathematical calculations. The figure 22 shows the length of micro-flow that is equal to **L = ct** becomes shorter in the new metric under action of the relativistic root. The proof is over.

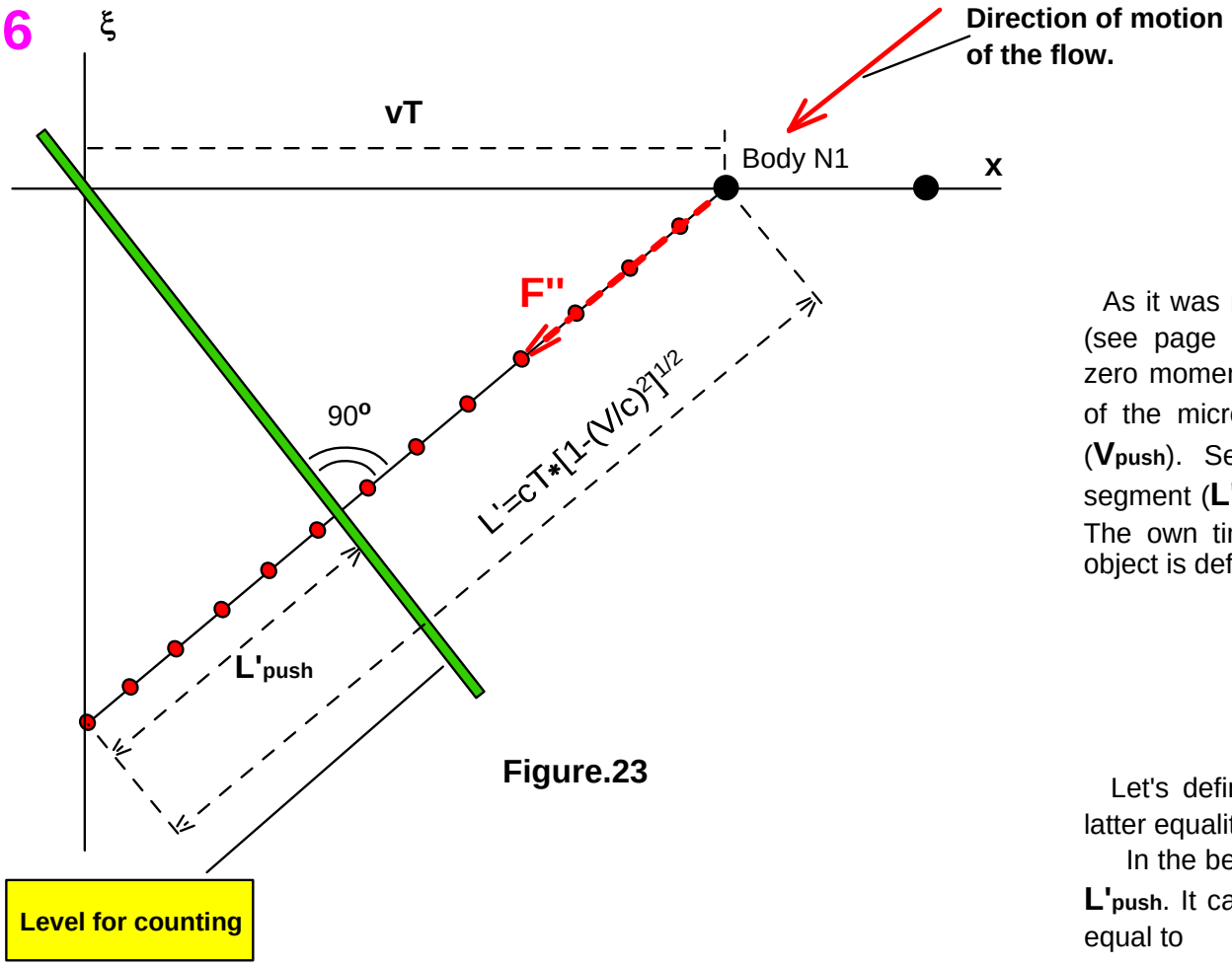


Figure.23

As it was noted in the previous analysis (see page 24), the period of time from zero moment is determined by the length of the micro-flow (L'_{push}) and speed of (V_{push}). See Figure 23. There is the segment (L'_{push}). It is marked by flashes. The own time of development of micro-object is defined as

$$T' = \frac{L'_{push}}{V_{push}}$$

Let's define the unknown values in the latter equality.

In the beginning we define the length of L'_{push}. It can be proved that this length is equal to

$$L'_{push} = [L - (V/c)*VT] *[1- (V/c)^2]^{1/2}.$$

To view the proof, please look at the page 26a.

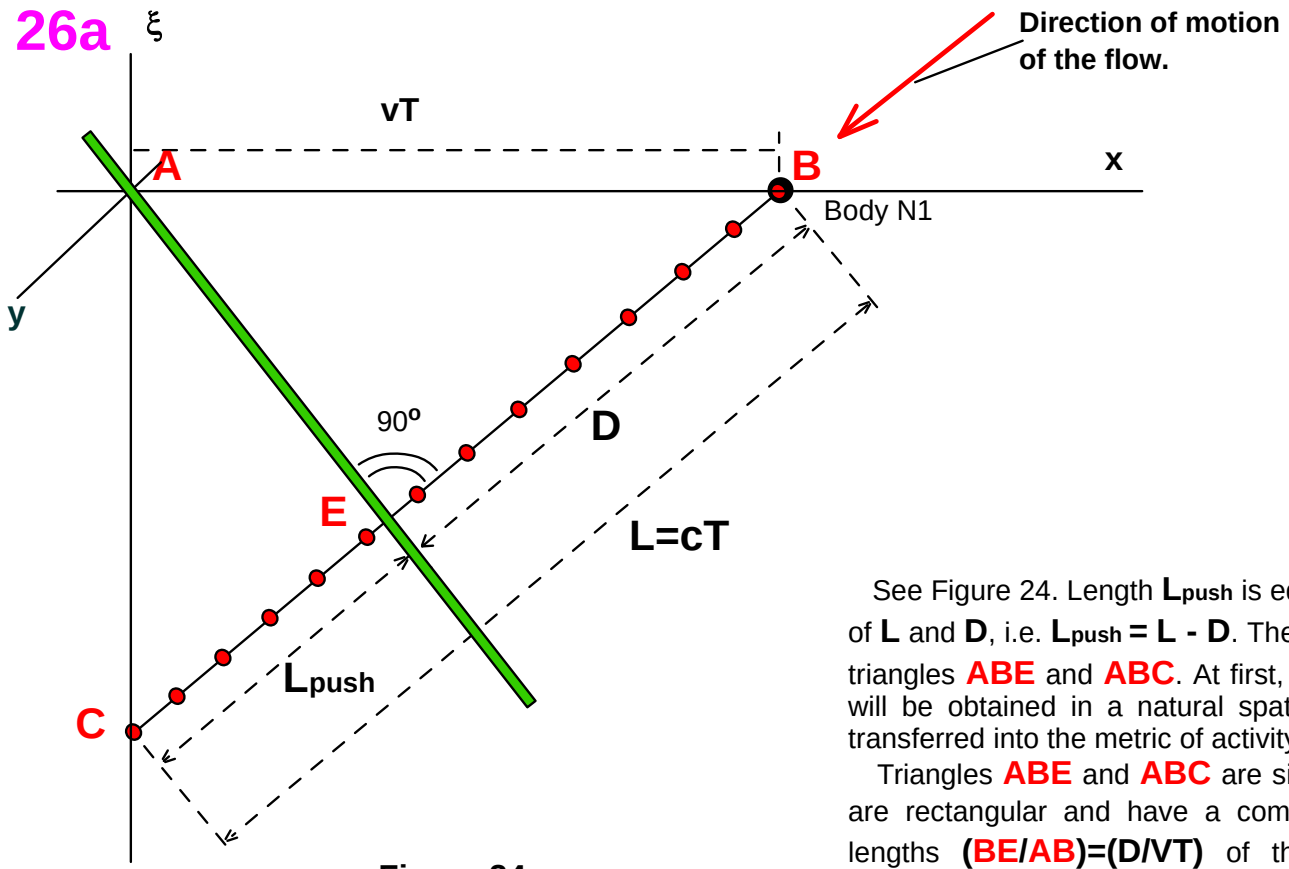


Figure.24

See Figure 24. Length L_{push} is equal to the difference between the lengths of **L** and **D**, i.e. $L_{push} = L - D$. The length **D** can be determined from similar triangles **ABE** and **ABC**. At first, all the lengths needed for the final result will be obtained in a natural spatial metrics. And after, the end result is transferred into the metric of activity of energy of the micro-flow.

Triangles **ABE** and **ABC** are similar to each other, since these triangles are rectangular and have a common angle. Therefore, the ratio of two lengths **(BE/AB)=(D/VT)** of the first triangle is equal to the ratio **(AB/BC)=(VT/L)** of the second triangle.

Hence it is **(D/VT)=(VT/L)** or **D=(VT/L)VT.** The length is **L=ct.** Substituting this value, we obtain **D=(VT/cT)VT=(V/c)VT.** If in equality $L_{push} = L - D$, we substitute the value **D** and after, we translate equality into metric of activity of energy, then we derive finally the value L_{push}:

$$L'_{push} = [L - (V/c) * Vt] * [1 - (V/c)^2]^{1/2}.$$

The last result must be proved.

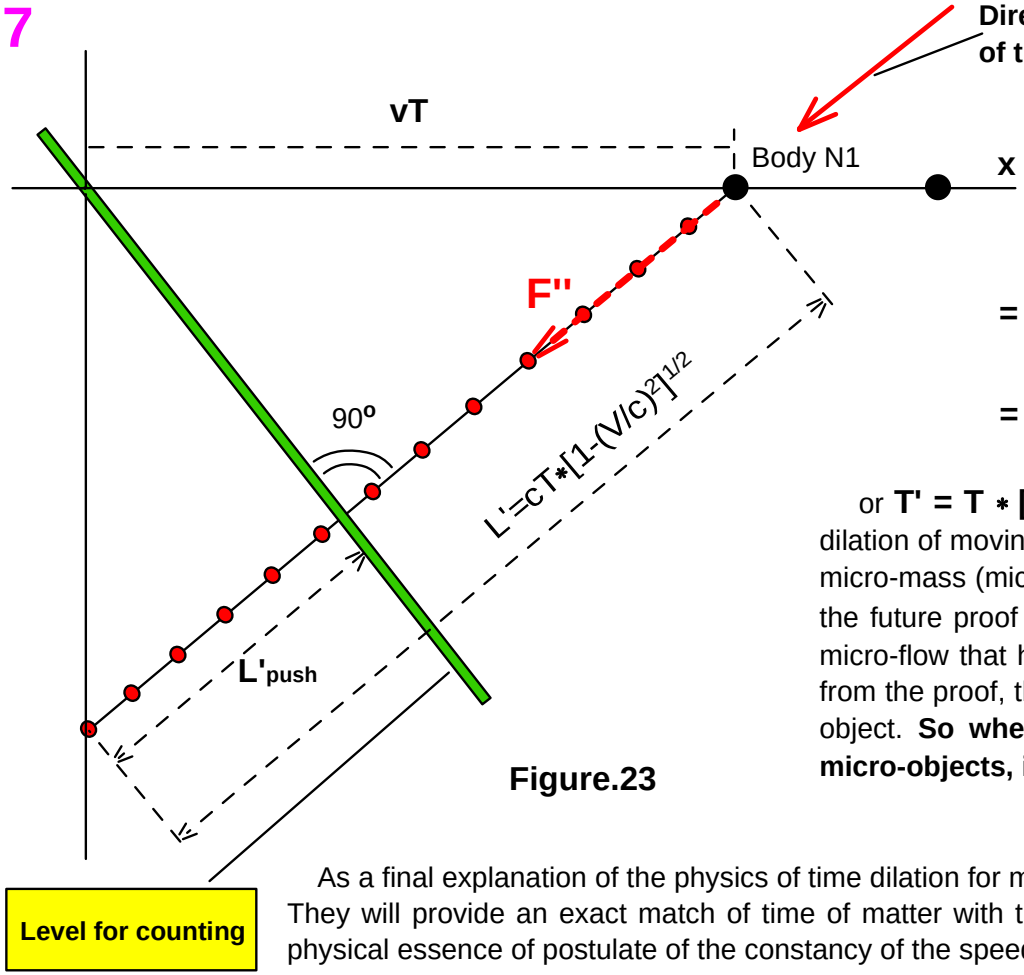


Figure.23

Speed (V_{push}) is equal to $V_{push} = c - V^2/c = c[1 - (V/c)^2]$. To view the proof, please look at the page 27a.

Now, we can define $T' = (L'_{push}/ V_{push}) =$

$$= \frac{(L- (v/c)*vT)*[1-(V/c)^2]^{1/2}}{c[1 - (V/c)^2]} = \frac{(L/c - (v^2/c^2)T)* [1-(V/c)^2]^{1/2}}{1 - (V/c)^2} =$$

$$= \frac{(T - (v^2/c^2)T)* [1-(V/c)^2]^{1/2}}{1 - (V/c)^2} = T*[1-(V/c)^2]^{1/2}$$

or $T' = T * [1-(V/c)^2]^{1/2}$. The last expression is known as the relativistic time dilation of moving frame of reference. And it coincides with own time of elementary micro-mass (micro-object) at motion. Here, we must highlight one feature because the future proof will use it. In Figure 23, the velocity (V_{push})) is equal to speed micro-flow that has flowing down through the level of counting. As it was obvious from the proof, this velocity determines the speed of passage of time of this micro-object. **So when in future proofs we will analyze the shifts of time other micro-objects, it is necessary to use that speed.**

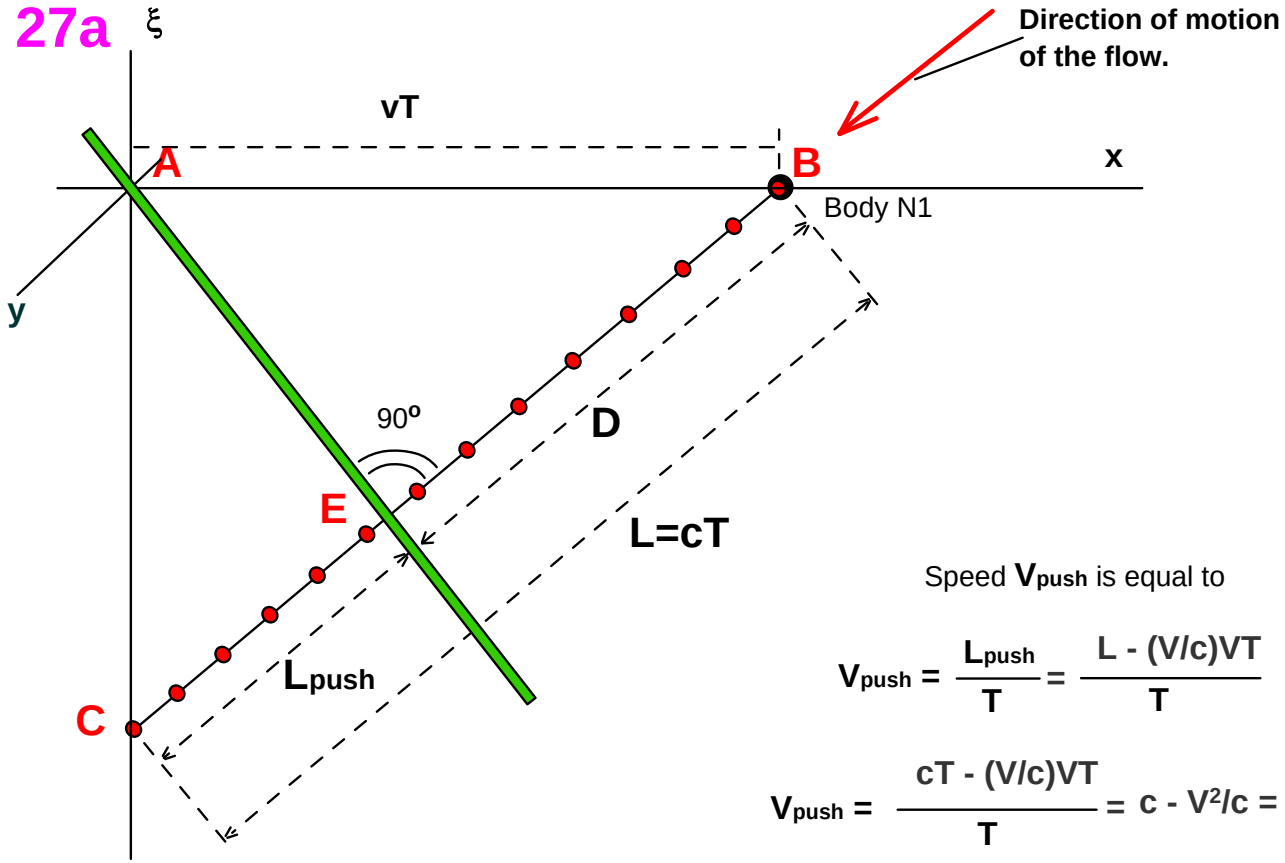
As a final explanation of the physics of time dilation for material micro-objects in this model, I emphasize three main factors. They will provide an exact match of time of matter with the known Lorentz transformation for time. Besides they open the physical essence of postulate of the constancy of the speed of light in an inertial frame of reference that is moving in a straight line at a constant speed without rotation.

The first factor is a factor weakening of action of the force parallel space on material micro-objects. The force weakens its action in according with the law of the relativistic root.

The second factor is the redistribution of energy of this force between the motion and the development of micro-object in time.

The third factor is the ability of micro-object to keep in the same value the ability to absorb energy out of parallel space at motion or at rest. This ability is a consequence of the wave properties of the focus. It has inverse of motion. The speed of this motion is always equal to the light speed. This occurs regardless of the fact that the wave energy focus is at rest or it is at motion in our space.

27a



Speed V_{push} is equal to

$$V_{push} = \frac{L_{push}}{T} = \frac{L - (V/c)VT}{T}$$

$$V_{push} = \frac{cT - (V/c)VT}{T} = c - V^2/c = c[1 - (V/c)^2]$$

The proof is over.

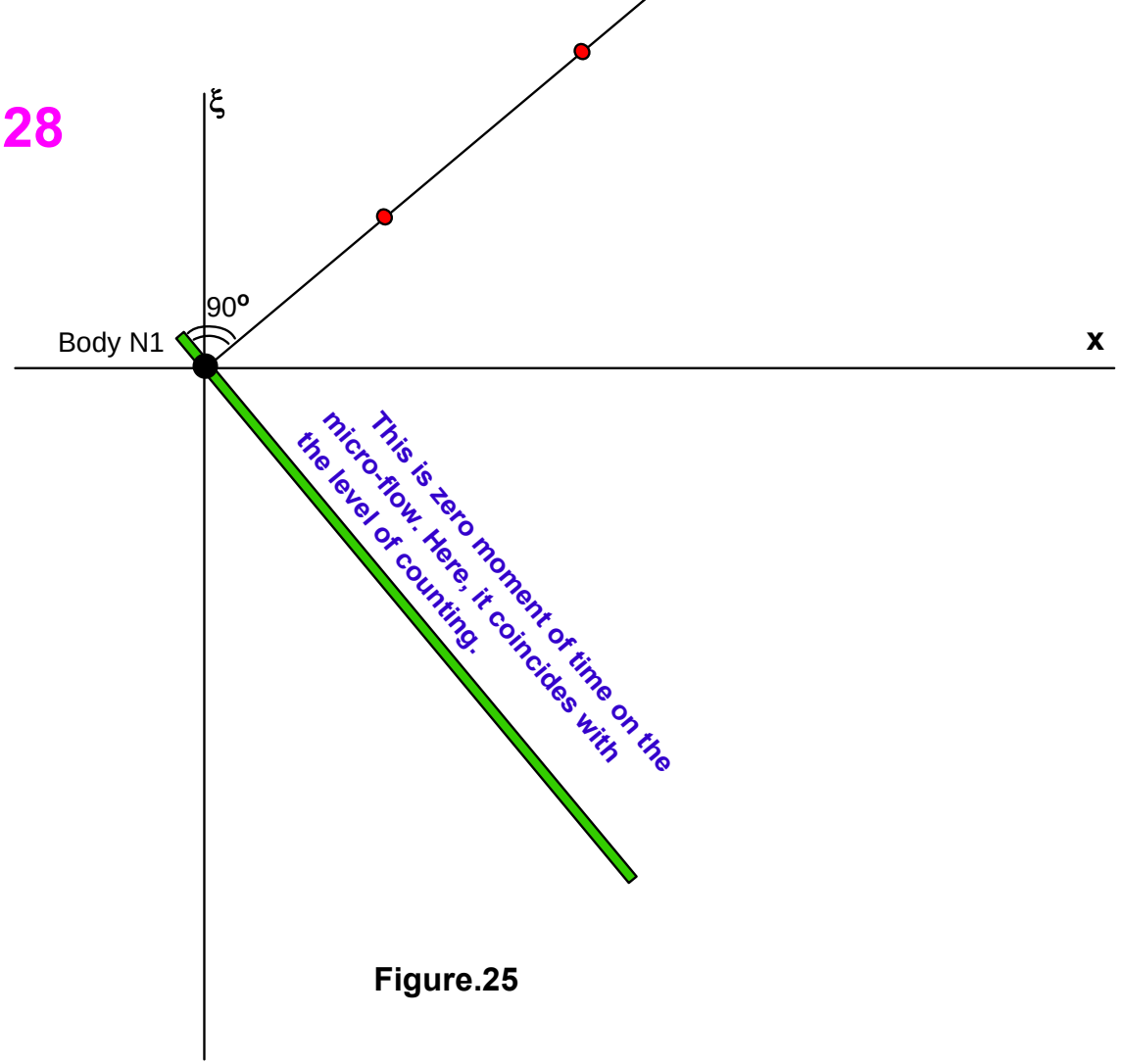


Figure.25

Here in Figure 25, a visual interpretation shows a demonstration for changing of the metric of time of micro-object that is moving.

For analysis, let's take a moment of time, when micro object is placed in the center of the frame of reference. This moment of time, we equate to zero. From the fixed moment and so on, we consider the lengths of time transitions that exist on the micro-flow relative to counting level (green line). On the micro-flow, there are red small balls. For this example, let's suppose when the length of the micro-flow that is passed through micro-object is equal to the distance between the red small balls, the micro-object has received a unit of energy. If we compare length of micro-flow that has passed through the counting level (green line) and the distance between the red small balls on the micro-flow, then it becomes clear how the change of metrics of micro-flow takes place.

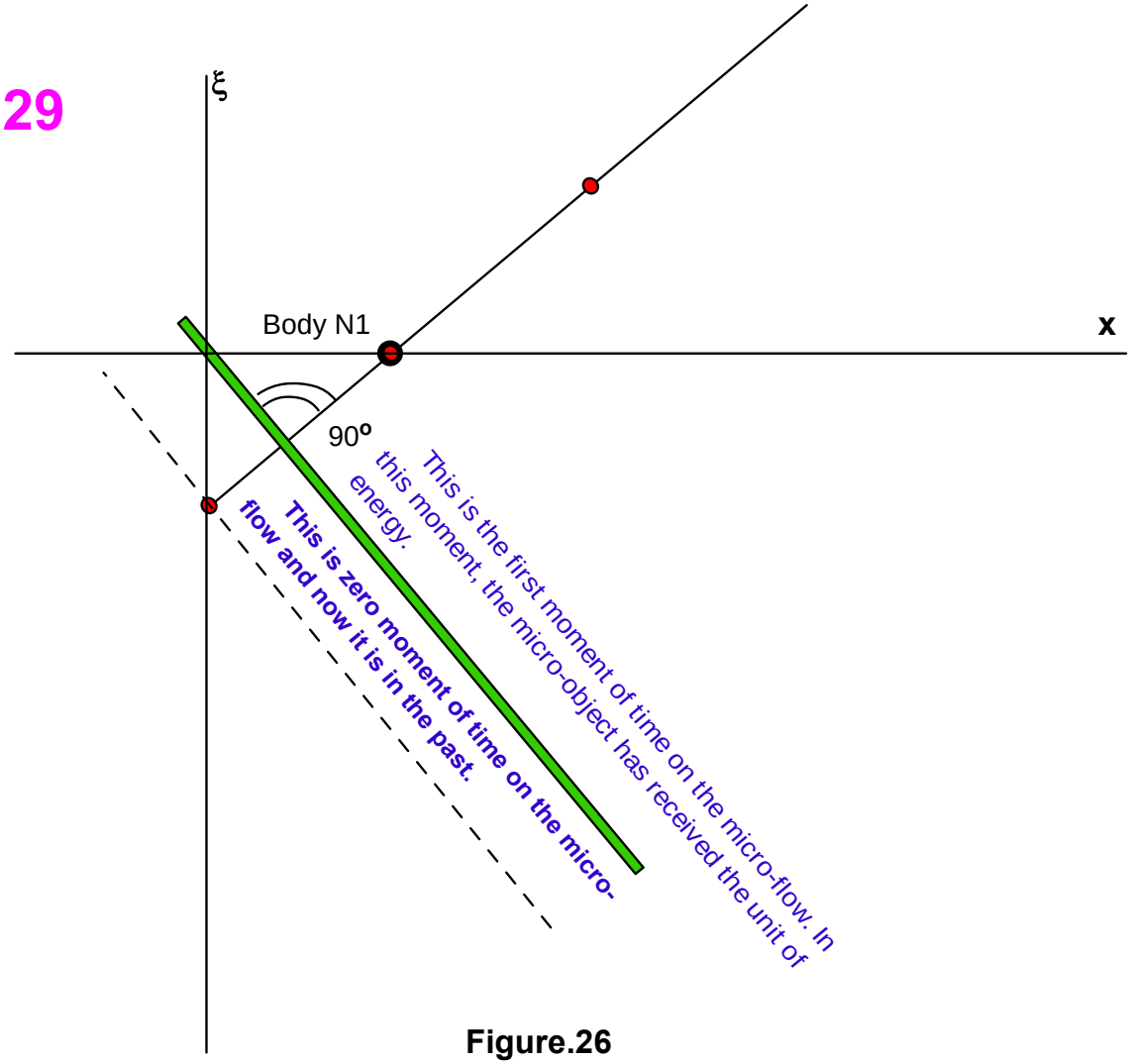


Figure.26

Figure 26 shows the first moment in time when micro-object received the first unit of energy. Micro-flow has passed through micro-object, its length is equal to the spacing between the two red small balls. Part of the energy is spent into motion, and the remaining part goes into the development of time. Because of it, below the level of counting there is only a short length of the micro-flow.

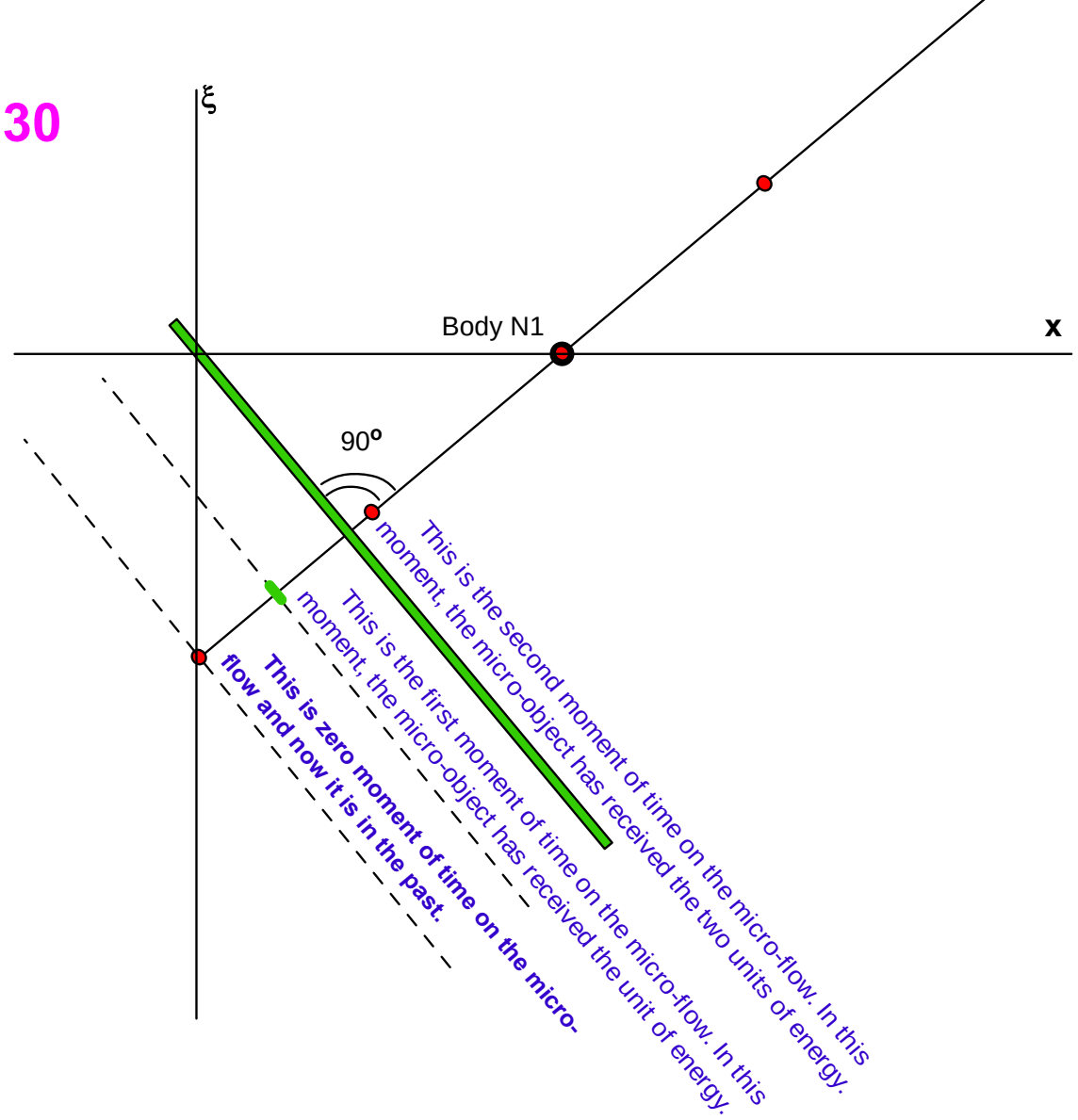


Figure.27

In Figure 27, we can already see the time period includes the two moments in time when micro-object has received two units of energy from the parallel space. In Figure 27, this is reflected by two red small balls on a micro-flow are located below micro-object.

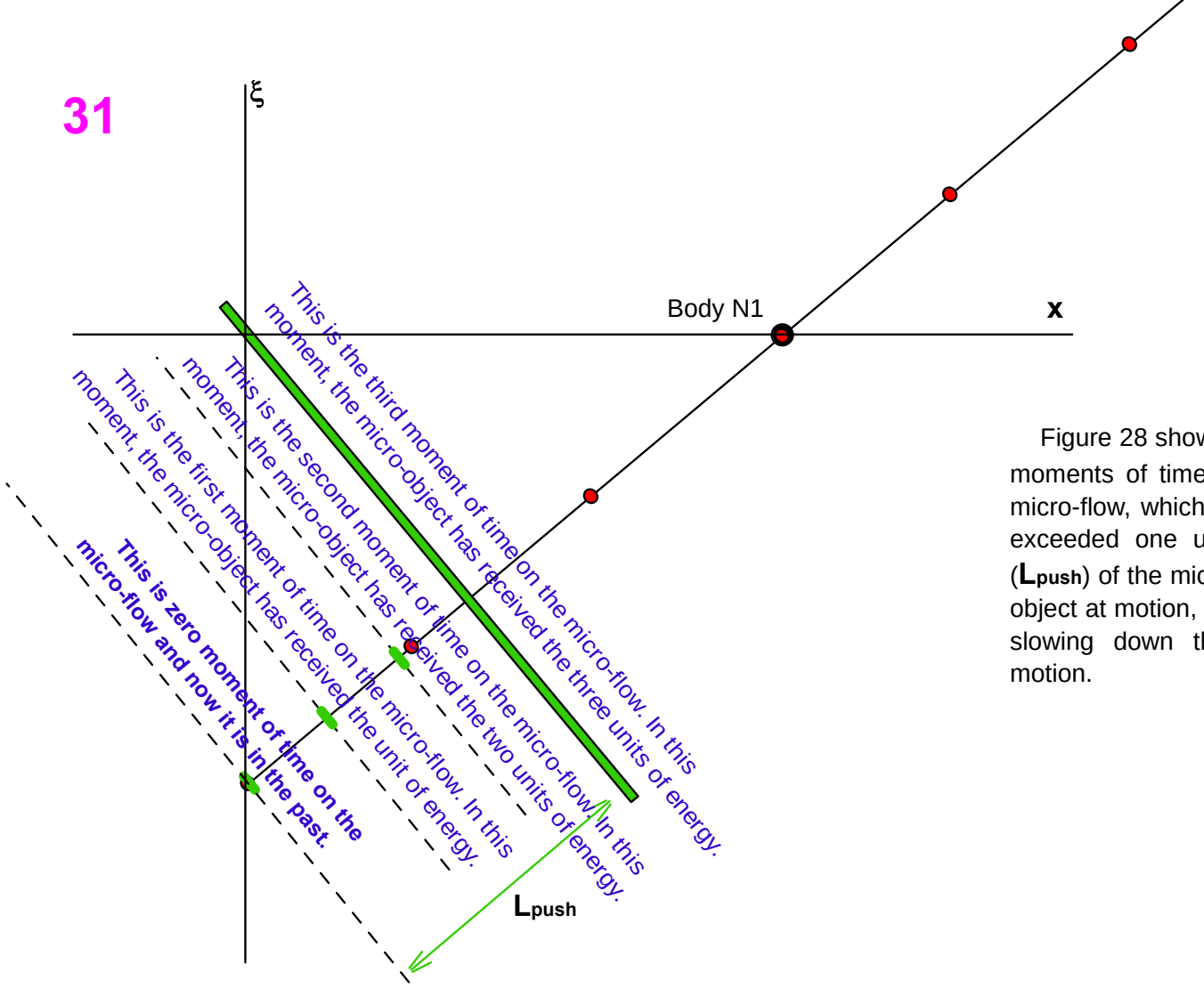


Figure.28

Figure 28 shows the time period, which has included three moments of time. Only now the total length (L_{push}) of the micro-flow, which has passed through the level (green line), exceeded one unit of the total energy. Since the length (L_{push}) of the micro-flow is associated with the time of micro-object at motion, then Figure 28 clearly shows the process of slowing down the development time of micro-object at motion.

Lorentz transformations for the time, as a consequence of the wave properties of physical matter in our world.

Before starting the proof, let's analyze some of the properties of the Lorentz transformation in direct mathematical analysis. Let's analyze the Lorentz transformation as mathematical formula.

$$t' = \frac{t - (v/c^2)x}{[1-(v/c)^2]^{1/2}}$$

This analysis will help us more accurately to understand the physical processes that will be considered in this model. Lorentz transformation gives the relationship between the instantaneous values of time of the two frames of reference at motion and at rest. Instantaneous time in the moving reference system depends on two variables **t** and **x**. To understand the impact of these variables onto time **t'** we can lock a variable, such as **t**. Then, changing the second variable **x**, we'll see how time (**t'**) is changed along the **x**-axis. Initially, in the frame of reference at rest we take the value of time is equal to zero, that is **t=0**. Then the Lorentz transformation becomes

$$t' = \frac{-(v/c^2)x}{[1-(v/c)^2]^{1/2}} \qquad \textbf{(a)}$$

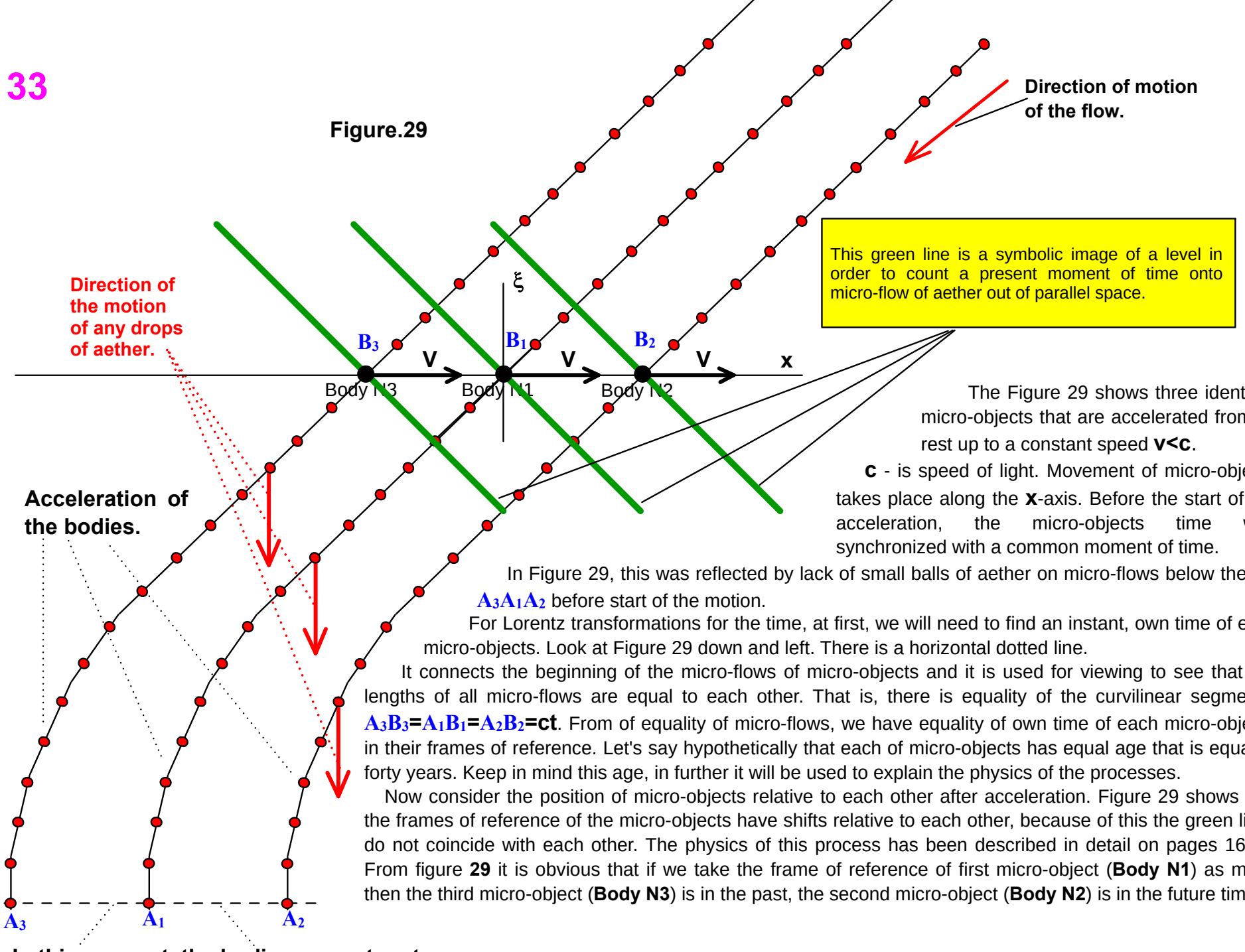
We assume that the velocity **v<c** is a positive constant that is not equal to zero. Then, the formula shows that for any positive values of **x**, the variable **t'** (it is time in the moving frame of reference) has always a negative value. Talking about it in physical terms we can say the following. At a fixed moment of time **t=0**, if a body has coordinate position that is equal to **x**, then in the moving frame of reference this body would be in the past time relative to frame of reference at rest. And this negative shift into the past time increases linearly with increasing values of **x**. Only the value **x=0** gives the time **t'** that is equal to zero **t'=0**. See formula. Now we take **x** with negative value.

To do this, in the last formula we replace positive value of **x** by negative value **-x**. Then Lorentz transformation takes the form:

$$t' = \frac{-(v/c^2)(-x)}{[1-(v/c)^2]^{1/2}} = \frac{(v/c^2)x}{[1-(v/c)^2]^{1/2}} \qquad \textbf{(b)}$$

This formula shows that for negative values of **x** the time **t'** gets a positive shift into the future time, and linearly increases with increasing of negative value **x**. These shifts, which were considered for value of time at positive and negative values of **x**, we will get for following physical processes. They will take place after acceleration of three elementary micro-objects, which are taken as the energy wave focuses.

Figure.29



The Figure 29 shows three identical micro-objects that are accelerated from at rest up to a constant speed **v<c**.

c - is speed of light. Movement of micro-objects takes place along the **x**-axis. Before the start of the acceleration, the micro-objects time was synchronized with a common moment of time.

In Figure 29, this was reflected by lack of small balls of aether on micro-flows below the line $A_3A_1A_2$ before start of the motion.

For Lorentz transformations for the time, at first, we will need to find an instant, own time of each micro-objects. Look at Figure 29 down and left. There is a horizontal dotted line.

It connects the beginning of the micro-flows of micro-objects and it is used for viewing to see that the lengths of all micro-flows are equal to each other. That is, there is equality of the curvilinear segments: $A_3B_3=A_1B_1=A_2B_2=ct$. From of equality of micro-flows, we have equality of own time of each micro-objects in their frames of reference. Let's say hypothetically that each of micro-objects has equal age that is equal to forty years. Keep in mind this age, in further it will be used to explain the physics of the processes.

Now consider the position of micro-objects relative to each other after acceleration. Figure 29 shows that the frames of reference of the micro-objects have shifts relative to each other, because of this the green lines do not coincide with each other. The physics of this process has been described in detail on pages 16,17. From figure **29** it is obvious that if we take the frame of reference of first micro-object (**Body N1**) as main, then the third micro-object (**Body N3**) is in the past, the second micro-object (**Body N2**) is in the future time.

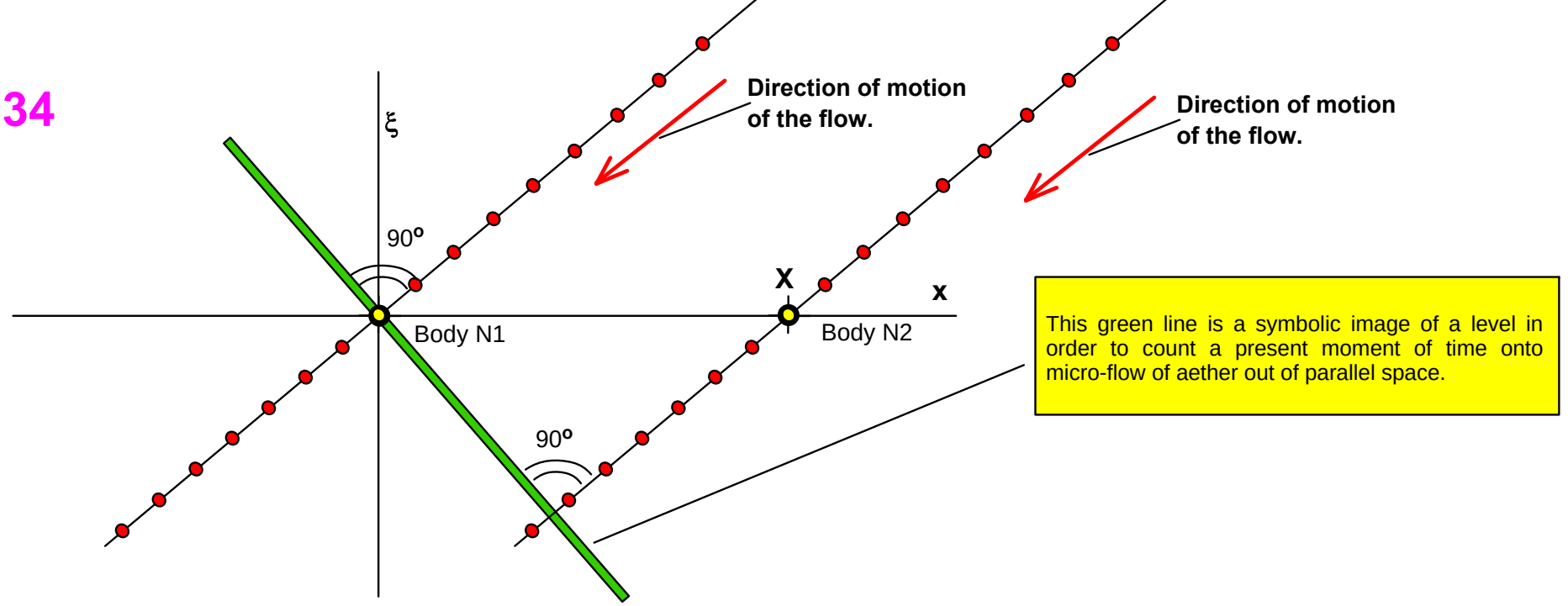
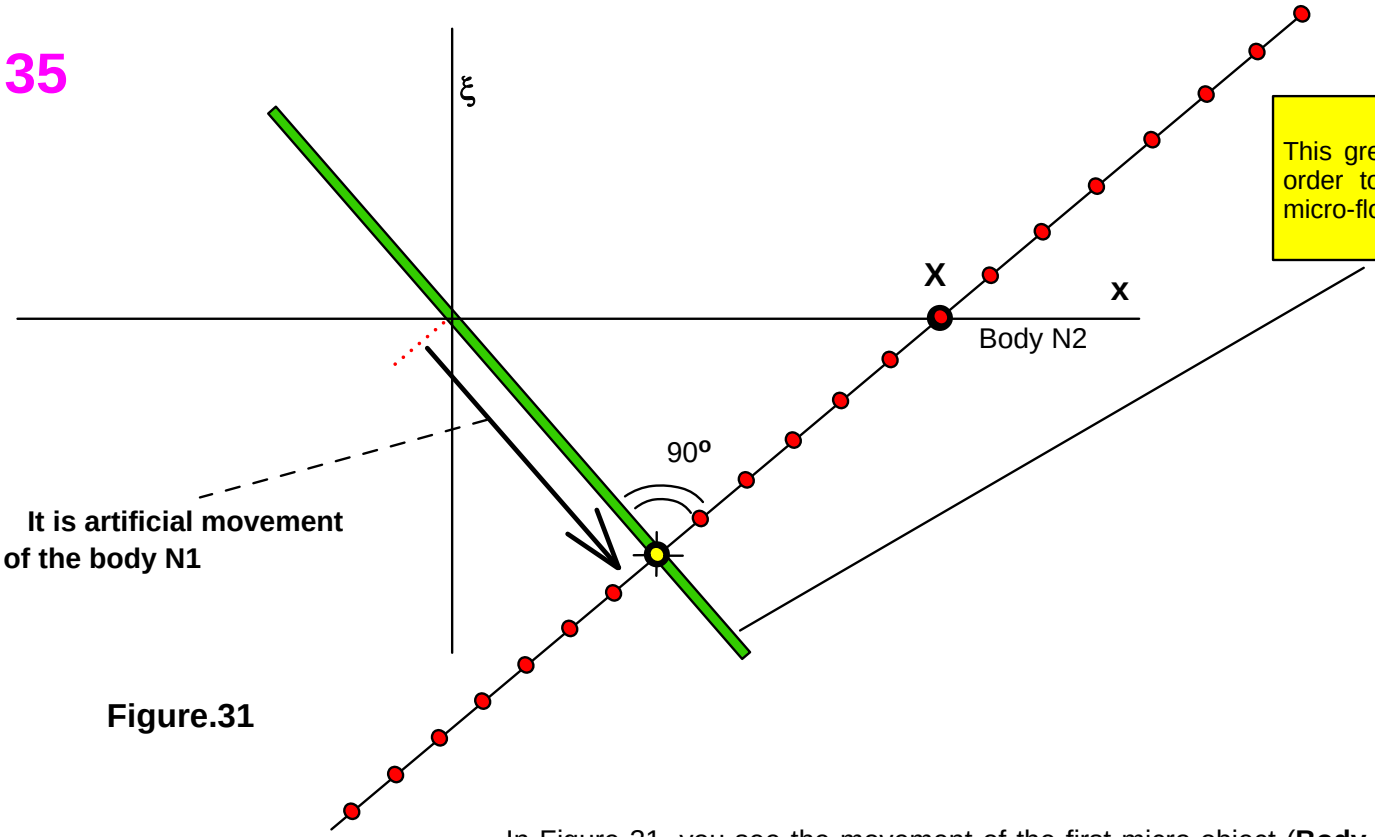


Figure.30

Let's find instant time of second micro-object (**Body N2**) in the frame of reference of the first micro-object (**Body N1**). To do this, let's stop time of the two micro-objects. Because of this reason, in Figure 30 micro-flows don't pass through the micro-objects. In the beginning, we define the instantaneous time of the second micro-object (**Body N2**) in the frame of reference of the first micro-object (**Body N1**), when its time is equal to zero (**t=0**). For the first micro-object (**Body N1**), it is a conditional, instantaneous time. In fact, the real, instant time can have any value. In Figure 30, the zero time is marked with help of "yellow" small ball on the micro-flow of micro-object (**Body N1**). Now after entering time of the first micro-object (**Body N1**), we define time of the second micro-object (**Body N2**) in its own frame of reference. It is always equal to the instantaneous time of the first micro-object (**Body N1**). This was already noted in the analysis on page 33. Therefore, if a moment of time of the first micro-object (**Body N1**), we took equal to zero, then the time of second micro-object (**Body N2**) has to be zero, too. This gives equalities of ages of micro-objects in their own frames of reference for instant time. Because of this reason on Figure 30, segments micro flows for both micro-objects coincide with each other, and "yellow" conditional balls of aether coincide with the centers of the micro-objects.

Now let's learn of instant time of the second micro-object (**Body N2**) in the frame of reference of instant time of the first micro-object (**Body N1**). To do this, we will simulate the movement of first micro-object (**Body N1**) with its micro-flow together along level green. This enables us to measure the length of the micro-flow of second micro-object (**Body N2**).



This green line is a symbolic image of a level in order to count a present moment of time onto micro-flow of aether out of parallel space.

Figure.31

In Figure 31, you see the movement of the first micro-object (**Body N1**) with stopping of micro-flow along the level green. With help of this action, we use the micro-flow of first micro-object (**Body N1**) as a ruler.

When the micro-flow has coincided with the second micro-object (**Body N2**), we must restore the old position of micro-flow relative to the second micro-object (**Body N2**), as it was shown in Figure 30.

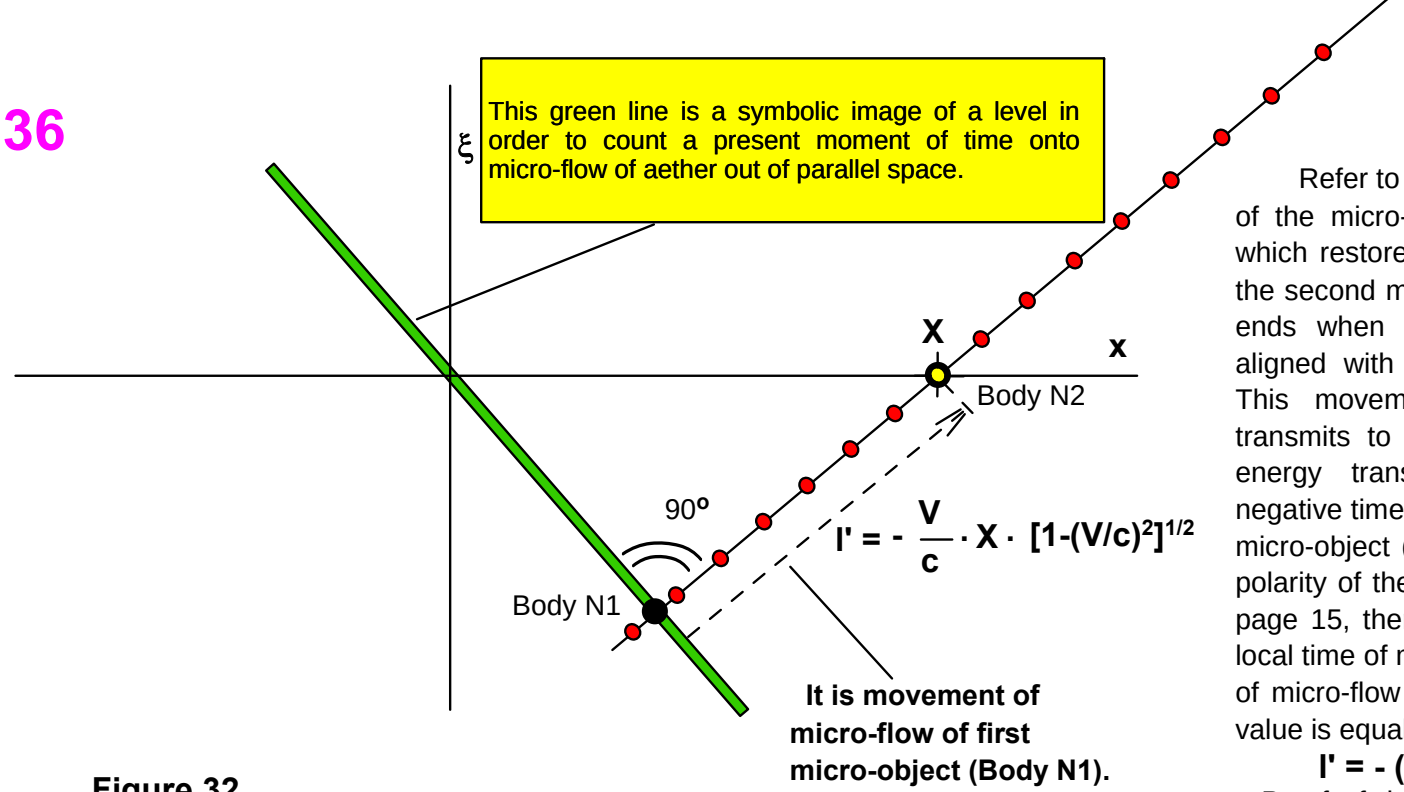


Figure.32

Refer to Figure 32. Here, we see the movement of the micro-flow of first micro-object (**Body N1**), which restores the old position of the micro-flow of the second micro-object (**Body N2**). This movement ends when the "yellow" small ball of aether is aligned with the second micro-object (**Body N2**). This movement has a negative direction and transmits to micro-object a negative energy. This energy transfer is developing micro-object in negative time. This gives the past time relative to the micro-object (**Body N1**). In order to understand the polarity of the time, you can once again look at the page 15, there is explained the polarity of time for local time of micro-object. If we mark a negative shift of micro-flow with help of symbol **(l)**, then the shift value is equal to

$$l' = -(v/c)x\,[1-(V/c)^2]^{1/2}$$

Proof of this shift coincides with the definition of length **D** in Figure 24. See page 26b. This conclusion will not be repeated.

If we know the length of the shift (**l'**) and speed $V_{push} = c[1 - (V/c)^2]$, then we can find time in the past of second micro-object (**Body N2**). It is equal to

$$t' = \frac{l'}{V_{push}} = -\frac{v/c^2}{[1-(V/c)^2]^{1/2}} X$$

The last expression coincides with the Lorentz transformation for the case when time is equal to **t=0**. See formula **(a)**, page 33.

Now, we will analyze the physics of the result. For this, let's analyze the following question. Why is there an obvious contradiction? The essence of this contradiction is the following. The second micro-object (**Body N2**) exists in the future of time relative to the first micro-object (**Body N1**), however the second micro-object (**Body N2**) has a negative energy in order to have shift into the past time. This shift occurs due to the wave properties of matter. And as any wave in a homogeneous medium, the long-lived matter has a constant speed. It is equal to the speed of light. **This motion with constant velocity gives the same age for two identical micro-objects in different times.** And this is possible only when in the future, the micro-object has an own shift into the past time. Let me explain this in more detail.

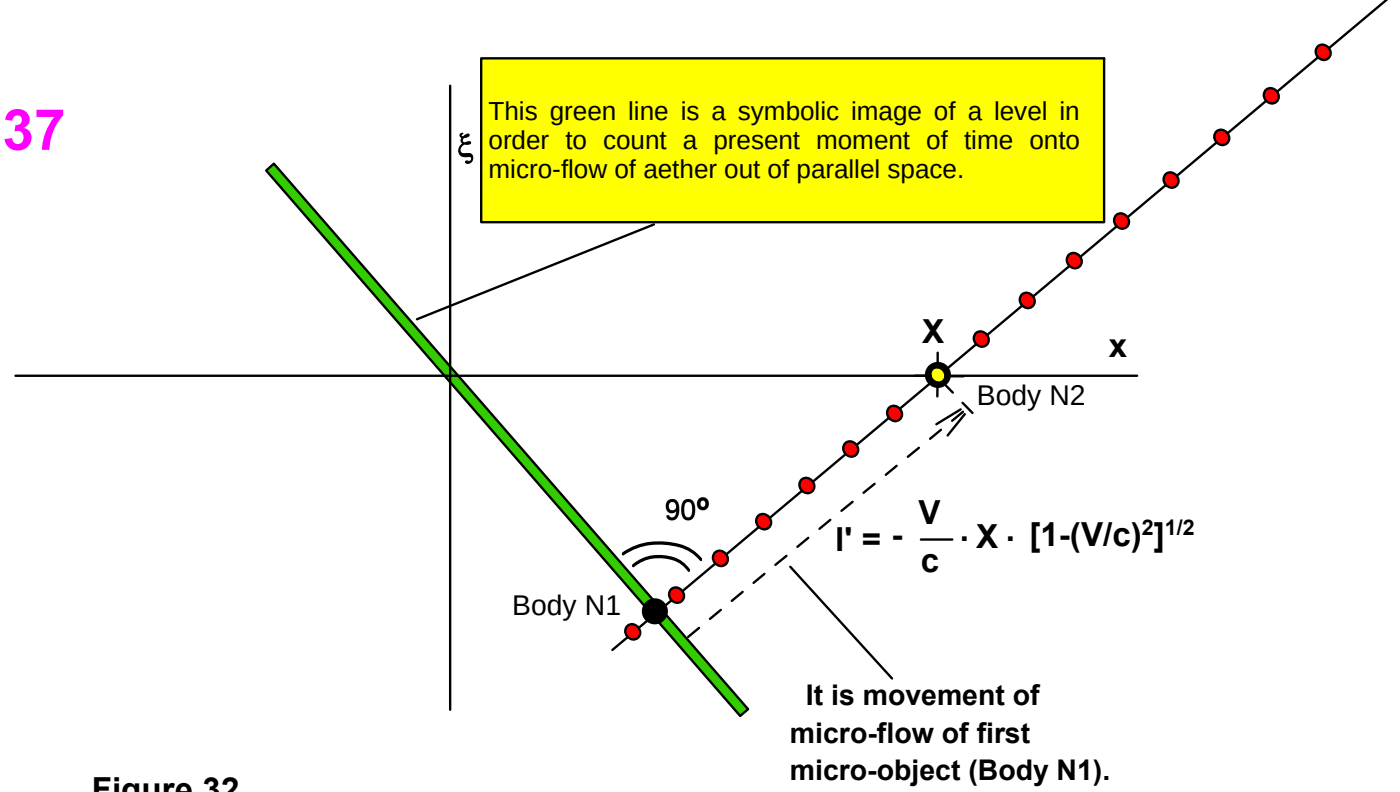


Figure.32

On page 34, there were introduced hypothetical ages of micro-objects. Also, there are assumed that they have ages, each of which is equal to forty years. In addition, before starting this analysis there was the condition that all three micro-objects are the same. They are only in a different times that are relative to each other, one is in the past, second is in the present and the third is in the future. So we can explain the physics of this process with help of age of one man, existing at different times, as an analogy. Let a person's age at the moment is equal to forty years. Let's consider the person in the future, twenty years later. How is age of this person? Obviously, in the future, age would be equal to sixty years. Now suppose that a person's age after twenty years has not changed and age is remained the same. It is equal to forty years. In this model, we have a similar case. Micro-object is located in the future time in the frame of reference of the first micro-object, and its age is not changed due to the wave properties of the micro-object. Is there a factor that provides the unchanging age? Yes, there is. This factor is a local, negative flow of time. Such negative flow of time rejuvenates the person for twenty years. This gives the following. When a person moves into the future and grows old, such a negative flow of time rejuvenates person. As a result, in the future, a person's age does not change. I hope that after this explanation, you have clear understanding physics action of negative micro-flow that passes through the second micro-object in the frame of reference of the first micro-object.

In the next explanation we shall use time **t** that isn't equal to zero. The time will be considered for second micro-object (**Body N2**). For this, we consider the motion of the second micro-object (**Body N2**) from point **x** up to point $\mathbf{x_t}$ in the positive direction of the **x**-axis. This motion will be considered for the time from **t=0** up to time **t**.

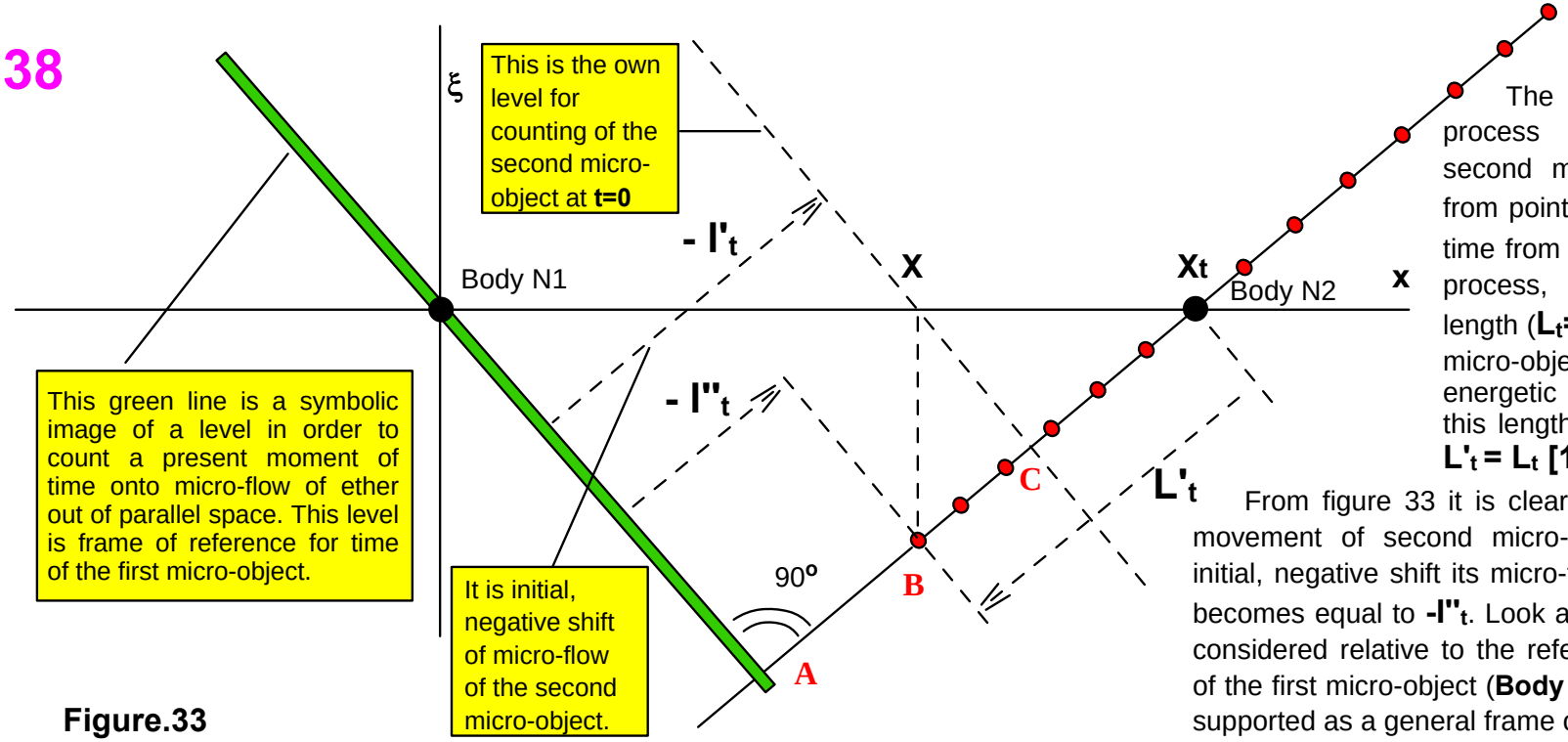


Figure.33

The Figure 33 shows the process of movement of the second micro-object (**Body N2**) from point **x** up to point x_t during time from **t=0** up to **t**. During this process, the micro-flow with length (L_t=**ct**) passes through the micro-object. In the metric of energetic activity of micro-flow, this length is equal to the length: $L'_t = L_t\,[1-(V/c)^2]^{1/2}$.

From figure 33 it is clear that by the end of the movement of second micro-object (**Body N2**), the initial, negative shift its micro-flow is decreased and it becomes equal to $-l''_t$. Look at this negative shift. It is considered relative to the reference level (green line) of the first micro-object (**Body N1**). This system will be supported as a general frame of reference for all proof.

Let's define this shift. From figure 33 it is also clear that the shift length is equal to $-l''_t = AC-BC$ or $l''_t = BC - AC$. The last equality takes into account polarity of movements of the micro-flow.

Length value (**AC**) is already known. The polarities of micro-flows are already included in the difference between the segments. See Figure 32. In the metric of energetic activity of micro-flow, it is equal to

$$AC = l' = \frac{V}{c}\cdot X\cdot [1-(V/c)^2]^{1/2}$$

Method for determining of the length (**BC**) is made in the proof of Chapter 2, page 26. Therefore the length (**BC**) in the metric of energy activity is equal to

$$BC = L'_{push} = [L_t - (V/c)*(x_t - x)]*[1-(V/c)^2]^{1/2}$$

Let's find the value l''_t. To do this, we substitute known values (**BC**) and (**AC**) that is $l''_t = BC-AC$.

$$l''_t = [L_t - (V/c)*(x_t - x)]*[1-(V/c)^2]^{1/2} - (V/c)*x*[1-(V/c)^2]^{1/2} = [L_t - (V/c)*x_t]*[1-(V/c)^2]^{1/2}$$

If we use the speed (V_{push}) that is equal to $V_{push} = c - V^2/c = c[1-(V/c)^2]$, then we obtain the final result:

$$t' = \frac{l''_t}{V_{push}} = \frac{(L_t)/c - (v/c^2)x_t}{[1-(v/c)^2]^{1/2}} = \frac{t - (v/c^2)x_t}{[1-(v/c)^2]^{1/2}}$$ or according to the conventional form. It is equal to $t' = \frac{t - (v/c^2)x}{[1-(v/c)^2]^{1/2}}$

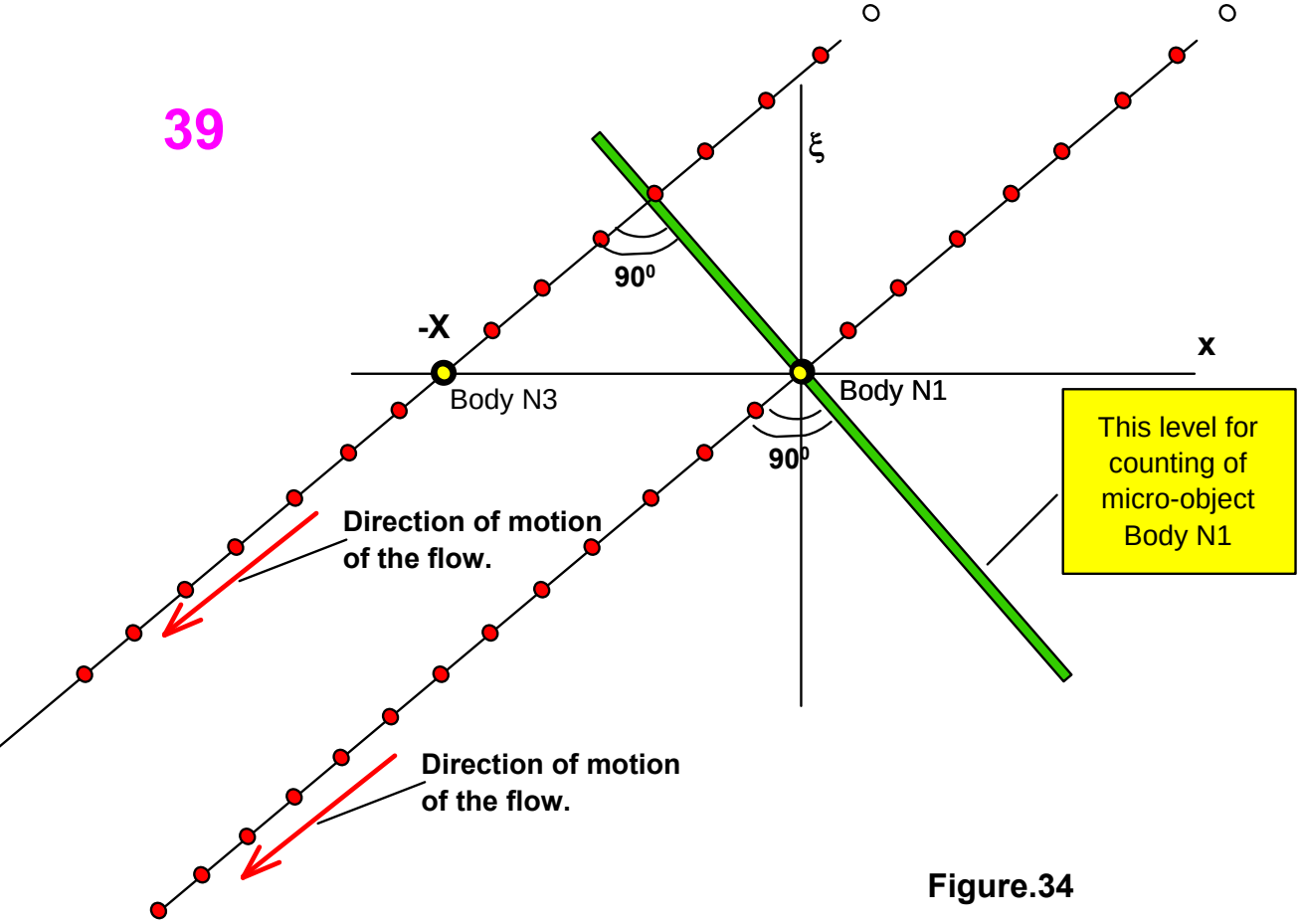


Figure.34

On this page we continue the analysis of time of micro-objects at motions. We have to examine the time of third micro-object (**Body N3**) in the frame of reference of the first micro-object (**Body N1**). To do this, we will stop time of the two micro-objects, as it was on page 35. Because of this reason, in Figure 34 micro-flows also don't pass through the micro-objects. In the beginning, we define the instantaneous time of the third micro-object (**Body N3**) in the frame of reference of the first micro-object (**Body N1**), when its time is equal to zero (**t=0**). This must be done to obtain a Lorentz transform of (b), page 32. In Figure 34, the zero time is marked with help of "yellow" small ball on the micro-flow of micro-object (**Body N1**). Now after entering time of the first micro-object (**Body N1**), we define time of the third micro-object (**Body N3**) in its own frame of reference. It is always equal to the instantaneous time of the first micro-object (**Body N1**). This was already noted in the analysis on page 33. Therefore, if a moment of time of the first micro-object (**Body N1**) we took as equal to zero, then the time of third micro-object (**Body N3**) has to be zero, too. This gives equalities of ages of micro-objects in their own frames of reference for instant time. Because of this reason on Figure 34, the "yellow" small balls on aether coincide with the centers of the micro-objects.

Now let's learn of instant time of the third micro-object (**Body N3**) in the frame of reference of instant time of the first micro-object (**Body N1**). To do this, we will simulate the movement of first micro-object (**Body N1**) with its micro-flow together along level green. This enables us to measure the length of the micro-flow of third micro-object (**Body N3**).

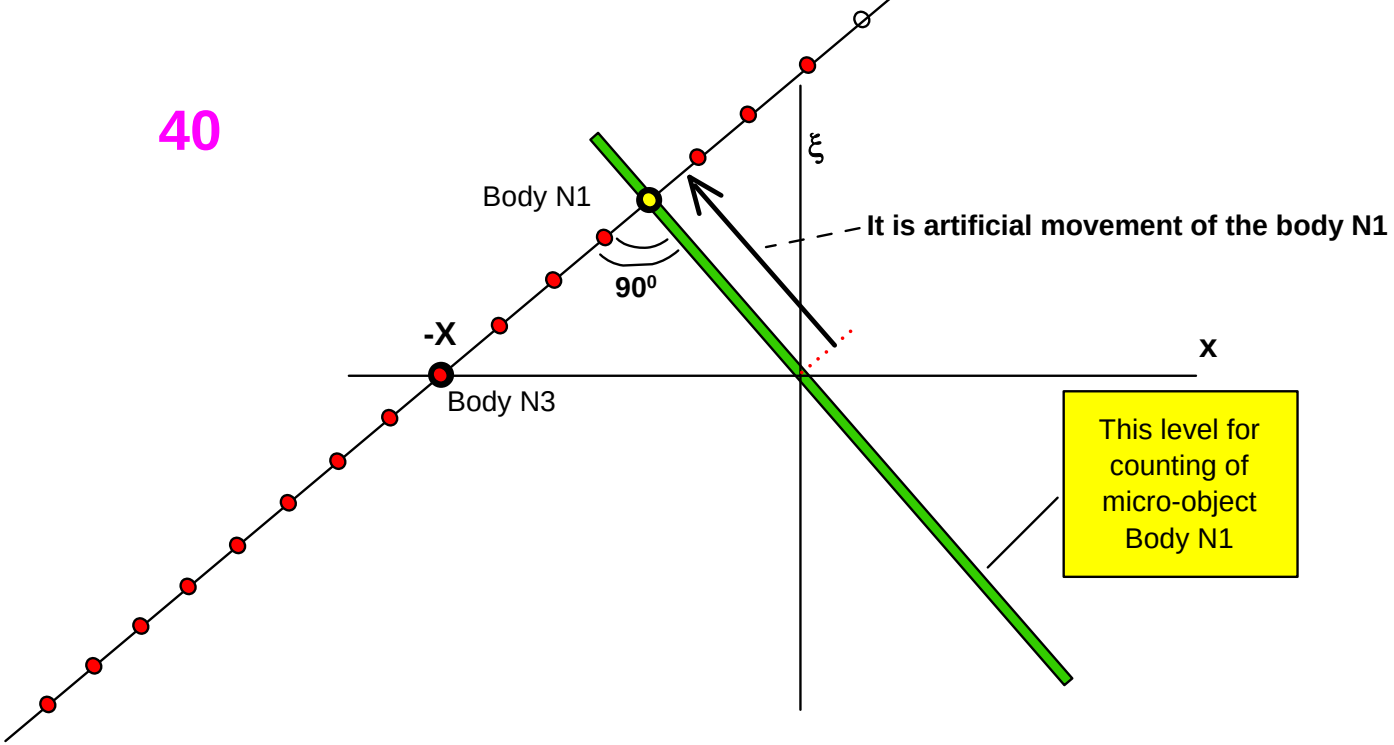


Figure.35

In Figure 35, you see the movement of the first micro-object (**Body N1**) with stopping of micro-flow along the level green. With help of this action, we use the micro-flow of first micro-object (**Body N1**) as a ruler.

When this micro-flow has coincided with the third micro-object (**Body N3**), we must restore the old position of micro-flow relative to the third micro-object (**Body N3**), as it was shown in Figure 34.

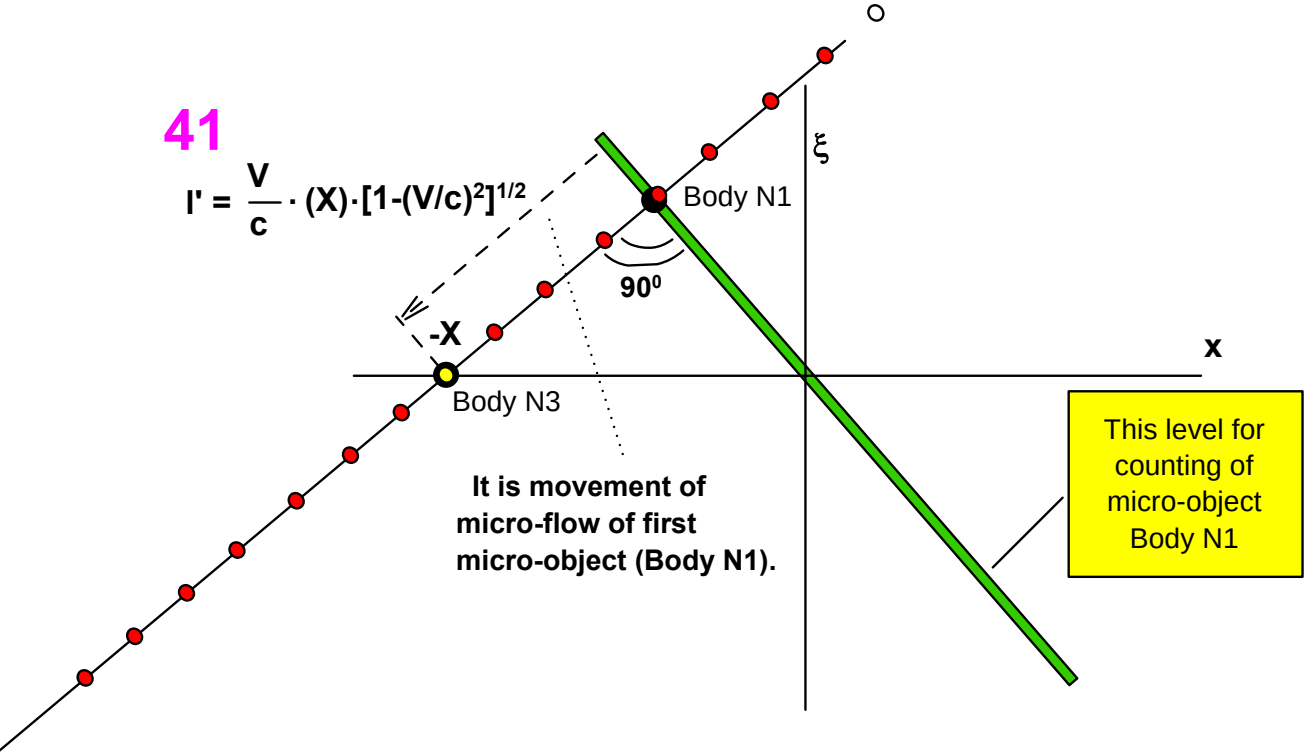


Figure.36

See on Figure 36. Here, we see the movement of the micro-flow of first micro-object (**Body N1**), which restores the old position of the micro-flow of the third micro-object (**Body N3**). This movement ends when the "yellow" small ball of aether is aligned with the third micro-object (**Body N3**). This movement has a positive direction and transmits to micro-object a positive energy. This energy transfer is developing micro-object in positive time. This gives the future time relative to the micro-object (**Body N1**). In order to understand the polarity of the time, you can once again look at the page 14, there is explained the polarity of time for local time of micro-object.

If we mark a positive shift of micro-flow with help of symbol **(l')**, then the shift value is equal to

$$\mathbf{l' = (v/c)x\ [1-(V/c)^2]^{1/2}}$$

Proof of this shift coincides with the definition of length **D** in Figure 24. See page 26b. This conclusion will not be repeated.

If we know the length of the shift (**l'**) and speed $\mathbf{V_{push} = c[1 - (V/c)^2]}$ of the micro-flow, then we can find time in the future of third micro-object (**Body N3**). It is equal to

$$\mathbf{t' = \frac{l'}{V_{push}} = \frac{v/c^2}{[1-(V/c)^2]^{1/2}}\ x}$$

The last equality coincides with the Lorentz transformation for time for all points of the negative **x**-axis, when the time is equal to **t=0**. This is required to get in this conclusion.

$$l' = \frac{V}{c} \cdot (X) \cdot [1-(V/c)^2]^{1/2}$$

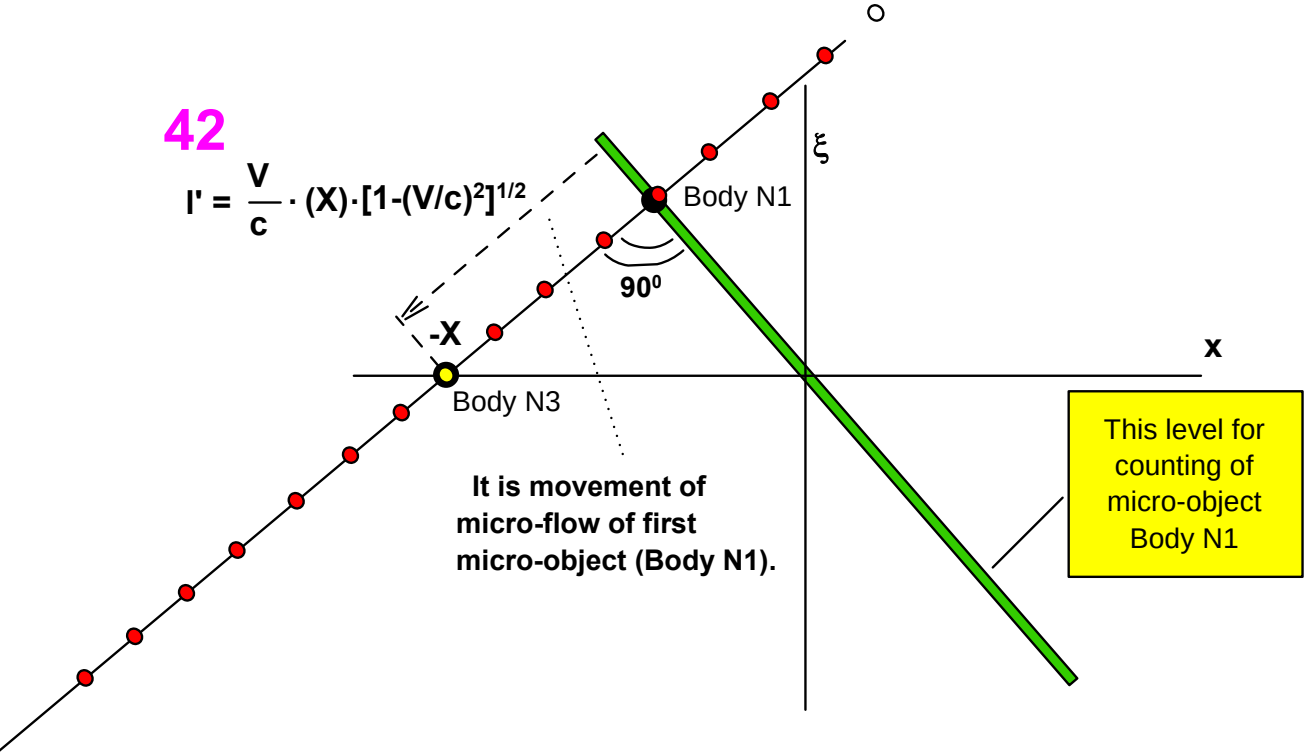


Figure.36

Let's consider the physics of the process of this result, as it was done on page 37 with help of a hypothetical person. Only here we consider the age of the same hypothetical person in the past. I recall that at the present time the age of person was equal to forty years. Let's consider the person in the past, ten years ago. Now we ask the following question. For example, how is age of this person, ten years ago in the past? It is indisputable in normal life, he would be equal to thirty years. Now, we assume artificially that ten years ago, the age of the person wasn't equal to thirty. Let person has age that is equal to age at the present time, that is, let age is equal to forty years. What kind of physical processes could provide this age in the past time? It can only give a local, positive flow of time. It causes premature aging of our hypothetical person for ten years in the past time. This model for micro-object (**Body N3**) obtains a similar phenomenon. In the frame of reference of the first micro-object, the third micro-object has extra energy, which gives additional development of this micro-object in time.

In the next explanation we shall use time **t** that isn't equal to zero. The time will be considered for third micro-object (**Body N3**). For this, we consider the motion of the third micro-object (**Body N3**) from point **-x** up to point $-x_t$ of the negative direction of the **x**-axis. This motion will be considered for the time from **t=0** up to time **t**.

$$l' = \frac{V}{c} \cdot X \cdot [1-(V/c)^2]^{1/2}$$

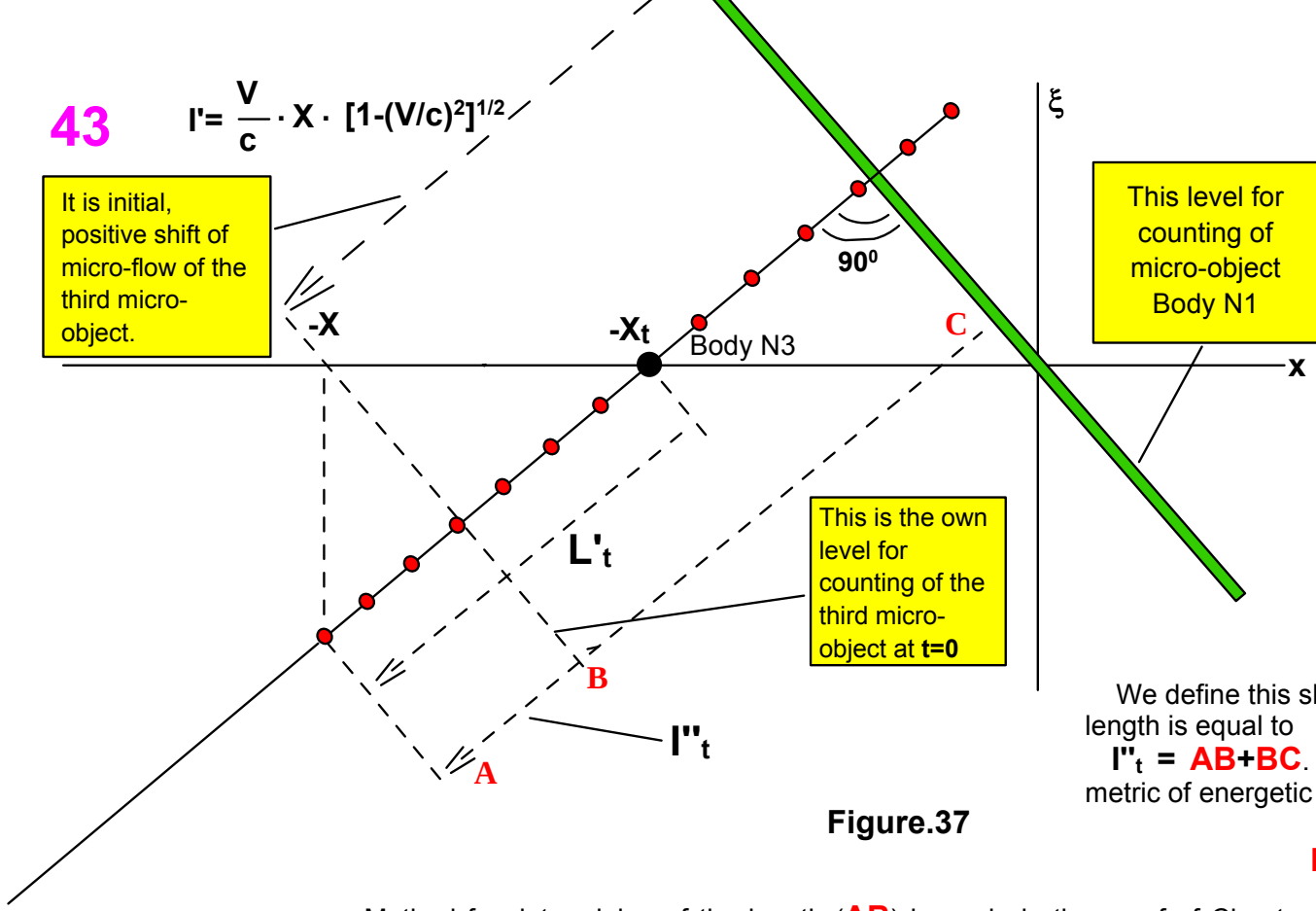


Figure.37

The Figure 37 shows the process of movement of the third micro-object (**Body N3**) from point **-x** up to point $-x_t$ during time from **t=0** up to **t**. During this process, the micro-flow with length (L_t=**ct**) passes through the third micro-object. In the metric of energetic activity of micro-flow, this length is equal to the length:

$$L'_t = L_t\,[1-(V/c)^2]^{1/2}.$$

From figure 37, it is clear that by the end of the movement of third micro-object (**Body N3**), the positive shift of the micro-flow is increased and it becomes equal to l''_t. Look at this positive shift. It is considered relative to the reference level (green line) of the first micro-object (**Body N1**). This system will be supported as a general frame of reference for all proof.

We define this shift. From figure 37 it is also clear that the shift length is equal to

l''_t = **AB**+**BC**. Length value (**BC**) is already known. In the metric of energetic activity of micro-flow, it is equal to

$$BC = l' = \frac{V}{c} \cdot X \cdot [1-(V/c)^2]^{1/2}$$

Method for determining of the length (**AB**) is made in the proof of Chapter 2, page 26. Therefore the length (**AB**) in the metric of energy activity is equal to

$$AB = L'_{push} = [L_t - (V/c)*\{(-x_t) - (-x)\}]*[1-(V/c)^2]^{1/2} = [L_t - (V/c)*(x - x_t)]*[1-(V/c)^2]^{1/2}$$

Let's find the value l''_t. To do this, we substitute known values (**AB**) and (**BC**) into the expression l''_t = **AB**+**BC**

$$l''_t = [L_t - (V/c)*(x - x_t)]*[1-(V/c)^2]^{1/2} + (V/c)*x*[1-(V/c)^2]^{1/2} = [L_t + (V/c)*x_t]*[1-(V/c)^2]^{1/2}$$

If we use the speed (V_{push}) that is equal to $V_{push} = c - V^2/c = c[1-(V/c)^2]$, then we obtain the final result:

$$t' = \frac{l''_t}{V_{push}} = \frac{(L_t)/c + (v/c^2)x_t}{[1-(v/c)^2]^{1/2}} = \frac{t + (v/c^2)x_t}{[1-(v/c)^2]^{1/2}}$$ or according to the conventional form, it is equal to

$$t' = \frac{t + (v/c^2)x}{[1-(v/c)^2]^{1/2}}$$. Last expression we had to get in this model.

Explanation of purpose and form of this model.

The primary goal that I set before myself as the author of this work it was to prove that all matter in our world are waves in specific forms. It had to be done to restore the full symmetry of light waves and matter. A prerequisite for this was the inertial properties of matter. I have always perceived it with the presence of a hidden motion that is not prominent in our world.

Solving this problem is long been executed with help ufologists and other representatives of inaccurate science, but their arguments and circumstantial evidence aren't taken seriously because of unrealistic mysticism, which are present in their arguments. Although mainstream science has been using various models in physics for multidimensional spaces, but at present, mainstream science cannot to come to a final decision. To solve the problem of inertial motion, I had to resort to model parallel spaces. But entering parallel spaces requires an explanation of their presence in hidden form inside our world. Solving of this problem was only obtained with help of model of wave focus that has energy exchange between parallel spaces. This model is used for the long-lived elementary micro-objects of our world. To prove the legitimacy of this model I had to introduce the model that has a physical and geometric modeling of parallel spaces - as a first step of the proof. However, it is not a pure physical model. This is math model. Model does not explain physics of the existence of these hidden spaces, but it is psychologically more susceptible for readers than a purely physical model for parallel spaces. Many of researchers have been using a lot of models for modeling of multidimensional spaces but they create models, which are not purely physical. These models are physical and mathematical, geometrical, etc. But the psychology of people has changed so that these models are perceived as purely physical. Nevertheless, we must understand that these models are not physical they are mathematical abstractions.Therefore, if this model will be interesting for the scientific community, then I will give further development of it as a pure physical model for parallel spaces. Such model explains the inner essence and physical invisibility of parallel worlds for our world.

Now we come to the main conclusion of this part of the work. We will obtain a physical explanation for one of the postulates of special relativity. For this, we consider the propagation of light in inertial frames of wave energy focuses in order to check that the constancy of the speed takes place due to the properties of matter. As usual, we consider the motion of light between the elementary micro-objects that move along the **x**-axis. This analysis shows that all the experiments in which researchers are trying to find the speed of light (electromagnetic signals) relative to the absolute ether useless since such experiments always give the same result. Speed of light is constant. I have already mentioned, but I repeat again that the speed of light can be detected as variable only when the specific conditions will be created for matter. Under these conditions the matter must lose the property of inertia. For neutral mass this property is counteraction to acceleration for the electric charge this property is electromagnetic counteraction to acceleration.

The proof of postulate of the constancy of the speed of light in inertial frame of reference at motion as a natural essence of matter in this model.

Before starting the proof, let's briefly analyze the formulas of Lorentz transformation in order to see the following. Changing of relativistic metric for coordinates and time there are not needed if the light propagates along the one **x**-axis. For this condition, the propagation of light takes the form: **x'=ct'**. It can be expressed more fully.

$$\frac{x-/+vt}{[1-(V/c)^2]^{1/2}} = c\,\frac{t-/+(v/c^2)x}{[1-(V/c)^2]^{1/2}} \quad \text{или} \quad x-/+vt = ct-/+(v/c)x \qquad (c)$$

The last expression shows that in the relativistic equation roots are removed and don't make any changes in equality. Because of this, the following proof can use this fact to simplify the math. At the beginning the propagation of light will take place along the positive direction of the **x**-axis later it will be along the negative direction of the **x**-axis. This part of the work will not consider light propagation in the perpendicular direction of motion of frame of reference. This is a very simple case and to me as author, it is not interesting. But to complete the proof, it will be discussed in the next part of the work, when the relativistic length contraction of physical bodies will be considered inside of inertial frame of reference at motion.

Remark. Since in the following explanation the relativistic metric of Lorentz transformation is equal to unity, then the conditional small "balls" of aether will not be displayed and micro-flows are drawn as red lines of segments.

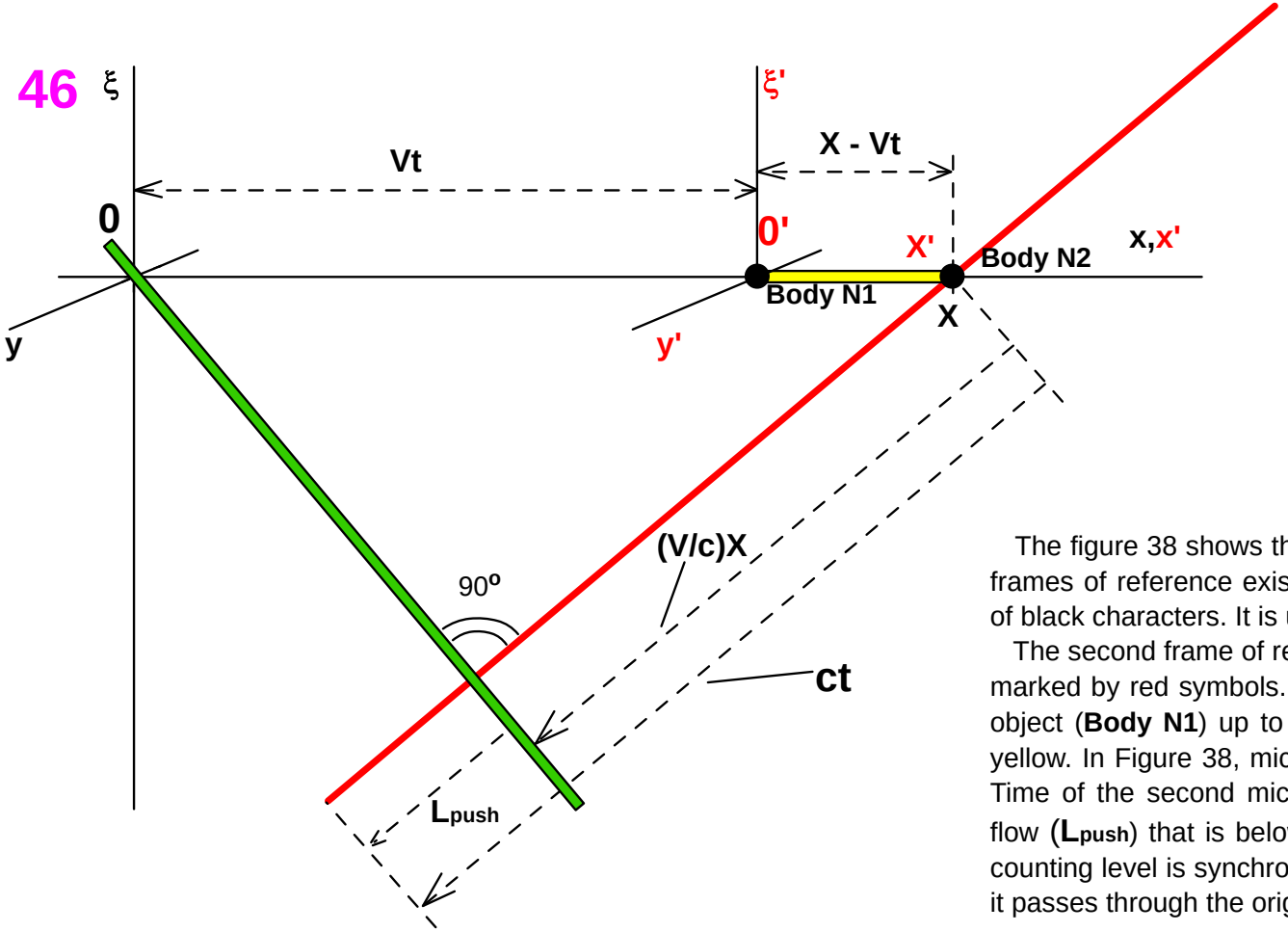


Figure.38

The figure 38 shows the two inertial frames of reference. One of the frames of reference exists at absolute rest and it is labeled with help of black characters. It is used only for visual image.

The second frame of reference is moving in absolute space, and it is marked by red symbols. The propagation of light from the first micro-object (**Body N1**) up to second micro-object (**Body N2**) is shown in yellow. In Figure 38, micro-flow out of parallel space is shown in red. Time of the second micro-object is determined by the length micro-flow (**L_{push}**) that is below the level for counting. It is green line. The counting level is synchronized with the light emission, because of this, it passes through the origin of the frame of reference.

This mathematical analysis must prove the following. For the second micro-object (**Body N2**) the speed of light doesn't undergo any changes. This statement is equivalent to proof of the equality of two lengths: (**L_{push}**) and (**O'X'**). Thereby it proves the equality (c), see the page 45. The length (**O'X'**) is equal to length of the path of light in the moving frame of reference. The length (**L_{push}**) determines time of the micro-object (**Body N2**). This equality of the length of path that light has travelled and of length of micro-flow was explained as property of matter. See page 11.

To view the proof, please look at the page 46a.

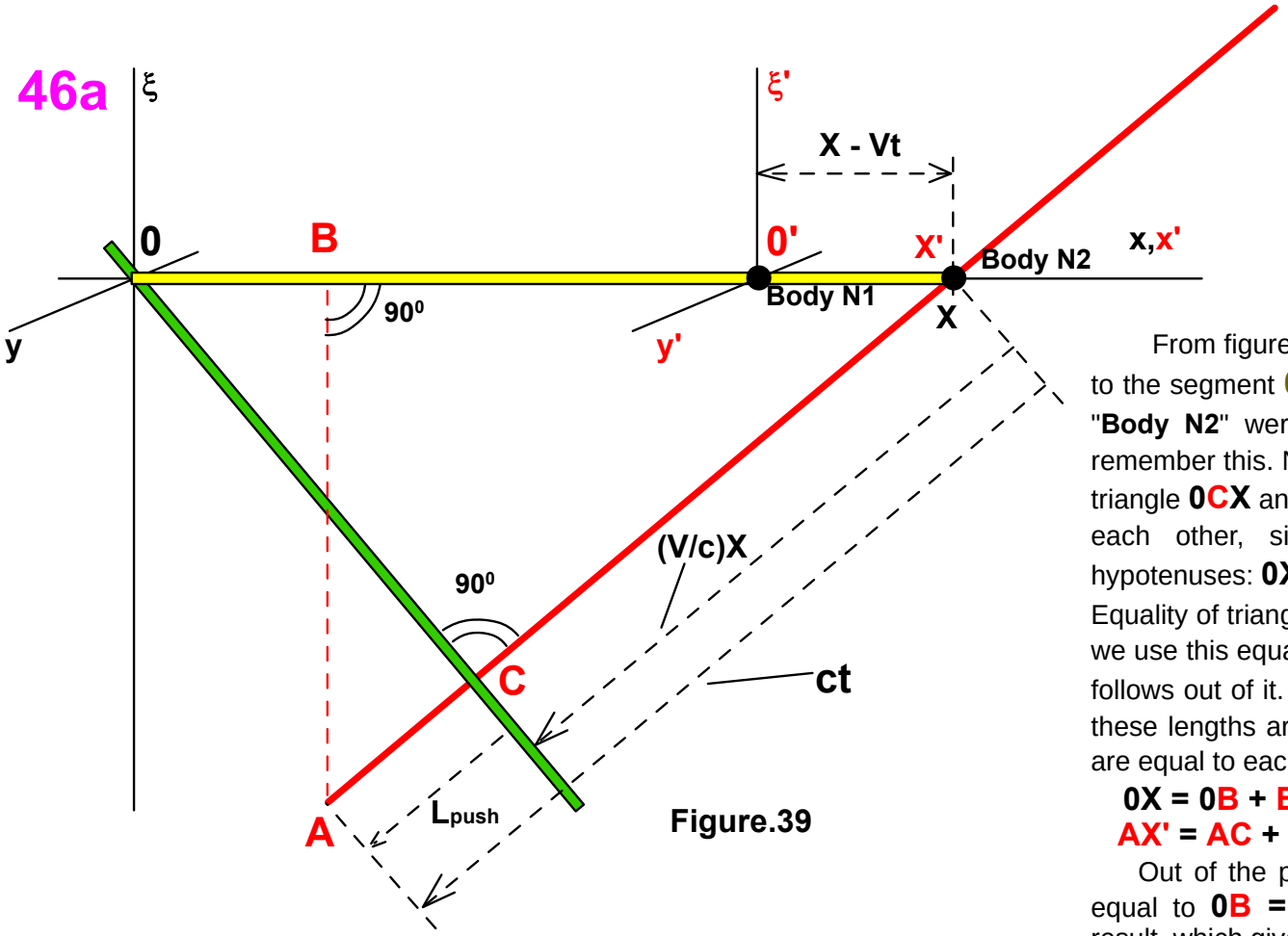


Figure.39

To prove the equality of two lengths (L_{push} = 0'X'), let's supplement Figure 39 with the next element. We lift a perpendicular line from the end of the segment L_{push} up to the **x**-axis.

From figure 39 it is obvious that the segment **0'X'** is equal to the segment **0B** (in moment of time **t=0** the "**Body N1**" and "**Body N2**" were in points "**0**" and "**B**" respectively). Let's remember this. Now, let's consider the two triangles. These are triangle **0CX** and triangle **ABX'**. These triangles are equal to each other, since they have equal angles and equal hypotenuses: **0X=AX'=ct**.

Equality of triangles gives the equality of lengths: **BX = CX'**. If we use this equation, then the equation of the following lengths follows out of it. This equation is **0B = AC**. It occurs because these lengths are component parts of following lengths, which are equal to each other.

0X = 0B + BX = ct

AX' = AC + CX' = ct

Out of the page 47a, we know that the length of (**0B**) is equal to **0B = 0'X'**. Therefore we obtain the desired end result, which gives equal lengths

0'X' = AC.

Segment **AC** is length of the micro-flow that passes through the second micro-object (L_{push}). Thus, we have obtained an exact geometric proof of the formula (c). See the page 45. The formula should be considered for the propagation of light in the direction of movement of micro-objects along one **x**-axis. For this case, as it was noted on the page 45, we can don't take into account of changes metrics spatial coordinates and time in the Lorentz transformation. Then the formula becomes

$$x - vt = ct - (v/c)x = L_{push} .$$

This proof showed that for second micro-object the speed of light isn't changed. This is ensured by the equality of path that light has travelled and the length of micro-flow that is giving the development of micro-object in time. And this phenomenon persists for all inertial systems, regardless of inertial motion. Similar proof can be carried out for the case when the light beam is reflected back from the second micro-object and after the light comes back to the first micro-object. And in this case we would have equality of length micro-flow of time and path length travelled by the light too.

The proof is over.

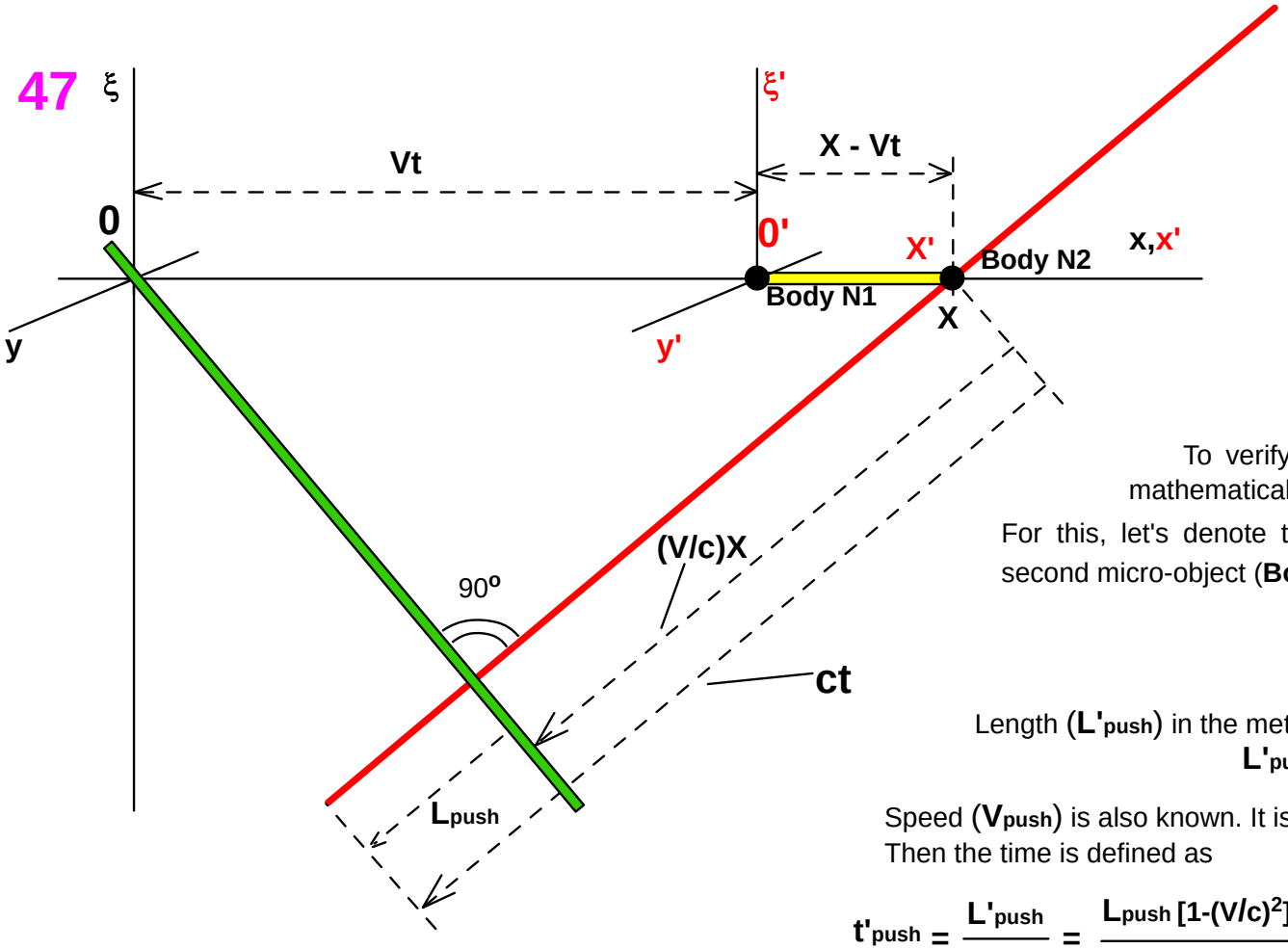


Figure.38

To verify this result, we continue a more complete mathematical proof of this example.

For this, let's denote the time of reception of the light signal by second micro-object (**Body N2**) as t'_{push}. Then the time is equal to

$$t'_{push} = \frac{L'_{push}}{V_{push}}$$

Length (L'_{push}) in the metric of energy activity of micro-flow is equal to

$$L'_{push} = L_{push}\,[1-(V/c)^2]^{1/2}$$

Speed (V_{push}) is also known. It is equal to $V_{push} = c - V^2/c = c[1 - (V/c)^2]$. Then the time is defined as

$$t'_{push} = \frac{L'_{push}}{V_{push}} = \frac{L_{push}\,[1-(V/c)^2]^{1/2}}{c[1 - (V/c)^2]} = \frac{L_{push}}{c[1 - (V/c)^2]^{1/2}} = \frac{t_{push}}{[1 - (V/c)^2]^{1/2}}$$

or

$$t'_{push} = \frac{t_{push}}{[1 - (V/c)^2]^{1/2}}$$

Pay attention to the next moment. In the last expression the time is $(t_{push})=L_{push}/c$. This equation will be used when we will compare the result obtained with the Lorentz transformation for time. Let's consider the Lorentz transformation more detail.

$$t = \frac{t - (V/c^2)x}{[1- (V/c)^2]^{1/2}}$$

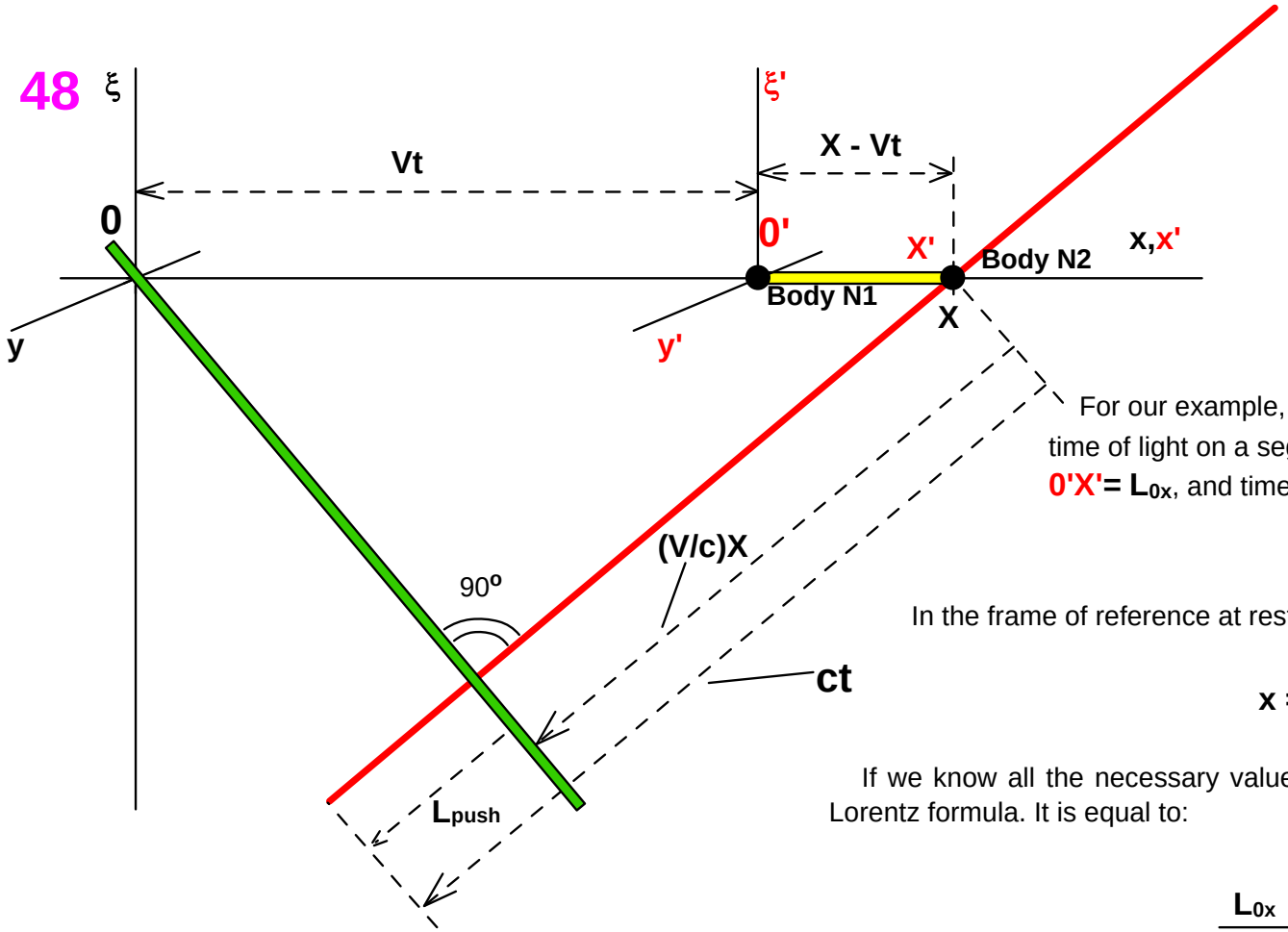


Figure.38

For our example, in the Lorentz formula, the time (**t**) is a motion time of light on a segment **0'X'**. In the future, let value of (**0'X'**) is **0'X'= L_{0x}**, and time of (**t**) is **$t=t_{0x}$**. Then we have

$$t_{0x} = \frac{L_{0x}}{c - V}$$

In the frame of reference at rest, the light travels the distance that is equal to

$$x = ct_{0x} = \frac{cL_{0x}}{c - V}$$

If we know all the necessary values, then we can determine the time out of the Lorentz formula. It is equal to:

$$t' = \frac{t_{0x} - (V/c^2)x}{[1-(V/c)^2]^{1/2}} = \frac{\frac{L_{0x}}{c - V} - \frac{V}{c^2}\frac{cL_{0x}}{c - V}}{[1-(V/c)^2]^{1/2}} = \frac{\frac{L_{0x}(c - V)}{c(c - V)}}{[1-(V/c)^2]^{1/2}} =$$

$$= \frac{\frac{L_{0x}}{c}}{[1-(V/c)^2]^{1/2}} = \frac{t_0}{[1-(V/c)^2]^{1/2}}$$

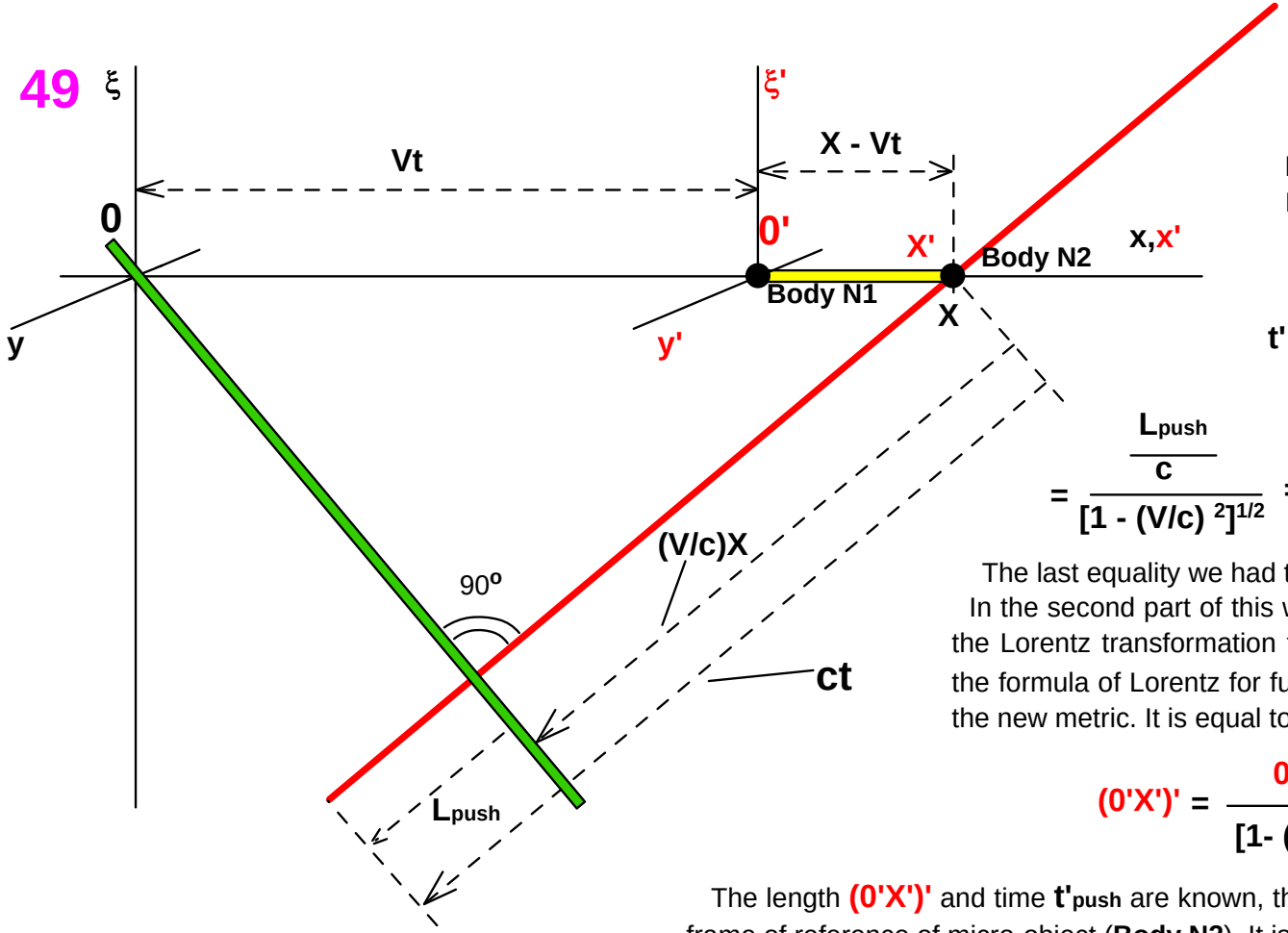


Figure.38

Previously, it was demonstrated that the length (**0'X**) is equal to the length (L_{push}). From this we have the following equality:

$$t' = \frac{\frac{L_{0x}}{c}}{[1-(V/c)^2]^{1/2}} = \frac{t_0}{[1-(V/c)^2]^{1/2}} =$$

$$= \frac{\frac{L_{push}}{c}}{[1-(V/c)^2]^{1/2}} = \frac{t_{push}}{[1-(V/c)^2]^{1/2}} = t'_{push} \quad \text{or} \quad t' = t'_{push}$$

The last equality we had to prove.

In the second part of this work in the framework of this model, we obtain the Lorentz transformation for space coordinates. Therefore, we can use the formula of Lorentz for further proof and transform the length of **0'X'** in the new metric. It is equal to

$$(0'X')' = \frac{0'X'}{[1-(V/c)^2]^{1/2}} = \frac{L_{0x}}{[1-(V/c)^2]^{1/2}}$$

The length **(0'X')'** and time t'_{push} are known, therefore we can find the speed of light **c'** in the frame of reference of micro-object (**Body N2**). It is equal to

$$c' = \frac{(0'X')'}{t'_{push}} = \frac{L_{0x}}{[1-(V/c)^2]^{1/2}} \frac{[1-(V/c)^2]^{1/2}}{t_{push}} = \frac{L_{0x}}{t_{push}}$$

Since time t_{push} is equal to $t_{push} = L_{push}/c$ and $L_{push} = L_{0x}$ then last expression takes the form:

$$c' = \frac{L_{0x}}{L_{0x}} c = c$$

Therefore, in this model, the speed of the light is not changed in frame of reference at motion. This completes the proof.

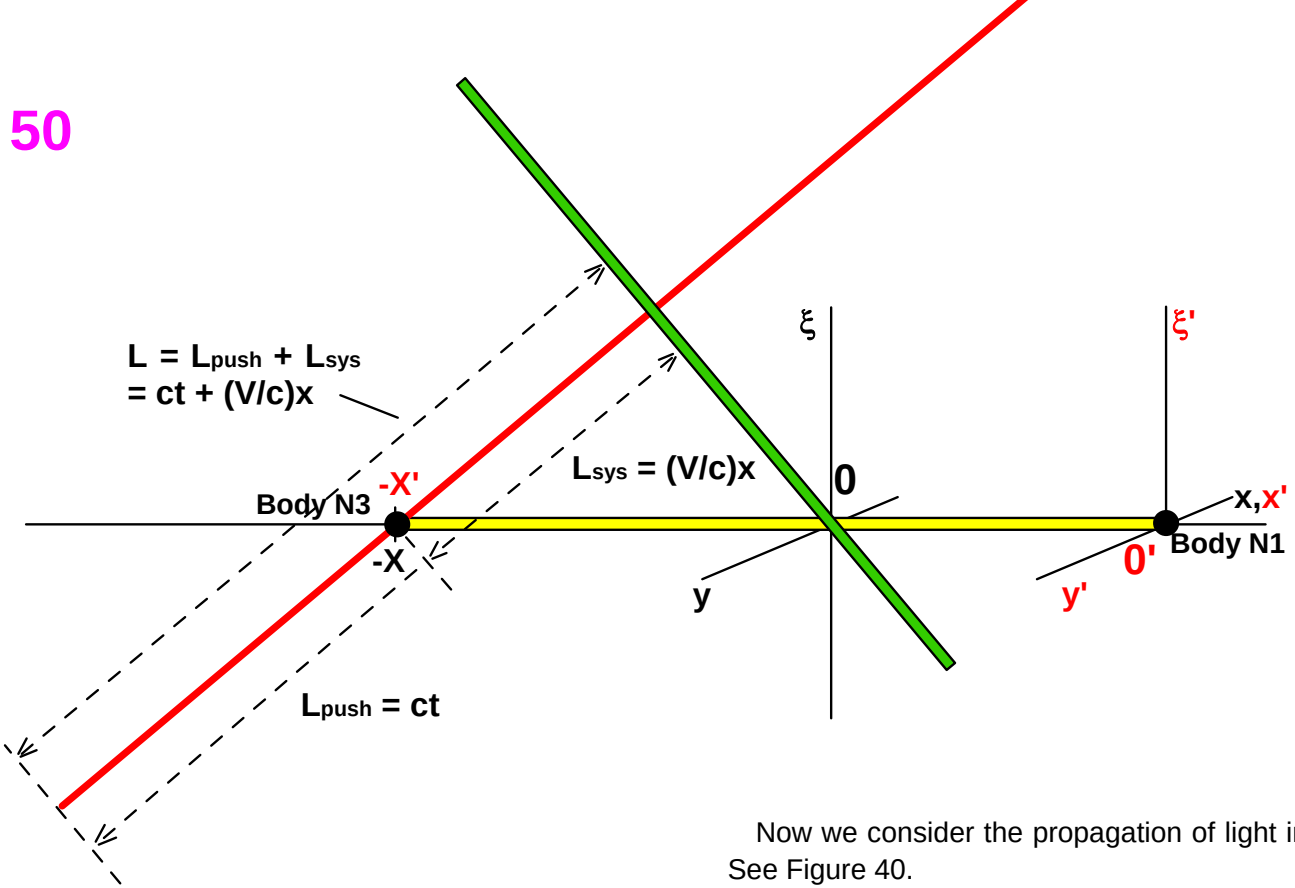


Figure.40

Now we consider the propagation of light in the negative direction of the axes (**-x,-x'**). See Figure 40.

On figure 40 the micro-object (**Body N3**) is located at the left side. We have to prove that the speed of light for this micro-object not changes when light propagates against its movement. The proof turns into proof of equality of the segments **L = L_{push} + L_{sys}** and **O'(-X')**. Here the segment (**L**) of micro-flow determines time of third micro-object (**Body N3**) relative to reference level (it is green line). The segment **O'(-X')** is the path traveled by the light from the first micro-object (**Body N1**) up to the third micro-object (**Body N3**). To view the proof please look at the page 50a.

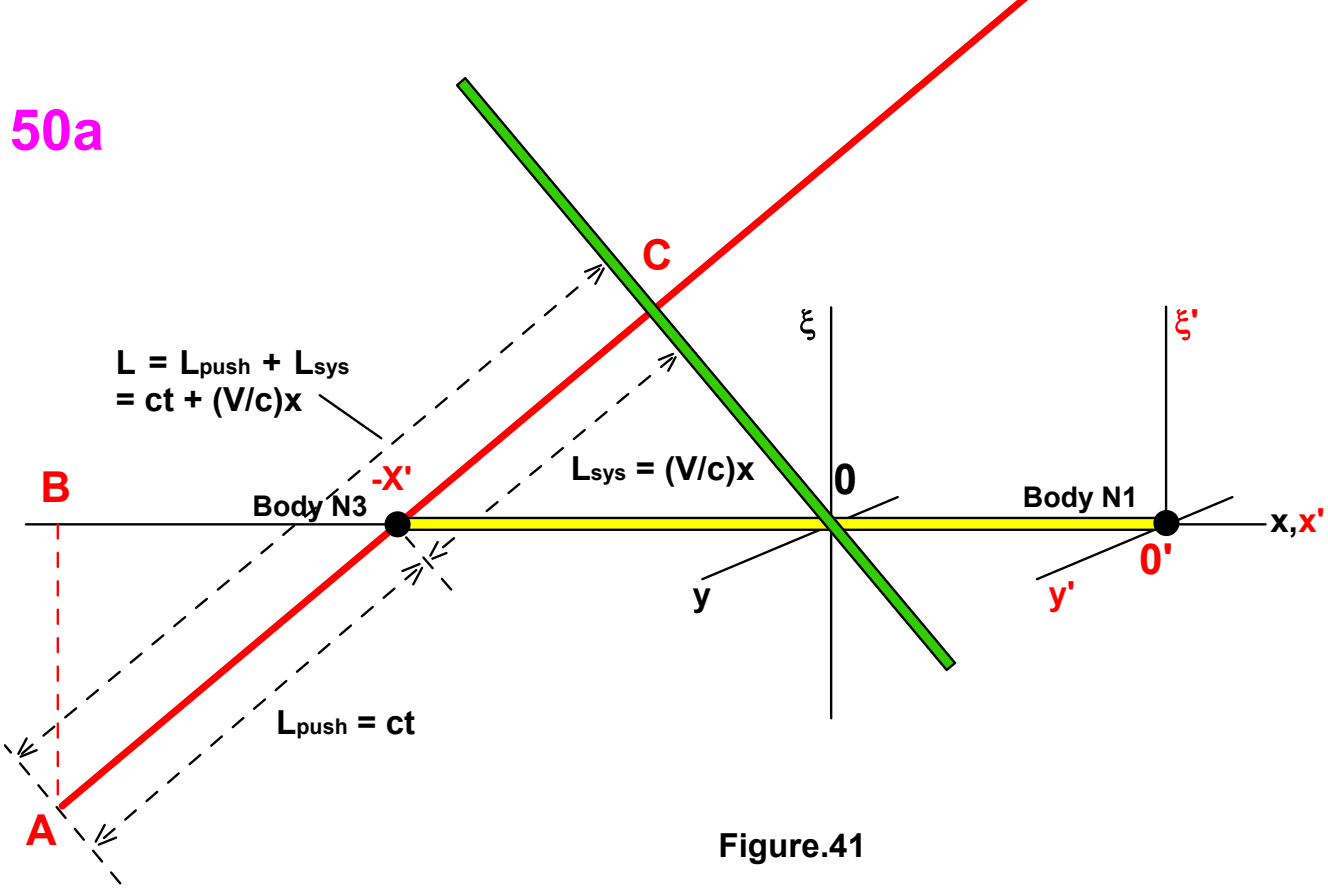


Figure.41

For further proof we draw a perpendicular line from the end of micro-flow onto the **x**-axis. See Figure 41. You recall that in the usual metric the length L_{push} is equal to **ct**. From this it follows that

$$L_{push} = (-X'0) = ct.$$

Equality is true because the length **(-X'0)** is the path travelled by the light in the absolute space for time **t**. In order to recollect this moment, check again Figure 41.

We consider the two triangles on it. First triangle is labeled with help of the symbols **-X'BA**. Second triangle is labeled with help of symbols **-X'C0**. These triangles are equal to each other, as they have equal angles and, in addition, have equal sides (**-X'A** and **-X'0**). From equality of triangles we have equality of lengths: $-X'B = -X'C = L_{sys}$.

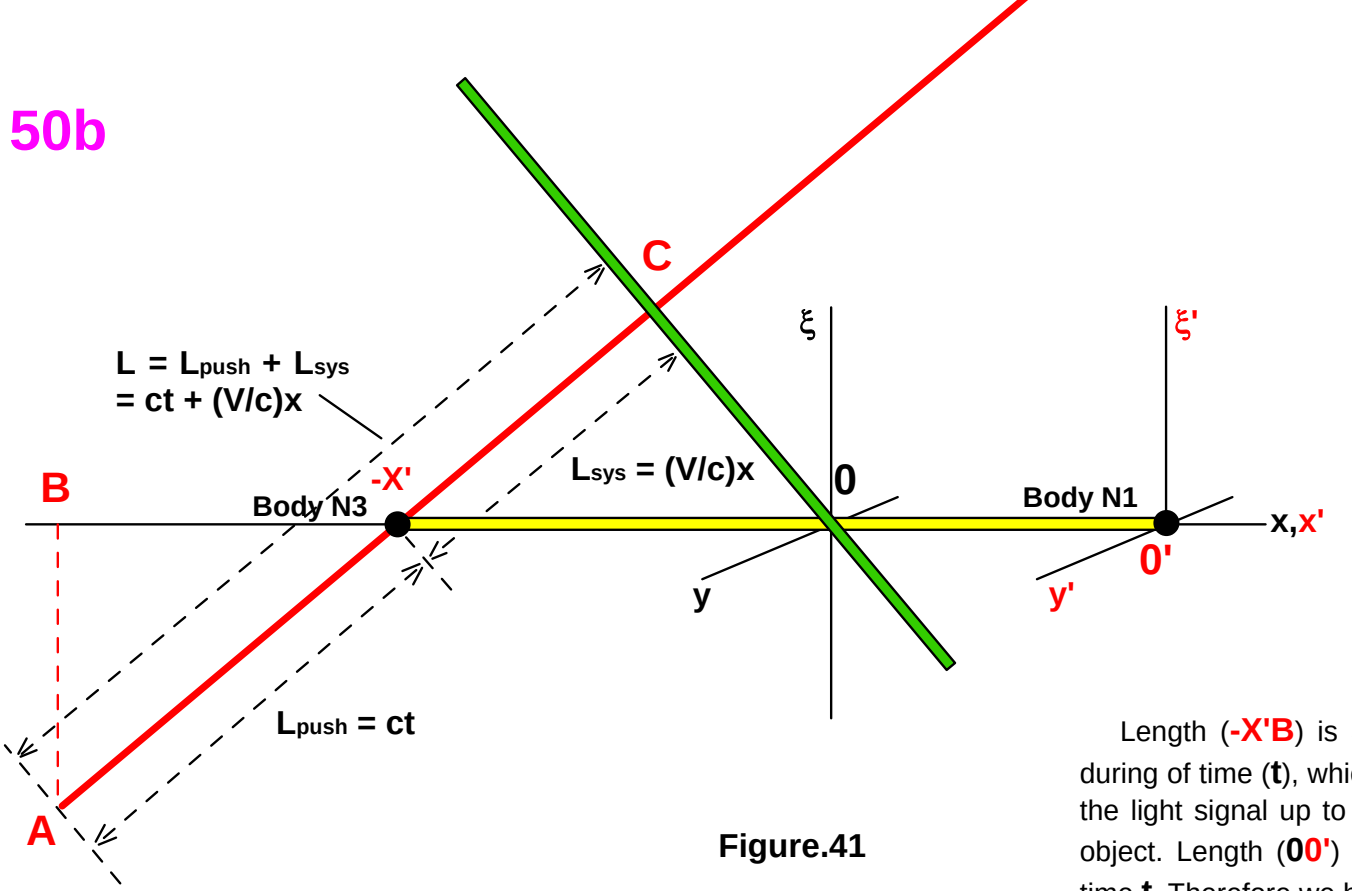


Figure.41

Length (**-X'B**) is a shift of the third micro-object (**Body N3**) during of time (**t**), which it had from the moment of the radiation of the light signal up to the arrival of the light signal at third micro-object. Length (**00'**) is a shift of the first micro-object during of time **t**. Therefore we have the equality **-X'B = 00'**.

The last equality gives equality of these lengths **-X'C = 00'**. This equality makes it possible to obtain the final result: **L= (L_{push} + L_{sys}) = ((-X'A) + (-X'C)) = -X'0'**. Result states the following. The length of the micro-flow of micro-object (**Body N3**) is equal to the path is travelled by the light. And since in the considered variant the length of micro-flow of this micro-object determines time from moment of light emission, the speed of light for the micro-object (**Body N3**) doesn't change. Thus, we have obtained second geometric proof of the formula (c). See the page 45. The formula should be considered for the propagation of light in opposite direction of movement of micro-objects along negative part of **x**-axis. Here, we can don't take into account of changes metrics spatial coordinates and time in the Lorentz transformation. Then the formula becomes

$$x + vt = ct + (v/c)x = L.$$

This proof showed that for third micro-object the speed of light isn't changed. This is ensured by the equality of path that light has travelled and the length of micro-flow that is giving the development of micro-object in time. And this phenomenon persists for all inertial systems, regardless of inertial motion. Similar proof can be carried out for the case when the light beam is reflected back from the third micro-object and after the light comes back to the first micro-object. And in this case we must have equality of length micro-flow of time and path length travelled by the light too.

The proof is over.

Conclusion.

Here the first part of the model ends. The only thing I would like to highlight and explain so that is what concerns the method of creation and presentation of this model. Here you have considered a model that is inherently physical-geometric model. A geometric construction or any proof in geometry may be proved in different ways and I think it's the experts understand. For example, I proved and revised more than three solutions. All they give the same result in the application to various geometric approaches to the proof, but of course, all they use in the derivation the main ideas of this model. For example, one could depart from the general model of the passage of aether through micro-objects, and I could use only passage of the micro-flows of energy out of the parallel space, etc., to obtain similar results, and it was easier to make. Especially, because recently in mathematical physics has become the norm to receive physical and abstract mathematical models and give them status as natural physical models. In this model, I tried to revive the primary understanding of the physical world that existed in physics up to the early twentieth century. And I wanted to create a model that would be understandable not only for narrow specialists but it must be a model that is acceptable for wide range of readers. I hope that I approached this goal. The second part will consider the Lorentz transformation for the coordinates in frame of reference of bodies at motion.

The proof will be performed in simplest form that is based on the physical requirements of conservation of the electromagnetic interaction in all inertial frames of reference. This requirement is naturally of course due to the constancy of the speed of light in the frames of reference of moving bodies. The third part of the work will be analyze the principle of relativity. It will be performed in frames of reference, which exist in absolute space, despite negation by opponents of absolute space. There it is proved. The frame of reference at rest is a special case for frame of reference that obeys to the Lorentz transformation. Such is the nature of wave matter of our world and time.

Now let's consider the main conclusions that follow from this work.

First, if there is aether pressure, at once there is an assumption about the existence of inhomogeneity in the pressure of aether of the parallel space. This heterogeneity in pressure should have little influence on the matter at the local scale, but on a galactic scale influence of heterogeneity pressure should affect strongly enough. This applies to origin of matter in our world, the formation of galaxies, etc. If this model is correct, it would be nice to start monitoring this pressure.

In addition, such monitoring is necessary because if there is acceleration of recession of galaxies in our universe, it becomes apparent final development of our universe and all matter in our world. Acceleration of recession of galaxies in universe takes place due to the effects of ether pressure of parallel space on the space of our world. This pressure bursts our space, causing it to expand. Accelerated expansion, suggests that our space approaches to the end of its cycle of destruction. Aether out of parallel space will blow up whole universe. Empty space will be exploded. In other words it can be said. Vacuum of empty space our universe will be blown up.

All the energy that will released by the explosion of the universe will collapse into lower parallel space and inside of a more lower parallel space this energy will give the birth of matter, as it happened in our space. Such are the cycles of life of parallel spaces. Unfortunately it is true, if we have a real acceleration of recession of galaxies galaxies inside of the universe of our world.

Second, this model implies the existence of parallel space with the presence of high pressure aether. As a consequence, if the model is correct, then we can look for ways to extract energy from the parallel space in the future.

Third, I have already said, but I will repeat again, us need the real quest of the state of matter when it loses the property of inertial mass. In this case, the matter will lose wave properties and it will not obey to the relativistic laws and we can determine own absolute motion in space with help this state of the matter.

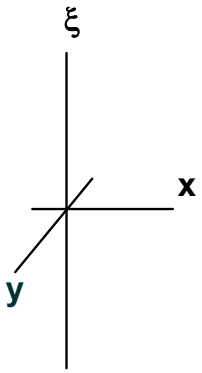
Fourth, there is the interesting possibility for artificial launching of micro-flows of matter in the opposite direction. It would be nice to do a real test for the possibility of creating antigravity forces, and we could look at impact of the reverse micro-flows on life time of micro-objects, etc.

That's all, thank you for your attention to my work.

See the next part.

Part 2

"Lorentz transformations of coordinates based on the wave nature of elementary physical bodies of our world."



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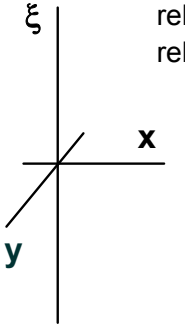
Part 2

Introduction.

The second part of the work deduces the Lorentz transformation for the spatial coordinates of the moving frame of reference. The conclusion will use the model of the focuses that have wave energy for elementary matter of our world. Fundamentals of models have been presented in Part 1, and all further proof relies on the fact that you have already viewed the first part of the presentation and understand its meaning. As before, there will be analyzed frames of reference that are natural for the nature of matter in our world. The model explains the reason for reducing of the sizes of the physical bodies moving uniformly in a straight line without rotation in absolute space, in a vacuum, in the absence of any force fields or other influences. Reducing body will be received absolute. I guess after these words, followers of the theory of relativity will be immediately discard this model as if it is flawed and, i think, they will not read the material this work at all.This is their characteristic point of view. Their main argument is if the decrease of size is an absolute, then principle of relativity is violated in inertial frames of reference and with help of experiment we are able to see that the frame of reference has motion relative to absolute space but this is contrary to reality.



Such an assessment may have occurred in relation to the first part of the work, which explains the nature of time. Nevertheless, this point of view is premature. The third part will show that in case of the inertial motion of material bodies in the absolute space inside of frame of reference of these bodies you cannot understand, what certain frames of reference remain at rest. It takes place because all inertial frames of reference of material bodies comply with the Lorentz transformation. Moreover, from the position of any moving inertial body (or bodies), a frame of reference that is at rest will be perceived by this body (or bodies) as an inertial frame of reference moving in the opposite direction and which complies with the same Lorentz transformation for the time and space coordinates. Here the text is deliberately used the term - the system of the body (bodies) because the effects of time dilation and decrease the size bodies are inherent for matter. These effects are not the properties of abstract space or frame of reference. These effects are associated with the wave nature of matter in our world only. The space in this presentation is introduced as an "absolute" and independent of the motion of material bodies. It is only the medium for wave objects in the form of waves or micro-object. If we compare together any of two or more frames of reference of material objects that are moving at different speeds relative to absolute space then all moving frames of reference will be subjected to the Lorentz transformations as well.

Such it is the nature of wave effects of matter in our world. Therefore, from point of view of inertial frames of reference based on the wave model of matter there do not exist the frame of reference at rest. This gives an illusory of the effect of the principle of relativity in absolute space. As it will be clear further the relativity effect occurs primarily due to changes in the flow time.

1. The physical explanation of the nature of the Lorentz transformation for the coordinates in the model of wave energy focuses and flows of time.

To derive the Lorentz transformation, we need analyze the following assumption. Has material body the change of physical dimensions when the body is at a motion? If it is so, then with help of this fact, it is possible to obtain the transformation of coordinates in accordance with changes of physical dimensions of bodies. I will briefly explain what it was said.

I think, the reader, without further explanation will understand by yourself that if you and all of material objects around you have been decreased by ten times then the absolute distance or material objects, that exist without the decreasing, are seeming for you as if they are increased by ten times.

Based on this fact, you would have to admit that the straightedge (ruler) for measuring the distance in your frame of reference should be reduced by ten times. This is the mechanism of the absolute conversion of unit of length for coordinate. However, the wave nature of matter implies the existence of the possibility of the relative changes of the spatial coordinates and time of the moving frames of reference. The reason for this is nature of the local (own) time of any of elementary micro-objects. Its flow has change at motion. But if absolute changes were not existing, there would be relative changes. Let's consider what way is changing the size of bodies at motion. To understand the reasons for reducing the size of the physical body at motion, let us remember the dominant physical factor that mainly determines the dimensions of the bodies of our world. In order to understand any natural phenomenon such an approach always is correct if you want to understand its physical nature.

I assume everyone knows that at a fixed temperature and an absence of other relevant factors, the real sizes of the physical bodies are determined by electromagnetic interactions between micro-objects of which they are composed. Electromagnetic interactions give the actual size of the atoms determine their bonds in molecules, etc. and the size of molecules determines the actual dimensions of the bodies of our world. Electromagnetic interactions are dependent on the electromagnetic force that exists in the analyzed physical frame of reference. But a magnitude of the electromagnetic force depends on the speed of propagation of the electromagnetic field and the properties of the micro-objects that are subjected to the action of electromagnetic force. Let's pass to the model of the focuss. it assumes that the properties of the micro-objects are associated with the properties of elementary focuses. The focuses consist of elementary waves and have the energy. The model allows the input of various kinds of waves in the form of the focuses that have wave energy. They form the elementary charges, the neutral masses, etc. It seems that there are a large variety of them but for the further proof we do not need do their analysis. Here, basic idea is that for all the variety of matter, the wave's energy of any of the focuses of micro-objects is not changing at inertial motion.

This idea was a main for the proof for the physics of time in the first part of the presentation. There used a model of a hypothetical point of the wave energy focus. Let' recall that the model does not have a mechanism that affects the structure of the wave energy focus at uniform rectilinear motion. It takes place because the mathematical model uses a model of hypothetical point. This point is an infinitely small. Only this mathematical point has the physical properties of the wave. Infinitesimal point cannot change its internal structure at motion. Therefore, the wave energy focus when it moves uniformly does not change its internal structure as well.

This is true not only of neutral bodies having mass, but the marked feature applies to the elementary charge. Moreover, in case of motion of micro-object of our world, its wave energy focus does not change its properties in order to absorb or give back of the energy. Therefore, if the statements are true then the using of their in the future should provide substantiation of conclusion of the Lorentz transformation. It will be logical proof of the correctness of the result.

But there is another factor that affects the strength of the electromagnetic interaction in an arbitrarily chosen inertial frame of reference. It is the speed of propagation of electromagnetic fields. To determine the speed it is sufficient to find the speed of light, because the light in nature has not only a corpuscular basis, but also light has electromagnetic features. The speed of light into moving inertial frame of reference has been found in the first part of this work. It was determined that inside any inertial frame of reference without a gravitational field, and when the frame of reference is uniformly and rectilinearly moving without rotation in vacuum, the speed of light remains constant. This effect arises because of the properties of the local (own) time of matter. I remind it briefly with help a few words.

The speed of light in absolute space is the absolute speed. And if there was observer at rest with invariable time, and if this observer would instantly register physical events, in this case, he noticed a change in the velocity of light in any of moving frames of reference. For example, if in a moving frame of reference, the light propagates in the direction of motion, in this case, the observer registers a lower speed of light in this frame of reference. The speed of light would be equal to **c' = c - v**, here **c** - is the absolute speed of light, **v** - is speed of movement of the inertial frame of reference. Due to the reduction of the speed of light in the moving frame of reference, the light would pass a shortened distance for a unit of time. Assume for example that the speed of light **c'** is decreased in five times. In this case, for absolute unit of time, the light passes in five times smaller absolute path. But the elementary substance does not have an absolute time. It has the local (own) time, which is distributed along the movement of the frame of reference. The law of distribution coincides with the formula of the Lorentz transformation for time. Speed of light as a physical quantity dependent on the two values of distance and time. Local time distribution gives a "temporary" effect. In order to understand the effect, let's consider a moving inertial frame of reference that has three material micro-objects, which are located in a single line along movement. In the frame of reference we fix a time moment. Let it is a local point of time of the material micro-object that placed in the center between the two extreme micro-objects and coincides with the emission of light. Consider the first micro-object located by the movement of the inertial frame of reference. The micro-object takes a flash of light from the central micro-object. Let the local (own) time of passage of light from the light source to the first micro-object is reduced because of slowing down the flow of time. In according to this model for the focuses that have wave energy, slowdown of the local (own) time of the first micro-object is directly proportional to reduction of the distance traveled by light in the moving inertial frame of reference. In our example, time is reduced by five times. The ratio of the distance that is decreased by five times and to time that also directly proportional decreasing by five times gives constant speed of light. This is the mechanism for the constancy of the speed of light for moving material micro-objects when the light propagates in direction of the motion.

If we consider the propagation of light in opposite to direction of the motion of micro-objects, in this case, to the absolute speed of light is added the speed of movement of material micro-object. Because of this, the speed of light is equal to **c' = c + v.** Therefore, inside of the moving inertial frame of reference during unit of time the light passes more distance. However, the second object that receiving the light will have a time that is increased in direct proportion. It takes place because of the increase the length of the time flow. The ratio between the increased distance and the increased time gives constancy of the speed of light for the second object. The whole mechanism was considered in the first part of this work for constancy of the speed of light (electromagnetic waves) inside of the moving inertial frame of reference.

Thus, in model of wave energy focus we have two factors. They should allow get the reduction of linear dimensions of bodies from purely physical considerations.

The first factor is the independence of the absorption of electromagnetic energy by the focuses that have wave energy from their movement. The second factor is the constancy of the velocity of propagation of electromagnetic energy for material objects at motion. Using these factors, we proceed to mathematical conclusions for physical changes of sizes in the physical body at inertial motion. After this conclusion we get the Lorentz transformation for the coordinates.

In order to analyze the changes in the linear dimensions of the body as it moves let's compare the sizes of the two identical bodies in a vacuum without the presence of any force fields. One of the bodies is at rest, and the second body is moving at a constant velocity **U=V**. Since we are interested in comparing of linear dimensions of bodies along the axes **x,y,z** inside of frame of reference at rest and along the axes **x ', y ', z '** in the moving frame of reference then the bodies can be in simplified form. For example, they can be by two identical cubes. See figure 1.

Figure 1.

To compare the size of the cube, we need to measure the distance between his ribs, and compare them with each other. Because the edges of the cube are parallel to each other we take points on the edges of any cube after we measure the distance between them. See figure 1. But since we have to consider the actual reduction of the material body, the points cannot be mathematical abstractions. Properties of points must correspond to the following requirements. First, their sizes have to be much smaller than the sizes of material bodies. Second, they must have physical properties of matter. The model for a focus that has wave energy satisfies the above conditions for the properties of matter. It was considered in part **1** of this work.

It is obvious, along the axis **Y '** and **Z '** the linear dimensions are identical for cube that has the motion. This is due to the symmetry of the axes with respect to the movement of the cube. Because of this reason, to evaluate the size of the cube along these two axes is enough to consider the change in size of the body along one of the axes, e.g., axis **Y '**. With such simplification, the analysis of cubes transforms into an analysis of two squares. See Figure 2.

Figure 2.

For the further analysis, the axes **Z** and **Z '** are unnecessary. They are replaced by axis ξ . This axis will reflect an existence of parallel space that is transmitting energy to the matter of our world. This energy gives existence and development of the matter of our world in time. See figure 3. Essence of the parallel space was already described in the first part of the work.

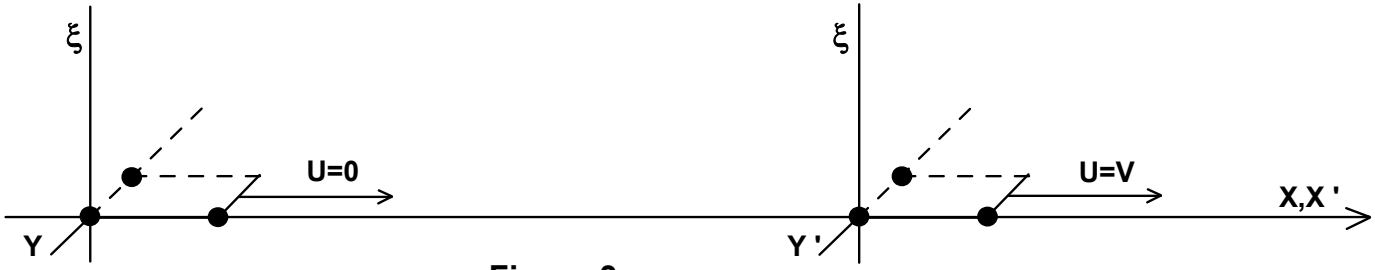


Figure 3.

Obviously, in order to compare the dimensions of the bodies from the two frames of reference, we need take one of them as "a primary frame of reference". Such frame of reference will be at rest. In frame of reference at rest, the body sizes are taken as "primary" too. We are interested in the answer to the following question. What are the dimensions of the body in a moving inertial reference frame? The answer is simple, the sizes are the same. Let me explain answer to this question.

Two factors create the reasons for immutability of the sizes of the body in the moving frame of reference. They are marked by previously. These factors are the following. The constancy of internal structure of a focus that has wave energy of the matter at motion and the constancy of the speed of propagation of electromagnetic interaction in all inertial reference frames. The propagation velocity of the electromagnetic interaction is determined by a speed of propagation of the electromagnetic field. Or if to say about it in other words, the speed is determined by the speed of light. This means that if after acceleration, you personally would be in a moving reference frame you asserted the following. Since the acceleration does not change all the internal components of the atoms and the propagation velocity of the electromagnetic field (light) in all directions then the size of any material object remain unchanged for me. But are there changes in body size? Yes. They appear when you compare the size of similar bodies in the two reference frames together. It takes place because in the moving reference frame, the speed of light is obtained a constant **c** due to the effect of time dilation.

In fact, the speed of light relative to absolute space is slowed down it indicates a decrease of transmission of electromagnetic energy. Weak electromagnetic energy creates less power, forcing the atoms are on small interatomic distances in material bodies. Therefore, the real sizes are also changed. The interatomic distance will be equal to distance wherein the atom receives the same energy per unit of time. It would be naturally to use the above statement to get a mathematical derivation for changes in body size that has a motion. In this case, if the proposed model is correct we should get a whole range of the relativistic changes in the body size. This requires an execution of only one requirement. Its essence is following. Within unit of time, light passes same distance between identical micro-objects in all inertial reference frames. The identical micro-objects are taken out of the same material bodies.That's all. In this case, the sizes of the same bodies in all inertial frames of reference are the same from the perspective of internal observers.

That is, let we are located in an inertial frame of reference and we accept time of passage of light between the two extreme micro-objects of a body as a standard unit of time, for this case, inside any other inertial frame of reference, these same micro-objects of same body will have the same distance, which a light will travel during standard unit of time. With this statement, it can be shown as in the moving frame of reference, the physical distance between the micro-objects are changing. Since the distance between the extreme micro-objects determines the real size of the physical body, they will show us how at motion, the size of the body has changes. However, before proceeding to mathematical analysis, we will do an intermediate proof, which will be used further. In proof we find relation between lengths of two flows from parallel space that give the development of two micro-objects in time for standard unit of time. One of the micro-objects will be absolutely at rest in our space, and the second micro-object will have inertial motion relative to the micro-object at rest. We need remember this conclusion. It will be used in further analysis.

Let's consider a frame of reference for a flow out of parallel space. Let the flow is passing through a micro-object at rest. The flow gives energy to the micro-object in order to sustain existence of micro-object over time and determines the rate of time. Each micro-object of our world has its own flow, so any micro-object exists in its local (own) time, and this property is inherent in all matter of our world. But the matter exists in the universe, and the universe has its global (total) time, regardless of the flows of matter. The micro-objects exist with own streams of time inside of the total time of the universe. Therefore, we can state for identical elementary particles unequal periods of life at the same time.

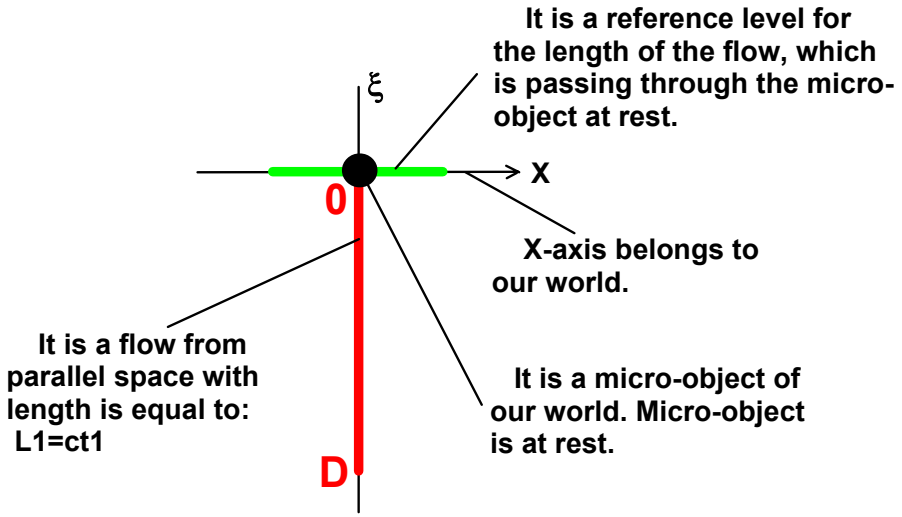


Figure 4.

Figure 4 in a form sufficient for analysis, displays all the above written. In figure 4, our space is reflected with x-axis as a single measurement. Other measurements for proof are unnecessary. The ξ-axis belongs to the parallel space. But remember that the upper half axis belongs to the internal part of the parallel space and the bottom half axis belongs to the external part of the parallel space. See the first part of the work. Internal part of the parallel space is subjected to high pressure. But since only a material substance may have the presence of pressure, it is necessary to use older model ether which fills the space and exists as an energy carrier.

The value of the ether pressure does not affect the further of the proof and, therefore, in this part of the work, it is not analyzed. When material objects absent inside our space the ether of the parallel space does not pass through our space. Ether passes through micro-objects of our world from the inner part of the parallel space to the external part of the parallel space. The passage of ether takes place through the channels of the focuses that are inside the micro-objects. When it takes place, ether transfers energy to the existence and development of micro-objects in time in our world. For this reason, this energy may be called time energy.

In Figure 4, the material object of our world is depicted with a black dot at the intersection of the axes **X** and ξ . As described in the first part of the work, such a micro-object in a form of simplified model corresponds to a model of a point mass. In fact, it is a focus of the wave energy that transfers ether from parallel space through itself at a constant speed is equal to the speed of light. The motion speed of ether is stabilized by the focus. In this mathematical analysis we don't need know the internal structure of the focus. Currently, you take it as a hypothesis. This approach is legitimate. After all, the whole subsequent analysis uses only one property of matter. It is its ability to stabilize passage of the ether of a parallel space through itself. How this is carried out - for this part of the analysis means nothing. In this work, the model uses an approach that has name "model of a black box." In the "model of a black box", an important feature is only its action. How the "black box" performs that action and what is its internal structure - for mathematical analysis this does not has a meaning. If you are not familiar with the similar model, you can check it by yourself. In order to understand all being said, I can give an example to illustrate the model of the "black box" as following.

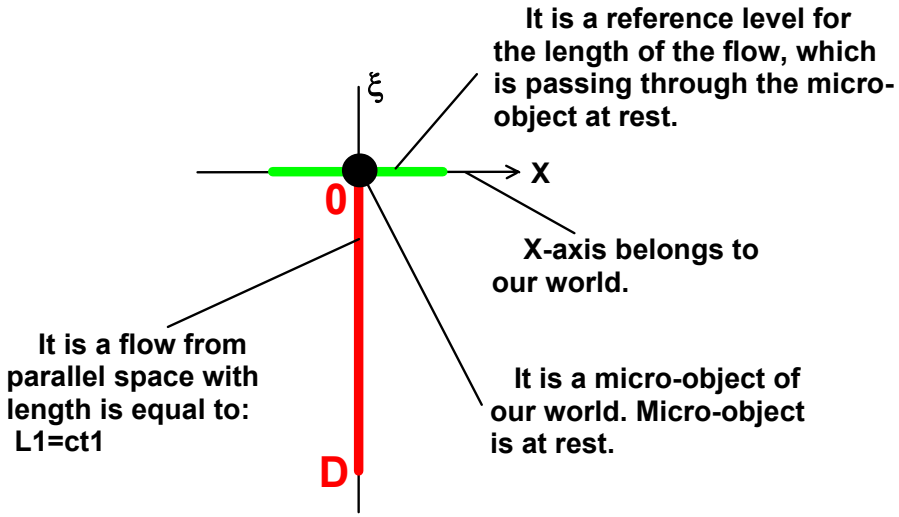


Figure 4.

Let us assume that there is the need to determine the time of your movement from one locality to another. To move you use some form of transportation. This may be a plane, a train or a car, anything. Is it important in order to determine time of your trip? Of course it isn't. Especially it isn't necessary to know the principle of action of the aircraft, trains, cars and their inner workings. For this problem, we can say that you got into some kind of "black box" that performed the function of a moving in space with such speed. That's all. Because if you know both distance and speed in this case, you can find time of your motion. In this work, applying a "black box" to the modeling of elementary substance gives a simple derivation of the Lorentz transformations. The approach is a simple. This approach should consider a point with mass that has of the properties of the wave's focus with energy of interchange between our world and parallel space.

These properties are listed in the work. Such a simple set of properties of matter provides numerous answers to existing fundamental laws of nature. From the answers it follows the main answer to the question about the being of our world that ancient philosophers had.

What is the universe around us, and what is matter of our world? On the first part of the questions, I have clear answer, but I think it is yet early in order to disclose publicly about this in detail. The answer to the second part of the question is obvious. All the material objects of our world, including you the reader, there are a set of waves in a specific form. They have an inverse movement, which is an inverting motion into a parallel space. In such movement, the object's wave doesn't move into the parallel space, it is stationary relative to the parallel space, and the space (ether) moves through the object. The speed of this movement, like the movement of the quantum of light is equal to the speed of light. In this case, we have a direct inversion of the movement into a "virtual motion". For understanding the physics, we can consider an example. It approximately reflects the essence of the "virtual movement". It is analogous to the movement of a photon in the reference frame, which is joined with the quantum of light. With respect to this reference frame, the quantum of light is at rest. Moreover, if you are in a state at rest in relation to the reference frame, then you could fixate the passage through a quantum of light of the ether of the space, and you should fixate the speed of the passage as is equal to the speed of light. Here is a rough analogy of the "virtual motion" of matter of our world.

Well, if all matter - it's the wave centered at the foci, it can be argued that matter is pure energy, although matter exists in special form between parallel worlds. And in essence, it is nothing, just an illusion of energy.

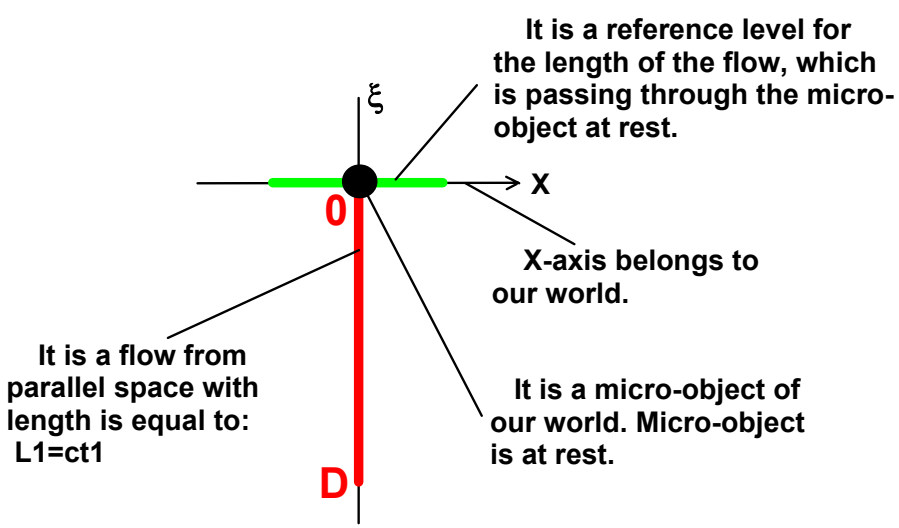


Figure 4.

Of course, I think that many would not agree, because the material world exists for perception and action, but, unfortunately, it is only the interaction energy foci in space and nothing more.

Look again at Figure 4. It shows a system that has a rough analogy to the reference system, which is joined with a moving light quantum.

Considered micro-object is at rest in our space. In Figure 4, the only one **X**-axis shows our space. The micro-object is at rest in our world. Due to this, the flow direction from the parallel space is perpendicular to our space. On figure 4, it is shown relative to **X**-axis. To determine the length of passage of the parallel space through the micro-object, we introduce a level of reference. It must coincide with the micro-object and the level has to be the perpendicular to the direction of flow from the parallel space.

The reference level will correspond completely to such conditions, if it coincides with the **X** -axis and passes through the center of a micro-object. In Figure 4, the green segment shows the reference level. It is disposed on the **X**-axis. As it is mentioned earlier, the flow passes from inner part of parallel space into the external part of parallel space through a micro-object. In figure 4, this flow corresponds to the motion along the ξ -axis downward. The flow passed through the micro-object during the time **t1**. It is shown with the segment in red (**0D**). The upper part of the flow isn't shown. This part of the flow doesn't affect the micro-object and, it has no sense, to display this part on Figure 4 and on subsequent figures. The length of the segment (**0D**) is equal to **L1=ct1**. The value **c** is speed of light. Let us assume that the length of the flow allows to evolve the micro-object for its local (own) time that is equal to one unit of time, i.e. **t1=1**. We take this length as a sample (standard) for the flow.

Now we leave analysis of the micro-object at rest and proceed to the analysis of the reference frame of a moving micro-object. Let the micro-object moves by inertia and it moves without rotation relative to the micro-object at rest. Its velocity is equal to **V** and the micro-object moves along the positive half of **X**-axis. Frame of reference of moving micro-object, we combine with the previous frame of reference. See a figure 5.

At the time t_2 the moving micro-object settles at point **B**. On figure 5, a black dot corresponds to this micro-object. During the time t_2, along the positive **X**-axis micro-object travels a distance that is equal to vt_2. The time t_2 corresponds to the time when the moving micro-object receives from the parallel space a portion of energy that is equal to one unit. When and how the moving micro-object will receive this energy, we will analyze with help of the Figure 5, in detail.

At first, let's consider the overall flow of parallel space, which passes through the moving micro-object. It is equal to the segment **BD** = L_2 = ct_2, the value **c** is velocity of light. Total flow is formed by the two components.

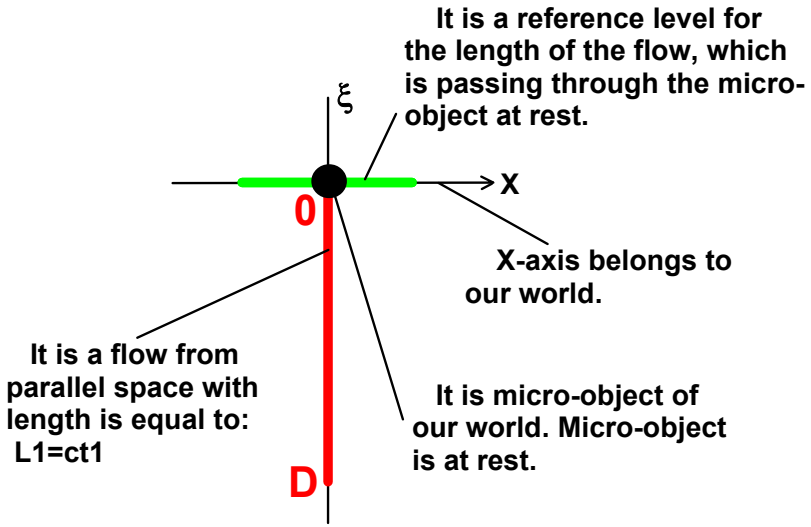


Figure 4.

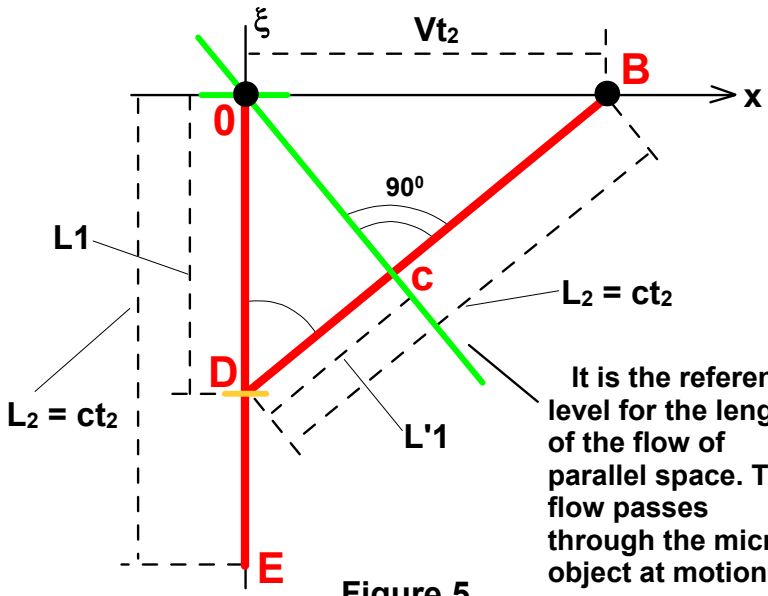


Figure 5.

The first of components of the flow takes place because of movement of the micro-object along the **X**-axis and it is equal to **0B = vt_2**. Flow component **0B** appears due to the inertial motion of the micro-object. The inertial motion is supported by the energy of the vertical passage of ether of the parallel space through micro-object, but this component does not transfer energy to the micro-object. See the first part of the work and the chapter. 2. The physics of relativistic delay of time of the elementary micro-object.

The second component of the flow is formed by the pressure of the ether of parallel space along an axis ξ and it is equal to the segment (**0D**). This component transfers energy to the micro-object. Figure 5 shows that the movement of the micro-object is fixed at time t_2, when the length (**0D**) is the length of **L1**. Such a flow length of the parallel space has given to the micro-object at rest a development in time that is equal to one standard unit. See figure 4. This length of flow gives the same development in time of the moving micro-object too. The development in time is equal to the same unit of time. The proof of this will be done below. Because the micro-object moves, the vertical velocity of the parallel space decreases and becomes equal to $U=(c^2-V^2)^{1/2}$. Such velocity slows down the speed of the transfer of the unit of energy to the micro-object at motion. Because of this reason, the moving micro-object receives unit of the energy from parallel space much later than the micro-object at rest. So by the time t_2 through the motionless micro-object is held the flow of parallel space and its length is greater than the length of **0D = L1**. At the moment of time t2 this length will be determined by the interval **0E=L_2=ct_2** and it is equal to the length of **BD**. See figure 5. All of this was listed to you, to understand that the process of energy transfer into micro-object at rest and a moving micro-object is a non-simultaneous. For a moving micro-object, this process is completed more lately.

We now turn to the analysis, which shows that a single portion of the energy from the parallel space gives the unit of time not only to a micro-object at rest but also to a micro-object at motion. At first, for flow from parallel space we introduce a reference level for a micro-object at motion. It is needed to determine the length of flow from the parallel space, which gives energy to the moving micro-object for development over time. This level must always be perpendicular to the flow and pass through the micro-object at rest, since in time zero the two bodies were located together. This arrangement provides a count level of energy transfer to micro-object for any time from zero to the actual point in time.

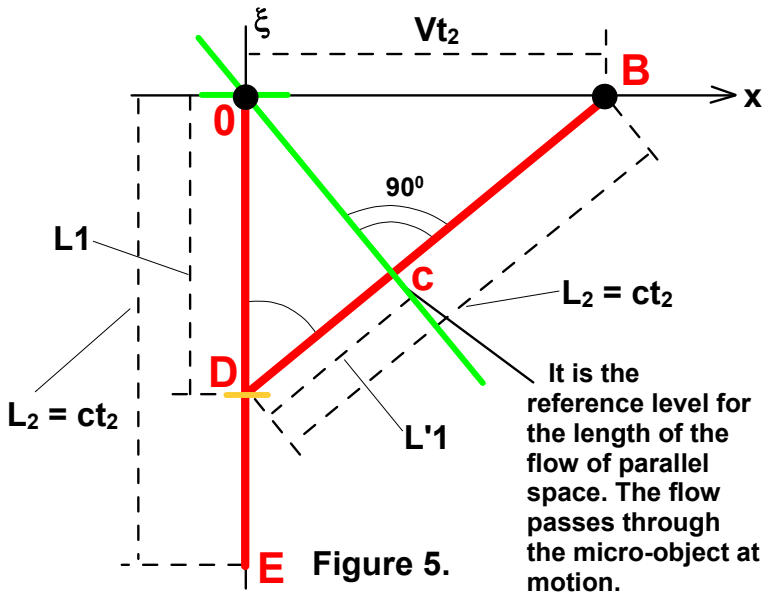


Figure 5.

In figure 5, the green segment (**0C**) depicts this level. For continuity the figures 4 and 5 in figure 5, for micro-object at rest the reference level is retained for flow from parallel space. The level is depicted with help a short, green segment. As before, it coincides with the **X**-axis.

In the first part of the work it was explained, which out of parts of the flow is giving energy to micro-object in order to develop the micro-object for time. In figure 5 this part of the flow is equal to the segment (**DC**). Its length corresponds to the transfer of energy during unit of time. This is truth although the figure 5 shows the difference of the lengths between the segments (**D0**) and (**DC**). Let's perform simple proof of what was said. For this from the first part of the work, recall the next. A flow that is located below reference level gives the time of development (of life) to the micro-object at rest and it is equal to

$$t = \frac{L}{c}$$

In figure 4, the segment (**0D**) has been introduced as a unit of time for flow: **0D = L1=ct1**. Hence, for a micro-object at rest, a unit of time is determined by value that is equal to

$$t1 = \frac{L1}{c} \quad .$$

So, for a micro-object at rest, the unit of time has been determined. We take it as a sample (standard). Let's now turn to the moving micro-object. Previously, the following requirement was made for this micro-object. The moving micro-object has to move up to the time t_2 when along the ξ -axis, the flow component from parallel space becomes equal to **L1**. As it defined earlier, the velocity of the flow component is equal to $U=(c^2-V^2)^{1/2}$. In this case, at time t_2 the flow length will be equal to $t_2(c^2-V^2)^{1/2}$. If we comply with the requirement of equality for the transmission of unit of energy in time t_2, then we obtain the equality

$$L1 = t_2 (c^2-V^2)^{1/2} \qquad (1).$$

From equation (1) we can find the time t_2. It is equal to

$$t_2 = \frac{L1}{(c^2-V^2)^{1/2}} = \frac{L1}{c[1-(V/c)^2]^{1/2}} = \frac{t1}{[1-(V/c)^2]^{1/2}} \quad .$$

As it was shown in the first part of the work for the moving micro-object, a flow from parallel space that has passed beyond the reference level (it is segment **DC**) gives the own time (**t '**) and it is equal to

$$t' = \frac{t - \frac{V}{c^2} X}{[1-(V/c)^2]^{1/2}} \quad .$$

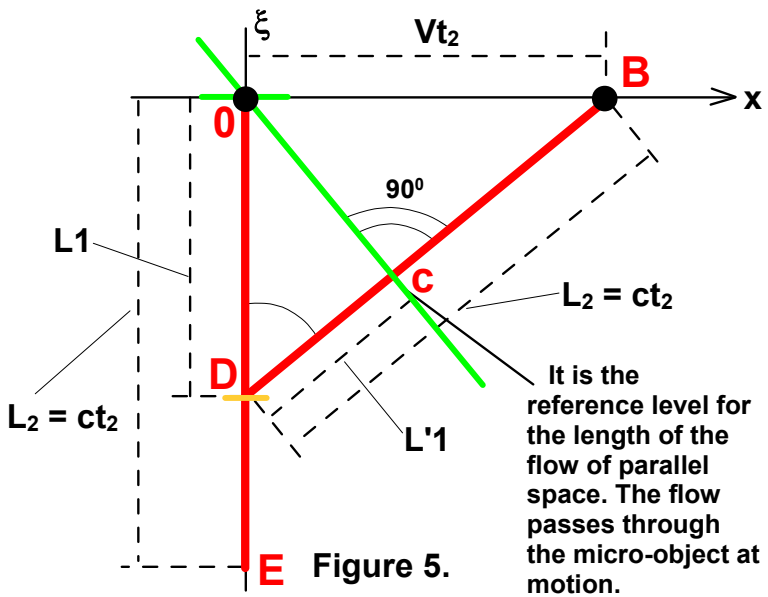


Figure 5.

Figure 5 shows that for the moving micro-object, a time (**t**) is equal to $t=t_2$, and $X=Vt_2$. Substituting these values into the formula for (**t '**), we obtain:

$$t' = \frac{t - \frac{V}{c^2} X}{[1-(V/c)^2]^{1/2}} = \frac{t_2 - \frac{V}{c^2} Vt_2}{[1-(V/c)^2]^{1/2}} =$$

$$= \frac{\frac{t1}{[1-(V/c)^2]^{1/2}} - \frac{V}{c^2} V \frac{t1}{[1-(V/c)^2]^{1/2}}}{[1-(V/c)^2]^{1/2}} =$$

$$= \frac{t1[1-(V/c)^2]}{1-(V/c)^2} = t1 \; .$$

This equality is required to proof: **t '=t1**.

The equality says that the flow's length (**DC**) that has been passed through the reference level at time t_2 gave the energy to the body for development of time that is equal to unit of time.

However, in order to further explain the physics of changing sizes of the body we need define the link between the length of the flow (**DC**) and flow (**D0**). To find this relationship, let's denote the length (**D0**) by **L1**, and (**DC**) via **L'1**, i.e. (**D0**) **= L1**, and (**DC**) **=L'1**. The relationship between the lengths of the flows will be equal to

$$L'1 = L1[1-(V/c)^2]^{1/2} \qquad (2).$$

Let's prove the expression (2). Its conclusion can be obtained from similar triangles Δ **0BD** and Δ **D0C**. See figure 5. These triangles are similar to each other because they are straight and have a common angle. These angles are angle **0DC** and angle **0DB**. Since the considered triangles are similar, then there is the equality of relationship of the sides:

$$\frac{DC}{D0} = \frac{D0}{DB} = \frac{t_2(c^2-V^2)^{1/2}}{ct_2} = [1-(V/c)^2]^{1/2}$$

Or $DC = D0[1-(V/c)^2]^{1/2}$.

Substitution of the values **DC** and **D0** in the last expression gives to us expression (2).

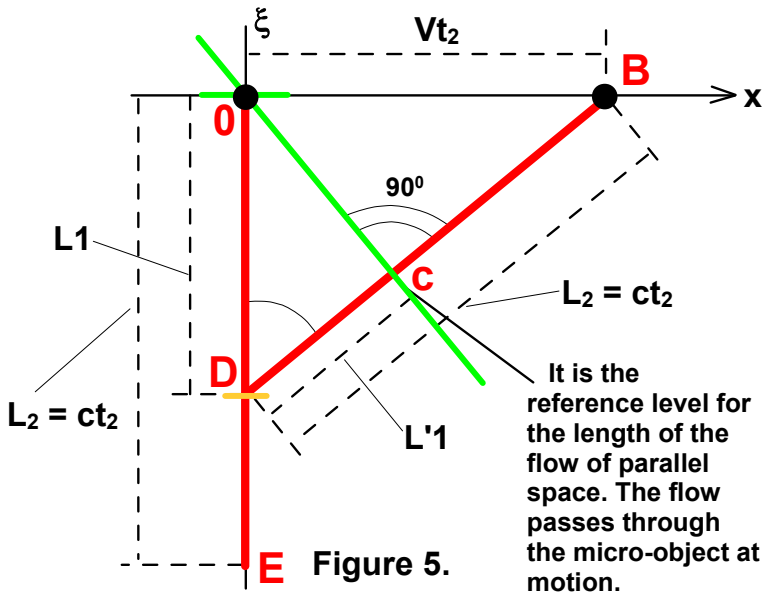


Figure 5.

After the equation (2), we can move on to the main conclusion of this part. Consider the Lorentz transformations for the space coordinates of the reference frame of a moving body.

2. The proof of the immutability of body size in the transverse direction with respect to its motion.

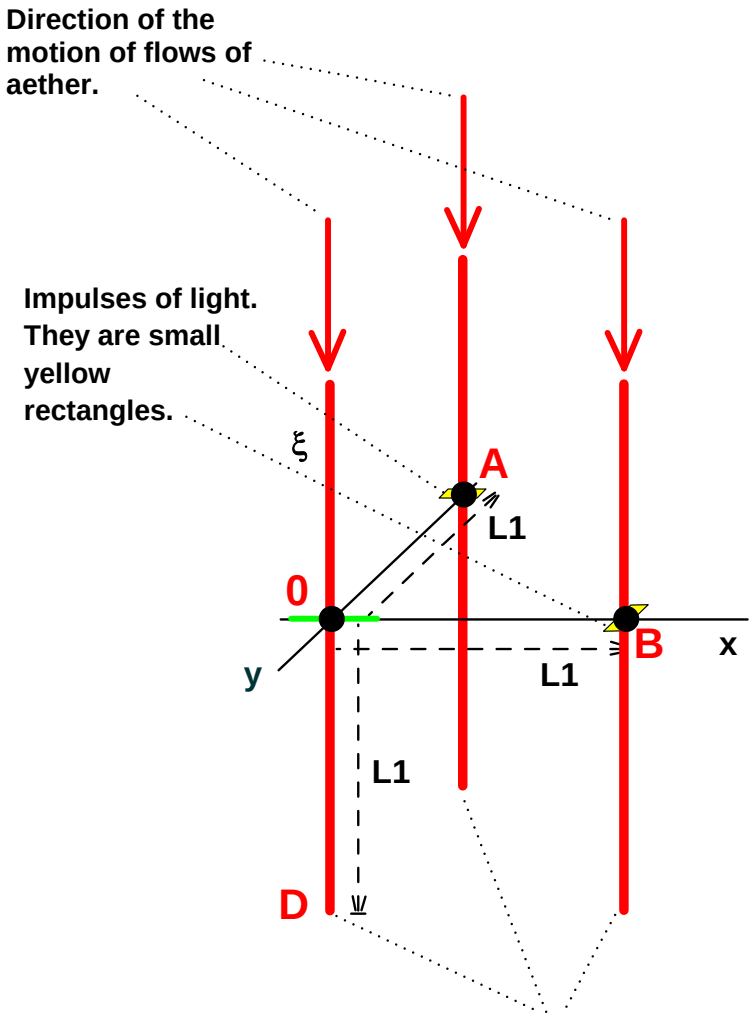


Figure 6.

To do this, let's consider on the first stage an isolated reference system **ξ ,X,Y** that is at rest with three micro-objects. See Figure 6. On this figure at time zero, a micro-object that is located in the center of the system emits two impulses of light. Impulses propagate along the axes **X,Y**. Figure 6 shows the impulses with help of small yellow rectangles.

On the axes **X,Y** at the distance **L1** there are two micro-objects. During time **t1**, each impulse of light travels a distance **L1** and reaches a micro-object. Since all the micro-objects are at rest, the flows from the parallel space go with a maximum speed that is equal to the speed of light. Therefore, the length of any flow that passed through the micro-object is also equal to the length **L1**. From a time zero up to time **t1**, any of flows provides development over time (existence) for each of micro-objects that is equal to **t1 = L1/c**. As previously noted, the values of **t1** and **L1** are accepted standards of the units. And micro-objects that are on the axes correspond to the extreme points of material cube at rest with edge length is equal to **L1**. Once again, you look at Figures from numbers 1 to 3, and read the accompanying comments to them.

Now, when we have the standards for the time and the distances between the micro-objects we can proceed to analysis of the changes in linear dimensions of the moving micro-object. But before, let's come back to the figure 6. It is obviously that the flows passing through the micro-objects have the same length. Therefore, to simplify the animation of the physical processes it is reasonable not to show flows that pass through the micro-objects are located at the points **(A,B)**. But in further analysis, we should remember of the equivalence of all flows passing through the micro-objects in a frame of reference at rest.

Consider the same body (cube) at motion. For the analysis of its sizes, as before, we will not consider directly the cube. We will consider micro-objects of the cube, which are located on edges of the cube. Assume that they are arranged on the axes **X ',Y '** and in the center of the moving frame of reference. Let us turn to the new figure 7.

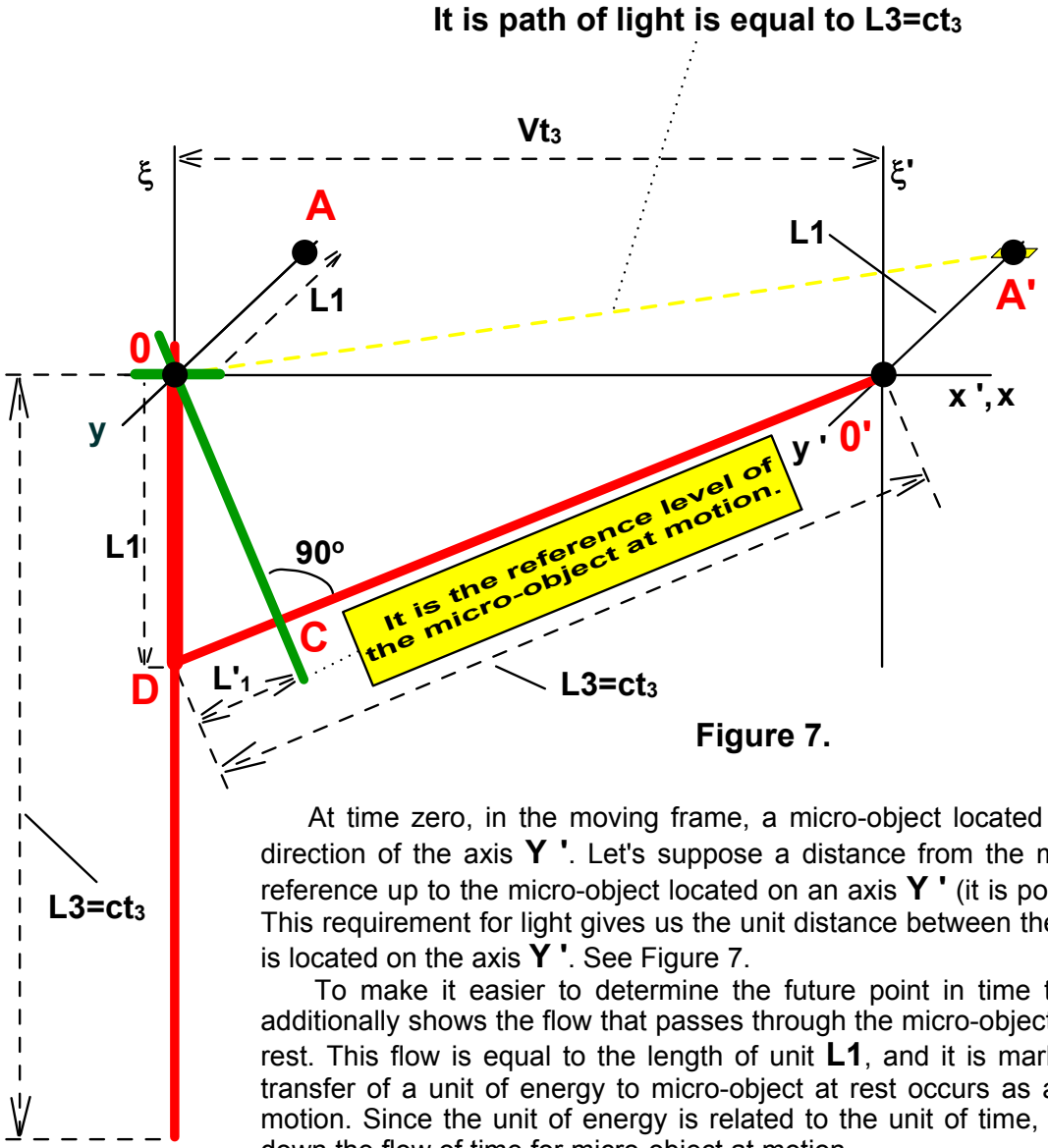


Figure 7.

In the beginning we will analyze a size of cube at motion with help of micro-objects. At first, the size will be considered along axis that is normal to its motion. At time zero, we combine a frame of reference at rest and a moving frame of reference by their centers. The great need in order to use a reference frame at rest in the future proof there is not. But for a better understanding of the physical processes that will be described later, it is better to leave the frame of reference at rest with its micro-objects. It will enable to visually see the standard units of lengths for the flows and distances on the axes **X ',Y '**. However, since at time zero the two frames of reference are coincide with each other; we cannot have the two physical micro-objects that are combined their centers. In this case, these micro-objects are obtained as if they are inserted into each other. However if we assume that they are close to each other, and their size is much smaller than the distances at which the processes are considered, the proof does not introduce inaccuracies in those assumptions. We can even enter a frame of reference with micro-objects that is at rest as an imaginary. It is necessary, in order to analyze the flows from parallel space and distances between the micro-objects. They should have standard lengths. All of the above will become clear from the following figures.

At time zero, in the moving frame, a micro-object located in the centre (it is point **0 '**) emits the light in the negative direction of the axis **Y '**. Let's suppose a distance from the micro-object that is located in center of the moving frame of reference up to the micro-object located on an axis **Y '** (it is point **A '**) is equal to the passage of light impulse per unit time. This requirement for light gives us the unit distance between the micro-object located in the center and the micro-object that is located on the axis **Y '**. See Figure 7.

To make it easier to determine the future point in time that gives the moving micro-object a unit of time, Figure 7 additionally shows the flow that passes through the micro-object at rest. It is located in the center of the frame of reference at rest. This flow is equal to the length of unit **L1**, and it is marked with thickened line. You can visually see that the event transfer of a unit of energy to micro-object at rest occurs as a first event if it is considered relative to the micro-object at motion. Since the unit of energy is related to the unit of time, this is clearly showing the physics of the process of slowing down the flow of time for micro-object at motion.

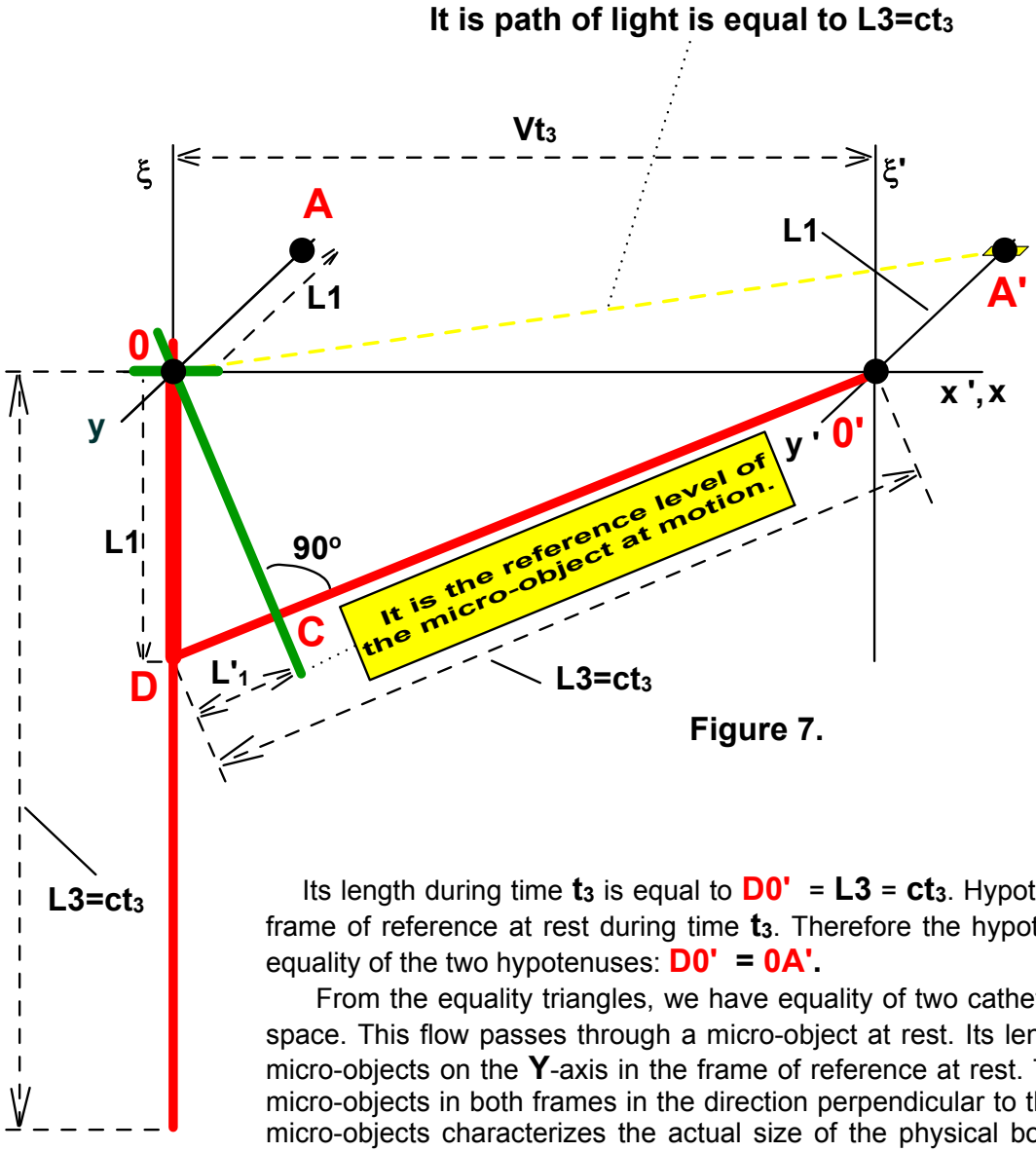


Figure 7.

At time t_3 (this is time of the reference frame at rest), when on axis ξ projection (**D0**) of the flow from parallel space (see segment **D0'**) becomes equal to **L1**, in this case, an energy equal to one unit has transmitted to the moving micro-object (it is located at point **0'**). Because of this energy, the time of a moving micro-object will be equal to one unit of time **t1**. See the micro-object that is located in the center of the moving frame of reference (it is a point **0'**). All micro-objects, which can be located on the axis **Y'**, have the same time. Because of this reason the time also is equal to **t1** for the micro-object that is located at the point **A'**.

After, in the moving frame of reference, we have introduced a requirement for a unit time, we can determine the actual distance on the axis **Y '** 'between the micro-object located at the center (it is the point **0'**) and the extreme micro-object (it is the point **A'**). This distance is equal to the segment **0'A'**, which gives us a metrics of the cube in the moving frame of reference.

We define length of the segment **0'A'**. To do this, let's examine the two right-angled triangles. See Figure 7. The first right-angled triangle is Δ **0D0'**. The second right-angled triangle is Δ **00'A'**. These triangles are equal to each other, because the hypotenuse **D0'** and cathetus **00'** of one triangle are equal to the hypotenuse **0A'** and a cathetus **00'** of another triangle. Cathetus **00'** is common for the triangles. Flow speed of parallel space (see segment **D0'**) is passing through a micro-object at motion has the speed of light.

Its length during time t_3 is equal to **D0'** = **L3** = ct_3. Hypotenuse **0A'** corresponds to the path that is passed by light in frame of reference at rest during time t_3. Therefore the hypotenuse **0A'** is also equal to **L3** = ct_3. Hence we obtain the equality of the two hypotenuses: **D0' = 0A'.**

From the equality triangles, we have equality of two cathetuses **0'A'** and **0D** but the cathetus **0D** is flow from parallel space. This flow passes through a micro-object at rest. Its length (**L1**) is equal to a unit of distance **0A=L1** between the micro-objects on the **Y**-axis in the frame of reference at rest. Thus, we have the equality of the unit of length between the micro-objects in both frames in the direction perpendicular to the motion. And due to the fact that the distance between the micro-objects characterizes the actual size of the physical bodies in both frames of reference, it can be argued that the metrics frames of reference in the direction perpendicular to the motion do not change, and we have to have the equality **Y=Y'** and **Z=Z'**.

Let us analyze the distances between micro-objects along their motion. Refer to Figure 8.

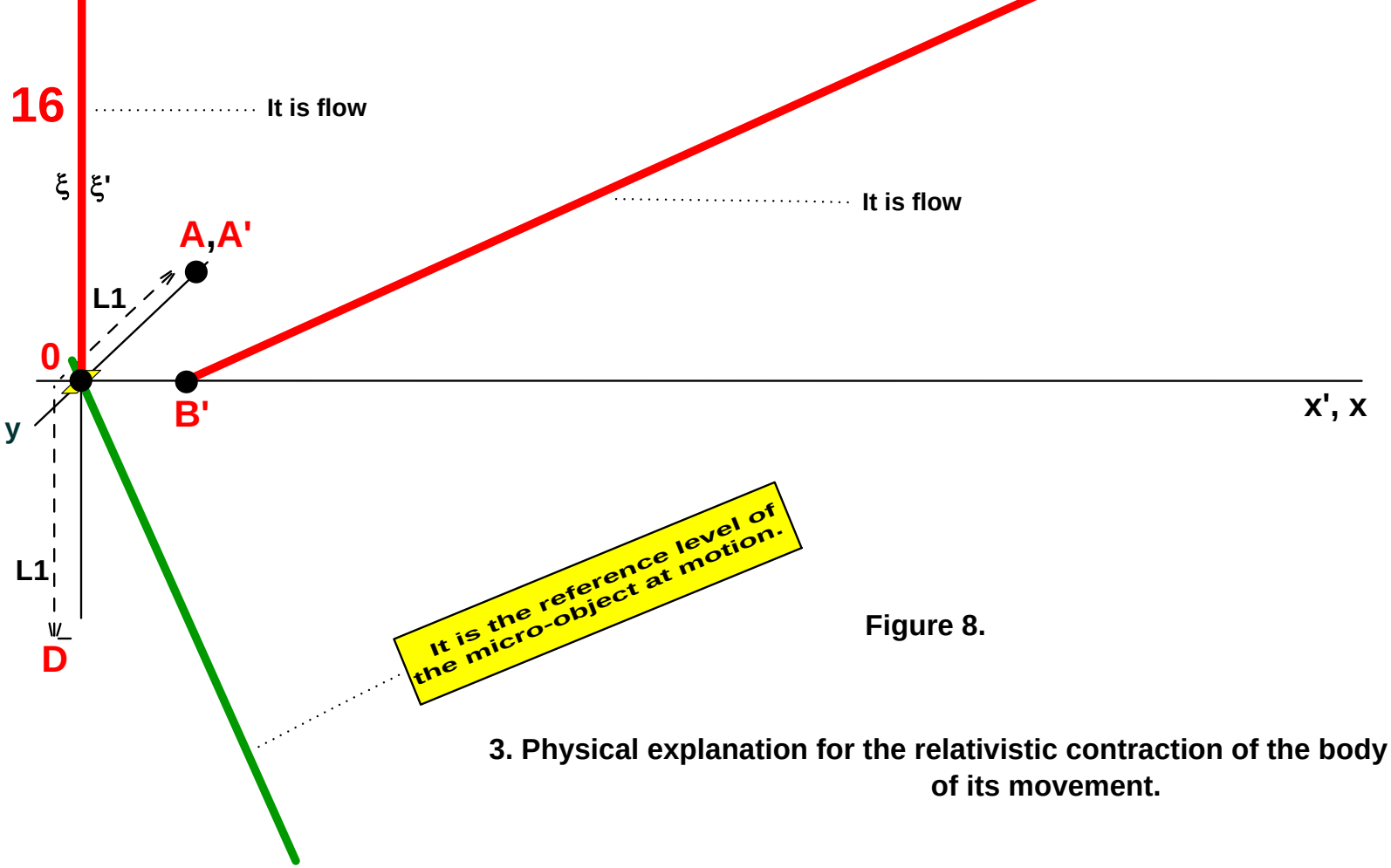


Figure 8.

3. Physical explanation for the relativistic contraction of the body in the direction of its movement.

As before, let's place the first micro-object in the center of the moving frame of reference and we put the second micro-object on some distance on the axis **X'** at point **B'**. Let the positive direction of the **X'** -axis coincides with the direction of movement. We assume that in the same zero time (see Figure 7) micro-object that is located in the center emits light impulse along positive direction of axis **X'**. We need to put a micro-object on the axis **X'** into such a point **B'** for which time of the passage of the light pulse to be equal to $t_{B'} = t1$.

In order to have a link with the previous figure in this figure the propagation of light impulse is left along the **Y'**-axis.

Time $t_{B'}$ for micro-object that is located in point **B'** will be measured relative to the old level of reference. It has been used for micro-object that is located at the point **0**. Such a measurement would give the equivalence of energy states for a time of two micro-objects (see points **A'** and **B'**).

Let' determine, when micro-object at the point **B'** will have a time is equal to $t_{B'} = t1$.

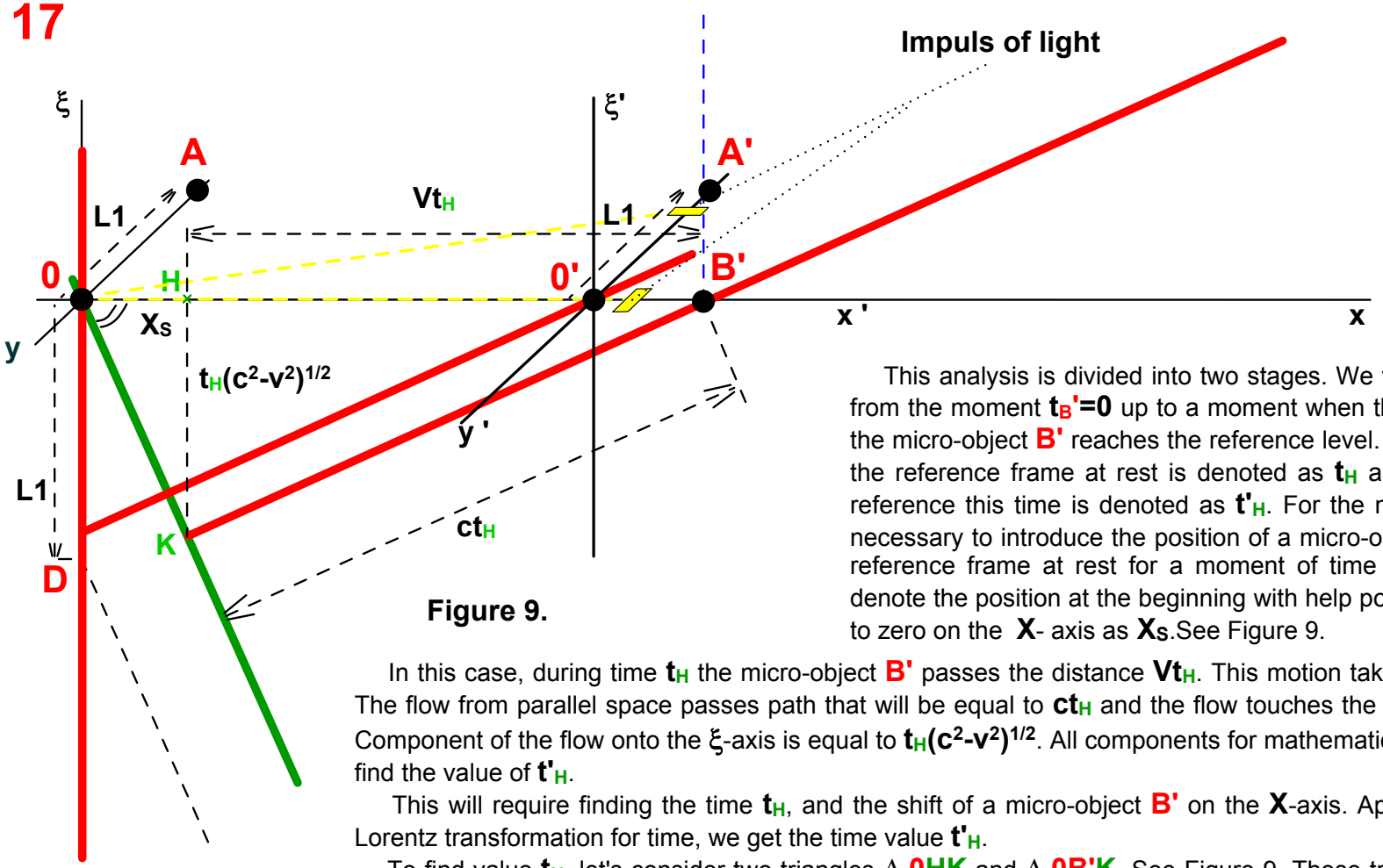


Figure 9.

This analysis is divided into two stages. We will consider the first stage from the moment $t_B'=0$ up to a moment when the flow of parallel space of the micro-object **B'** reaches the reference level. The time of this process in the reference frame at rest is denoted as t_H and in the moving frame of reference this time is denoted as t'_H. For the mathematical analysis, it is necessary to introduce the position of a micro-object **B'** on the **X**-axis in a reference frame at rest for a moment of time that is equal to zero. We denote the position at the beginning with help point **H**, and the shift relative to zero on the **X**- axis as X_S.See Figure 9.

In this case, during time t_H the micro-object **B'** passes the distance Vt_H. This motion takes place from the point **H**. The flow from parallel space passes path that will be equal to ct_H and the flow touches the reference level at point **K**. Component of the flow onto the ξ-axis is equal to $t_H(c^2-v^2)^{1/2}$. All components for mathematical analysis introduced, we find the value of t'_H.

This will require finding the time t_H, and the shift of a micro-object **B'** on the **X**-axis. Applying these values to the Lorentz transformation for time, we get the time value t'_H.

To find value t_H, let's consider two triangles Δ **0HK** and Δ **0B'K**. See Figure 9. These triangles are similar to each other. From the triangles we get the equality of relations:

$$\frac{KB'}{0K} = \frac{HK}{X_S} \quad \text{или} \quad KB' = \frac{0K \cdot HK}{X_S}$$

We substitute the value $KB'=ct_H$ in the last expression and we get

$$t_H = \frac{0K \cdot HK}{c \cdot X_S}$$

The value (**HK**) is known. See Figure 9. It is equal to $HK= ct_H[1-(V/c)^2]^{1/2}$. Substituting the value of **HK** in the last equality, we come to expression:

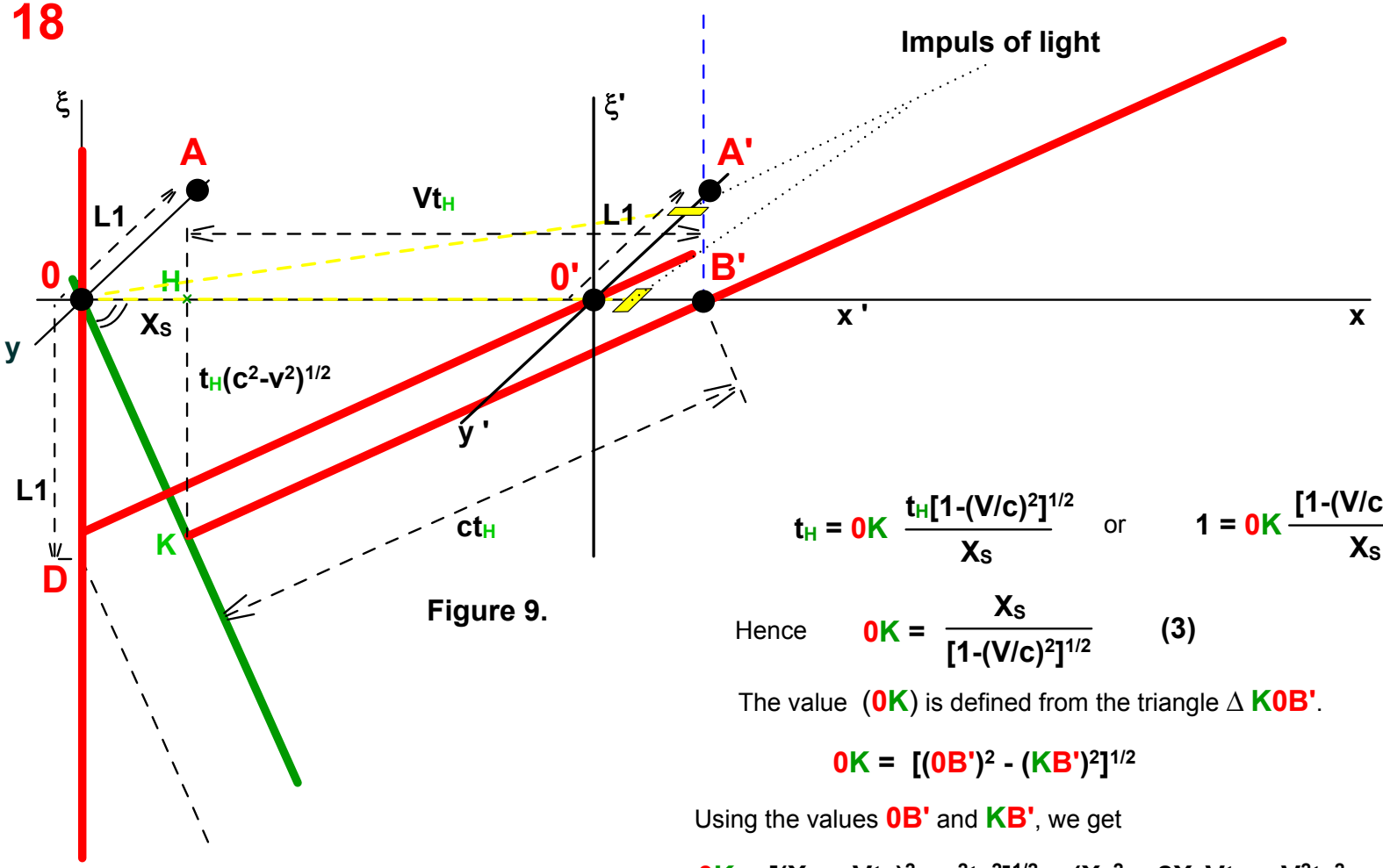


Figure 9.

$$t_H = 0K\,\frac{t_H[1-(V/c)^2]^{1/2}}{X_S} \quad \text{or} \quad 1 = 0K\,\frac{[1-(V/c)^2]^{1/2}}{X_S}$$

Hence $$0K = \frac{X_S}{[1-(V/c)^2]^{1/2}} \qquad (3)$$

The value $(0K)$ is defined from the triangle Δ **K0B'**.

$$0K = [(0B')^2 - (KB')^2]^{1/2}$$

Using the values **0B'** and **KB'**, we get

$$0K = [(X_S + Vt_H)^2 - c^2t_H^2]^{1/2} = (X_S^2 + 2X_SVt_H + V^2t_H^2 - c^2t_H^2)^{1/2}$$

We return to the expression (3). Take the left and right sides of the equation into the square.

$$[1-(V/c)^2]\,(0K)^2 = X_S^2$$

Use the value of **0K** and remove the brackets. After, let's group the homogeneous members in the expression.

$$[X_S^2 + 2X_SVt_H + V^2t_H^2 - c^2t_H^2]\cdot(1 - V^2/c^2) = X_S^2;$$

$$(1 - V^2/c^2)X_S^2 + 2(1 - V^2/c^2)X_SVt_H - (1 - V^2/c^2)^2c^2t_H^2 - X_S^2 = 0;$$

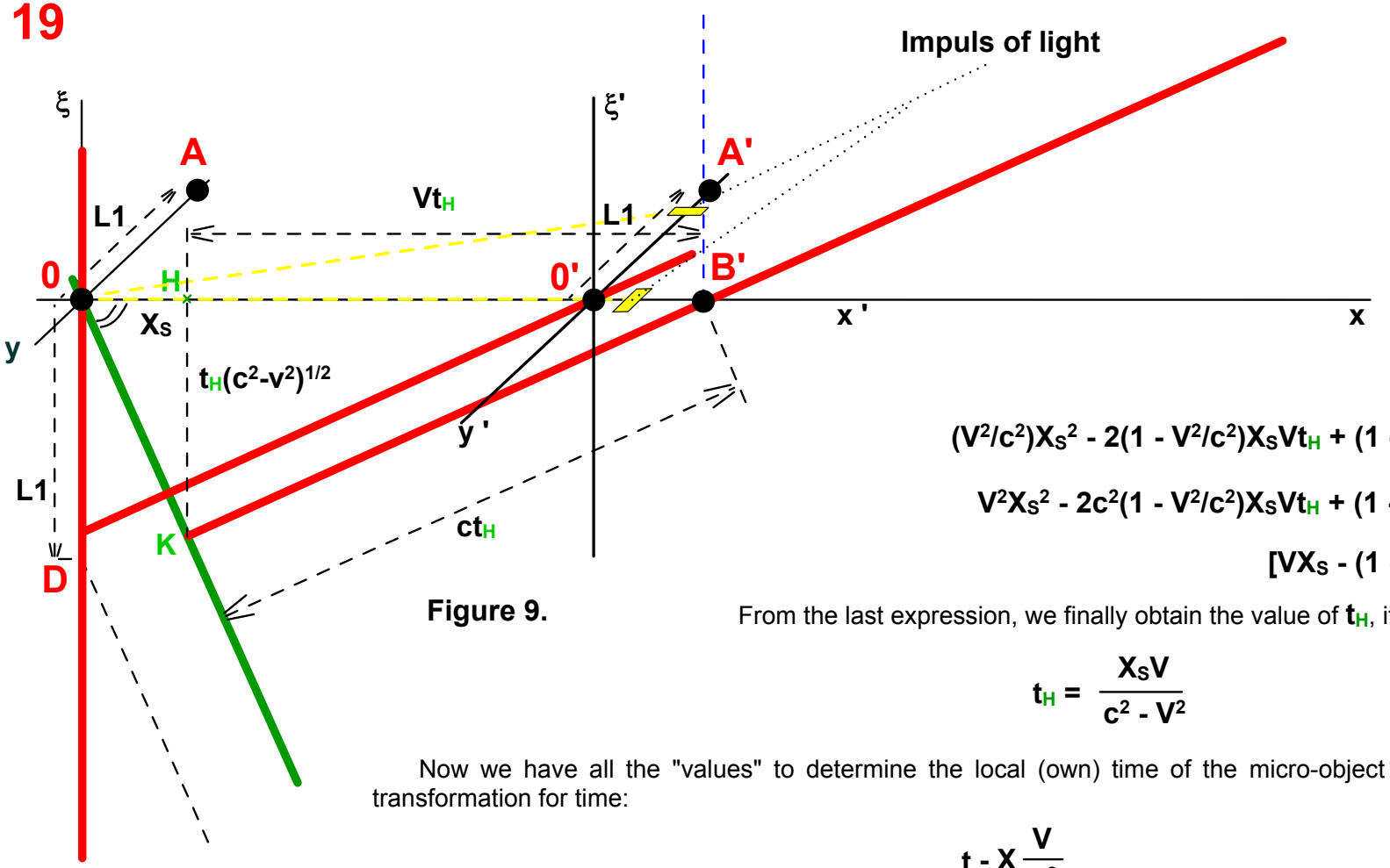


Figure 9.

$$(V^2/c^2)X_S^2 - 2(1 - V^2/c^2)X_S V t_H + (1 - V^2/c^2)^2 c^2 t_H^2 = 0;$$

$$V^2 X_S^2 - 2c^2(1 - V^2/c^2)X_S V t_H + (1 - V^2/c^2)^2 c^4 t_H^2 = 0;$$

$$[VX_S - (1 - V^2/c^2)c^2 t_H]^2 = 0;$$

From the last expression, we finally obtain the value of t_H, it is equal to

$$t_H = \frac{X_S V}{c^2 - V^2}$$

Now we have all the "values" to determine the local (own) time of the micro-object **B'**, let's use the Lorentz transformation for time:

$$t'_H = \frac{t - X\frac{V}{c^2}}{[1-(V/c)^2]^{1/2}}$$

Substituting the value of $t = t_H$ and $X = X_S + Vt_H$ in the Lorentz transformation, we get

$$t'_H = \frac{t_H - (X_S + Vt_H)\frac{V}{c^2}}{[1-(V/c)^2]^{1/2}} = \frac{\frac{X_S V}{c^2 - V^2} - (X_S + V\frac{X_S V}{c^2 - V^2})\frac{V}{c^2}}{[1-(V/c)^2]^{1/2}} = X_S \frac{\frac{V}{c^2 - V^2} - (1 + \frac{V^2}{c^2 - V^2})\frac{V}{c^2}}{[1-(V/c)^2]^{1/2}} =$$

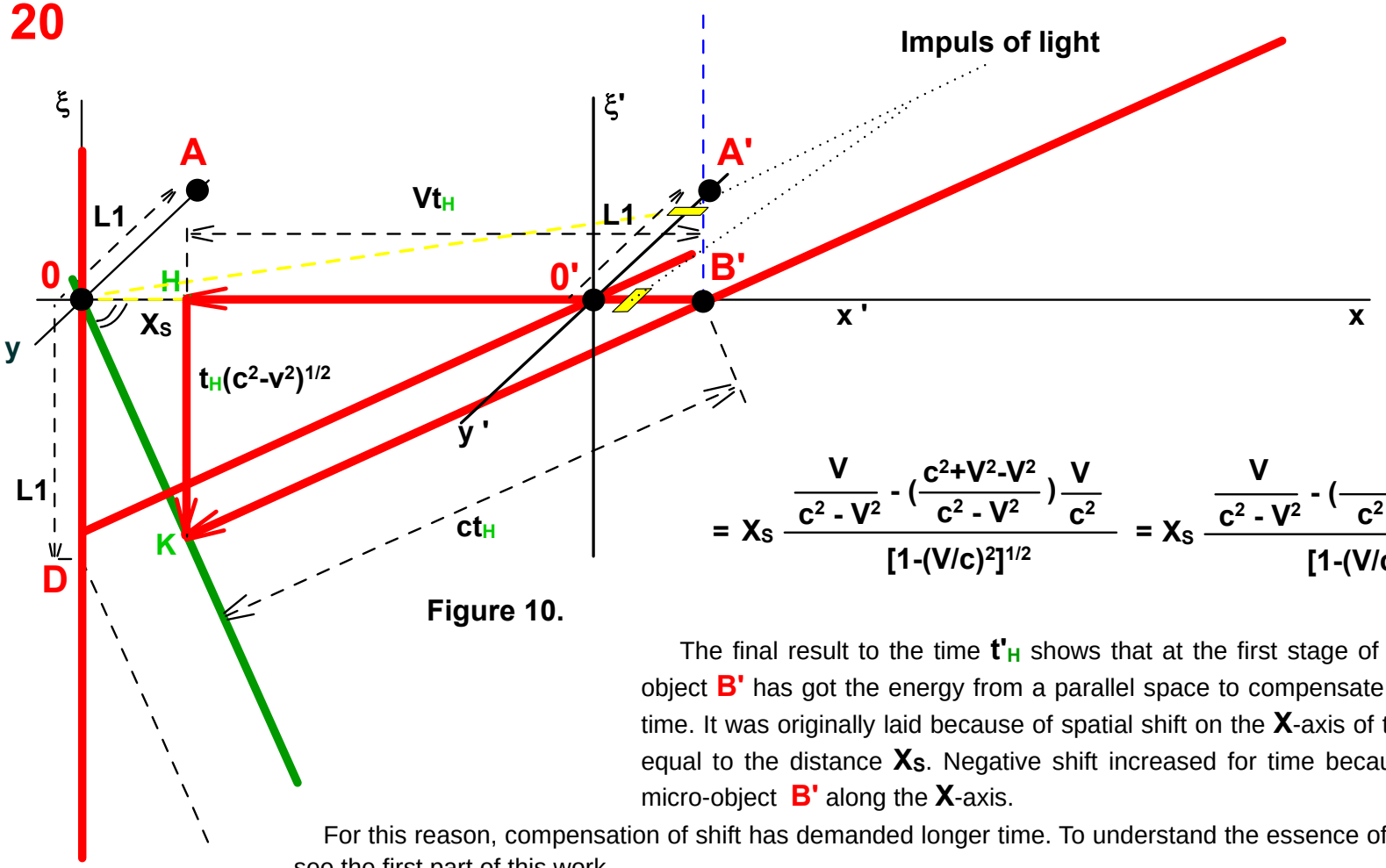


Figure 10.

$$= X_S \frac{\frac{V}{c^2 - V^2} - \left(\frac{c^2+V^2-V^2}{c^2 - V^2}\right)\frac{V}{c^2}}{[1-(V/c)^2]^{1/2}} = X_S \frac{\frac{V}{c^2 - V^2} - \left(\frac{c^2}{c^2 - V^2}\right)\frac{V}{c^2}}{[1-(V/c)^2]^{1/2}} = 0$$

The final result to the time $\mathbf{t'_H}$ shows that at the first stage of the movement, the micro-object **B'** has got the energy from a parallel space to compensate for the negative bias over time. It was originally laid because of spatial shift on the **X**-axis of the micro-object **B'** that is equal to the distance $\mathbf{X_S}$. Negative shift increased for time because of the movement of a micro-object **B'** along the **X**-axis.

For this reason, compensation of shift has demanded longer time. To understand the essence of the original negative shift, see the first part of this work.

Thus, by the time $\mathbf{t_H}$, own time (local time) of a micro-object **B'** was equal to zero: $\mathbf{t'_H=0}$. To again understand the physics of the transfer of energy for the time in geometric form, in detail, see Figure 10. On this figure, overall flow from parallel space is represented by vector **B'K** which splits into two components: the vector **B'H** and the vector **HK**. The first component (vector **B'H**) is a component of the flow, which appears due to the physical movement of a micro-object **B'** in our world. In figure 10, this is represented with help of movement along the **X**-axis.

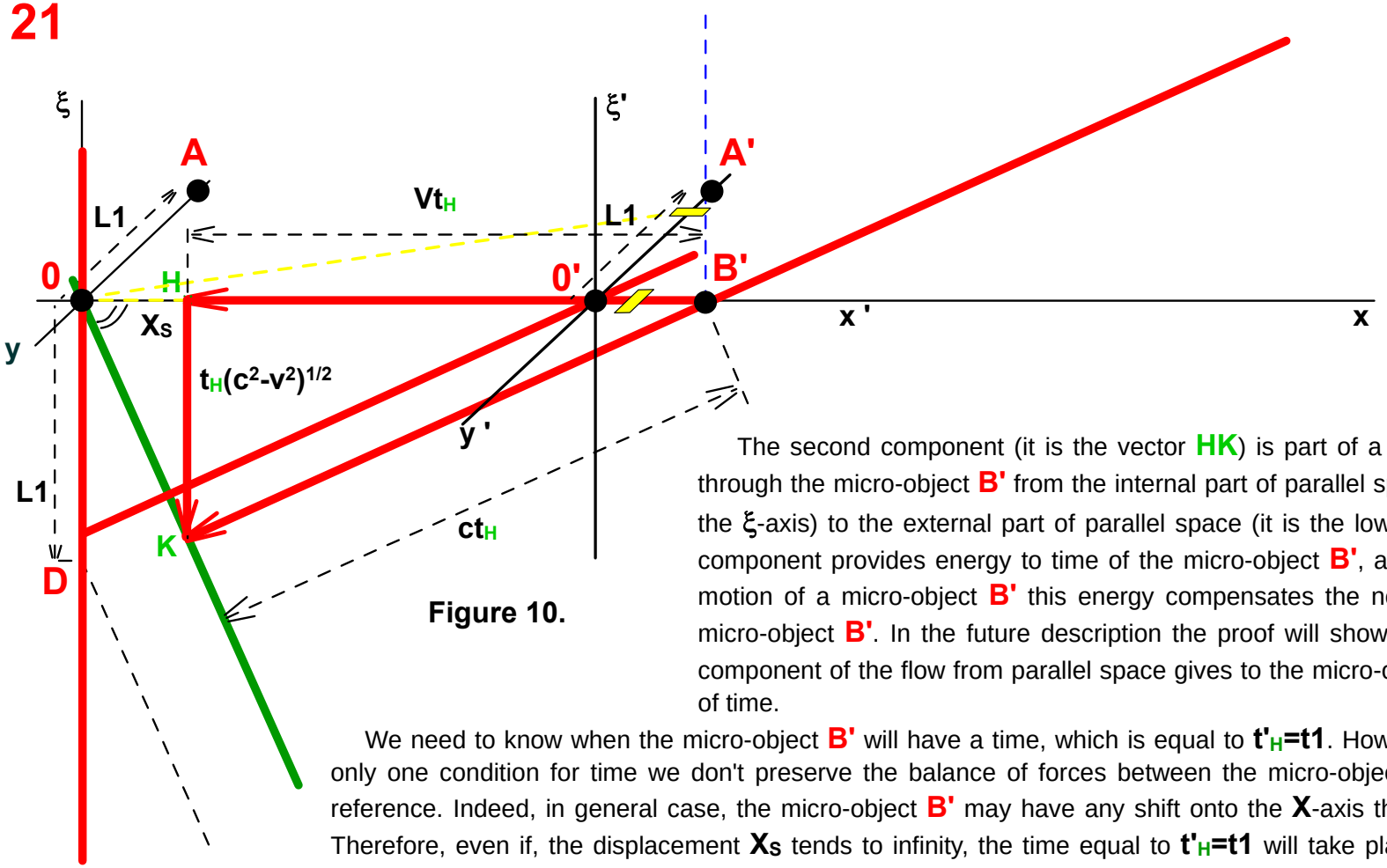


Figure 10.

The second component (it is the vector **HK**) is part of a parallel space that passes through the micro-object **B'** from the internal part of parallel space (it is the upper part of the ξ-axis) to the external part of parallel space (it is the lower part of the ξ-axis). This component provides energy to time of the micro-object **B'**, and during the first stage of motion of a micro-object **B'** this energy compensates the negative shift in time of the micro-object **B'**. In the future description the proof will show, the impact of the second component of the flow from parallel space gives to the micro-object **B'** a positive amount of time.

We need to know when the micro-object **B'** will have a time, which is equal to $\mathbf{t'_H=t1}$. However, if we continue to use only one condition for time we don't preserve the balance of forces between the micro-objects in the moving frame of reference. Indeed, in general case, the micro-object **B'** may have any shift onto the **X**-axis that is equal to $\mathbf{0 \le X_S < +\infty}$. Therefore, even if, the displacement $\mathbf{X_S}$ tends to infinity, the time equal to $\mathbf{t'_H=t1}$ will take place in the future for micro-object **B'**. But for the balance of forces between the micro-objects in the moving frame of reference it is necessary that the micro-object **B'** is located at a certain distance from the micro-object **0'**. The distance is determined by two factors that need to occur simultaneously: if for the micro-object **B'** time comes $\mathbf{t'_H=t1}$, the light from the micro-object **0'** should reach the micro-object **B'**.

Using these two factors, we proceed to the second stage of analysis. Consider, when a moment $\mathbf{t'_H=t1}$ will take place. Let's analyze it from time $\mathbf{t'_H=0}$ until $\mathbf{t'_H=t1}$. Within this period of the time light from the micro-object **0'** should reach micro-object **B'**. In the example of Figure 5 has already been shown, any micro-object at motion will have the development time that is equal to unit of time when the micro-object receives energy from parallel space that is equal to unit. Unit of energy isn't changed for both the micro-object at rest and for the micro-object at motion. We apply this condition to the transfer of a unit of energy to the micro-object **B'**.

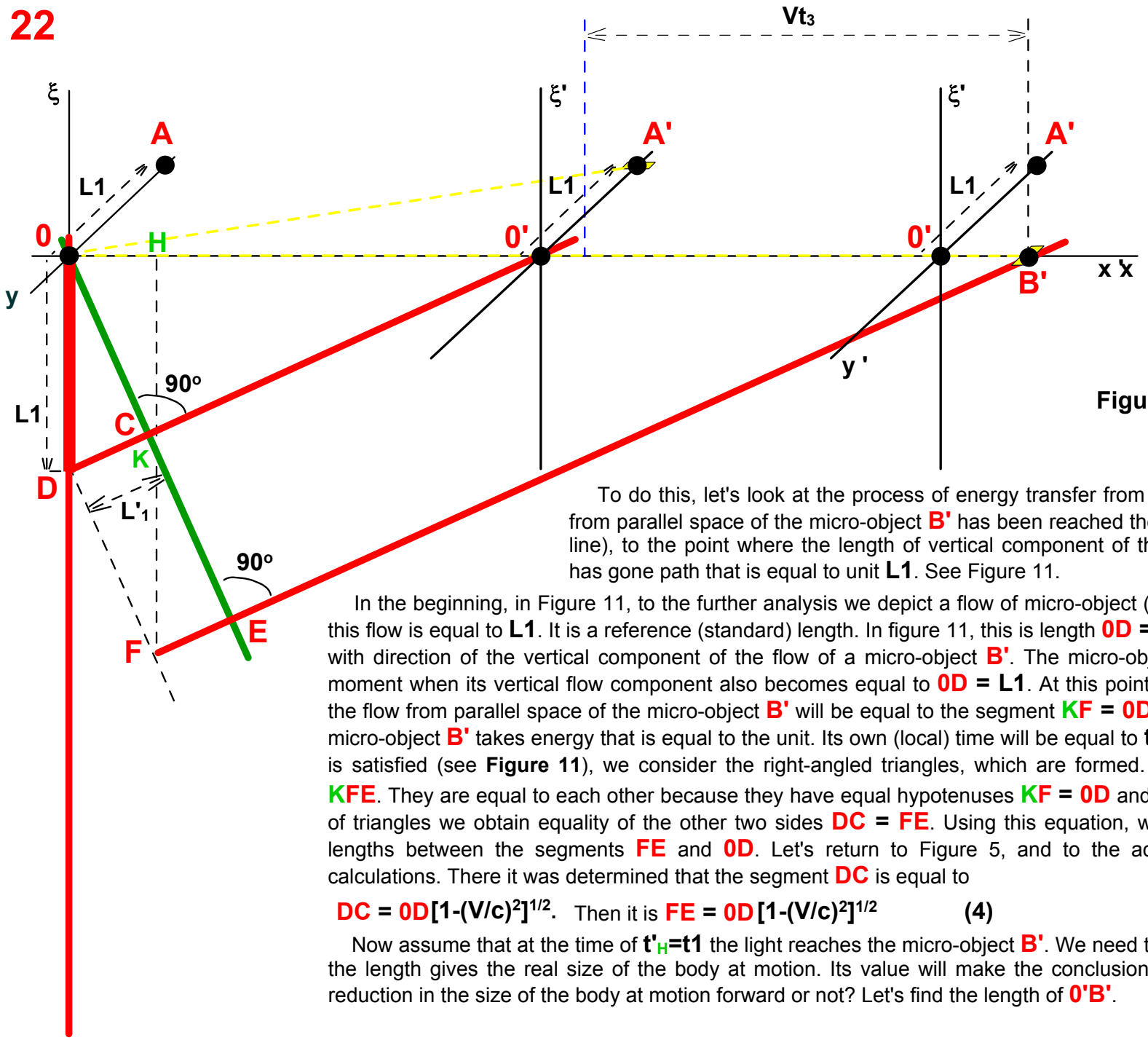


Figure 11.

To do this, let's look at the process of energy transfer from the moment when the flow from parallel space of the micro-object **B'** has been reached the reference level (it's green line), to the point where the length of vertical component of the flow from parallel space has gone path that is equal to unit **L1**. See Figure 11.

In the beginning, in Figure 11, to the further analysis we depict a flow of micro-object (**0**) at rest. Let the length of this flow is equal to **L1**. It is a reference (standard) length. In figure 11, this is length **0D = L1**. Its direction coincides with direction of the vertical component of the flow of a micro-object **B'**. The micro-object **B'** has to move up to moment when its vertical flow component also becomes equal to **0D = L1**. At this point, the vertical component of the flow from parallel space of the micro-object **B'** will be equal to the segment **KF = 0D = L1**, and in this moment micro-object **B'** takes energy that is equal to the unit. Its own (local) time will be equal to $\mathbf{t'_H=t1}$. When this condition is satisfied (see **Figure 11**), we consider the right-angled triangles, which are formed. These are Δ **0DC** and Δ **KFE**. They are equal to each other because they have equal hypotenuses **KF = 0D** and corners. From the equality of triangles we obtain equality of the other two sides **DC = FE**. Using this equation, we define the connection of lengths between the segments **FE** and **0D**. Let's return to Figure 5, and to the accompanying mathematical calculations. There it was determined that the segment **DC** is equal to

$$\mathbf{DC = 0D[1-(V/c)^2]^{1/2}}.$$ Then it is $$\mathbf{FE = 0D[1-(V/c)^2]^{1/2}} \qquad (4)$$

Now assume that at the time of $\mathbf{t'_H=t1}$ the light reaches the micro-object **B'**. We need to find the length of **0'B'**, as the length gives the real size of the body at motion. Its value will make the conclusion whether is there a natural reduction in the size of the body at motion forward or not? Let's find the length of **0'B'**.

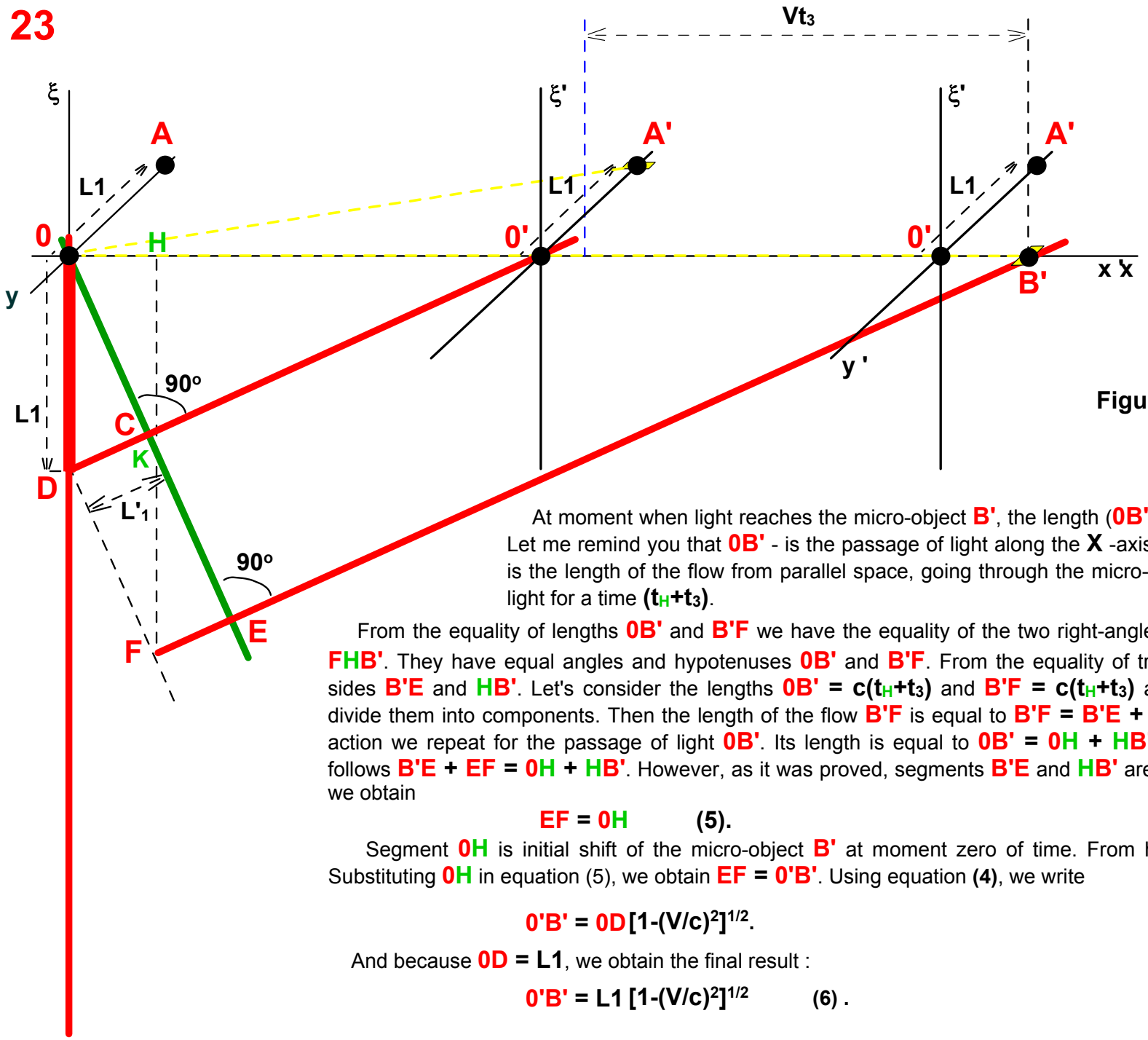


Figure 11.

At moment when light reaches the micro-object **B'**, the length (**0B'**) is **0B' = B'F = c(t_H+t_3)**. Let me remind you that **0B'** - is the passage of light along the **X** -axis for the time **(t_H+t_3)**. **B'F** - is the length of the flow from parallel space, going through the micro-object **B'** with the speed of light for a time **(t_H+t_3)**.

From the equality of lengths **0B'** and **B'F** we have the equality of the two right-angled triangles Δ **0EB'** and Δ **FHB'**. They have equal angles and hypotenuses **0B'** and **B'F**. From the equality of triangles we have the equal sides **B'E** and **HB'**. Let's consider the lengths **0B' = c(t_H+t_3)** and **B'F = c(t_H+t_3)** and for further analysis we divide them into components. Then the length of the flow **B'F** is equal to **B'F = B'E + EF = c(t_H+t_3)**. The same action we repeat for the passage of light **0B'**. Its length is equal to **0B' = 0H + HB' = c(t_H+t_3)**. From here It follows **B'E + EF = 0H + HB'**. However, as it was proved, segments **B'E** and **HB'** are equal to each other. Then we obtain

EF = 0H (5).

Segment **0H** is initial shift of the micro-object **B'** at moment zero of time. From here it follows **0H = 0'B'**. Substituting **0H** in equation (5), we obtain **EF = 0'B'**. Using equation **(4)**, we write

$$0'B' = 0D\,[1-(V/c)^2]^{1/2}.$$

And because **0D = L1**, we obtain the final result :

$$0'B' = L1\,[1-(V/c)^2]^{1/2} \qquad (6)\ .$$

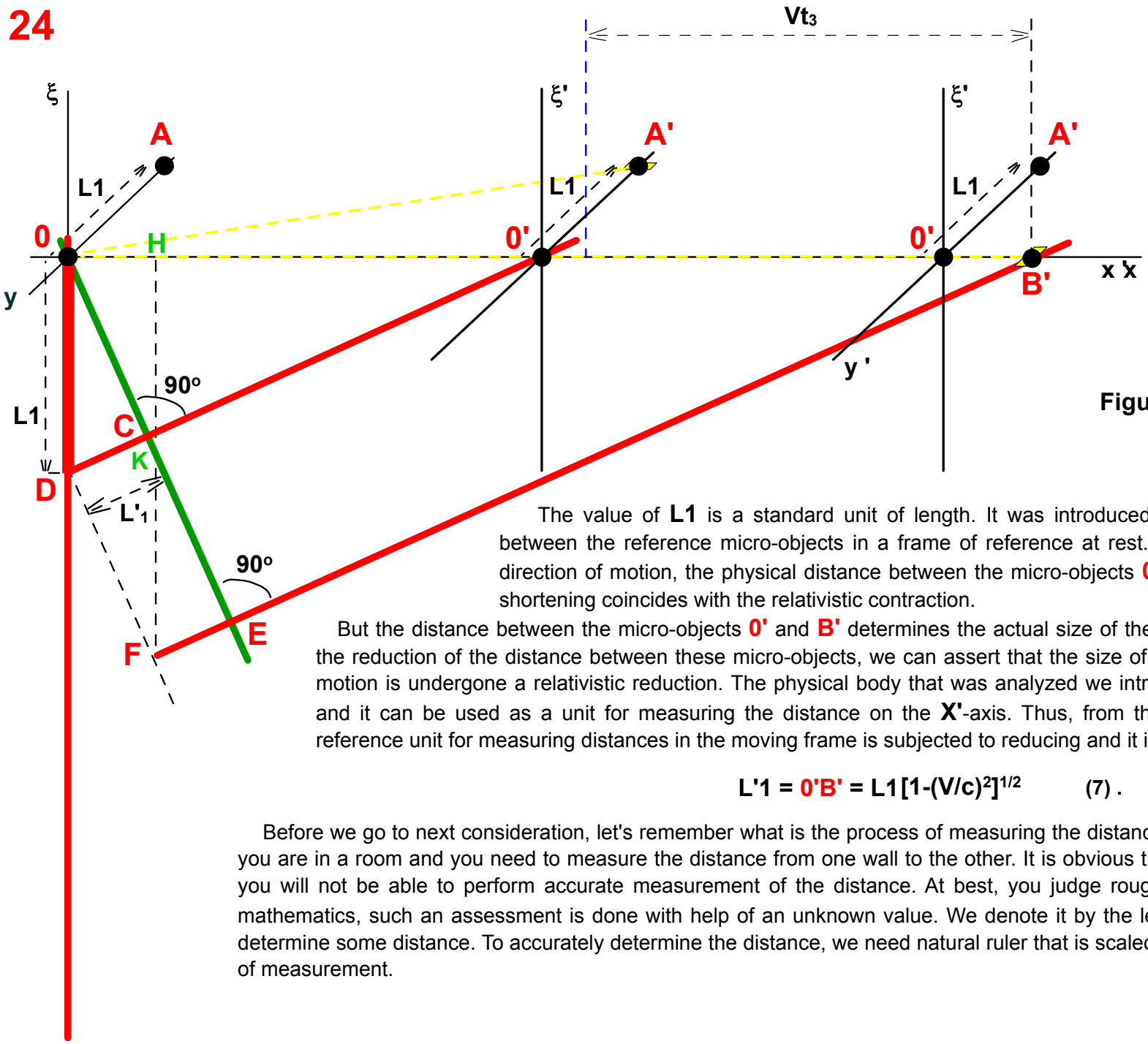


Figure 11.

The value of **L1** is a standard unit of length. It was introduced to determine the distance between the reference micro-objects in a frame of reference at rest. Result (6) says that along direction of motion, the physical distance between the micro-objects **0'** and **B'** is shortened. The shortening coincides with the relativistic contraction.

But the distance between the micro-objects **0'** and **B'** determines the actual size of the physical body. Because of the reduction of the distance between these micro-objects, we can assert that the size of the body in the direction of motion is undergone a relativistic reduction. The physical body that was analyzed we introduced as a standard body and it can be used as a unit for measuring the distance on the **X'**-axis. Thus, from the above it follows that the reference unit for measuring distances in the moving frame is subjected to reducing and it is equal to

$$L'1 = 0'B' = L1[1-(V/c)^2]^{1/2} \qquad (7)\ .$$

Before we go to next consideration, let's remember what is the process of measuring the distance? To do this, imagine that you are in a room and you need to measure the distance from one wall to the other. It is obvious that without the aid of tools, you will not be able to perform accurate measurement of the distance. At best, you judge roughly about the distance. In mathematics, such an assessment is done with help of an unknown value. We denote it by the letter **S**. In this manner, we determine some distance. To accurately determine the distance, we need natural ruler that is scaled with using a standard unit of measurement.

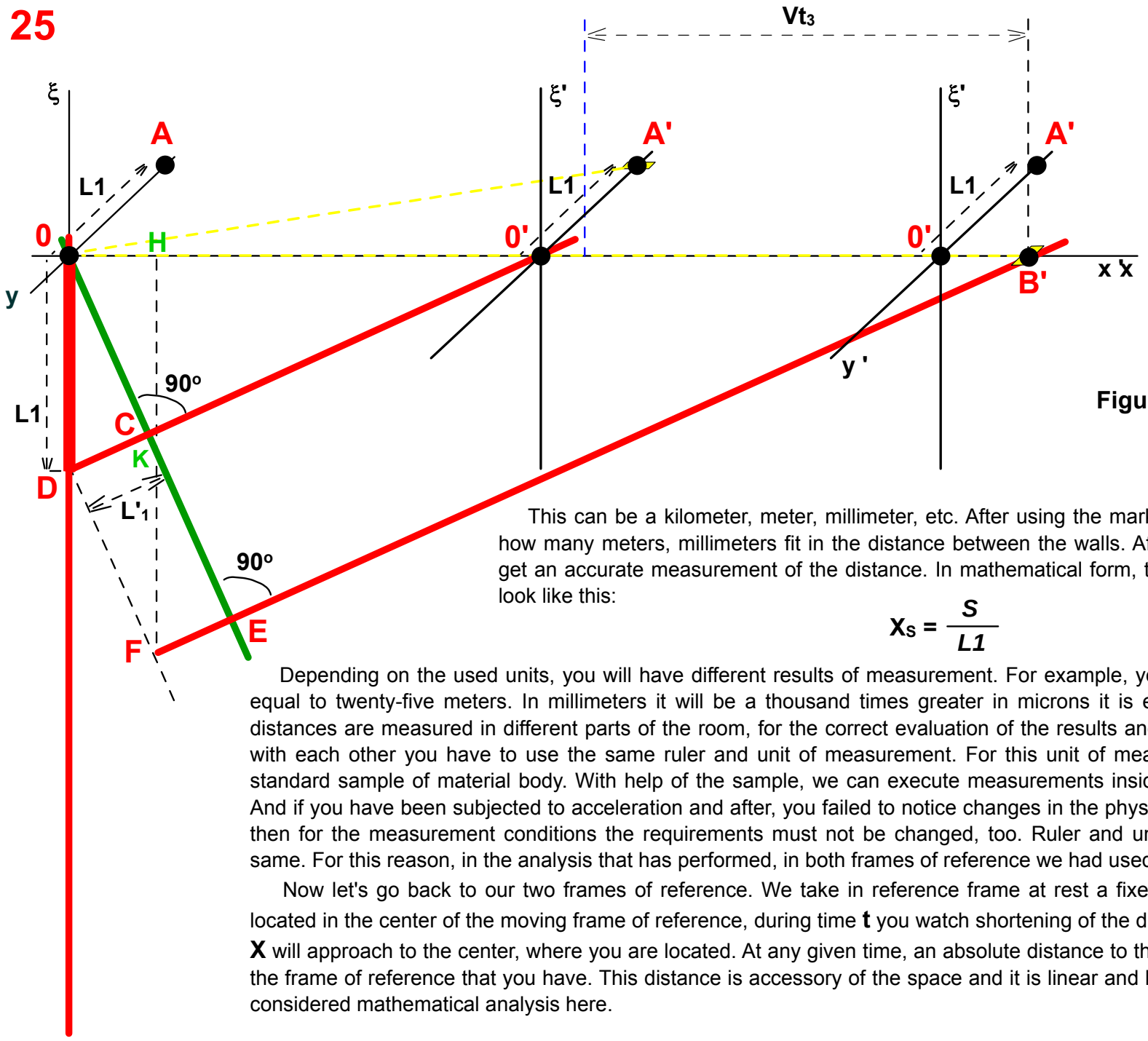


Figure 11.

This can be a kilometer, meter, millimeter, etc. After using the marking of ruler, you can count how many meters, millimeters fit in the distance between the walls. After the calculation, you will get an accurate measurement of the distance. In mathematical form, the measurement result will look like this:

$$X_S = \frac{S}{L1}$$

Depending on the used units, you will have different results of measurement. For example, you got measurement that is equal to twenty-five meters. In millimeters it will be a thousand times greater in microns it is else more. Therefore, if the distances are measured in different parts of the room, for the correct evaluation of the results and in order to compare them with each other you have to use the same ruler and unit of measurement. For this unit of measurement we must have a standard sample of material body. With help of the sample, we can execute measurements inside any frames of reference. And if you have been subjected to acceleration and after, you failed to notice changes in the physical state of the ruler (body) then for the measurement conditions the requirements must not be changed, too. Ruler and unit of measure must be the same. For this reason, in the analysis that has performed, in both frames of reference we had used the same metric cubes.

Now let's go back to our two frames of reference. We take in reference frame at rest a fixed point **X**. Then, if you are located in the center of the moving frame of reference, during time **t** you watch shortening of the distance to the point **X**. Point **X** will approach to the center, where you are located. At any given time, an absolute distance to the point is not dependent on the frame of reference that you have. This distance is accessory of the space and it is linear and homogeneous for whole the considered mathematical analysis here.

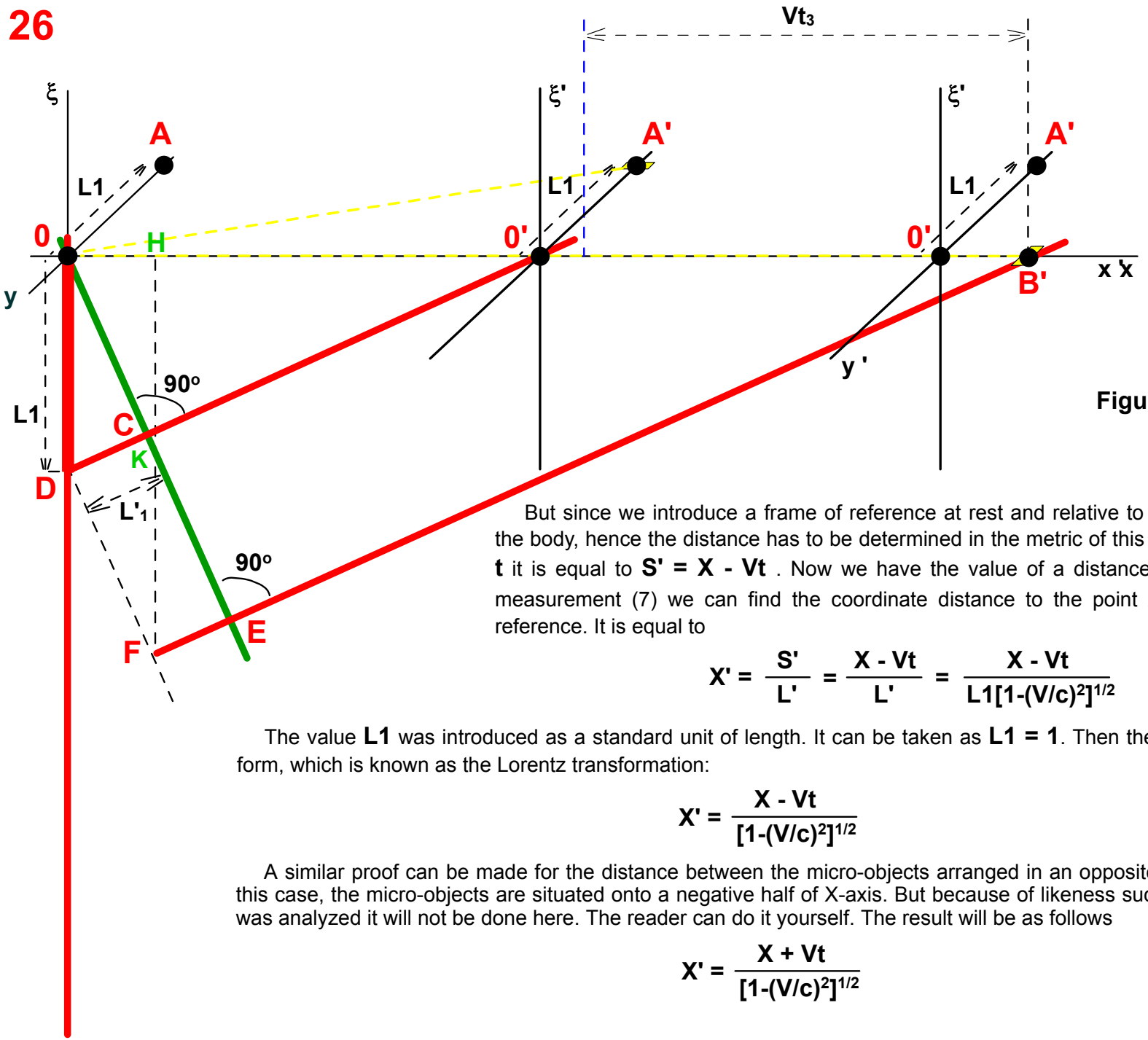


Figure 11.

But since we introduce a frame of reference at rest and relative to it we consider reduction of the body, hence the distance has to be determined in the metric of this frame of reference. At time **t** it is equal to **S' = X - Vt** . Now we have the value of a distance **S'** and the metric unit of measurement (7) we can find the coordinate distance to the point **X** in the moving frame of reference. It is equal to

$$X' = \frac{S'}{L'} = \frac{X - Vt}{L'} = \frac{X - Vt}{L1[1-(V/c)^2]^{1/2}}$$

The value **L1** was introduced as a standard unit of length. It can be taken as **L1 = 1**. Then the result takes a well-known form, which is known as the Lorentz transformation:

$$X' = \frac{X - Vt}{[1-(V/c)^2]^{1/2}}$$

A similar proof can be made for the distance between the micro-objects arranged in an opposite side of the movement. In this case, the micro-objects are situated onto a negative half of X-axis. But because of likeness such proof to the proof, which was analyzed it will not be done here. The reader can do it yourself. The result will be as follows

$$X' = \frac{X + Vt}{[1-(V/c)^2]^{1/2}}$$

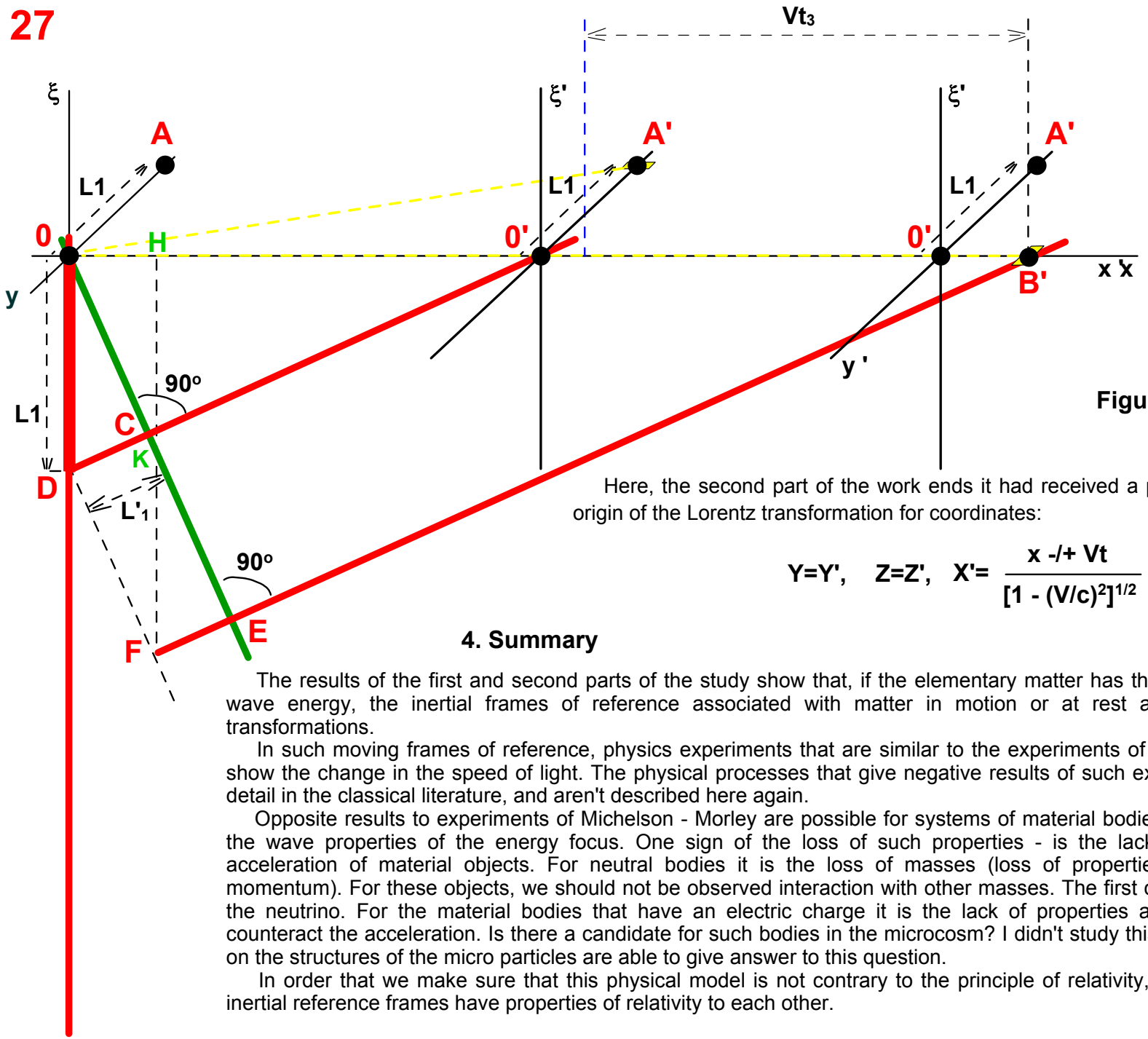


Figure 11.

Here, the second part of the work ends it had received a physical explanation for the origin of the Lorentz transformation for coordinates:

$$Y=Y',\quad Z=Z',\quad X'=\frac{x \text{ -/+ } Vt}{[1-(V/c)^2]^{1/2}}$$

4. Summary

The results of the first and second parts of the study show that, if the elementary matter has the properties of the focus of wave energy, the inertial frames of reference associated with matter in motion or at rest are subject to the Lorentz transformations.

In such moving frames of reference, physics experiments that are similar to the experiments of Michelson - Morley will not show the change in the speed of light. The physical processes that give negative results of such experiments are described in detail in the classical literature, and aren't described here again.

Opposite results to experiments of Michelson - Morley are possible for systems of material bodies, where these bodies lose the wave properties of the energy focus. One sign of the loss of such properties - is the lack of reaction forces during acceleration of material objects. For neutral bodies it is the loss of masses (loss of properties in order to transfer the momentum). For these objects, we should not be observed interaction with other masses. The first candidate for such bodies is the neutrino. For the material bodies that have an electric charge it is the lack of properties an electromagnetic force to counteract the acceleration. Is there a candidate for such bodies in the microcosm? I didn't study this question. May be, experts on the structures of the micro particles are able to give answer to this question.

In order that we make sure that this physical model is not contrary to the principle of relativity, it remains to show that all inertial reference frames have properties of relativity to each other.

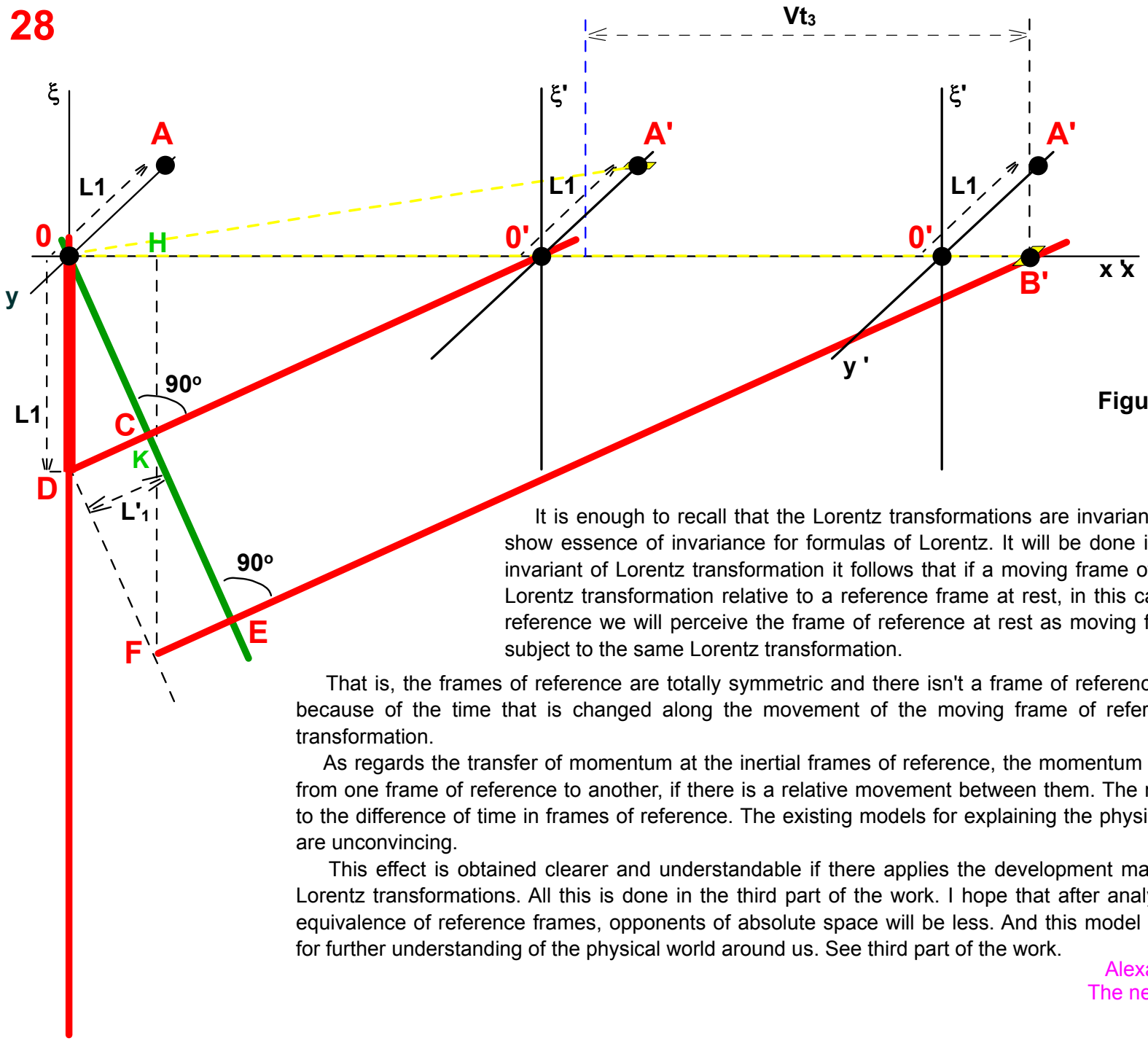


Figure 11.

It is enough to recall that the Lorentz transformations are invariant. Third part of the work will show essence of invariance for formulas of Lorentz. It will be done in brief form. And out of the invariant of Lorentz transformation it follows that if a moving frame of reference is subject to the Lorentz transformation relative to a reference frame at rest, in this case, out of moving frame of reference we will perceive the frame of reference at rest as moving frame of reference, which is subject to the same Lorentz transformation.

That is, the frames of reference are totally symmetric and there isn't a frame of reference at rest. This effect arises because of the time that is changed along the movement of the moving frame of reference according to Lorentz transformation.

As regards the transfer of momentum at the inertial frames of reference, the momentum is changed in the transition from one frame of reference to another, if there is a relative movement between them. The momentum is changing due to the difference of time in frames of reference. The existing models for explaining the physics of change of momentum are unconvincing.

This effect is obtained clearer and understandable if there applies the development mathematical formulas for the Lorentz transformations. All this is done in the third part of the work. I hope that after analyzing the conditions for the equivalence of reference frames, opponents of absolute space will be less. And this model will be accepted as a basis for further understanding of the physical world around us. See third part of the work.

Alexander Poshelaev.

The next part will be continued.

Part 3.

“The analysis of invariant properties of the Lorentz transformation.”

Introduction.

For time and positions of coordinates the Lorentz transformation is fundamental to the special theory of relativity. Lorentz transformation is fundamental to principal conclusions of this theory also. If ever this transformation is repealed the foundations of special relativity will be altered or destroyed. But for the time being the range of Michelson's experiments confirms validity of the Lorentz transformation. Because of importance of the Lorentz transformation to theoretical physics the part 3 will be analyze their physical and mathematical features in more detail. This is especially important for readers who don't know deeply principle of relativity, but easy to perceive the point of view of the supporters of the special theory of relativity on impossibility of an existence of spatial ether. As is well known, their point of view is to deny the existence of ether. Arguments for confirmation of this position are summarized roughly as follows: the model of absolute ether is absurd, since inside of moving frame of reference any Michelson experiment can show a changing of the speed of light and in such frame of reference the principle of relativity doesn't exist. Therefore, the question of the existence of absolute ether was always a matter of principle in physics, and it requires additional analysis. Briefly describe the plan for further analysis and its purpose.

The first section of the part 3 will explain how, thanks to the Lorenz equations for time and coordinates in the moving inertial frame of reference the speed of light exists without a changing. It is a simple analysis and it performs next explanation. If the frame of reference at rest and the moving frame of reference exist inside the luminous ether and the moving frame of reference obey to transformation Lorenz for the time and coordinates then inside of the moving frame of reference and inside of the frame of reference at rest the speed of light isn’t changed. This small analysis is needed for the first and second parts of this work. The work shows that if properties of inertial frames to associate with specific wave properties of the elementary particles of our world, the inertial frames of reference obey to the Lorentz transformations. Thus, when a model of absolute

space and ether in the first and the second parts gives the Lorentz transformation, we can assume that the speed of light in a moving frame of reference isn't changed. It was the main goal: getting the Lorentz transformation in the model of absolute space. Because then all the conclusions of the special theory of relativity are obtained automatically by themselves. Professionals, I guess, know about it. Nevertheless, why is it done? For what is necessary to repeat the earlier results which are already recognized? These questions from the proponents of the theory of relativity I had permanently. The answers are simple to these questions. These results are obtained in the new model for physical nature of elementary particles of our world (bazon Higgs). Moreover, if the foundations of the model are correct then they will give further insight into the nature of the fabric of our world and It explains the physical nature of postulates such as the postulates of theory of special relativity and Newton's laws and so on. As we know, the nature of these postulates is not clear. This model gives an explanation and understanding of the real existing of the parallel worlds and it will be received in not the abstract, mathematical form, which gives a very slow, almost blind, forward movement of physics. Here, explanation is deduced with help of the physical model.

The second section of the part 3 will continue the detailed explanation of the reasons due to which this model exists without violation of the principle of relativity into the absolute space. This section explains with help of the mathematics and physics why inside any inertial frame of reference that has a inertial motion, you will perceive a frame of reference at rest as a moving frame of reference that has motion relatively to absolute space. This effect occurs if the moving inertial frame of reference for time and coordinates obeys to the Lorentz transformation. The Lorentz transformation has invariant properties. Because of these properties if you are inside a moving frame of reference you will not be able to consider a frame of reference existing at rest as "frame of reference at rest". The invariance of Lorentz transformation takes place from the specific allocation of time along the movement of the inertial reference frame and changing of the coordinates inside this frame of reference. Because of them, being in a moving frame of reference, it is impossible to perceive the frame of reference at rest. And in normal circumstances it is impossible to find signs which saying it is some of an inertial frame of reference that is being at absolute rest but your inertial frame of reference is moving. That is, if you would were in a moving inertial frame of reference, for frame of reference at rest, you register the slow down the flow of time reducing the length of bodies along motion, as if this

frame exists at motion. It seems that there are absurd contradictions. And it is logically, if you are located as an observer inside a moving frame of reference you have to register the acceleration time for frame that exists absolutely at rest. And if inside the moving frame of reference you are reduced along the movement, in this case, in the frame of reference at rest you should to register increase of the size of a body along the motion because you yourself were reduced in size. But it will not be because inside the moving frame of reference, the physical properties your body and properties of all the material bodies obey to the Lorentz transformations. Therefore, all inertial frames of reference become as invariant frames of reference relatively to each other. In addition, if we consider three inertial frames, one of which will be a frame of reference at rest absolutely, while the other two are moving at different speeds then all of these frames of reference are equivalent to each other and the principle of relativity between them is saved. All of this analysis show that the introduction of absolute space is not contrary to the principle of relativity. And in all inertial frames of reference moving relative to absolute space under normal conditions the experiments class of Michelson will not register a change in the speed of light or violations of Lorentz transformations.

The third section of the part 3 will analyze the transformation of energy and momentum in the transition from one inertial frame of reference to another a moving frame of reference. The momentum is associated with the passage of time in own frames of reference of bodies. It gives the change in the momentum transfer in these frames of reference. It takes place because of slowdown of time flow at motion. And requirement to preservation of motion energy of body leads to the automatic change of relativistic mass of the body. Existing attempts in literature for conclusion of change of the mass at motion on the basis of other physical presupposition from my point of view are not consistent. So, as an example, in the third section, there is conclusion that will remind you about conservation of momentum at relativistic speeds. It will show how the Lorentz transformations give automatically the increase of relativistic mass in inertial frame of reference at motion. The Lorentz transformation is a basis of other findings of the special theory of relativity. This applies to energy, etc. Everything revolves around this transformation in the direct or indirect latent form. It does not make sense to disclose all such findings in a detailed form. If a reader is interested by these issues in detail I hope the reader can to do that without assistance. For initial aid for the reader there are three sections in this part.

1. Derivation of constant speed of light, in the inertial frame of reference, which conforms to Lorentz transformation.

Consider two frames of reference. The first of frames of reference is at rest. See figure **1**.

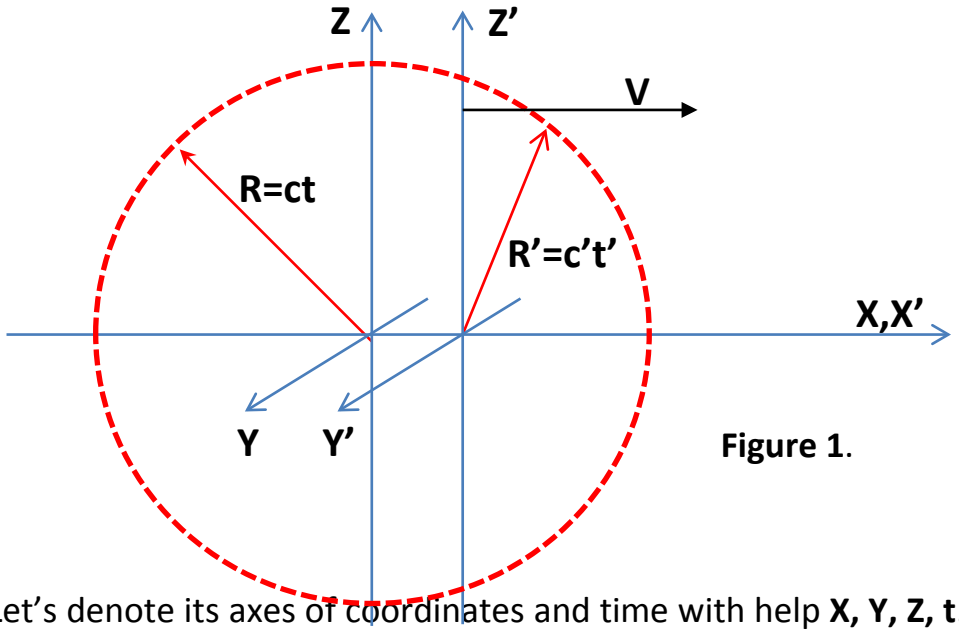


Figure 1.

Let’s denote its axes of coordinates and time with help **X, Y, Z, t**. The time **t** in Figure **1** isn't displayed. The second frame of reference moves relative to the first frame of reference at a constant speed **V** without rotation. Let the movement takes place along the positive direction of the **X**-axis relative to the frame of reference at rest. Let’s denote its axes of coordinates and time with help **X‘, Y‘, Z‘, t‘**. A point in time when the frames of reference were combined with each other by centers we take as **t = 0** and **t '= 0** for each of the frames of reference. Let the frame of reference **X, Y, Z** will be at rest relative to absolute space.

We assume that light travels through the ether of the absolute space, which is fixed. Then the speed of light in ether is constant and does not depend on motion of the frames of reference.

Let's assume that at time zero from the joint centers of the frames of reference a flash of light is emitted. In the frame of reference at rest the light spreads in form of a sphere at speed of **c**. At time **t** the sphere's radius is equal to **R=ct** wherein **R** is $\mathbf{R=(x^2+y^2+z^2)^{1/2}}$. Inside the moving frame of reference, the light will spread at different speeds. In the negative direction of the axis **X'** speed of light is equal to the speed **V** increased by moving of this frame of reference and will be equal to **c' = c + V.** In the positive direction of the axis **X'** speed of light is reduced due to the motion of the moving frame of reference. In this case, the speed of light is equal to **c'=c-V**. Along axes **Y',Z'** the speed of light is equal to $\mathbf{c''= (c^2-V^2)^{1/2}}$. Such is the picture of the propagation of light in the classical frames of reference.

Now assume that the moving frame of reference obeys to the Lorentz's transformation for coordinates and time. It takes place relative to frame of reference at rest:

$$\mathbf{X'} = \frac{x-/+Vt}{\sqrt{1-\frac{v^2}{c^2}}}; \quad \mathbf{Y'=Y;} \quad \mathbf{Z'=Z;} \quad \mathbf{t'} = \frac{t-/+\frac{V}{c^2}x}{\sqrt{1-\frac{v^2}{c^2}}} \qquad \mathbf{(1)}$$

Now we will compare the propagation of light in such a frame of reference with respect to the frame of reference at rest. For the frame of reference at rest, equation of propagation for spherical wave in an arbitrary point in time **t** is:

R = ct, где $\mathbf{R} = \sqrt{x^2 + y^2 + z^2}$

Alternatively, it can be written as is $\mathbf{t} = \frac{\sqrt{x^2+y^2+z^2}}{c}$ **(2)**

In a moving frame of reference, the propagation of light can be written as are

$(R')^2 = (c')^2 (t')^2$ **(3)** , here $(R')^2$ is $(R')^2 = (x')^2 + (y')^2 + (z')^2$

Making the substitution into (3) out of the Lorentz transformation (1), we get

$$\frac{(x-/+Vt)^2}{1-\frac{V^2}{C^2}} + Y^2 + Z^2 = (c')^2 \frac{(t-/+\frac{V}{C^2}x)^2}{1-\frac{V^2}{C^2}}$$

After some transformations, we obtain:

$$c^2(X-/+Vt)^2 + (c^2-V^2)Y^2 + (c^2-V^2)Z^2 = (c')^2c^2(t-/+\frac{V}{C^2}X)^2$$

From the last expression we find the unknown value of the speed of light in the moving frame of reference $(c')^2$. It is equal to:

$$(c')^2 = \frac{c^2(X-/+Vt)^2+(c^2-V^2)Y^2+(c^2-V^2)Z^2}{c^2(t-/+\frac{V}{C^2}X)^2}$$

Now we execute the substitution of value **t** from the expression (2).

$$(c')^2 = \frac{c^2(X-/+\frac{V}{C}\sqrt{X^2+Y^2+Z^2})^2+(c^2-V^2)Y^2+(c^2-V^2)Z^2}{c^2(\frac{\sqrt{X^2+Y^2+Z^2}}{C}-/+\frac{V}{C^2}X)^2} =$$

$$= c^2 \frac{(cX-/+V\sqrt{X^2+Y^2+Z^2})^2+(c^2-V^2)Y^2+(c^2-V^2)Z^2}{(c\sqrt{X^2+Y^2+Z^2}-/+VX)^2} =$$

$$= c^2 \frac{c^2X^2 -/+ 2cXV\sqrt{X^2+Y^2+Z^2} + V^2X^2 + V^2Y^2 + V^2Z^2 + c^2Y^2 - V^2Y^2 + c^2Z^2 - V^2Z^2}{(c\sqrt{X^2+Y^2+Z^2} -/+ VX)^2} =$$

$$= c^2 \frac{c^2(X^2+Y^2+Z^2) -/+ 2cXV\sqrt{X^2+Y^2+Z^2} + V^2X^2}{(c\sqrt{X^2+Y^2+Z^2} -/+ VX)^2} =$$

$$= c^2 \frac{(c\sqrt{X^2+Y^2+Z^2} -/+ V\,X)^2}{(c\sqrt{X^2+Y^2+Z^2} -/+ VX)^2} = c^2 = (c')^2 \text{ or } c' = c$$

This equality shows that if in the moving frame of reference the time and coordinates are subjected to the Lorentz transformations, the light in this frame of reference is propagated exactly as in the frame of reference at rest. Therefore, with the help of a class of experiments of Michelson it is impossible to determine the movement of the frame of reference relative to absolute space (ether). Since the velocity **V** can take any value, the above is true for any velocity **V** from zero up to light speed.

Thus, from the mathematical analysis is above it can be concluded that if for the model in this work (parts 1 and 2) the Lorentz's transformations are obtained for inertial frame of reference at motion, in this case, in such frame of reference the propagation of light is the same as in the frame of reference at rest. Moreover, it must be noted that in contrast to the model of frames of reference in the special theory of relativity the model of the first and second parts discloses the essence of this phenomenon. It is based on the wave properties of fabric (matter) of our world.

2. Perception of frame of reference at rest from point of view of an inertial frame of reference at motion that obeys to the Lorentz transformations.

Thus, the first section has executed a direct transition from frame of reference at rest into a moving frame of reference. This transition was subjected to the Lorentz transformation. If we consider such transition in the theory of special relativity this transition was performed on the basis of the postulate which states that the speed of light in any inertial frame is constant. In the theory of special relativity in order to perform the postulate, affine frame of reference was found with help of mathematical modeling. Such reference frame gives the Lorentz transformation for the direct transition from the frame of reference at rest to a moving frame of reference, in case if weighting factor is applying to this transition. The reverse transition from the frame of reference at motion to the frame of reference at rest is automatically obtained because of the invariance of the Lorentz transformations. This property allowed simulating transitions in both directions mathematically without explaining why there are these changes for coordinates and the time in the inertial frames of reference. In such simulation the ether was not needed. It was replaced by mathematics.

In order to ensure that the Lorentz transformation is invariant, consider the reverse transition in more detail. Revers transition is by transition from the frame of reference at motion to the frame of reference at rest. We assume that the direct transition from the frame of reference at rest to the frame of reference at motion is already there. In this work the part 1 gives a natural explanation for this physical phenomenon. The analysis will be carried out without frames of reference from the special theory of relativity. Analyses were carried out using conventional classical frames of reference. Let us analyze the transition. We assume that the coordinates and the time in frame of reference at motion relative to frame of reference at rest are subjected to the Lorentz transformations. Consider the Figure 2. It shows frame of reference at rest with its metric on the axes **X,Y,Z**. The frame of reference has an arbitrary point **x** (x-small) on the positive half **X**- axis.

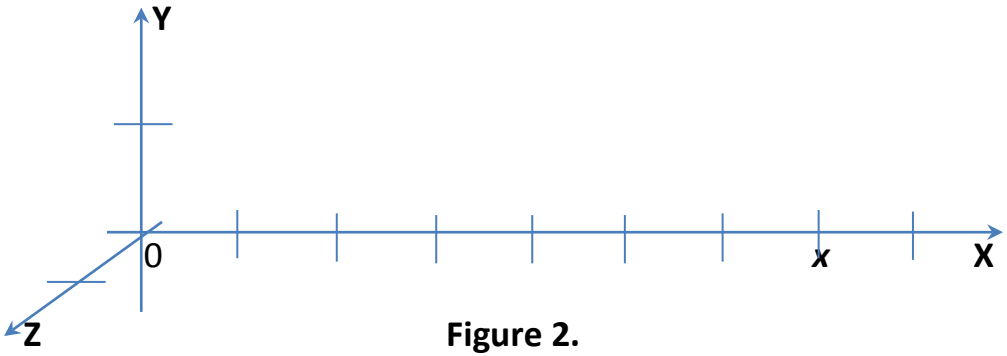


Figure 2.

Let's add a moving frame of reference (**X',Y',Z'**) to the picture 2. This frame of reference has own metric. According to Lorentz transformation on the axes **Y'**, **Z'** the metric coincides with the metric **Y, Z** frame of reference at rest. On the axis **X'** metric is reduced. Frame of reference will move relative to frame of reference at rest at speed **V**. The motion will take place along positive direction of **X** -axis without rotation. Center of the moving frame of reference has a small, arbitrary shift on **Z** -axis. This shift is made only for artificially improving image perception. At time **t,t '= 0** center of the moving frame of reference is located on the axis **Z**. See figure 3.

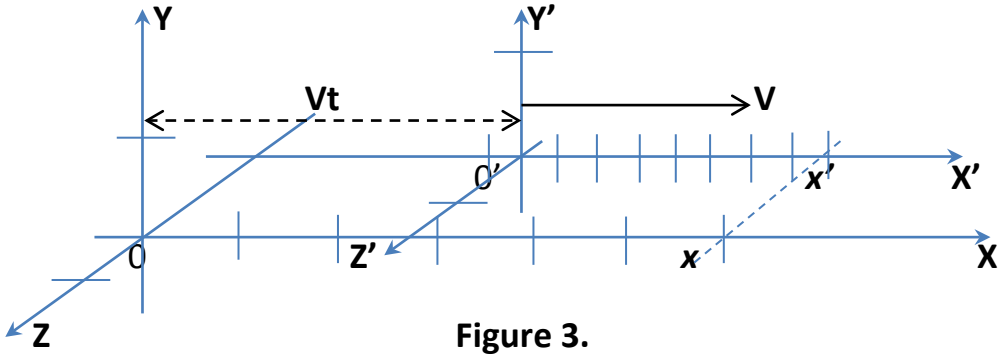


Figure 3.

Inside of the moving frame of reference at time **t** position of point **x** will correspond to the point **x'**. If we don't take into account of the metric of the axis **X'** in moving frame of reference, the length of the segment **0'*x'*** is equal to ***x*-Vt**. However, the moving frame of reference has relativistic contraction of material bodies along the axis **X'**, including measuring rulers. For this reason, onto the interval ***x*-Vt** is placed more metric lengths and we have to write the coordinate **x'** in the following form:

$$x' = \frac{x - Vt}{\sqrt{1 - \frac{V^2}{C^2}}} \quad (4)$$

Let's perform the transition back in order to estimate the changing of the coordinates of the frame of reference at rest relative to the frame of reference at motion. The transition back will analyze step by step in detail. Obviously, along axes **Z'** and **Z**, **Y'** and **Y** the transitions don't give changes on axes because **Z'= Z, Y' = Y.** The picture is changed between the axes **X** and **X'**. Let us consider it in more detail. We perform the first action of the transition. From (4) we obtain:

$$x - Vt = x'\sqrt{1 - \frac{V^2}{C^2}} \quad (5)$$

This result underlines the complete asymmetry of the two frames of reference. In case if the result would have symmetry the segment length ***x – Vt*** should be equal to the value ***x'***. But in the frame of reference along the axis **X'** the metric reduced according to the value of the relativistic root. See the figure 3. Because of this, in formula (4) in the denominator there is the relativistic root. If you perform the reverse transition out of the moving frame to the frame of reference at rest the length **x'** should be reduced in order to reduce the artificially increasing of the absolute length **x'**. This reduction is performed with using of the relativistic root which acts with a multiplication on the length of **x'**. This is essence of the action for the relativistic root on the right side of equation (5). Let's do the next step is for the formula (5).

$$x = x'\sqrt{1 - \frac{V^2}{C^2}} + Vt \quad (6)$$

In expression (6) segment ***Vt*** is a special shift during time t. This restores motion of the frame of reference during time **t** with respect to point zero of the frame of reference at rest. See figure 3. This segment by itself is not subjected to transformation because of the metrics of the frame of reference at motion. Therefore, in (6), it is as an additional element without mathematical influences.

Now it is clear that the expression (6) for relations of the coordinate axes **X'** and **X** gives the asymmetry for the reverse transition from frame of reference at motion to the frame of reference at rest. See the formula (4) and (6). It would seem that the reverse transition is a violation of the principle of relativity, but in the expression (6) the element ***Vt*** has a time **t** that belongs the frame of reference at rest. But we need find a relation between the parameters of the frame of reference at motion and of the frame of reference at rest. Therefore it is necessary to associate the time **t** with the time **t'**. For this we use the Lorentz transformation to the time that ties time **t** of the moving frame of reference to the frame of reference at rest.

$$\mathbf{t'} = \frac{t - \frac{V}{C^2}X}{\sqrt{1 - \frac{V^2}{C^2}}} \qquad \mathbf{(7)}$$

We find from (7) the time **t**. For the finding we will do the following

$$\mathbf{t'}\sqrt{1 - \frac{V^2}{C^2}} = t - \frac{V}{C^2}X$$

Hence, the time t is

$$t = \mathbf{t'}\sqrt{1 - \frac{V^2}{C^2}} + \frac{V}{C^2}X \qquad \mathbf{(8)}$$

Pay attention to the last term in this expression: $\frac{V}{c^2}X$. This a time, but it is associated only with the location of the point **X** on the **0X** -axis and in during time it doesn't change. Making the substitution of obtained value (8) for the time in the expression (6). Then we get:

$$x = x'\sqrt{1-\frac{v^2}{c^2}} + V(t'\sqrt{1-\frac{v^2}{c^2}} + \frac{v}{c^2}X) = \frac{v^2}{c^2}X + Vt'\sqrt{1-\frac{v^2}{c^2}} + x'\sqrt{1-\frac{v^2}{c^2}}$$

This result is displayed in Figure 4.

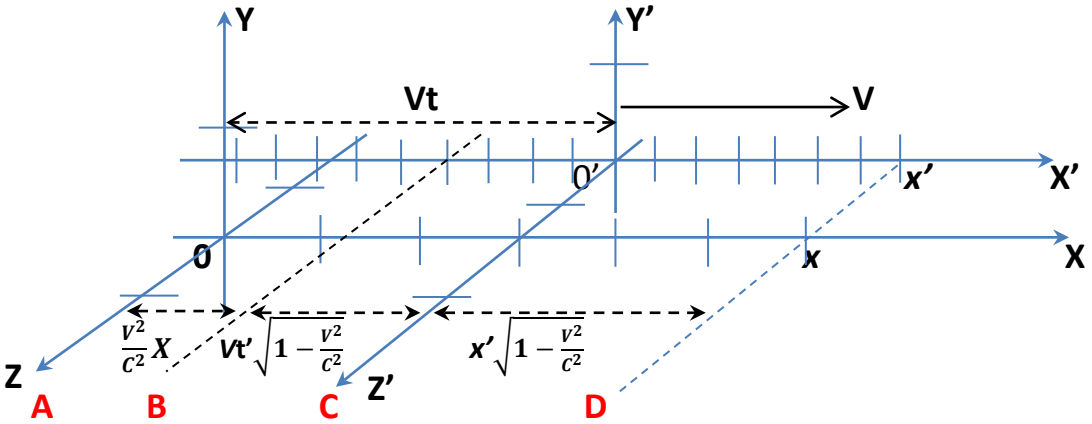


Figure 4.

Figure 4 shows a segment **0x**. It is divided into three sections, i.e. **0x** = **AD** = **AB** + **BC** + **CD** where are

$$AB = \frac{v^2}{c^2}X,\ BC = Vt'\sqrt{1-\frac{v^2}{c^2}},\ CD = x'\sqrt{1-\frac{v^2}{c^2}}.$$

From this result, it is clear that the time-varying displacement ***Vt*** consists of two components. One of the components is a constant that is equal to $\frac{V^2}{c^2}X$ and depends only on the position of **X**.

This component appears due to the changing time along axis **X'** in the moving frame of reference. If we consider the segment **BD** then it is a constant over time too and segment **BD** depends on the chosen point ***X*** in the frame of reference at rest. It can be found equal to

$$BD = AD - AB = X - \frac{V^2}{c^2}X = X\cdot\left(1 - \frac{V^2}{c^2}\right)$$

But the total length of this segment has a connection with the time **t'** and the coordinate **x'**. See figure 4. According to this figure we obtain:

$$BD = X\left(1 - \frac{V^2}{c^2}\right) = Vt'\sqrt{1-\frac{V^2}{c^2}} + x'\sqrt{1-\frac{V^2}{c^2}}$$

The segment **BD** has a shorter metric. But since this metric is strictly related to location of the point of ***X*** then we can find an unit metric to measure the distance up to the point ***X***. The distance up to this point ***X*** in new metric is equal to:

$$X = \frac{Vt'\sqrt{1-\frac{V^2}{c^2}} + x'\sqrt{1-\frac{V^2}{c^2}}}{1-\frac{V^2}{c^2}} = \frac{x' + Vt'}{\sqrt{1-\frac{V^2}{c^2}}}$$

Given that ***Z = Z'***, ***Y = Y'*** we are getting the full inverse Lorentz transformation for coordinates

$$X = \frac{x' + Vt'}{\sqrt{1-\frac{V^2}{c^2}}}; \quad Z=Z', \quad Y=Y'$$

Last result shows that in the frame of reference at rest, the coordinates are also subjected to the Lorentz transformations. Let's analyze physics of the result in this reverse transition. To understand it better, we first consider a hypothetical frame of reference at motion. Let this frame of reference is obeying to the following transformation. It takes place relatively to frame of reference at rest.

$$x' = \frac{x - Vt}{\sqrt{1-\frac{V^2}{C^2}}};\ y' = y;\ z' = z;\ t' = \frac{t}{\sqrt{1-\frac{V^2}{C^2}}}$$

This transformation differs from Lorentz transformation by lack of the second element for time when there is a passage from **t** to **t** '. It is additional time.

$$\frac{-\frac{V}{C^2}X}{\sqrt{1-\frac{V^2}{C^2}}}$$

This time is distributed along the **X**-axis. Let's perform common inverse transformation for the hypothetical frame of reference. It is equal to

$$x = (x' + Vt')\sqrt{1-\frac{V^2}{C^2}};\ y = y';\ z = z';\ t = t'\sqrt{1-\frac{V^2}{C^2}}$$

The result shows that the hypothetical frame of reference does not give invariance transformations in the reverse transition. The frame of reference turns out an asymmetrical. Without additional mathematical analysis, it could be argued that the speed of light will have a different meaning in the frames of reference that are related with help of such transitions.

However, note the following are. The hypothetical frame of reference gives the correct asymmetrical transition to the frame of reference at rest. It has a reduction of spatial and time metrics relative to the frame of reference at rest. So, for example, at the reverse transition to the **x**-axis, on axis **x'**, a distance must be multiplied by the relativistic root.

It is obvious that in the considered transformations, there is not symmetry due to lack of the additional element for time in the direct transformation. It is that gives correction metric along the **x**-axis when there is the reverse transition to the Lorentz transformation. Let's consider how this additional element of time affects the metric.

To do this, go back to the Figure 4. It is seen that absolute shift (**Vt**) is equal to two components:

$$\mathbf{Vt = Vt'}\sqrt{1-\frac{V^2}{C^2}}+\frac{V^2}{C^2}X$$

The first component of the sum is real shift of the frame of reference during time **t'**. The second component ($\frac{V^2}{C^2}X$) of the sum is a shift of the frame of reference, which appears due to the second element of time. The shift provides a time that does not change over time and this time is a function of the position in space of a point on the **x**- axis. Shift of frame of reference during this time can be called a virtual shift. In the physical movement it does not exist. This shift reflects presence of changes in properties of the frame of reference. To understand a hidden action of the shift, let's perform this analyze with help of an observer.

It is obvious that during of absolute time (**t**) the observer detects the shift of the frame of reference, its value is equal to **Vt**. Virtual motion of the frame of reference with respect to himself he cannot see. However, inside of the absolute length **Vt** the additional shift should be because the observer at the point **x** has the additional time that is equal to ($\frac{V}{C^2}X$). For this time, the observer must ascertain additional shift. Its length is equal to ($\frac{V^2}{C^2}X$).

But in absolute measurement, the frame of reference has the motion, which is equal to **Vt**, and there is no additional motion of the frame of reference. Here we have a seeming contradiction. But in reality it is not, since in a fixed length **Vt** the additional shift is possible if there is a natural decrease in the metric of the length. More short metric enables to include greater length ($\frac{V^2}{C^2}X$ and **Vt'**$\sqrt{1-\frac{V^2}{C^2}}$) inside fixed length (**Vt**). This is the physics of changes of properties of the frame of reference at rest from a position of a moving frame of reference. Therefore, because of the changing of metric onto **x**-axis, the segment (**BD**) is equal to **BD** = $X\left(1-\frac{V^2}{C^2}\right)$. Changing of the metric because of distribution of time along the movement gives the end result for reverse Lorentz transformation. For this reverse Lorentz transformation, the frame of reference at motion is transformed into the frame of reference at rest and the frame of reference at rest is transformed into the frame of reference at motion, which moves in the opposite direction. In this case the transition from one frame of reference to another keeps in force the Lorentz transformation. A similar analysis can be performed for the reverse transition of time. Because of identity of such analysis to the performed analysis, it will not be executed.

Obviously, the reason for invariance of the inverse transformation of Lorentz is provided by the frame of reference at motion. This frame of reference obeys to the Lorentz transformation at a direct transition out of frame of reference at absolute rest. It is property of the system that gives at the reverse transition the perception of frame of reference at absolute rest as frame of reference at motion, which is subjected to the same Lorentz transformation. However, the property of moving frame of reference cannot be determined by abstract reasons. Physical properties of frame of reference must be connected with the properties of the physical space and the properties of material bodies of our space.

The model proposed here, gives explanation of this connection. This model reveals the essence of the general connections between material objects of our world, parallel space and space of our world.

For a more complete reverse transition, it remains to analyze the relationship between the times of the two frames of reference.

Let's consider it with purely mathematical transformations. We write expression of the direct Lorentz transformation for the time from a point of view of the frame of reference at rest onto a frame of reference at motion.

$$t' = \frac{t - \frac{V}{c^2}X}{\sqrt{1-\frac{V^2}{c^2}}}$$

We transform this expression to the form:

$$t'\sqrt{1-\frac{V^2}{c^2}} = t - \frac{V}{c^2}X \quad \text{or} \quad t = t'\sqrt{1-\frac{V^2}{c^2}} + \frac{V}{c^2}X$$

We use the expression (6) in order to replace the value of **X**. Then we obtain the following

$$t = t'\sqrt{1-\frac{V^2}{c^2}} + \frac{V}{c^2}\left(x'\sqrt{1-\frac{V^2}{c^2}} + Vt\right) = t'\sqrt{1-\frac{V^2}{c^2}} + \frac{V}{c^2}x'\sqrt{1-\frac{V^2}{c^2}} + \frac{V^2}{c^2}t$$

$$\text{or} \quad t\left(1 - \frac{V^2}{c^2}\right) = t'\sqrt{1-\frac{V^2}{c^2}} + \frac{V}{c^2}x'\sqrt{1-\frac{V^2}{c^2}}$$

The last equation gives the Lorentz transformation for the time.

$$t = \frac{t' + \frac{V}{c^2}X'}{\sqrt{1-\frac{V^2}{c^2}}}$$

The results for the time and coordinates show that inside absolute space from the point of view of a moving frame of reference it is impossible to define that the frame of reference at rest is motionless.

The above analysis considered two of the transition. The first transition was direct transition from a frame of reference at rest to a moving frame of reference. Speed of the frame of reference at motion, was introduced in an arbitrary range of $0 \le \mathbf{V} < c$. Here the direct transition wasn't considered. You can see the proof for the direct transition in part 1 and part 2 this work. The reverse transition is carried out from a moving frame of reference to the frame of reference at rest. Figure 5 shows these two transitions.

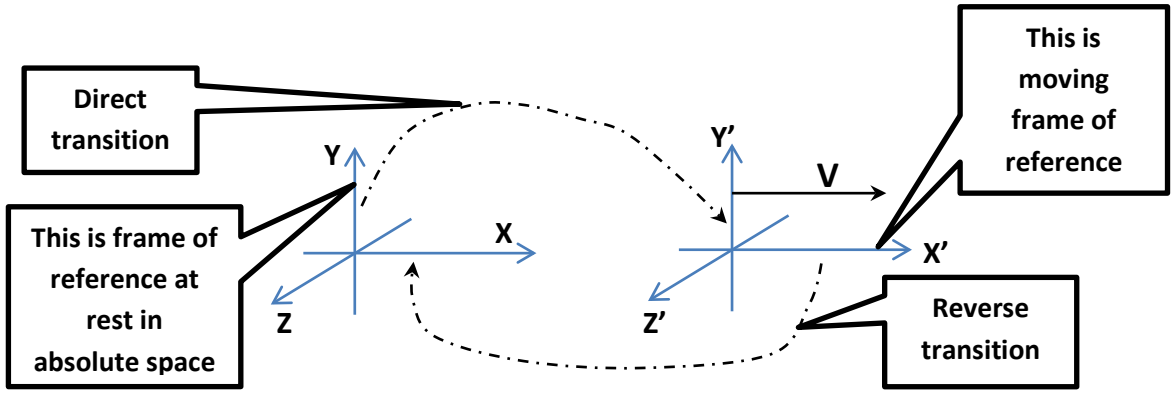


Figure 5.

For a more complete check of invariance Lorentz transformation, it is required to consider another transition between two inertial frames of reference. Let these two frames of reference are moving linearly with different constant velocities relative to the fixed frame of reference at rest. This frame of reference is fixed with respect to absolute space. The two frames of reference move without rotation along the positive axis x of the fixed frame of reference. Let the time and coordinates each of frames of reference relative to the frame of reference at rest are subjected to the Lorentz transformations. We need find out the next: does the transition obey to the Lorentz transformations between moving frames of reference? See Figure 6.

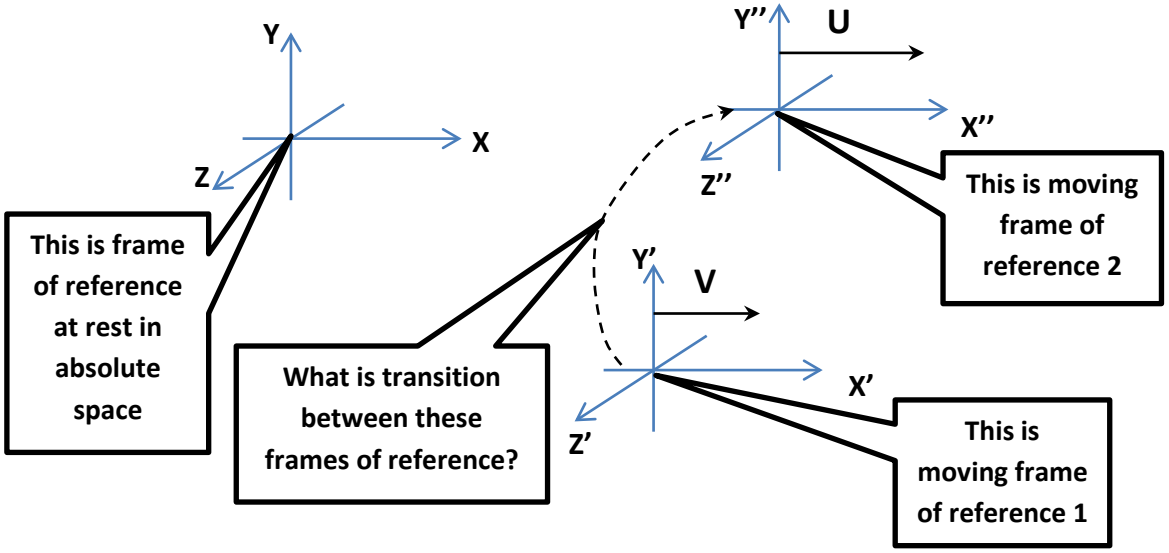


Figure 6.

To determine this transition we need perform two intermediate transitions. See Figure 7.

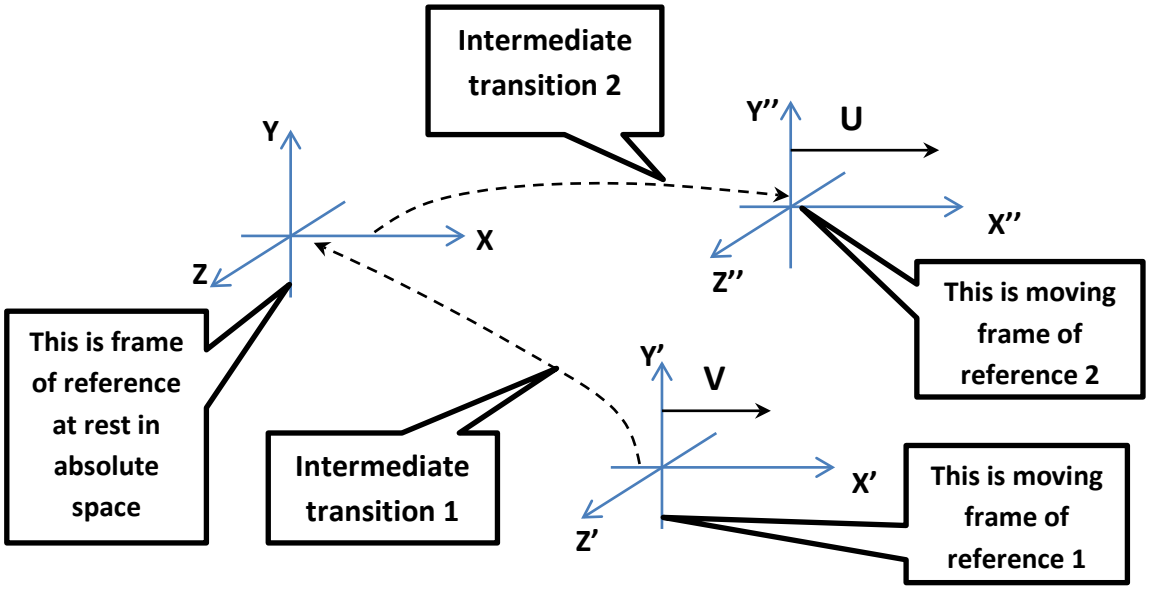


Figure 7.

The first intermediate transition will give link between the moving frame 1 of reference **(X',Y',Z',t')** and the frame of reference **(X,Y,Z,t)** at rest. The second intermediate transition will give link between the frame of reference **(X,Y,Z,t)** at rest and the moving frame 2 of reference **(X'',Y'',Z'',t'')**. The sum of these two transitions gives a general transition from the moving reference frame 1 into the moving frame of reference 2. Let's perform these transitions. Before performing mathematical analysis let's agree that the speed **U** of the second frame of reference more the speed **V** of the first frame of reference. Both speeds are considered relative to the frame of reference that is at rest in absolute space. Let's write the Lorentz transformation for the first transition.

$$X = \frac{x' + Vt'}{\sqrt{1 - \frac{V^2}{C^2}}} \; ; \quad Y=Y'; \quad Z=Z'; \quad t = \frac{t' + \frac{V}{C^2}x'}{\sqrt{1 - \frac{V^2}{C^2}}} \qquad (9)$$

It links the coordinates **X', Y', Z'** and the time **t'** of the first moving frame of reference with coordinates **X, Y, Z** and the time **t** of the frame of reference at rest. Lorentz transformations for the second transition is following

$$X'' = \frac{x - Ut}{\sqrt{1 - \frac{U^2}{C^2}}} \; ; \quad Y''=Y; \quad Z''=Z; \quad t'' = \frac{t - \frac{U}{C^2}x}{\sqrt{1 - \frac{U^2}{C^2}}} \qquad (10)$$

This transition gives relationship between the coordinates **X, Y, Z** and the time **t** of the frame of reference at rest and **X'', Y'', Z'', t''** of the second moving frame of reference. But for further mathematical analysis we need the transition between the two moving frames of reference. Therefore, in the last equalities (10) let's will make a replacement of values **X, Y, Z, t**. They will be taken from (9). Such a replacement will link the values (**X'', Y'', Z'', t''**) of second moving frame of reference with the values (**X', Y', Z', t'**) of first moving frame of reference. Let's carry out these changes:

$$X'' = \frac{\frac{x' + Vt'}{\sqrt{1 - \frac{V^2}{C^2}}} - U\frac{t' + \frac{V}{C^2}x'}{\sqrt{1 - \frac{V^2}{C^2}}}}{\sqrt{1 - \frac{U^2}{C^2}}} \; ; \quad Y''=Y'; \quad Z''=Z'; \quad t'' = \frac{\frac{t' + \frac{V}{C^2}x'}{\sqrt{1 - \frac{V^2}{C^2}}} - \frac{U}{C^2}\left[\frac{x' + Vt'}{\sqrt{1 - \frac{V^2}{C^2}}}\right]}{\sqrt{1 - \frac{U^2}{C^2}}} \quad (11).$$

At first, let's perform mathematical transformations for the time **t''**

$$t'' = \frac{\frac{t' + \frac{V}{C^2}x'}{\sqrt{1-\frac{V^2}{C^2}}} - \frac{U}{C^2}\left[\frac{x' + Vt'}{\sqrt{1-\frac{V^2}{C^2}}}\right]}{\sqrt{1-\frac{U^2}{C^2}}} = \frac{t' + \frac{V}{C^2}X' - \frac{U}{C^2}X' - \frac{VU}{C^2}t'}{\sqrt{1-\frac{V^2}{C^2}}\sqrt{1-\frac{U^2}{C^2}}} = \frac{t'\left(1-\frac{VU}{C^2}\right) + \frac{V-U}{C^2}X'}{\sqrt{1-\frac{V^2}{C^2}}\sqrt{1-\frac{U^2}{C^2}}} =$$

$$= \frac{\left(1-\frac{UV}{C^2}\right)\left[t' - \frac{U-V}{C^2\left(1-\frac{UV}{C^2}\right)}X'\right]}{\sqrt{1-\frac{V^2}{C^2}}\sqrt{1-\frac{U^2}{C^2}}} = \frac{t' - \frac{U-V}{C^2\left(1-\frac{UV}{C^2}\right)}X'}{\frac{\sqrt{1-\frac{V^2}{C^2}}\sqrt{1-\frac{U^2}{C^2}}}{\left(1-\frac{UV}{C^2}\right)}} = \frac{t' - \frac{U-V}{C^2\left(1-\frac{UV}{C^2}\right)}X'}{\frac{\sqrt{C^2-V^2}\sqrt{C^2-U^2}}{C^2\left(1-\frac{UV}{C^2}\right)}} =$$

$$= \frac{t' - \frac{U-V}{C^2\left(1-\frac{UV}{C^2}\right)}X'}{\frac{\sqrt{C^4 - C^2U^2 - C^2V^2 + U^2V^2}}{C^2\left(1-\frac{UV}{C^2}\right)}} = \frac{t' - \frac{U-V}{C^2\left(1-\frac{UV}{C^2}\right)}X'}{\frac{\sqrt{C^4 - C^2U^2 - C^2V^2 + U^2V^2 - 2C^2UV + 2C^2UV}}{C^2\left(1-\frac{UV}{C^2}\right)}} =$$

$$= \frac{t' - \frac{U-V}{C^2\left(1-\frac{UV}{C^2}\right)}X'}{\frac{\sqrt{(C^2-UV)^2 - C^2(V-U)^2}}{(C^2-UV)}} = \frac{t' - \frac{U-V}{C^2\left(1-\frac{UV}{C^2}\right)}X'}{\sqrt{1-\frac{C^2(U-V)^2}{(C^2-UV)^2}}} = \frac{t' - \frac{U-V}{C^2\left(1-\frac{UV}{C^2}\right)}X'}{\sqrt{1-\frac{(U-V)^2}{C^2(1-\frac{UV}{C^2})^2}}} \quad \textbf{(12)}$$

Consider the last result. There is a fraction in the numerator and the denominator. It is equal to the value of some speed. We denote it by the letter **U'** and write down its value

$$U' = \frac{U-V}{(1-\frac{UV}{C^2})} \quad (13)$$

In order to understand the physical meaning of the velocity **U'** let's consider Figure 8, and analyze a speed with which the second frame of reference **X'', Y'', Z''** is moving relative to the first frame of reference **X', Y', Z'**. We denote the unknown velocity as U' and find its value.

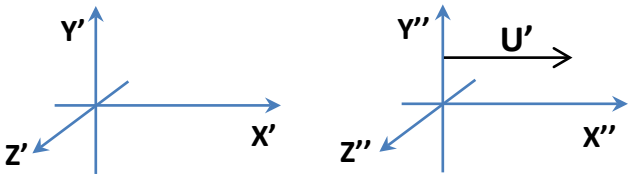


Figure 8.

Speed conclusion will be performed in a simplified form but it will give the exact speed to final value of **U'**.

In the first reference frame of reference **X', Y', Z'** let's consider two infinitesimal interval associated with the movement of the second frame of reference. Suppose the first interval ***ΔX'*** corresponds to the displacement of the second frame of reference on axis ***X'***. The second interval corresponds to the time **t'**. It is equal to an interval of the time during which the second frame of reference is shifted by the amount ***ΔX'*** along the axis ***X'***. Since the speed of the first frame of reference and the second frame of reference are known only to a relatively frame of reference at rest, let's find out the intervals with help of the Lorentz transformation of the frame of reference at rest. On the axis ***X'***, the first interval is equal to

$$\Delta X' = \frac{\Delta X - V\Delta t}{\sqrt{1-\frac{V^2}{C^2}}}$$

We take the second interval over time:

$$\Delta t' = \frac{\Delta t - \frac{V}{C^2}\Delta X}{\sqrt{1-\frac{V^2}{C^2}}}$$

Let's find the ratio of the two intervals:

$$\frac{\Delta X'}{\Delta t'} = \frac{\Delta X - V\Delta t}{\Delta t - \frac{V}{C^2}\Delta X} = \frac{\frac{\Delta X}{\Delta t} - V}{1 - \frac{V}{C^2}\frac{\Delta X}{\Delta t}} \qquad \textbf{(14)}$$

The ratio $\Delta X'/\Delta t'$ is velocity of the second frame of reference that is moving relative to the first frame of reference. The ratio $\Delta X/\Delta t$ is equal to the velocity of the second frame of reference it is relative to the frame of reference at rest in absolute space. Then, according to previously introduced symbol $\Delta X'/\Delta t'$ is equal to

$\frac{\Delta X'}{\Delta t'} = U'$ and the ratio $\Delta X/\Delta t$ is $\frac{\Delta X}{\Delta t} = U$

Let's rewrite (14) in accordance with the symbols that are introduced for the speeds. Then we get

$$U' = \frac{U - V}{1 - \frac{VU}{C^2}}$$

This speed coincides with the speed that was used in the expression (13). Let's substitute this value into the expression (12) and we rewrite the value of time **t''**.

$$\mathbf{t''} = \frac{t' - \frac{U'}{C^2}x'}{\sqrt{1 - \frac{(U')^2}{C^2}}}$$

Thus, relative to the first frame of reference, the time (**t''**) of second moving frame of reference is also subjected to the Lorentz transformation for time.

It remains to obtain the Lorentz transformations for coordinates. Let's execute it. Obviously, if we use the expressions (9) and (10) then we shall obtain the identities

Y'' = Y', Z'' = Z'

Now, we find the connection between **X''** and **X'**. For its definition let's continue the mathematical transformations for **X''** from (11).

$$\mathbf{X''} = \frac{\frac{x' + Vt'}{\sqrt{1 - \frac{V^2}{C^2}}} - U\frac{t' + \frac{V}{C^2}x'}{\sqrt{1 - \frac{V^2}{C^2}}}}{\sqrt{1 - \frac{U^2}{C^2}}} = \frac{X' + Vt' - Ut' - \frac{VU}{C^2}X'}{\sqrt{1 - \frac{V^2}{C^2}}\sqrt{1 - \frac{U^2}{C^2}}} = \frac{X'\left(1 - \frac{VU}{C^2}\right) - (U - V)t'}{\sqrt{1 - \frac{V^2}{C^2}}\sqrt{1 - \frac{U^2}{C^2}}} =$$

$$= \frac{\left(1-\frac{UV}{C^2}\right)\left[X'-\frac{U-V}{\left(1-\frac{UV}{C^2}\right)}t'\right]}{\sqrt{1-\frac{V^2}{C^2}}\sqrt{1-\frac{U^2}{C^2}}} = \frac{X'-\frac{U-V}{\left(1-\frac{UV}{C^2}\right)}t'}{\frac{\sqrt{1-\frac{V^2}{C^2}}\sqrt{1-\frac{U^2}{C^2}}}{\left(1-\frac{UV}{C^2}\right)}} = \frac{X'-\frac{U-V}{\left(1-\frac{UV}{C^2}\right)}t'}{\frac{\sqrt{C^2-V^2}\sqrt{C^2-U^2}}{C^2\left(1-\frac{UV}{C^2}\right)}} =$$

$$= \frac{X'-\frac{U-V}{\left(1-\frac{UV}{C^2}\right)}t'}{\frac{\sqrt{C^4-C^2U^2-C^2V^2+U^2V^2}}{C^2\left(1-\frac{UV}{C^2}\right)}} = \frac{X'-\frac{U-V}{\left(1-\frac{UV}{C^2}\right)}t'}{\frac{\sqrt{C^4-C^2U^2-C^2V^2+U^2V^2-2C^2UV+2C^2UV}}{C^2\left(1-\frac{UV}{C^2}\right)}} =$$

$$= \frac{X'-\frac{U-V}{\left(1-\frac{UV}{C^2}\right)}t'}{\frac{\sqrt{(C^2-UV)^2-C^2(V-U)^2}}{(C^2-\mathrm{UV})}} = \frac{X'-\frac{U-V}{\left(1-\frac{UV}{C^2}\right)}t'}{\sqrt{1-\frac{C^2(U-V)^2}{(C^2-UV)^2}}} = \frac{X'-\frac{U-V}{\left(1-\frac{UV}{C^2}\right)}t'}{\sqrt{1-\frac{(U-V)^2}{C^2(1-\frac{UV}{C^2})^2}}}$$

The latter result gives the final equation:

$$\mathbf{X''} = \frac{X'-U't'}{\sqrt{1-\frac{(U')^2}{C^2}}}\,.$$

Now, we get finally a common link between the first moving frame of reference and the second moving frame of reference for the coordinates and time. This relationship takes the forms:

$$X'' = \frac{X' - U't'}{\sqrt{1 - \frac{(U')^2}{c^2}}}\ ,\ Y'' = Y',\ Z'' = Z',\ t'' = \frac{t' - \frac{U'}{c^2}x'}{\sqrt{1 - \frac{(U')^2}{c^2}}}\ .$$

Obviously, these formulas are the Lorentz transformation. Similarly, we can get feedback for the moving frames of reference for the coordinates and time. This feedback will also be subjected to the Lorentz transformations, which take the forms:

$$X' = \frac{X'' + U't''}{\sqrt{1 - \frac{(U')^2}{c^2}}}\ ,\ Y' = Y'',\ Z' = Z'',\ t' = \frac{t'' + \frac{U'}{c^2}x''}{\sqrt{1 - \frac{(U')^2}{c^2}}}\ .$$

The analysis show that the Lorentz transformations are invariant and it is true for inertial reference frames existing in absolute space, and analysis showed that if the inertial reference frames obey the Lorentz transformations, there is no absolute frame of reference in order to be chosen. But there is the only problem. We have to find a physical model which could explain why in inertial systems of our world the coordinates and time obey to the Lorentz transformations. Model of this work solves this problem. The model is based on the ideas of de Broglie wave nature of matter but the model develops them on a different basis. Because the model uses the properties of waves the model exists in form that gives very easy understanding of the basic physical laws. They are obtained as simple consequences of this model.

3. Transformation of energy and momentum in the transition from one inertial frame to another inertial frame of reference.

Lorentz transformation defines the transformation of energy and momentum in case of a transition from one inertial frame of reference to another moving frame of reference. To understand the principle of relativity let's consider these transformations. It will be clear from further text: the changing of energy and momentum in the transition from one inertial moving frame of reference to another takes place because of the differences of flows times in these frames of reference. A lot of proofs try to explain these phenomena by other methods. In my view they are inconclusive.

Let's consider two inertial frames of reference. One of the frames of reference is at rest. The second frame of reference will move relative to the frame of reference at rest with a velocity **V** without rotation. Where they exist - it does not matter for further analysis. For example, the frame of reference at rest can be in absolute space. The main thing for the frames of reference is that they are linked by Lorentz transformation. See Figure 9. It show that the frame of reference at rest is marked by **X, Y, Z,** the moving frame of reference is marked by **X', Y', Z'.** Relative to the frame of reference at rest, there is a mass point, which is moving with constant velocity **U**. At rest the value of the point mass is equal mass $\mathbf{m_0}$. In Figure 9, it is shown by a black circle. In the moving frame of reference the velocity of the moving mass is **U'**.

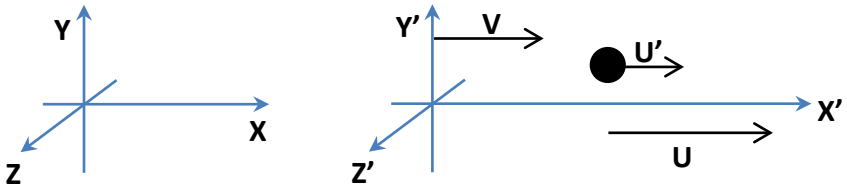


Figure 9.

Let's use the Lorentz transformation to define transformations of energy and momentum in the transition from one inertial frame of reference to another. Let's start with the differential form of the Lorentz transformations. We denote the infinitesimal interval of own time of the point mass as Δ∱. Let's write a link of this interval relative to the moving frame of reference. This relationship is next:

$$\Delta ∱ = \Delta t' \sqrt{1 - \left(\frac{U'}{C}\right)^2} \qquad \textbf{(15).}$$

A similar relation of the interval of time with the frame of reference at rest is equal to

$$\Delta ∱ = \Delta t \sqrt{1 - \left(\frac{U}{C}\right)^2} \qquad \textbf{(16).}$$

Let's consider the infinitesimal interval **ΔX'** in the moving frame of reference and we associate it with the frame of reference at rest.

$$\Delta X' = \frac{1}{\sqrt{1 - \frac{V^2}{C^2}}} [\Delta X - V\Delta t] \quad .$$

Let's divide both sides by Δ∱. Then we obtain the result

$$\frac{\Delta X'}{\Delta ∱} = \frac{1}{\sqrt{1 - \frac{V^2}{C^2}}} \left[\frac{\Delta X}{\Delta ∱} - V \frac{\Delta t}{\Delta ∱}\right] .$$

Carry out the change Δ∱. On the left hand side of the equation we shall replace Δ∱ with help of 15, and on the right hand side of the equation with help 16. Then we get

$$\frac{1}{\sqrt{1-\left(\frac{U'}{C}\right)^2}}\ \frac{\Delta X'}{\Delta t'} = \frac{1}{\sqrt{1-\frac{V^2}{C^2}}}\left[\frac{1}{\sqrt{1-\frac{U^2}{C^2}}}\ \frac{\Delta X}{\Delta t} - \frac{V}{\sqrt{1-\frac{U^2}{C^2}}}\frac{\Delta t}{\Delta t}\right]$$ or it is equal to

$$\frac{U'}{\sqrt{1-\left(\frac{U'}{C}\right)^2}} = \frac{1}{\sqrt{1-\frac{V^2}{C^2}}}\left[\frac{U}{\sqrt{1-\frac{U^2}{C^2}}} - \frac{V}{\sqrt{1-\frac{U^2}{C^2}}}\right] .$$

Multiplying both sides by $\mathbf{m_0}$ we get

$$\frac{m_0\ U'}{\sqrt{1-\left(\frac{U'}{C}\right)^2}} = \frac{1}{\sqrt{1-\frac{V^2}{C^2}}}\left[\frac{m_0 U}{\sqrt{1-\frac{U^2}{C^2}}} - \frac{m_0 V}{\sqrt{1-\frac{U^2}{C^2}}}\right] .$$

From this it follows the natural conclusion that if the point mass at motion is dependent on the speed in according to the form

$$\mathbf{m(u)} = \frac{m_0}{\sqrt{1-\left(\frac{U}{C}\right)^2}} .$$

Then in the transition from one frame of reference to another the momentum is equal to

$$P_x'(u') = \frac{P_x(U)}{\sqrt{1-\frac{v^2}{c^2}}} - \frac{m_0 V}{\sqrt{1-\frac{v^2}{c^2}}\sqrt{1-\frac{U^2}{c^2}}} \quad (17).$$

Pulse values along the axes **Y',Y** and **Z',Z** is not changed therefore $P'_y = P_y$, $P'_z = P_z$.

We find the conversion of energy. Let's consider the infinitesimal interval **Δt'** in the moving frame of reference and tie it with the frame of reference at rest.

$$\Delta t' = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}}\left(\Delta t - \frac{V}{c^2}\Delta X\right) .$$

Dividing both sides by Δ ξ we get the result.

$$\frac{\Delta t'}{\Delta \xi} = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}}\left(\frac{\Delta t}{\Delta \xi} - \frac{V}{c^2}\frac{\Delta X}{\Delta \xi}\right) .$$

Carry out the change Δξ. On the left hand side of the equation we shall replace Δξ with help of 15, and on the right hand side of the equation with help 16. Then we get

$$\frac{1}{\sqrt{1-\left(\frac{U'}{c}\right)^2}}\frac{\Delta t'}{\Delta t'} = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}}\left[\frac{1}{\sqrt{1-\frac{U^2}{c^2}}}\frac{\Delta t}{\Delta t} - \frac{V}{c^2\sqrt{1-\frac{U^2}{c^2}}}\frac{\Delta X}{\Delta t}\right]$$ или

$$\frac{1}{\sqrt{1-\left(\frac{U'}{C}\right)^2}} = \frac{1}{\sqrt{1-\frac{V^2}{C^2}}\sqrt{1-\frac{U^2}{C^2}}} - \frac{VU}{C^2\sqrt{1-\frac{V^2}{C^2}}\sqrt{1-\frac{U^2}{C^2}}} \quad .$$

Multiply both sides by $\mathbf{m_0C^2}$. Equality becomes

$$\frac{m_0C^2}{\sqrt{1-\left(\frac{U'}{C}\right)^2}} = \frac{m_0C^2}{\sqrt{1-\frac{V^2}{C^2}}\sqrt{1-\frac{U^2}{C^2}}} - \frac{m_0C^2VU}{C^2\sqrt{1-\frac{V^2}{C^2}}\sqrt{1-\frac{U^2}{C^2}}} \qquad \textbf{(18).}$$

Introduce the notation $\mathbf{E'(u')} = \frac{m_0C^2}{\sqrt{1-\left(\frac{U'}{C}\right)^2}}$, $\mathbf{E'(u)} = \frac{m_0C^2}{\sqrt{1-\left(\frac{U}{C}\right)^2}}$ and substituting them into (17) and (18) we finally obtain

$$\mathbf{P_x'(u')} = \frac{P_x(U)}{\sqrt{1-\frac{V^2}{C^2}}} - \frac{m_0Vc^2}{c^2\sqrt{1-\frac{V^2}{C^2}}\sqrt{1-\frac{U^2}{C^2}}} = \frac{P_x(U)}{\sqrt{1-\frac{V^2}{C^2}}} - \frac{E'(U)V}{c^2\sqrt{1-\frac{V^2}{C^2}}} \quad .$$

$$\mathbf{E'(u')} = \frac{m_0C^2}{\sqrt{1-\frac{V^2}{C^2}}\sqrt{1-\frac{U^2}{C^2}}} - \frac{m_0C^2VU}{C^2\sqrt{1-\frac{V^2}{C^2}}\sqrt{1-\frac{U^2}{C^2}}} = \frac{E(U)}{\sqrt{1-\frac{V^2}{C^2}}} - \frac{P_x(U)V}{\sqrt{1-\frac{V^2}{C^2}}} \quad .$$

This result shows that in inertial frames of reference the pulse is stored, even if frames of reference are subjected to the Lorentz transformation. But the value of the mass must be a function of speed and vary inversely proportional to the relativistic root. The reason for this there is slowing down of the time flow in the moving frame of reference. Physical nature of this

phenomenon may be explained by the following way. Let’s assume that in the moving frame of reference you take a mass equal to unit in order to accelerate this mass up to unit of speed. Suppose that the acceleration has been performed for a period that is equal to a conventional unit of time. Now, we turn to the frame of reference at rest. Inside this frame of reference, the mass has been accelerated for a longer time than the time unit. It takes place, because in the moving frame of reference the time flow has been delayed with respect to the frame of reference at rest. Therefore, in the frame of reference that is at rest, by contrast, time flowing faster than the in the moving frame of reference. If for a simplified approach, inside both frames of reference we consider the value of an accelerating force as a constant, in this case, we must conclude that the mass inside of the frame of reference at rest has a value much greater than a unit. It takes place, because the work was performed for the mass acceleration for a long time. But since an accelerating force has not changed, the slow acceleration of the mass could be caused only by an increasing value of the mass. Such is simple physics of this phenomenon. Almost all the conclusions of the special theory of relativity there are inherently geometric and mathematical promotion of the Lorentz transformation in various forms without the use of a physical model. Such approach allowed to reject the ether's model of absolute space because there wasn't need use the ether for all the theoretical conclusions. But in special theory of relativity, the mathematical model could not explain the physical nature of its postulates. Besides the application of the principle of relativity to the frames of reference lead to various paradoxes. The essence of their well-known and they are many times discussed in the literature. The problems associated with paradoxes are usually removed by using verbal arguments without the physical and mathematical proofs. In this work, on the contrary, the input of absolute space and ether became needful because the work develops the idea of de Broglie further about wave nature of elementary fabric of our world. Thanks to a new physical model this work was able to prove that our elementary fabric by properties has symmetry relative to the photon. In particular, the elementary particles have a hidden continuous wave motion like a wave of the photon. This work has physical explanation for the postulates of special relativity and the Lorentz transformation. Besides the model has a simple physical and geometrical form. This work explains how and where waves of matter exist and it explains true essence of time. All these explanations give a clear understanding of why in our world the frames of reference obey to the Lorentz transformation. From the model, it becomes clear why the ether

model of absolute space does not violate the principle of relativity for inertial frames of reference. In addition, this model shows why all the main conclusions of the special theory of relativity in such a model are valid and can be obtained automatically. To verify this, see the first and second parts of this work. It reveals additional properties of matter in our world because of which the inertial frames of reference of our world obey to the Lorentz transformation for the time and coordinates.

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Часть 4.

Derivation of relativistic forces to accelerate elementary mass based on its "wave" motion in a parallel space.

1. Derivation of the relativistic force under longitudinal acceleration of elementary mass.

In the first part of this work, it was stated that the elementary mass is a wave micro-object, which keeps constant movement with speed of light. Movement exists as an inverse movement and it takes place relative to parallel space, because of this, the movement is hidden for our world. In order to confirm the validity of this assumption, this part offers the conclusion of relativistic force to accelerate the elementary mass on basis of its "wave" motion in a parallel space.

Before the mathematical analysis, let us recall the physical processes occurring in this model at movement of elementary mass relative to a parallel space. See figure 1. It depicts the reference system **ξ,x,y**. The plane of **x,y** belongs to our world. Axis of ξ is axis of the parallel space. An elementary mass, it is point (**m**) that is depicted by a black ball. The mass moves at a constant velocity (**V**) along the positive direction of the axis **x**. Aether of parallel space passes through the elemental mass with tilt relative to the **x**-axis downward.

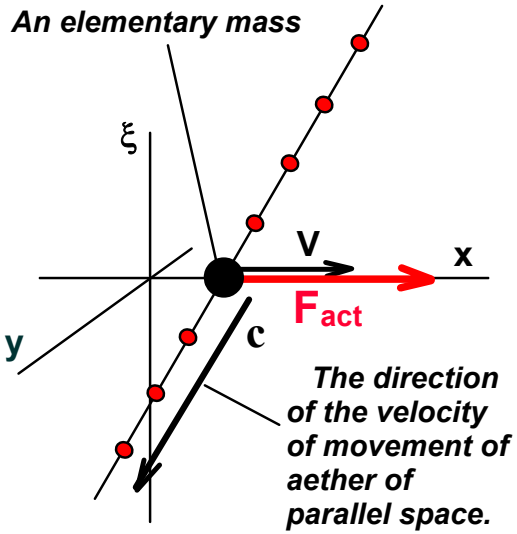

Figure 1.

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Such a motion of aether maintains its overall speed of passage through the elementary mass. This speed is equal to the speed of light **c**. In this section, the **y**-axis is not used in mathematical analysis; therefore, in the subsequent figures we remove this axis. Suppose a force acts on the elementary mass.

It is designated as ($\mathbf{F_{act}}$). See the figure 2. Its direction coincides with the direction of movement of the elementary mass along **x**. The force is valid for an infinitesimal period **Δt**. At first, we determine how this force can accelerate the elementary mass. After, we find the amount of force ($\mathbf{F_{act}}$).

We can understand the physics of this force by several ways. But to confirm really the assumption about that parallel space passes through elementary mass, we are using a virtual movement of this elementary mass in parallel space. And we will see the reason because of which the ordinary force of Newton ($\mathbf{F_{act}}$) becomes a relativistic force. This approach indirectly proves that there is a parallel space and it is material by its nature.

Consider the reference frame with axes **ξ,x** and let inside it elementary mass moves with velocity **V** along **x**. Because of this movement, the aether of parallel space encounters with the elementary mass along **x**-axis, and passes through the elementary mass. Consequently, along the ξ-axis, the parallel space will move at a slower speed and it is equal to $\mathbf{(c^2-V^2)^{1/2}}$. Obviously, in the case of changing speed of elementary mass along axis (**x**) in the common space **ξ,x** inertia force will manifest. The physics of this process has been described in the first part of this work. Recollect, aether is the bearer of the space in which the elementary mass exists as the object of a wave. Therefore, we can say that the elementary mass has a movement in parallel space. But when a curvature of straight path takes place, in this space there must be manifested the inertia force, and reaction force to warping path. This version of the movement of elementary mass is displayed in Figure 2. For this model we believe that the elementary mass has virtual movement in the opposite direction relative to the direction of movement of aether of parallel space.

The direction of the velocity of the virtual motion of elementary mass.

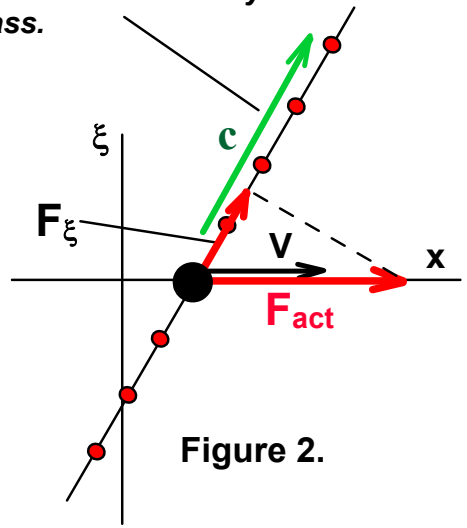

Figure 2.

The direction of the velocity of the virtual motion of elementary mass.

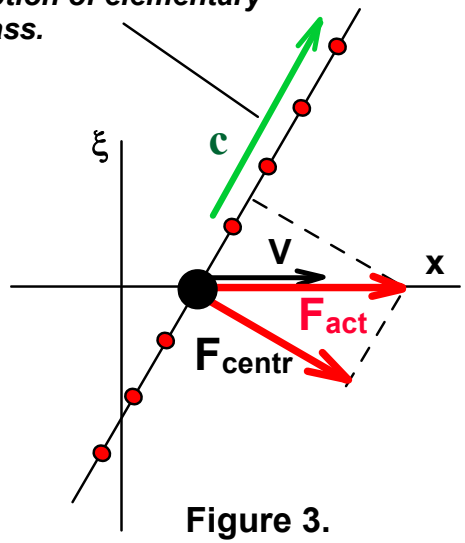

Figure 3.

See the green vector that is equal to the speed of light (**c**). There it has the opposite direction and coincides with direction of the virtual movement of the elementary mass. At moving of elementary mass in parallel space the **x**-axis is always aligned with of the elemental mass.

Let analyze the effect of the force ($\mathbf{F_{act}}$), in detail. To do this, consider the action of its two components. The first component of force we obtain by means of force projection ($\mathbf{F_{act}}$) onto the speed vector of the virtual motion of elemental mass. The projection of this force is denoted by ($\mathbf{F_\xi}$) and we consider its action. Obviously, this force is to give extra speed of the virtual movement of the elementary mass and the speed will be more of the speed of light. But this is impossible, because the wave velocity of the elementary mass is always equal to the speed of light. We conclude that the force ($\mathbf{F_\xi}$) does not accelerate the elemental mass.

Consider the action of the second component of the force ($\mathbf{F_{act}}$). For this we shall project this force so that it is as perpendicular to the velocity vector (**c**) and passes through the elementary mass, simultaneously. See Figure 3. On the figure, this force vector is shown by ($\mathbf{F_{centr}}$). It will not affect the wave speed of the virtual motion of the elemental mass.

However, it changes direction of movement of elementary mass, and compels the elementary mass to go according to a virtual arc. See Figure 4. We believe that under action of the force ($\mathbf{F_{centr}}$) for infinitesimal period $\mathbf{\Delta t}$ elementary mass gets extra speed along the **x**-axis. Let the speed is equal to ($\mathbf{V_{add}}$), and it is much less than the speed **V**. That is $\mathbf{V_{add} << V}$. Then the speed of the elementary mass along the **x**-axis becomes equal to $\mathbf{V_x = V + V_{add}}$. In parallel space the virtual speed becomes equal to $\mathbf{U_\xi = [c^2 - (V + V_{add})^2]^{1/2}}$.

The total speed of the elementary mass does not change and remains equal to the speed of light. Since the acceleration period $\mathbf{\Delta t}$ is taken extremely small, during this period, elementary mass moves inside of parallel space according to an arc with a constant curvature. Vector "wave" speed of elementary mass there is as the tangent vector to the arc of the virtual motion of elemental mass. The radius of curvature of the arc is a constant for infinitesimal time $\mathbf{\Delta t}$. If this radius we combine with elementary mass, it will be perpendicular to the vector of the "wave" speed of elementary mass and will be coincide with the force vector ($\mathbf{F_{centr}}$). Let remark the radius of curvature as $\mathbf{R_m}$. See the Figure 4. From all of this follows the following conclusion. Because each moment of time during period $\mathbf{\Delta t}$, the force ($\mathbf{F_{centr}}$) is perpendicular to the "wave" of the movement of the elementary mass and force vector is directed along the radius of curvature at the center of the arc, this force acts as a centripetal force. Its value is equal to:

$$\mathbf{F_{centr} = m \bullet a_{centr}},$$ here $\mathbf{a_{centr}}$ – is as centripetal acceleration.

From physics we know that the centripetal acceleration is:

$$\mathbf{a_{centr}} = \frac{\mathbf{V_{lin}^2}}{\mathbf{R_m}}$$

here $\mathbf{V_{lin}}$ – is a linear velocity of movement of the elementary mass on a circle of radius $\mathbf{R_m}$. In our case, the linear velocity $\mathbf{V_{lin}}$ is "wave" speed (**c**) of the elementary mass.

3

Virtual speed of motion of elementary mass

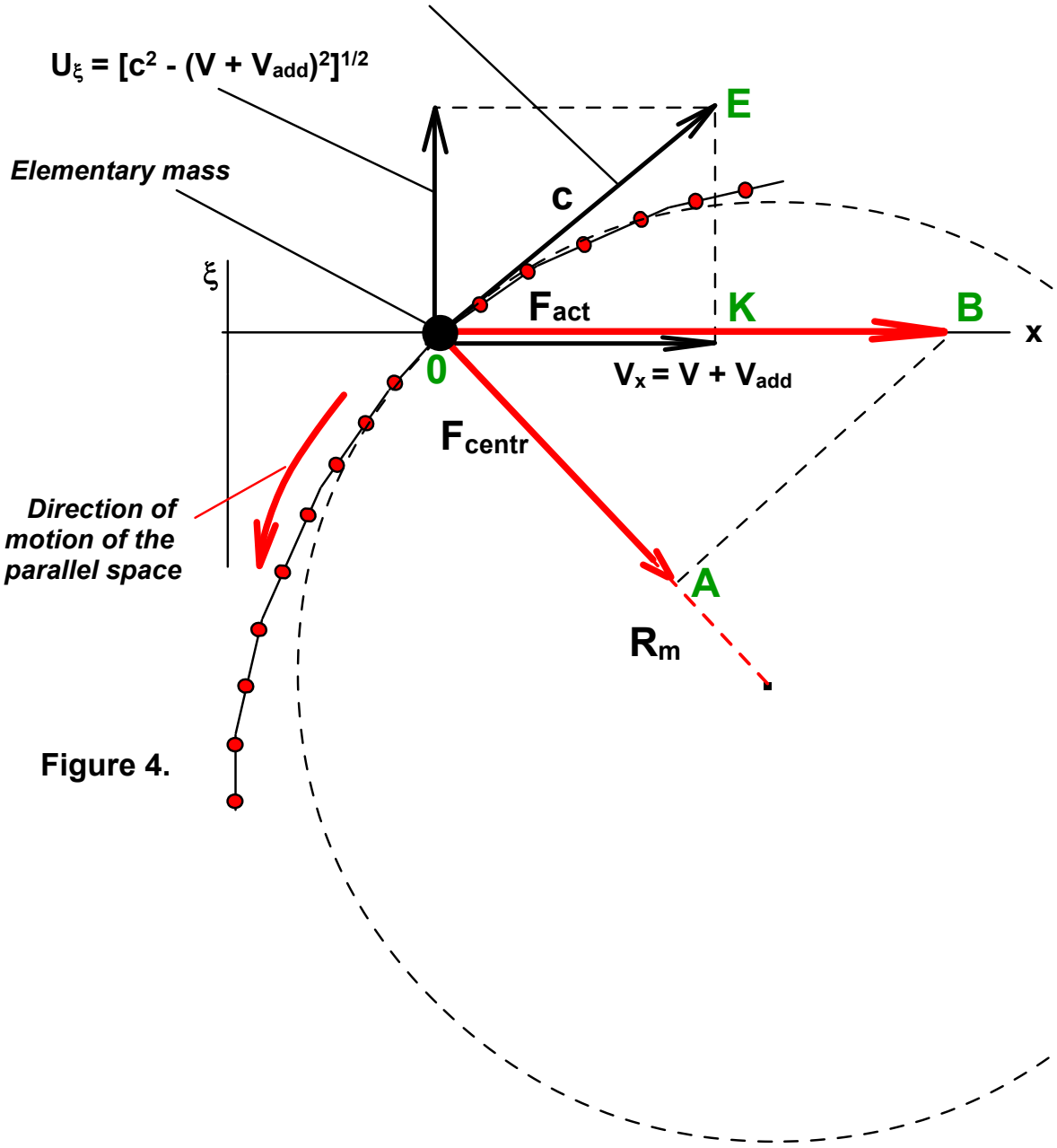

Figure 4.

Therefore, the centripetal acceleration is equal to

$$a_{centr} = \frac{c^2}{R_m}$$

Then, the force (Fcentr) is:

$$F_{centr} = \frac{m \cdot c^2}{R_m} \qquad (1)$$

Let's define the radius R_m.

The curve of the virtual movement of the elementary mass during acceleration, itself is not described by coordinates ξ,**x**. It is described by using speed, which is a function of the time parameter.

For this case, according to mathematics the radius of curvature of the curve given by parametric form can be found from the formula:

$$R_m = \frac{[\{\varphi'(t)\}^2 + \{\psi'(t)\}^2]^{3/2}}{\left|\varphi'(t) \cdot \psi''(t) - \varphi''(t) \cdot \psi'(t)\right|} \qquad (2)$$

The value of the denominator is taken by modulo.

$\varphi'(t)$ and $\psi'(t)$ are the first derivatives with respect to **t**, and they are equal to the following values.

$\varphi'(t)$ is equal to the speed of the elementary mass along **x**-axis, i.e. $\varphi'(t) = V + V_{add}$.

$\psi'(t)$ is equal to the speed of the virtual motion of the elementary mass along the axis ξ, i.e. $\psi'(t) = [c^2 - (V + V_{add})^2]^{1/2}$.

$\varphi''(t)$ and $\psi''(t)$ are the second derivatives with respect to **t**, and they are equal to the following values.

$\varphi''(t)$ is equal to the acceleration of the elementary mass along **x**-axis, i.e.

$$\varphi''(t) = \frac{dt\,(V + V_{add})}{dt}$$

Speed **V** is the initial speed of the elementary mass along **x**-axis. It is constant and does not change over time. Therefore, the derivative of this speed is equal to zero:

$$\frac{dt\,(V)}{dt} = 0$$

Hence $\varphi''(t) = \frac{dt\,(V_{add})}{dt} = a_x$

$\psi''(t)$ is equal to the acceleration of the elementary mass along the axis ξ, i.e.

$$\psi''(t) = \frac{dU_\xi}{dt} = \frac{d\{[c^2 - (V + V_{add})^2]^{1/2}\}}{dt} = \frac{-a_x\,(V + V_{add})}{[c^2 - (V + V_{add})^2]^{1/2}} \quad .$$

Making the substitution of values of $\varphi'(t)$, $\psi'(t)$, $\varphi''(t)$, $\psi''(t)$ in formula (2) we find the radius of curvature R_m :

$$R_m = \frac{[(V + V_{add})^2 + c^2 - (V + V_{add})^2]^{3/2}}{\left| \frac{-a_x\,(V + V_{add})}{[c^2 - (V + V_{add})^2]^{1/2}} - a_x\,[c^2 - (V + V_{add})^2]^{1/2} \right|} = \frac{c^3\,[c^2 - (V + V_{add})^2]^{1/2}}{a_x \left| [(V + V_{add})^2 + c^2 - (V + V_{add})^2]^{3/2} \right|} =$$

$$= \frac{c[c^2 - (V + V_{add})^2]^{1/2}}{a_x} \quad .$$

Given that the speed $V + V_{add} \approx V$, since $V_{add} << V$, the last expression takes the form:

$$R_m = \frac{c}{a_x} \cdot (c^2 - V^2)^{1/2} = \frac{c}{a_x} \cdot \left(1 - \frac{V^2}{c^2}\right)^{1/2} \quad .$$

Substituting the value R_m in (1) we define force F_{centr}.

$$F_{centr} = m \cdot \frac{c^2 \cdot a_x}{c^2 \left(1 - \frac{V^2}{c^2}\right)^{1/2}} = m \cdot \frac{a_x}{\left(1 - \frac{V^2}{c^2}\right)^{1/2}} \qquad (3)$$

As it is mentioned earlier, the centripetal force F_{centr} is created by force F_{act}, which in our world acts onto the elemental mass. In this analysis, the force acts along the **x**-axis. See Figure 4.

Let define the value of the force $\mathbf{F_{act}}$ required for the operation of centripetal force $\mathbf{F_{centr}}$. It is determined from the triangle **ΔA0B** and numerically is equal to:

$$\mathbf{F_{act}} = \frac{\mathbf{F_{centr}}}{\mathbf{\cos(\angle A0B)}} \qquad (4)$$

Cosine of corner **∠A0B** we can find from the similar triangles: **ΔA0B** and **ΔKE0**. They are rectangular and sharp corners **∠A0B** and **∠KE0** are equal to each other because of mutually respective rays of angles are as perpendicular. On this basis their cosines are equal to each other:

$$\mathbf{\cos(\angle A0B) = \cos(\angle KE0)}$$

Cosine **∠KE0** can be found from the speeds that forming a triangle **ΔKE0**:

$$\mathbf{\cos(\angle KE0)} = \frac{\mathbf{U_\xi}}{\mathbf{c}} = \frac{\mathbf{[c^2 - (V + V_{add})^2]^{1/2}}}{\mathbf{c}}$$

Given that the speed $\mathbf{V + V_{add} \approx V}$, since $\mathbf{V_{add} << V}$, the last expression takes the form:

$$\mathbf{\cos(\angle KE0)} = \left(\mathbf{1 - \frac{V^2}{c^2}}\right)^{\mathbf{1/2}}$$

Substituting the value of the cosine to the expression (4), we find:

$$\mathbf{F_{act}} = \frac{\mathbf{F_{centr}}}{\mathbf{\cos(\angle A0B)}} = \frac{\mathbf{F_{centr}}}{\left(\mathbf{1 - \frac{V^2}{c^2}}\right)^{\mathbf{1/2}}}$$

Substituting the last expression of the value of the force $\mathbf{F_{centr}}$ from (3), we get:

$$\mathbf{F_{act}} = \mathbf{m} \cdot \frac{\mathbf{a_x}}{\mathbf{1 - \frac{V^2}{c^2}}} \qquad (5)$$

In this formula it remains to take into account that the mass has a value of:

$$\mathbf{m} = \frac{\mathbf{m_0}}{\left(\mathbf{1 - \frac{V^2}{c^2}}\right)^{\mathbf{1/2}}}.$$

Substituting the value of **m** in the expression (5) we finally obtain the value of forces $\mathbf{F_{act}}$. It is equal to

$$F_{act} = m_0 \cdot \frac{a_x}{\left(1 - \frac{V^2}{c^2}\right)^{3/2}}.$$

It coincides with the expression of the force for longitudinal acceleration of mass obtained by Einstein in the special theory of relativity.

Let's analyze the obtained result for the force for the relativistic longitudinal acceleration of elementary mass on the basis of its movement as "wave" in parallel space.

Firstly, in our world reaction force that prevents acceleration of the elementary mass arises from the arising of centrifugal force. This force comes from the curvature of the path of movement of the elementary mass in parallel space.

Secondly, the transition of Newton's force into relativistic form is caused by a change in the radius of curvature of the virtual movement of the elementary mass in a parallel space and by drift of the centripetal force from our world into inwards of the parallel space.

From the model considered for relativistic force, the main theoretical conclusion of this section follows, the essence of which is as following. Theoretically it is possible to accelerate elementary mass up to the speed of light without using the relativistic forces. To do this in a parallel space, we need to create a deceleration force. In order to understand this, see Figure 5. In this figure, the centripetal force is divided into two forces $\mathbf{F_{actn}}$ and $\mathbf{F_{\xi}}$. Obviously, the force $\mathbf{F_{actn}}$ much less relativistic forces $\mathbf{F_{act}}$. To compare these forces with each other, see Figure 4. To accelerate the elementary mass by force $\mathbf{F_{actn}}$ we must create $\mathbf{F_{\xi}}$ force acting on the elementary mass in a parallel space. By its essence, it is the deceleration force. It will reduce the speed of movement of elementary mass along the axis ξ. The vector sum of the forces $\mathbf{F_{\xi}}$ and acceleration force $\mathbf{F_{actn}}$ acting in our world should give precisely the vector $\mathbf{F_{centr}}$ of centripetal force needed to accelerate a point mass. By this method, the overclocked elementary mass will give an additional gain in energy during deceleration in our world, and it gives the using of the energy of the parallel space. For braking motion of the elementary mass along the axis ξ enough reduce the flow speed of aether of parallel space passing along this axis. Such deceleration of aether of parallel space is equivalent to action of the force $\mathbf{F_{\xi}}$.

Now, we will run a small analysis of radius of curvature of the virtual path of the elementary mass at different speeds its initial speed of $\mathbf{V}$.

1. If in our world, the elementary mass is being moved at a speed close to the speed of light and is accelerated, the radius of curvature of the virtual path goes to zero:

$$\lim_{V \to c} (R_m) = \lim_{V \to c} \left[\frac{c^2}{a_x} \cdot \left(1 - \frac{V^2}{c^2}\right)^{1/2}\right] = 0, \text{ because } \lim_{V \to c} \left[\frac{V^2}{c^2}\right] = 1 .$$

2. If at the beginning, the elementary mass is at rest and after, it has a small acceleration, and in this case, the radius of curvature of the virtual path of the elementary mass becomes a huge. Its value becomes equal to:

$$\lim_{V \to 0} (R_m) = \frac{c^2}{a_x} \text{ due to the fact that } \lim_{V \to 0}\left[\frac{V^2}{c^2}\right] = 0, \text{ therefore } R_m = \frac{c^2}{a_x} \qquad (6)$$

Let analyze the radius of curvature that is obtained when the elementary mass has acceleration that is equal to $\mathbf{a_x}$ = 10 meters/seconds^2 = 0,01 km/seconds^2.

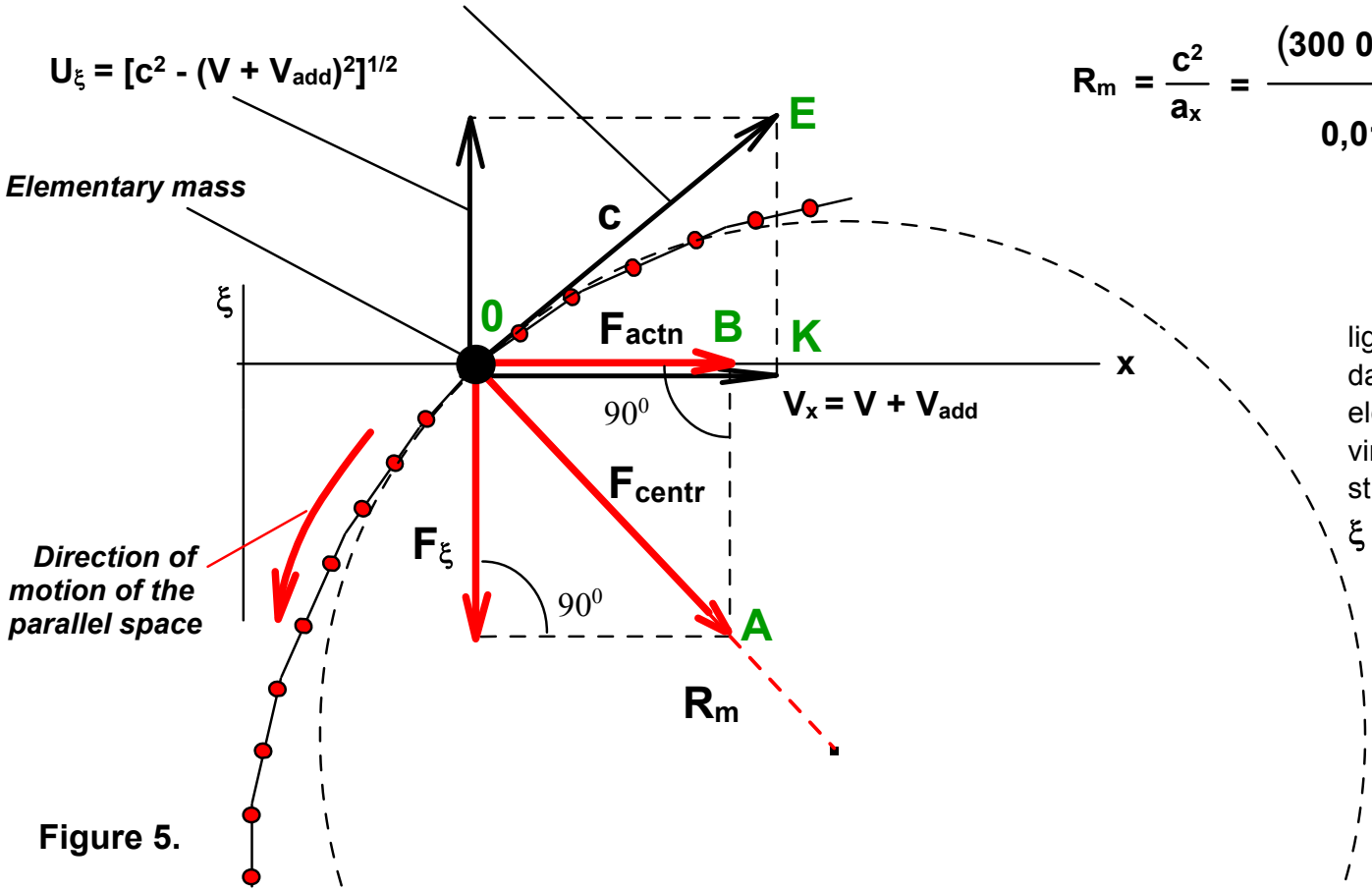

Figure 5.

For such acceleration the force of Newton is necessary. With help of this small analysis we can see the small curvature of the virtual path that the elementary mass has in the parallel space and how big the radius of this curvature. Let substitute all the values in the last expression:

$$R_m = \frac{c^2}{a_x} = \frac{\left(300\ 000\ \frac{\text{kilometres}}{\text{seconds}}\right)^2}{0{,}01\left(\frac{\text{kilometres}}{\text{seconds}^2}\right)} =$$

$$= 9\ 000\ 000\ 000\ 000 \text{ kilometres}$$

The resulting value is large enough. The light beam can pass this radius for ≈ 347 days. The curvature of the virtual path elementary mass tends to zero. Arc of virtual path straightens and becomes a straight line, which coincides with the axis of ξ in parallel direction.

Center of the virtual circle will be located in our world. Because of this, the vector of centripetal force $\mathbf{F_{centr}}$ coincides with the axis **x**. Therefore, the force $\mathbf{F_{act} = F_{centr}}$.

The value of the elementary mass at low speeds is equal to the elementary mass at rest. Therefore, substituting the value of the radius of curvature $\mathbf{R_m}$ (6) in the expression (1) we obtain the value of the force:

$$\mathbf{F_{act} = F_{centr} = \frac{m \cdot c^2}{R_m} = m \cdot a_x} \qquad (7)$$

From analysis follows if the curvature of the curvature of the virtual path elementary mass tends to zero then the acceleration force becomes by a force of Newton. This conclusion will be used in the next section when transverse acceleration force for the elementary mass will be found.

In this section, the description of the material is finished. Let's find the value of the force for the transverse acceleration of the elementary mass.

2. Derivation of relativistic transverse force for acceleration of elementary mass.

For the next description, let's introduce the initial conditions for the transverse force. Suppose that before the start of action of the force, the elementary mass moves uniformly in a straight line in space of "our world" with an arbitrary speed $\mathbf{V} << \mathbf{c}$. The value of a speed is not greater than the speed of light. We choose a system of reference ξ, **x** as it was done in the first section of this part, that is let the **x**-axis coincide with the elementary mass and with the direction of its movement, and so on. We supplement the frame of reference by additional axes **y** and **y '**. Let there the axis **y '** always is combined with the elementary mass. Suppose that along this axis acts transverse force $\mathbf{F_y}$. We introduce a new axis ξ'. Suppose that it coincides with the vector wave velocity (**c**). See Figure 6.

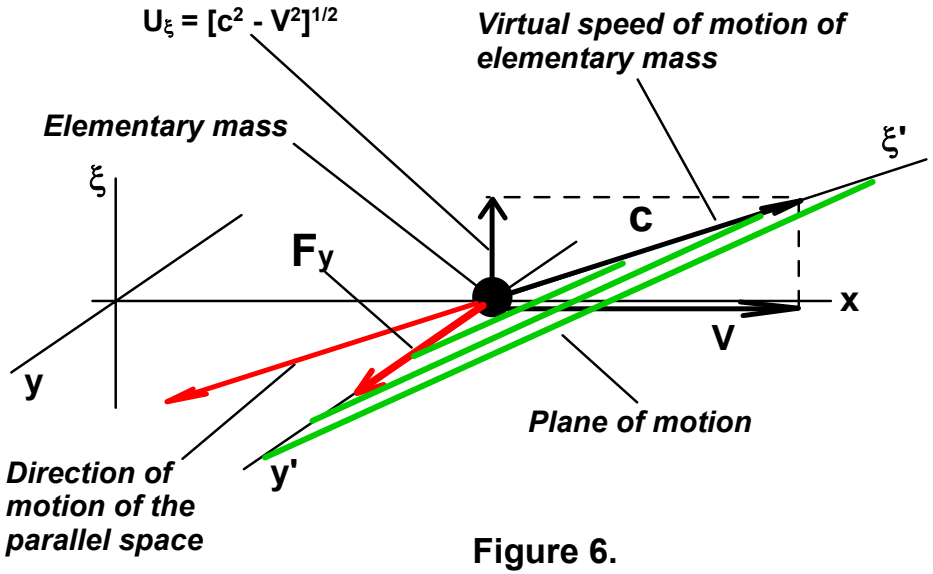

Figure 6.

It is obvious that the acceleration of elementary mass in the plane **y'**,ξ**'** represents a condition where before action of the force $\mathbf{F_y}$ elementary mass was at rest relative to the axis **y'**. This case for accelerating elementary mass has been considered in the previous section, when there was made a conclusion (7). There is only one difference between these accelerations. The derivation of (7) corresponds to the acceleration of the elementary mass at rest. Therefore, the value of the elementary mass was consistent with the mass at rest. At transverse acceleration of the elementary mass is assumed that the elementary mass has an initial speed **V**. Because of this, the value of elementary mass is equal to:

$$m = \frac{m_0}{\left(1 - \frac{V^2}{c^2}\right)^{1/2}}.$$

Therefore, if the elementary mass is accelerated by the force $\mathbf{F_y}$ at a constant acceleration, we must take into account the relativistic changing of mass in the formula (7). Then, if we take into account that after the transverse acceleration elementary mass acquires a speed $\mathbf{V_y} << \mathbf{V}$, we get the final result for the transverse force:

$$F_{acty} = m_0 \cdot \frac{a_y}{\left(1 - \frac{V^2}{c^2}\right)^{1/2}}.$$

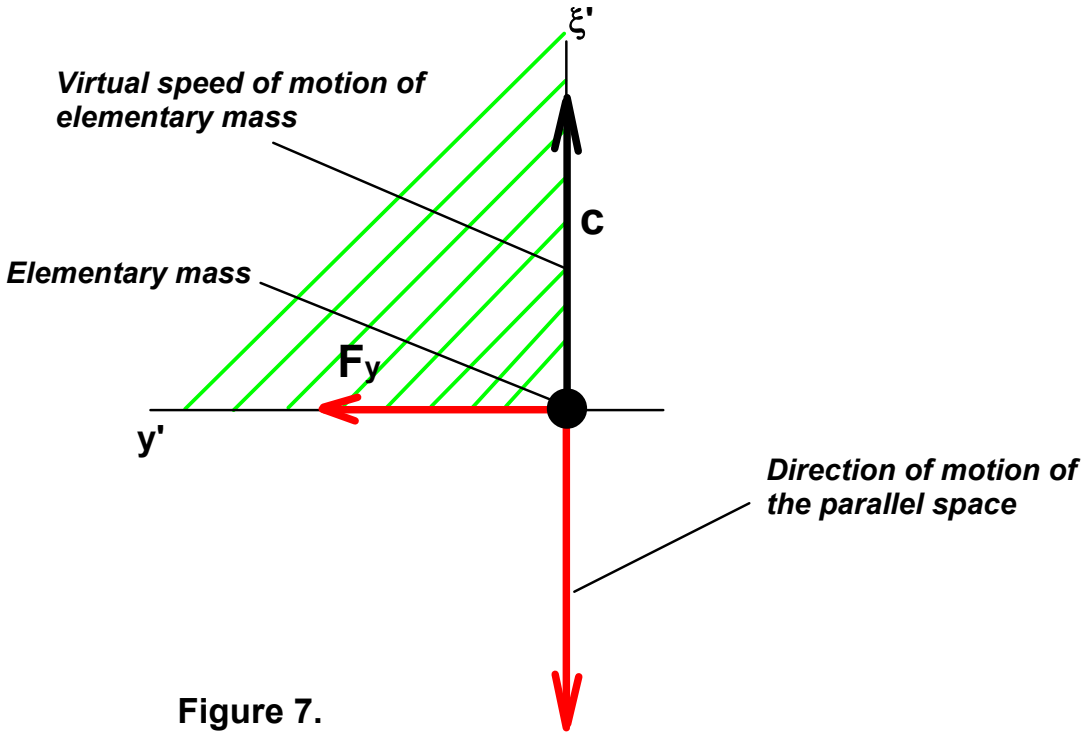

Figure 7.

Last expression coincides with the expression of the transverse force in the special theory of relativity. This was required in order to prove. That is all.

The new balance of energy in an inelastic collision of material masses at small speeds.

To get the energy balance let's recollect well-known example of redistribution of kinetic energy between the two point objects at their amorphous (inelastic) collision. Under understanding of point objects, we mean infinitesimal small points that have masses. Let masses of the point objects are taken an arbitrary and speed of their collision is very small, and tends to zero in the system at rest. Let the mass of the first point objectis equal to $\mathbf{m_1}$, and its speed is equal to $\mathbf{U_1}$. The mass of the second point objectis equal to $\mathbf{m_2}$, and it is at rest. See figure 1.

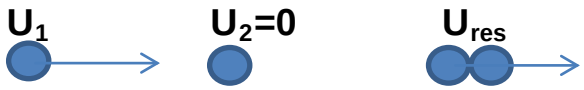

Figure 1.

Because the collision of the point masses occurs along a single axis, we replace the velocity vector by scalar. After, we using the total momentum before and after collision shall find the resultant velocity of the two masses after the collision.

$\mathbf{m_1 \cdot U_1 = (m_1+m_2) \cdot U_{res}}$, hence $\mathbf{U_{res}} = \dfrac{\mathbf{m_1 \cdot U_1}}{\mathbf{m_1+m_2}}$

All these mathematical calculations are simple for the reader, but they are necessary to further criticism of established concepts in physics. They have to be considered in detail to show their inconsistencies. Let's consider the

kinetic energy, which has the point with mass $\mathbf{m_1}$ before the collision, and the kinetic energy of the points with masses ($\mathbf{m_1+m_2}$) are sticking together. The kinetic energy of the point mass $\mathbf{m_1}$ is equal to:

$$\mathbf{E_1 = \frac{m_1 \cdot (U_1)^2}{2}}$$

After the collision, the kinetic energy of point masses are sticking together is equal to:

$$\mathbf{E_{(1+2)} = \frac{(m_1+m_2)\cdot(U_{res})^2}{2} = \frac{(m_1+m_2)(m_1\cdot U_1)^2}{2\cdot(m_1+m_2)^2} = \frac{(m_1\cdot U_1)^2}{2\cdot(m_1+m_2)}}\ .$$

Let’s analyze these kinetic energies. To do this, let 's find their difference.

$$\mathbf{E_{diff} = E_1 - E_{(1+2)} = \frac{m_1\cdot(m_1+m_2-m_1)(U_1)^2}{2\cdot(m_1+m_2)} = \frac{m_1\cdot m_2\cdot(U_1)^2}{2\cdot(m_1+m_2)} \geq 0} \quad (1)$$

The result shows the positive difference energies. This says that in the inelastic collision the kinetic energy of the first material point is not completely turns into the energy of motion of two agglomerated material points. But the energy in a closed system can not disappear, but the balance of resulting shows the opposite result. Since the concept of kinetic energy was based on Newton's laws, then assume that Newton's laws are wrong - is absurd (at low speeds they are accurate). It remains one conclusion, which is suggested by classical physics. It is the transfer of energy from one form to another. In particular, part of the energy that is not turned into energy of agglomerated point masses is turned into "thermal" energy of the point masses. And, from the point of view of classical physics, this is enough. But the conclusion for the concept of energy was derived from the laws of classical mechanics, such as Newton's laws, the law of conservation of momentum, and so on. But there from point of view of of mathematics the mass is - a coefficient which has a physical dimension. Any ability to absorb or radiate heat, this coefficient in

Newton's laws has not. Moreover, all laws will be performed regardless what there is essence of mass, that is, the what volume is taken by this mass; what there is internal structure of mass and so on . The mass is “Black box”.

In particular, these laws apply to an infinitesimal volume, namely, to a mathematical point having mass. The structure here does not play any role, for an infinitesimal volume it is not defined. However, Newton's laws will work in this case too. If we go to the conservation of kinetic energy in the example of inelastic collisions, the concept of "mathematical point" with a mass does not has contradiction until we energy difference, which was obtained not equate to the heat. In this case, it will be "absurdity" (from the standpoint of classical physics). The difference between the energy that we got in the example has a value, and it is greater than zero. Therefore, if there we do not set limits on the value of mass, equating the difference between the energy to the heat energy **Q**, we can get an infinite density of thermal (heat) energy **T**.

$$\mathbf{T = \lim_{\Delta x,\Delta y,\Delta z\to 0} \frac{Q}{\Delta x\cdot\Delta y\cdot\Delta z} = \infty}$$

Such a result is "unacceptable" from a position of physical reality. The density of thermal energy should blow up the point with mass, if there does not exist endless internal or external forces of restraint.

However, disbalance of energy can be eliminated in the wave model of elementary masses. Let’s consider this.

As it was shown in the fourth part of the presentation, in the space **ξ,y,z,x** there are reaction forces. Therefore, in this example, any mass has the energy of motion in our world, and in a parallel space simultaneously. Considering this factor we can find a new balance of energies in view of the energy that exists in a parallel space.

Before the collision, the first and second point mass had the following speeds of virtual movement in parallel space. The speed of the first point mass in parallel space, along the axis **ξ** is equal to $\mathbf{U_{1\xi} = \sqrt{c^2 - (U_1)^2}}$. The

speed of the second point mass along the axis ξ was equal to **c**. The speed of the point masses, which stuck together after the collision is equal to:

$$U_{res\xi} = \sqrt{c^2 - \frac{(m_1)^2 \cdot (U_1)^2}{(m_1 + m_2)^2}} \quad .$$

Let's find the kinetic energy of the masses in a parallel space due to the virtual movements. Along the axis ξ, the first point mass has got energy that is equal to:

$$E_{1\xi} = \frac{m_1 \cdot [c^2 - (U_1)^2]}{2}$$

The second point mass has got energy, equal to:

$$E_{2\xi} = \frac{m_2 \cdot c^2}{2}$$

After the collision, the agglomerated masses have energy, equal to:

$$E_{(1+2)\xi} = \frac{(m_1 + m_2) \cdot (U_{res\xi})^2}{2} = \frac{(m_1 + m_2) \cdot (c^2 - \frac{(m_1)^2 \cdot (U_1)^2}{(m_1 + m_2)^2})}{2} = \frac{(m_1 + m_2) \cdot [(m_1 + m_2)^2 \cdot c^2 - (m_1)^2 \cdot (U_1)^2]}{2 \cdot (m_1 + m_2)^2} =$$

$$= \frac{(m_1 + m_2) \cdot c^2}{2} - \frac{(m_1)^2 \cdot (U_1)^2}{2 \cdot (m_1 + m_2)}.$$

Let's consider the difference between the kinetic energy in the parallel space before the collision and after it, and we consider its value and its sign.

$$E_{diff\xi} = E_{1\xi} + E_{2\xi} - E_{(1+2)\xi} = \frac{m_1\cdot[c^2-(U_1)^2]}{2} + \frac{m_2\cdot c^2}{2} - \frac{(m_1+m_2)\cdot c^2}{2} + \frac{(m_1)^2\cdot(U_1)^2}{2\cdot(m_1+m_2)} = \frac{(m_1)^2\cdot(U_1)^2}{2\cdot(m_1+m_2)} - \frac{m_1\cdot(U_1)^2}{2} =$$

$$=\left[\frac{m_1}{(m_1+m_2)} - 1\right]\cdot \frac{m_1\cdot(U_1)^2}{2} = - \frac{m_1\cdot m_2\cdot (U_1)^2}{2\cdot(m_1+m_2)} \leq 0 \qquad (2).$$

Now let's analyze the results of the energy difference in the parallel space $E_{diff\xi}$ and in our world E_{diff}. See the results of (1) and (2). They show that in the parallel space after the collision the kinetic energy of agglomerated point masses become greater than the first mass and the second mass before the collision.

The value of increase in energy in the parallel space is exactly equal to the lost energy in our world. The balance of energy in an inelastic collision of point masses is preserved without transition in other form of energy.

$$E_{diff} = \frac{m_1\cdot m_2\cdot (U_1)^2}{2\cdot(m_1+m_2)} \geq 0$$

$$E_{diff\xi} = - \frac{m_1\cdot m_2\cdot (U_1)^2}{2\cdot(m_1+m_2)} \leq 0 \qquad \text{or}$$

$$E_{diff} + E_{diff\xi} = 0.$$

Here, this part of the material is finished.

Literature.

1. Эйнштейн А. Собрание научных трудов. М.: Наука, 1966

2. Борн Макс. Эйнштейновская теория относительности. М.: Мир, 1972, 2-е изд.

3. Киттель Ч., Найт У., Рудерман М. Берклеевский курс физики. М.: Наука, 1975.

4. Пожелаев А.Е. Новая модель окружающего физического мира, раскрывающая природу действия законов теории относительности Эйнштейна. Минск, Белорусский комитет "Дзеці Чарнобыля". 2001 г. ISBN 985-6486-06-8