Euclidean Reality Theory – Spectacular Conclusions and New Problems

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The model of Euclidean space, in which all four dimensions are identical, and the time- and spatial dimensions we observe, are only certain directions in FER (Four-dimensional Euclidean Reality), depending on the choice of the observer and the observed body [1-3], allows for the derivation of many spectacular conclusions [4,5]. Such conclusions may suggest that our ideas about the construction of the reality differ greatly from what actually surrounds us.
The FER model predicts the new method of the composition of velocities, which does not allow for exceeding the speed of light, but allows for accelerating the body to the velocity observed as the speed of light, using finite energy. The new method of the composition of velocities results from a different transformation of coordinates than the Lorentz one. Such transformation anticipates the time dilation analogically to the Relativity Theory, but does not anticipate the Lorentzian shortening of spatial dimensions in case of macroscopic observations.
When observers are moving along linear trajectories which have a common beginning, and they are observing each other, they are observing the increasing of mutual velocities proportionally to the distance between the observers. This phenomena allows for describing the increase of the velocity of the galaxies in a very simple way. The increase of velocities of galaxies is now a seeming effect, and is not the result of any real acceleration resulting from enigmatic repulsion interactions. The increase of the velocity, the Hubble's constant, as well as the definition of the Hubble's constant as the reverse of the age of the Universe, are obtained here from a very simple formula consisting of just a few symbols. According to the FER model we are able to observe only half of the real Universe.

The new approach to the issue of physical reality, consisting in the description of the space with the help of hypothetical Euclidean dimensions which cannot be directly observed, provides many new conclusions and indicates some new problems. Some of the conclusions are contradictory with predictions of the RT; however, neither these nor the other conclusions have been experimentally verified yet.

The first of conclusions described in [1] is the new rule of composition of the velocities and the consequences resulting from the conclusion, such as the possibility of accelerating a particle to the velocity interpreted as the speed of light.
In the classic RT, the rule of composition of velocities results from the Lorentz Transformation. The new transformation of velocity, presented in previous papers [4], must be a result from a certain transformation of coordinates, but different from the Lorentz Transformation. Both transformations, the new transformation of velocities and the new transformation of coordinates, are a result of the new rule of composition of the velocities consisting of the addition of the angles between trajectories of the bodies, along with a new idea of observation saying that the space axis of an observer is perpendicular to the trajectory of observed body.

We can draw the new transformation of coordinates by considering an observation of a body from the point of view of two observers moving with different velocities. The described situation is presented in the fig. 1.

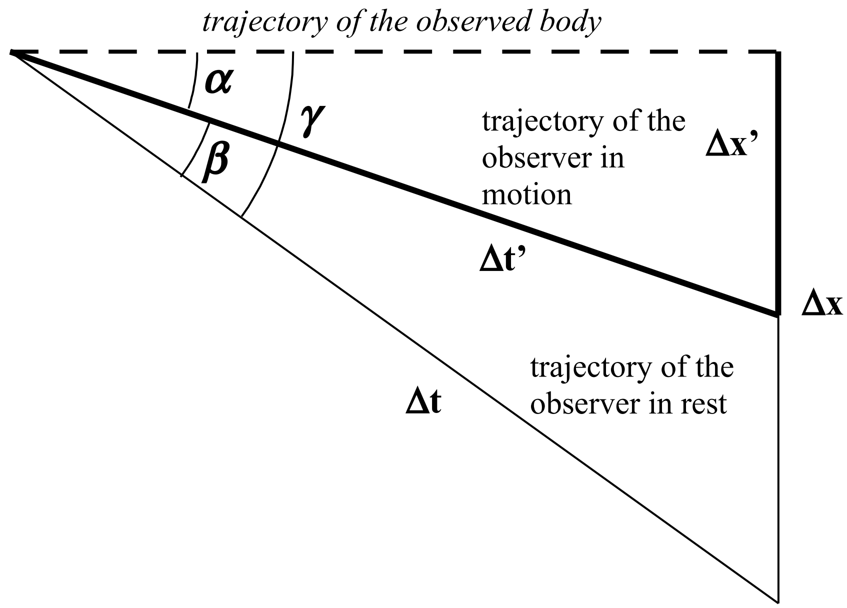


Fig.1. Observation of a body by two observers in the FER

In the FER model, the sinus of the angle between trajectories of bodies is equal to their relative velocity; we then have:

(1a) $v = \frac{\Delta x}{\Delta t} = \sin\gamma$ - velocity of the body in the coordinate system of the observer in rest

(1b) $v' = \frac{\Delta x'}{\Delta t'} = \sin\alpha$ - velocity of the body in the coordinate system of the observer in motion

(1c) $V = \sin\beta$ – the relative velocity of the observers connected with the **xt** and **x't'** frames

Now, with the help of simple geometrical relations resulting from the fig. 1, we can derive formulas for transformation of the coordinates from the coordinate system of one observer to the coordinate system of the other observer.

(2)
$$\Delta t = \frac{\Delta t'}{\cos\beta} + \frac{\Delta x' \sin\beta}{\cos\beta \, \cos(\alpha + \beta)}$$

(3)
$$\Delta x = \Delta x' + \frac{\Delta t' \sin\beta}{\cos(\alpha + \beta)}$$

or with the help of velocities (1a, 1b, 1c):

(4)
$$\Delta t = \frac{\Delta t'}{\sqrt{1 - V^2}} + \frac{V \Delta x'}{\sqrt{1 - V^2}\left(\sqrt{1 - v'^2}\sqrt{1 - V^2} - Vv'\right)}$$

(5)
$$\Delta x = \Delta x' + \frac{V \Delta t'}{\sqrt{1 - v'^2}\sqrt{1 - V^2} - Vv'}$$

We can see that, although in the formula for the time coordinate there exists an element responsible for the time dilation, in the formula for the space dimension there is no element responsible for the Lorentz contraction. I would like to note that the absence of the Lorentz contraction does not disqualify the new formulas because in the FER the Lorentz Transformation is not required for justifying the constancy of the speed of light, as in the case of RT. The justifying of the invariance of light speed is in FER is a consequence of the fact that propagation of the EM waves and the motion of mass bodies are now described with different mechanisms. The velocity isn't the value characterizing the motion any more – it is only a certain observable aspect of the motion of bodies along their trajectories. The role of the velocity is playing by a more general idea now, namely the angle between the trajectories which can describe even the values which can not be described by the velocity.
We now have two transformations that exclude each other: the transformation in the FER, derived above, and the Lorentz Transformation. This proves that in the FER model it is possible to show that the Lorentz Transformation is wrong, because derivation of the Lorentz Transformation in the FER is possible only if the fundamental rule of observation in FER is broken, namely the rule stating that the space axis of an observer must be perpendicular to the trajectory of an observed body.

Deriving of the Lorentz Transformation in the FER:
The way of deriving the Lorentz Transformation is shown below:

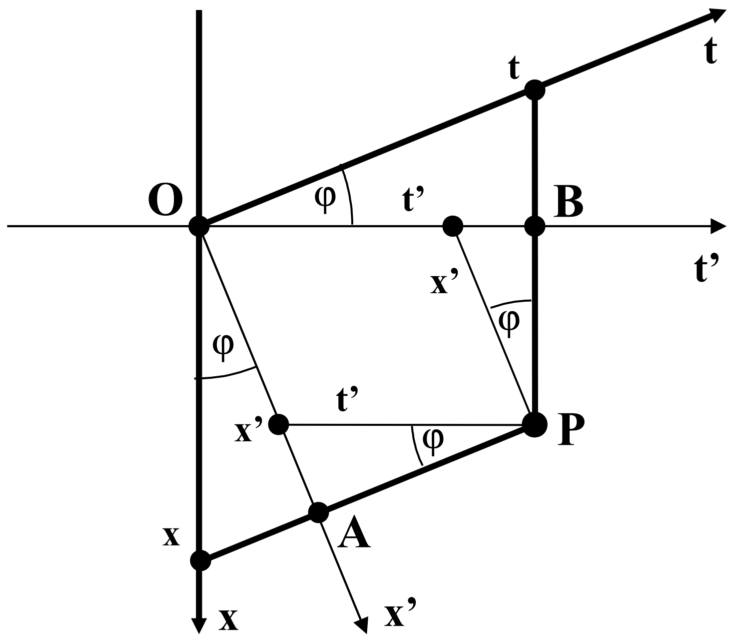


Fig. 2. Coordinates xt and x’t’ of the point P and axes of frames xt i x’t’ in FER

Let us put a point P in frames of both bodies – *Fig.1* According to the picture, x-co-ordinate of the point P is equal to:

$$x = \frac{OA}{\cos\varphi}$$

then:

$$OA = x' + t'\sin\varphi$$

so that, if we remember that **sinφ** denotes the velocity **V**, we can write:

$$x = \frac{x' + t'\sin\varphi}{\cos\varphi} = \frac{x' + t'V}{\sqrt{1 - V^2}}$$

(6)

In the same way we can obtain the next equation:

$$t = \frac{OB}{\cos\varphi}$$

$$OB = t' + x'\sin\varphi$$

$$t = \frac{t' + x'\sin\varphi}{\cos\varphi} = \frac{t' + x'V}{\sqrt{1 - V^2}}$$

(7)

As shown above, the geometrical interpretation of FER allows to derivate the Lorentz Transformation in a very simple way.

The deriving of the Lorentz Transformation in the FER, presented above, seems to be trivially simple and obvious. However, as it was mentioned before, in this deriving there is a hidden mistake.

In the fig 2 we are deriving the Lorentz Transformation considering coordinates of point P. According to the FER model, in order to define the space axis of the point, it is necessary to know the trajectory of this point because the space axis must be perpendicular to the trajectory of the observed object. Let us note that defining, in the fig. 2, the coordinates xt , we are assuming that the trajectory of the point P is parallel to the time axis t' of the coordinate system of the observer x't' – see fig. 3

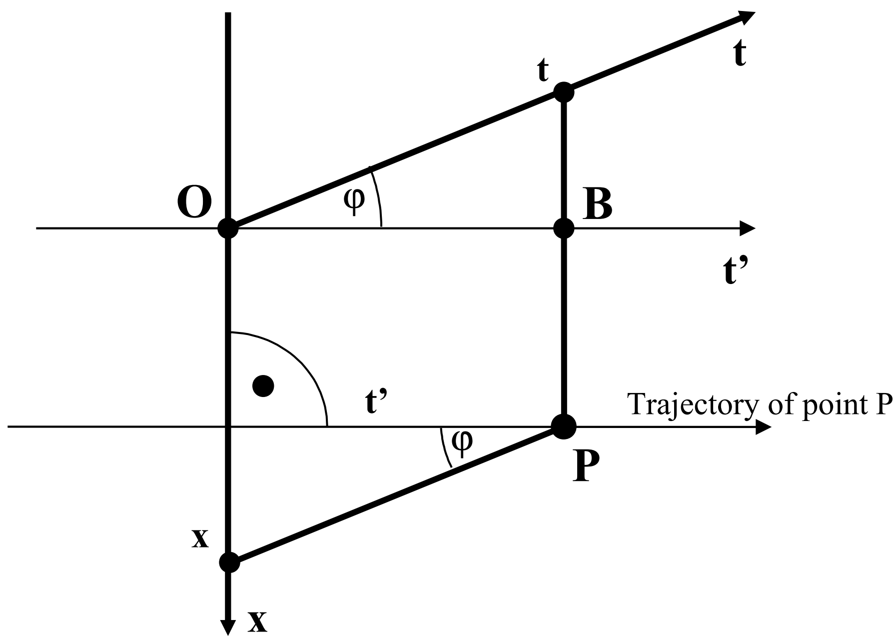


Fig .3 Defining the coordinates xt of point P, we are assuming that trajectory of point P is parallel to the time axis t' of the coordinate system x't'. It is due to the fact that the space axis of the observer x , in the FER, must be perpendicular to the trajectory of the observed body t'.

On the other hand, defining, in the fig. 2, the coordinates x't' , we are assuming that the trajectory of the point P is parallel to the time axis t of the coordinate system of the observer xt – see fig. 4

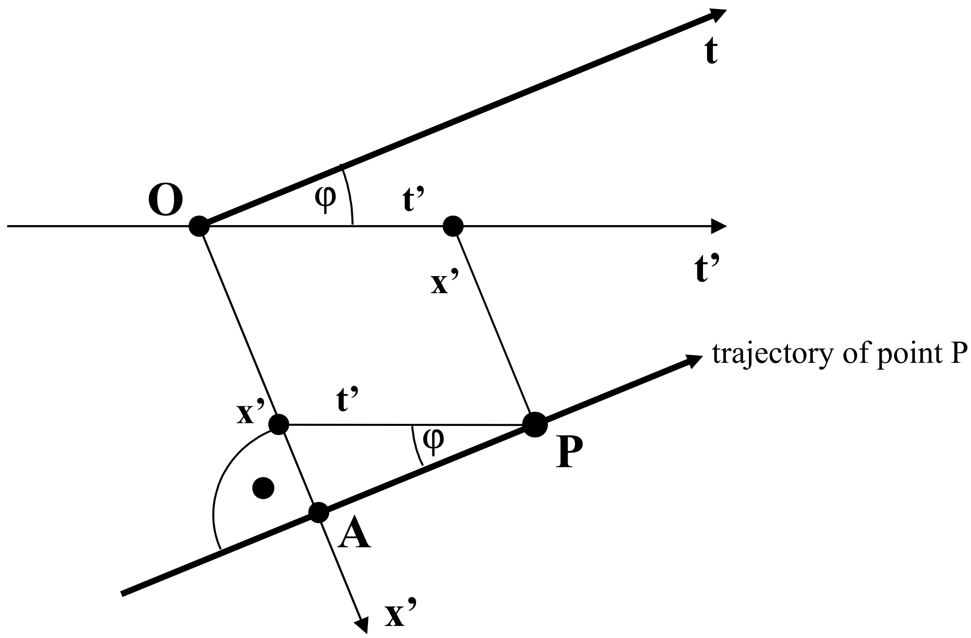


Fig .4 Defining the coordinates x't' of point P we are assuming that trajectory of point P is parallel to the time axis t of the coordinate system xt. It is due to the fact that the space axis of the observer x' , in the FER, must be perpendicular to the trajectory of the observed body t.

Therefore, the point P, in the fig.2, is the point of intersection of trajectories of two different bodies moving along these different trajectories. One of the bodies is moving along the trajectory parallel to the time axis of coordinate system xt, the second one is moving along the trajectory parallel to the time axis of the x't' coordinate system.
The formulas of the Lorentz Transformation derived in such a way do not allow for describing the coordinates of any real body, but they are only describing the coordinates of the point of intersection of the trajectories of different bodies. From mathematical point of view, the formulas of the Lorentz Transformation are correct in every single point of the space; however, from the physical point of view, such description is useless. Thus the equations of Lorentz Transformation are still a mathematically correct solution of the space-time interval equation but, due to their non-physical character, the use of these formulas may lead to false conclusions. It seems that the Lorentz contraction, in the case of macroscopic observations, can be such a false conclusion. I would also like to remind that the essence of the mistake consists in the fact that in the Relativity Theory one can give the coordinates of any point in the space-time without knowing its trajectory – which has been applied in the fig. 2 – while the new rules introduced by the FER model need additionally, for defining the coordinates of any point, the knowledge of the trajectory the point belongs to.

The next new conclusion resulting from the FER model is a trivially simple mechanism explaining the observed phenomena of the recession of galaxies. If we apply the rule of observation, obligatory in the FER, which says that the space axis of the observer is perpendicular to the trajectory of an observed body, then a mutual observation of observers moving along trajectories that have one common point results in the fact that the observed velocity will be proportional to the observed distance. This phenomenon has nothing to do with any acceleration and is only a consequence of the available way of performing the observations. The case described above is illustrated in the fig. 5

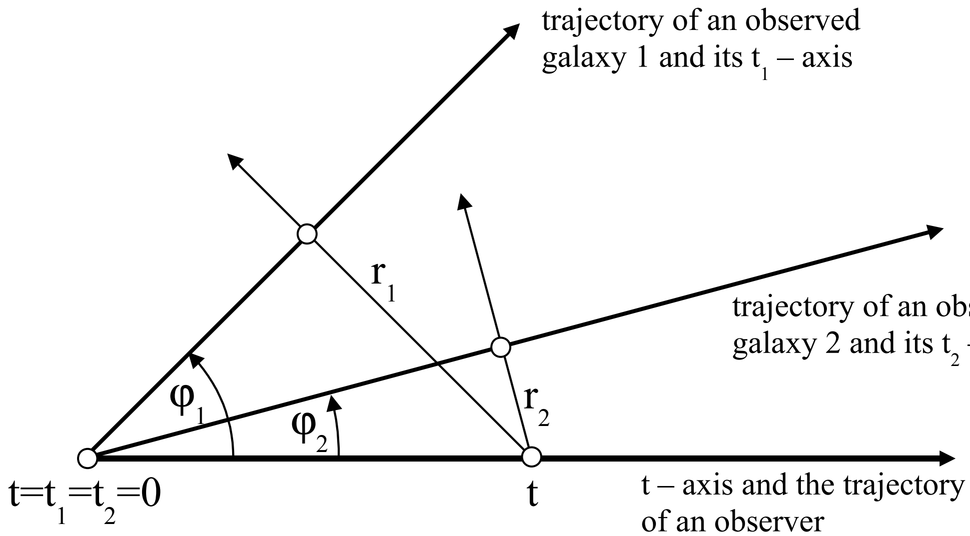


*Fig. 5. The trajectory of the observer and the trajectories of two exemplary galaxies in the FER. The trajectories of the observer and the galaxies have a common origin. The observer, during observation of each of the galaxies, interprets a different direction in FER as his space dimension – in the picture $r_i=x_i^2+y_i^2+z_i^2$, i=1,2. During the observation, the observer is in the point **t** on his trajectory.*

The space directions of the observer's coordinate system are perpendicular to the trajectory of the observed galaxy, and therefore the observed velocity is equal to the sinus of an angle between the trajectory of the observer and the trajectory of the observed galaxy, and the velocity is also proportional to the observed (in the observer's coordinate system) distance from the galaxy – fig. 5. [5]:

$$V_i = \sin\varphi_i = \frac{r_i}{t} = Hr_i \qquad \textbf{(8)}$$

where:

V_i - the velocity of the i-th galaxy observed from the observer's coordinate system

r_i - the distance from the i-th galaxy observed in the observer's coordinate system

t – the time which has passed from the Big Bang (t=0 in fig.5) in the observer's frame

H – the constant of proportionality which is binding the observer's distance from the galaxy with its velocity.

As it has been shown, a single, very simple formula 8 contains two basic properties of the expanding Universe, namely:

- The observed velocity of a galaxy is directly proportional to the observed distance from the galaxy
- The constant of proportionality – the Hubble constant – is inversely proportional to the age of the Universe:

$$H = \frac{1}{t}$$

We learn about the fact that the velocities of the galaxies are proportional to the distance upon the red shift observation of the spectrum of heavenly bodies. The FER model gives a very simple explanation of the "red shift" phenomenon for the galaxies moving in the way illustrated in the fig.5

According to the model presented in this work, we can express our trajectory, the trajectory of the galaxy that is moving away, and axes of our coordinate system, in the following way – fig. 6

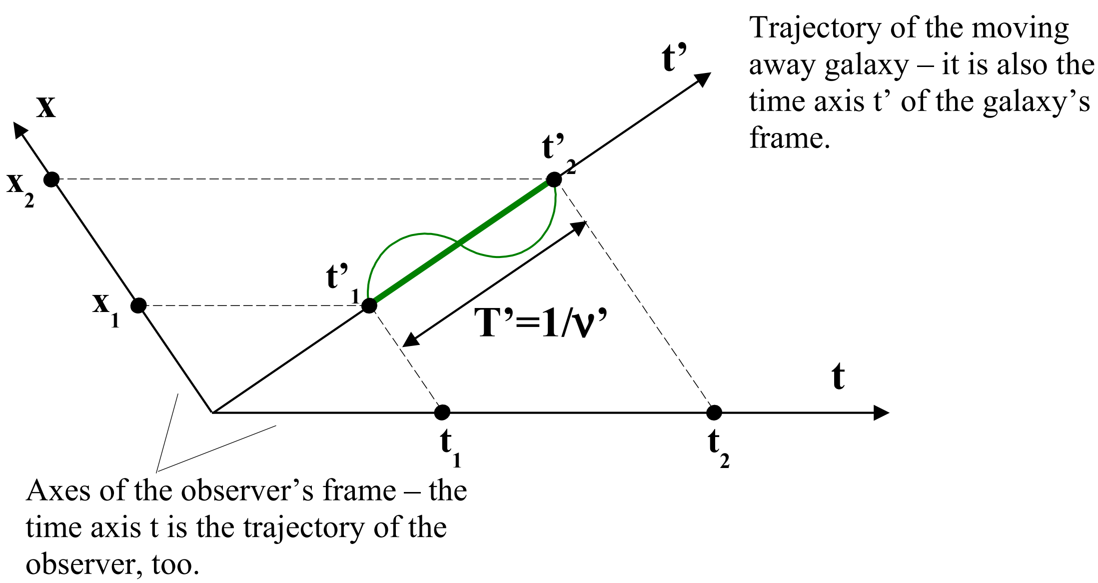
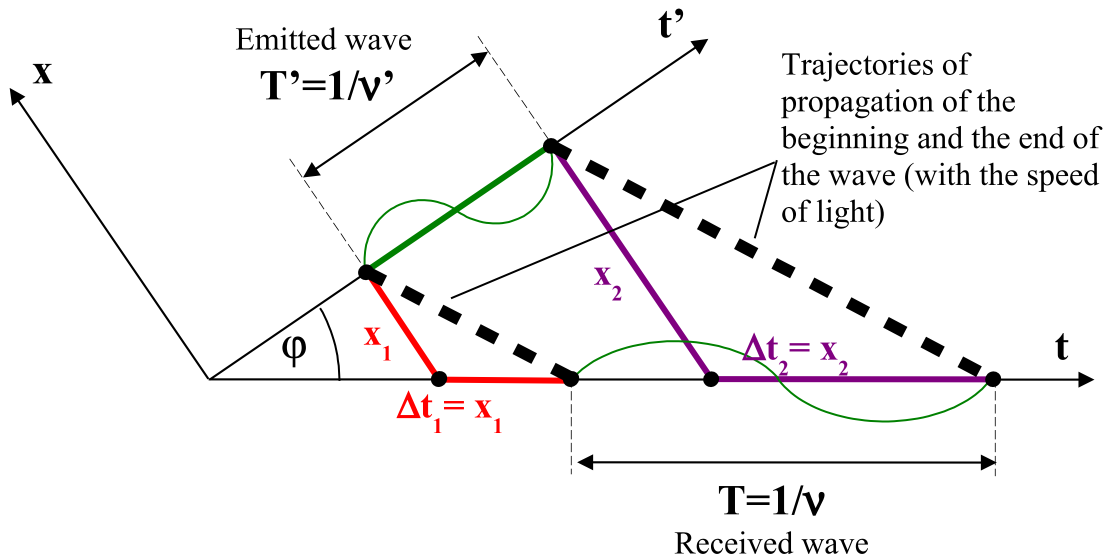


Fig. 6 Trajectory of a galaxy that is running away and the axes of the observer presented in the FER. The runaway galaxy is emitting a wave of frequency equal to ν' (T'- the period of vibrations).

The runaway galaxy is emitting wave with the frequency ν'. Coordinates of the beginning and the end of the wave, which was emitted in the observer's frame, are equal respectively to x_1t_1

and x_2t_2 – see fig. 6. In the frame connected with the galaxy, the beginning and end of the wave are emitted at times respectively t'_1 and t'_2.

The wave which had been emitted is propagating with the speed of light, according to the rules presented in [1] (we should remember that in the FER c=1). Fig 7 shows the resultant trajectories of propagation of the beginning and the end of the wave.



Rys. 7 Propagation of the wave in the FER – the wave passes the distance x_i and in the same time it is carried along the trajectory of the observer by a value $\Delta t_i = x_i$ (i=1,2; in the fig. 13.1 $x_0=0$ then $x_i = \Delta x_i$). The received wavelength is different from the emitted one. By the way – it is a very pictorial illustration of the Doppler effect which takes into account the relativistic change of the time.

From simple geometrical dependences resulting directly from the fig. 7 and remembering that c=1, $V = \sin\varphi$ we finally obtain:

$$\nu = \nu' \frac{1-V}{\sqrt{1-V^2}} = \nu' \frac{\sqrt{1-V}}{\sqrt{1+V}}$$

(9)

This is the formula which describes the case when the body is moving away from the observer. As we can see, the frequency measured by the observer - **ν** - is lower than the frequency observed in the frame of the body in motion - **ν'**.

The formula 9 is the one already obtained from SRT if one-dimensional motion is assumed (one body falling centrally onto another one).

The Dark side of the Universe

The method of observation of bodies in FER described in this paper and [1,2] allows to predict new physical phenomena which should be observed sooner or later. One of the phenomena, consisting of the dependence of products of self decay of relativistic particles on the energy of these particles, was described in [1]. Another phenomenon should be registered during an observation of faraway galaxies.

Since the directions in FER perceived by us as the space dimensions are perpendicular to the trajectories of the observed galaxies, we are able to observe only those galaxies which are moving along trajectories inclined to our trajectory at an angle smaller than 90^0. If we assume that the galaxies are moving along trajectories distributed almost uniformly between all of the possible directions in FER, then we are able to observe only half of the Universe. Another, non-observable half of the Universe is marked in the fig. 8 as the dark side of the Universe. Due to the change of the velocity of the Earth in relation to the Universe, which is the consequence of the rotational motion around the Sun, the boundaries of the observed Universe would change as a function of the season of a year. The effect of the observation from the Earth's surface is very small and it is valid for the galaxies which are moving with the velocity only $2*10^{-6}$ % slower than the speed of light [5], but we can expect that the galaxies which are within the presently observed boundary of the Universe could also appear and disappear in certain seasons of the year, if the velocity of the galaxies could be measured with sufficient accuracy – the above mentioned $2*10^{-6}$ %. The described situation is presented in fig. 8.

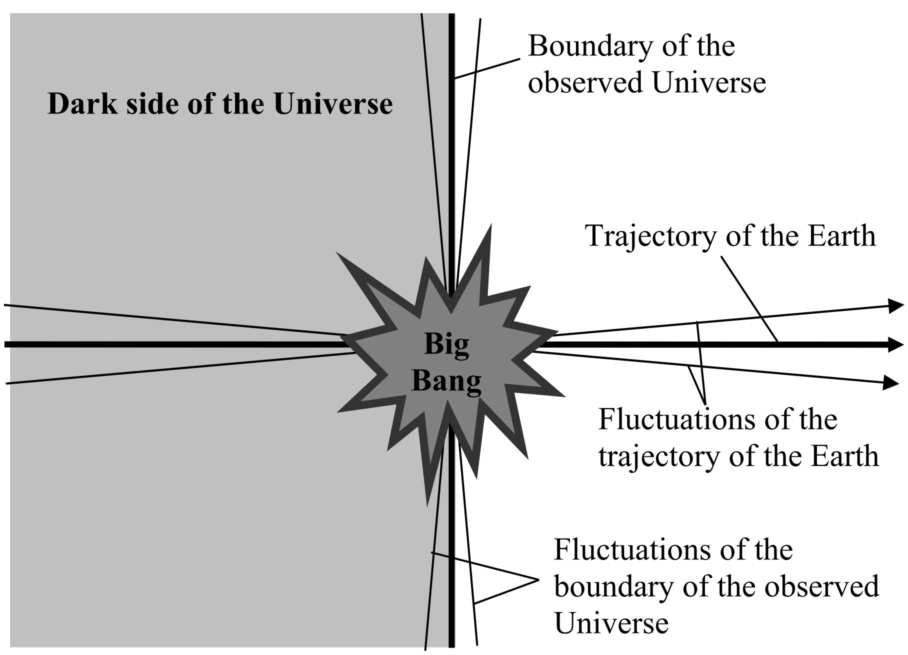


Fig.8 Dark Side of the Universe. We are able observe only objects moving along trajectories inclined to our trajectory at angle lower than 90^0. Therefore half of the Universe is not observable. Motions of the Earth around the Sun causes that the boundaries of the observed Universe are changing as a function of a time of a year.

Problems of the FER model

In FER the space axis of an observer is determined as perpendicular to the trajectory of the observed body. This mechanism of observation is a source of certain new problems which have not been comprehensively explained yet. It occurs that it is not possible to determine an objective position of any body in space without knowing about its interaction with other bodies. For instance:

Let us imagine that in the space-time **xt** a probe is positioned, registering some bodies; it is located in the distance X from the beginning of the coordinate system of the observer (e.g. from an oscilloscope).

Let us assume that in the same moment of time the probe registers three particles moving with various velocities.

In space-time **xt** one can observe that a detector which registers bodies that move with various velocities is located in one point of space-time with coordinates **XT**.

A case of observation of the same bodies (moving with various velocities) by this probe presented in the FER is shown in *fig. 9*

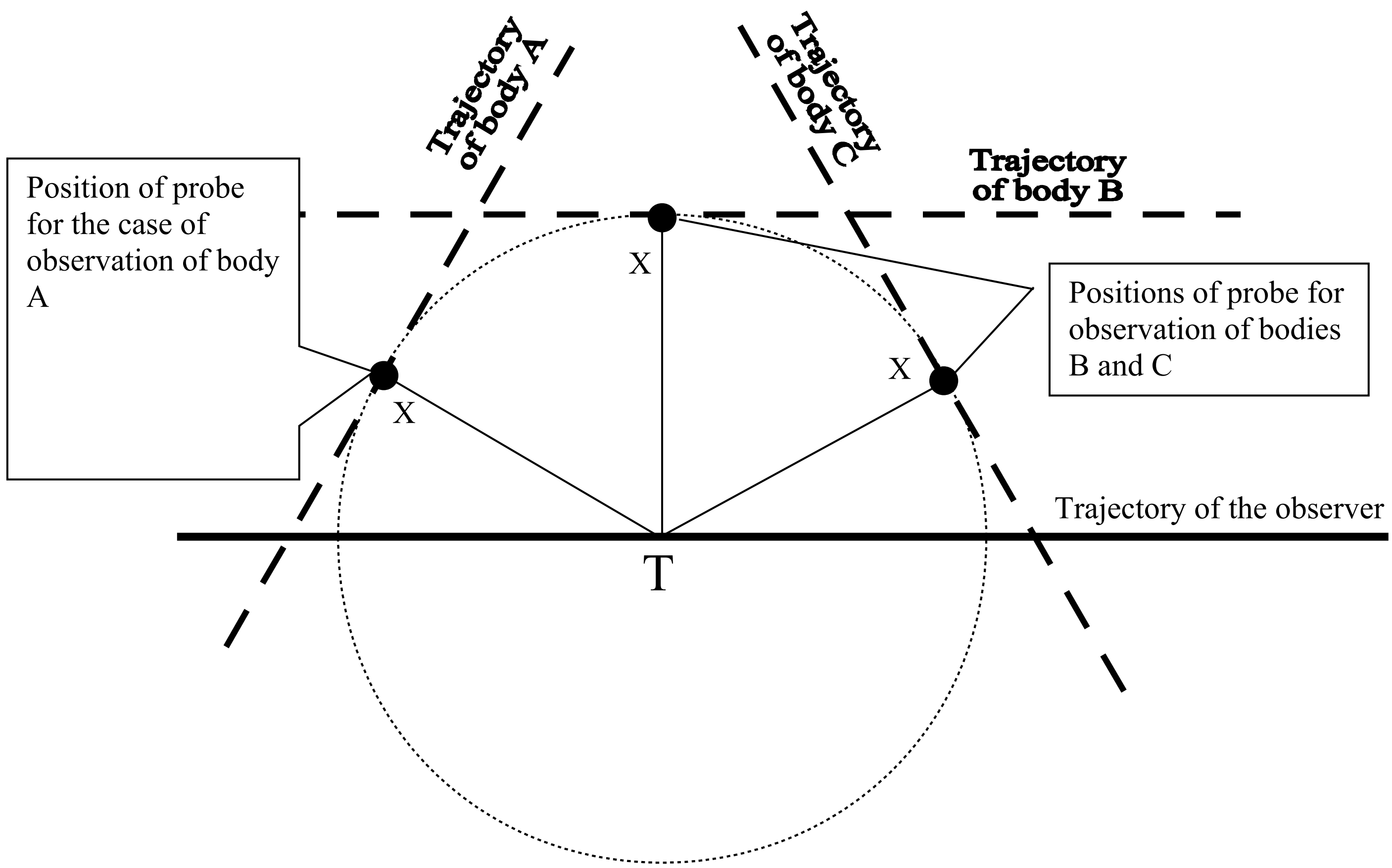


Fig. 9 The probe is seen in space-time xt as one single point with coordinates XT. The same probe in the objective reality takes different positions depending on the angle between trajectory of the observed body and trajectory of the observer (i.e. observed velocity of the body).

In this picture, the probe, at the X distance from the beginning of the coordinate system of the observer, registers, in the same time T, three bodies moving with different velocities.

A circle with its center in point T shows all the possible positions (in the objective reality) of the probe, for detection (in time T) of bodies moving with all possible velocities (i.e. along all possible trajectories).

As shown in *fig. 9* , in the FER, the observation of each body requires choosing a different position for the probe. **This condition must be fulfilled because a space-dimension must be perpendicular to the trajectory of the observed body.**

It means that the probe observed in the classical space-time as a single point with co-ordinates XT, in the FER can be located in every point of the circle with its center in point T and the radius of X.

Therefore, instead of one point xt in classical space-time, we can define only a class of points being the circle.

Only the act of choosing the observed body (or the observer) chooses one point from this class. However, without the presence of the observed body, we are not able to determine location of the probe on the circle presented in the fig. 9

Analogously, in the FER we have problems with determining the trajectory of a body. Similarly to the case described above, we are not able to describe the trajectory of the body in the FER, but only a certain class of trajectories. The choice of the specified trajectory is made in the moment of determining the beginning and the end of the trajectory.

Therefore, it seems that the notions, well known from previous theories, as, for instance, location of a body or its world line, cannot be applied in FER in a manner we used in classical theories. In the FER, we are not able to consider a location in space and in time as separate values. We can only know a certain superposition of the location of the body in the time and space, but the specific values of time and space coordinates can be applied only if the other body, with which the considered body is interacting, are determined.

For instance, considering the flow of the SUPERTIME for the particular body, we are able to determine only the sum $dt'^2 + dx^2$ (in case of one-dimensional motion)[2], while we are not able to determine specific values dt'^2 or dx^2 until the frame of the observer is chosen. Moreover, for every observer, the specific values dt'^2 and dx^2 will be different, while their sum will be constant and not dependent on the choice of observer.

Conclusions

The new model of the Euclidean Reality yields new spectacular conclusions. It is possible to experimentally verify these conclusions. The new transformation of coordinates suggests that the Lorentz Transformation, applied up till now, although mathematically correct, is non-physical and may lead to false conclusions. A trivially simple derivation of the formula describing the recession of galaxies, the value of a Hubble's constant and its connection with the age of the Universe, may suggest correctness of the model because such a significant simplification of the phenomena, described till now with much more complicated models, does not seem to be only a matter of accident. However, apart from promising, spectacular conclusions, new problems also appear and they may suggest that the true picture of reality can be far from the picture we are able to observe an from what we can imagine.

References:

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