The Recession of Galaxies

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Recent papers show that the space-time can be described with the 'Four-dimensional Euclidean Reality' (FER), in which all dimensions have identical properties. According to the new model, the dimensions of time and space that we are able to observe are not the dimensions that create the reality. They are only certain directions in FER, which are interpreted by us as the dimensions of time and space. The directions so interpreted by us as the time- and space dimensions depend on the choice of an observed body and an observer; that is to say, the directions are different for every such pair: observer and observed body. According to the new model of reality, observers that move in FER along trajectories having a common origin – as takes place in case of the galaxies – observe other bodies/observers as moving with recessional velocity proportional to the distance from the observer. The velocity proportional to the distance is now the result of observation only, and has nothing to do with any cosmic acceleration.

1. Introduction

In 1905 Einstein published the article that became the foundation of Special Relativity Theory (SRT). This theory changed the concept of reality that surrounds us by introducing the idea of four-dimensional reality. The fourth dimension that creates this reality was to be time, which we are able to measure with our clocks. After initial spectacular successes of SRT, the progress of science has slowed down. During the 100 years elapsed from the publication of the SRT, it was not possible to either introduce the unification of EM and gravitational interactions, or to unify quantum mechanics with the SRT.

In my previous papers [1-3], I suggested that the origin of the above mentioned problems with unifying other models with the SRT could be the hasty assumption that the fourth dimension that creates the reality is just the time that we can measure ourselves with our clocks. I am not isolated in this opinion, because the idea saying that the fourth dimension of the reality differs from the time of an observer has appeared more and more often in the last few years [4-14].

From the mathematical point of view, the assumption that time is the fourth dimension of reality is equivalent to the assumption that the time dimension is perpendicular to the three space dimensions. However, according to my previous papers [1-3], the similarity between the time- and the space dimensions can be also justified on the basis of the model in which the time is not perpendicular to the three space dimensions, but is instead inclined to the three-dimensional space at a non-zero angle. The new reality is still four-dimensional, but the fourth dimension, perpendicular to the three-dimensional space, is no longer time. Time is now the composition of the fourth dimension and the three space dimensions. As a result, we obtain the Four-dimensional Euclidean Reality (FER).

In the FER, the description of many physical phenomena is significantly simpler, and some new predicted phenomena occur. The new predicted phenomena can be a reliable test for the correctness of the new model [1].

2. The Idea of the New Model of Space-Time

According to SRT, reality is constructed of the time- and space-dimensions that we are able to measure directly. Therefore, we obtain the picture of reality that can be easily accepted – the reality is such as we can observe. However, in order to justify the constancy of the speed of light, the assumption of deformation of the dimensions of moving bodies had to be introduced. This assumption still causes various controversies and misunderstandings. Hence, the SRT is improperly interpreted by a number of physicists. This is the origin of certain, sometimes incredible, paradoxes [15].

According to the model of reality presented in the last papers [1,2], the reality is constructed of certain dimensions – we will mark them with letters a,b,c,d . None of the dimensions has the meaning of time or space – in the Fig. 1 two of four dimensions are shown: **a** and **b** (it could well be any other two dimensions, c,d or a,d or b,c , *etc.*) Generally, we can say that the dimensions of space and time are certain compositions of a,b,c,d dimensions, while the dimensions themselves cannot be directly observed. The dimensions closest to a and b are the space dimension of the observer - x and the dimension of the proper time of the observed body – t' (they are perpendicular to each other as well). Therefore, in my previous papers [1,2] only dimensions x,y,z,t' were used for the description of reality, instead of the a,b,c,d ones.

In the new reality bodies are moving along certain trajectories (the motion, the space, the time and the trajectory in FER were defined in [1]). The length of the trajectory passed by a body in FER is the measure of the time which is indicated by the clock bounded with the body. The directions in FER perceived by us as the space dimensions are always perpendicular to the trajectory of the observed body [1] – Fig. 1. What it means practically is that for observation of every body the observer is interpreting different directions in FER as the space dimensions.

However, the observer does not realize that for every observation he is interpreting different directions in FER as the space dimensions, and he has the impression that he is observing all bodies in one and the same coordinate system. Hence, in relation to the Relativity Theory, the FER model describes the observation in a more complicated way, while the description of the reality itself is much simpler because in the new model the reality is assumed to be pure Euclidean one, while in SRT it was assumed to be the Lorentzian one [1].

In SRT, there exist relativistic effects on the properties of the Lorentzian space-time (the space dimension could be stretched or compressed). According to the FER model, relativistic phenomena are not the real changes of properties of the bodies or properties of the FER itself, but they are only the effect resulting from the way in which we are able observe the surroundings. Hence, if according to SRT we can say ***"the dimension is deformed"***, then according to the FER model we can say that ***"the dimension is observed as if it was deformed"*** while ***truly***, the dimension is not deformed, but it is observed at a different angle [1].

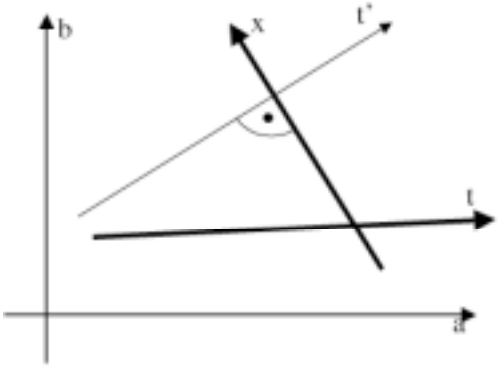

Figure 1. The time and space dimensions – x, t and the dimension of the proper time of the observed body - t' - in the new Euclidean reality, described with the a, b dimensions (FER). The trajectories of the observer and the observed body in a, b space (FER) are the time dimensions of the observer and the observed body, respectively. The direction in FER perceived by the observer as its space-dimension is perpendicular to the trajectory of the observed body (its time axis – t').

Summarizing: the most important property of the new model, from the point of view of further considerations, is the fact that:

The directions in FER which are perceived by us as the space dimensions are perpendicular to the trajectory of an observed body

then

during observation of every single body we are perceiving different directions of FER as our space dimensions.

On the Illusion Created

The increase of the galaxies' velocities as a function of distance is only the result of the manner in which the observations are performed. Let us assume that the Universe had a common origin, and the galaxies are moving in FER along linear trajectories having this common origin. An observer is moving along one of the trajectories. The described situation is shown in Fig. 2.

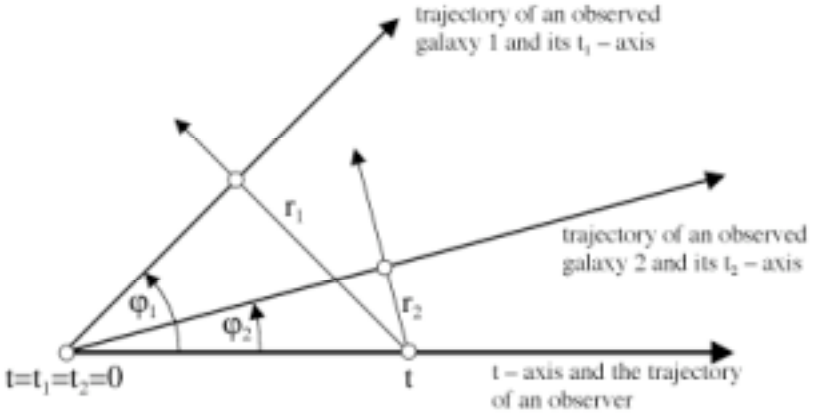

Figure 2. The trajectory of the observer and the trajectories of two exemplary galaxies in the FER. The trajectories of the observer and the galaxies have a common origin. The observer during observation of each of the galaxies interprets a different direction in FER as his space dimension – in the picture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

The space directions of the observer's coordinates system are perpendicular to the trajectory of the observed galaxy, and therefore the observed velocity is equal to the sine of an angle between the trajectory of the observer an the trajectory of the observed galaxy, and the velocity is also proportional to the observed (in the observer's coordinates system) distance from the galaxy – Fig. 2. [1]:

$$V_i = \sin \varphi_i = r_i / t = H r_i \qquad (1)$$

where V_i is the velocity of the i-th galaxy observed from the observer's coordinates system, r_i is the distance from the i-th galaxy observed in the observer's coordinates system, t is the time that has passed from the Big Bang ($t = 0$ in Fig. 2) in the observer's frame, H is the constant of proportionality which is binding the observer's distance from the galaxy with its velocity.

As has been shown, a single very simple formula (1) contains two basic properties of the expanding Universe; namely:

- The observed velocity of a galaxy is directly proportional to the distance from the galaxy.
- The constant of proportionality – the Hubble constant – is inversely proportional to the age of the Universe: $H = 1/t$.

In the previous papers I have shown that the new FER model simplifies the description of relativistic phenomena [1] and allows for connecting the Relativity Theory with the wave structure of matter [2]. In the present paper I am showing that the same model can explain the phenomena of the galaxies recession in an extremely simple way, with the only one trivial formula (1). Now the increase of the galaxies' velocities is the effect of the manner of performing observations available to us, while the galaxies are moving in the same way from centuries and the observed increase of their velocity has nothing to do with any acceleration. The increase of the galaxies' velocities is the consequence of the specific manner of observing the galaxies based on the fact that for the every galaxy we are interpreting different directions in FER as our space dimension (Fig. 2).

4. Method of Experimental Verification of the Model

The method of observation of the bodies in FER described in this paper and [1,2] allows one to predict new physical phenomena that should be observed sooner or later. One of the phenomena, consisting of the dependence of products of self decay of relativistic particles upon 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. 3 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 [1], but we can expect that the galaxies which are on of the presently observed boundary of the Universe can 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. 3.

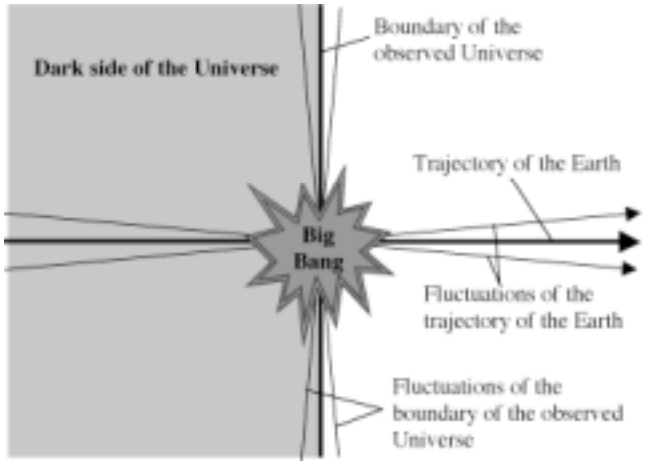

Figure 3. The Earth's trajectory and trajectories of the galaxies that are at the boundary of the observed Universe. The boundaries of the observed Universe are changing as a result of the change of the trajectory of the Earth during its rotational motion around the Sun.

5. Conclusions

An assumption that the physical reality can be described with the help of the FER model results in the simpler description of the reality. Moreover, we obtain a very simple justification of the recession of galaxies – a phenomenon that until now had to be described with help of complicated cosmological models [16] or with the help of enigmatic hypothetical interactions. The increasing velocity of the galaxies is no more than an effect of the observation that can be performed only with the help of available devices and signal carriers (quanta of radiation). According to the FER model, all galaxies from the beginning of the Universe are moving in the same way and the observed 'acceleration' is not a result of real acceleration, but rather a result of observation which can be performed only along those directions in FER that are perpendicular to the trajectory of the observed galaxy. One advantage of the presented model is the incredible simplicity of the description. The acceleration of the galaxies, decreasing of the Hubble's constant as a function of the time, and the value of the Hubble's constant equal to an inverse of the age of the Universe, are the result of the very simple formula (1) and no longer come from any complicated cosmological models. Such great simplification of the description cannot be a matter of any accident, and if a really simple explanation of complicated problems exists, then, regardless of the present state of knowledge, it should be taken into consideration.

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