9.1 MEASUREMENT OF THE NEUTRINO'S VELOCITY AT CERN

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In connection with our deliberations on the notion of time[1] we can assume that the lapse of time t_U in a given small region of space U depends, *inter alia*, on the distance between the boundary hypersurfaces $\tau(q)$, on the vector of asymmetry of mirror spaces ${}^{\alpha\beta}\vec{\xi}(q)$ and on tensors of elasticity of the boundary hypersurfaces ${}^{\beta}K(q)$, ${}^{\alpha}K(q)$.

$$\underset{q\in U}{\forall} t_U\left(\tau(q), {}^{\alpha\beta}\vec{\xi}(q), {}^{\beta}K(q), {}^{\alpha}K(q)\right) \quad \textbf{(1)}$$

Generally, it can be assumed that elastic properties of boundary hypersurfaces in a given small region of space U depend on the distance between the boundary hypersurfaces and on the vector of asymmetry of mirror spaces.

$$\begin{gathered}\underset{q\in U}{\forall} {}^{\beta}K\left(\tau(q), {}^{\alpha\beta}\vec{\xi}(q)\right),\\ \underset{q\in U}{\forall} {}^{\alpha}K\left(\tau(q), {}^{\alpha\beta}\vec{\xi}(q)\right)\end{gathered} \quad \textbf{(2)}$$

Using the dependence of the distance τ between the boundary hypersurfaces and vector of asymmetry ${}^{\alpha\beta}\vec{\xi}$ of mirror space on the gravitational field intensity, we have, ultimately:

$$\underset{q\in U}{\forall} t_U\left(\tau(q), {}^{\alpha\beta}\vec{\xi}(q), {}^{\beta}K\left(\tau(q), {}^{\alpha\beta}\vec{\xi}(q)\right), {}^{\alpha}K\left(\tau(q), {}^{\alpha\beta}\vec{\xi}(q)\right)\right) = t_U\left(\vec{\gamma}(q)\right) \quad \textbf{(3)}$$

Directly from the above dependence, we conclude that a small region of space U may be expanded to larger regions of space in the case when the gravitational field intensity is constant in that region.

Let us now proceed to measuring the velocity of physical objects which, as we know, are vortex disturbances of space.

[1] See Chapter V.

The measurement of the instantaneous velocity v_c of a physical object is the measurement of the path ds covered by the object in a given time interval dt.

$$v_c = \frac{ds}{dt} \tag{4}$$

In contrast, mean velocity v_m is measured by determining the quotient:

$$v_m = \frac{\Delta s}{\Delta t} \tag{5}$$

We known from earlier deliberations that the measure of the path covered in a curved space is the length of geodetics rather than the length of a straight section. Therefore, a distance measured, for instance, by means of a laser rangefinder is measured correctly[2].

However, because the neutrino's velocity is measured along the trajectory passing through the inside of the Earth, it is not possible to measure the distance Δs directly. This generates the question of how the distance was measured at CERN.

The question is far from being trivial since space is curved in the fourth dimension, as demonstrated in the previous chapters.

The issue of measurement of the distance covered by the neutrino will be shown in the figure below, where the boundary hypersurface ${}^{\beta}\aleph$ alone is shown.

[2] Measurements must be made in small sections, in which the gravitational field strength is approximately constant.

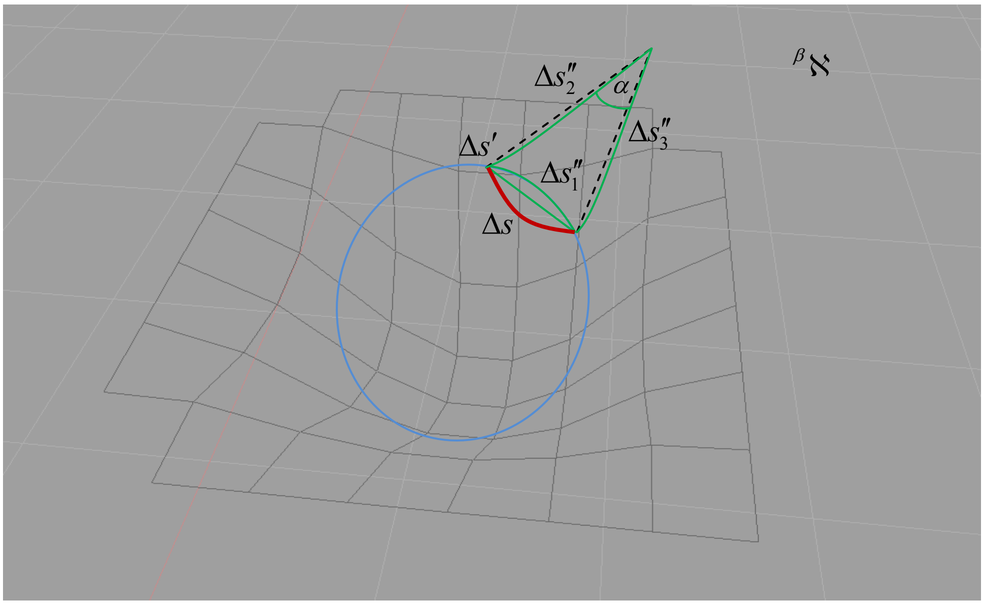

FIG. 1

For example, it is possible to measure the distance between the measurement endpoints $\Delta s''$ and then, taking advantage of the fact that the Earth is an ellipsoid, find the straight line distance $\Delta s'$.

According to a different approach, we measure the path $\Delta s_2''$ and $\Delta s_3''$ covered by the laser beam which is reflected from the Moon[3] and the angle α between the incident beam and the reflected beam. Such measurements enable us to find the distance $\Delta s'$ which is the base of the triangle[4].

Unfortunately, it is clearly seen in the figure that the distance found according to that method is incorrect because the curvature of space in the fourth dimension was not taken into consideration.

A correctly found distance is the line shown in the figure in red color, which overlaps the geodetics of the boundary hypersurface $^{\beta}\aleph$ and of which the length is Δs .

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[3] Or a satellite.

[4] The trajectories $\Delta s_2''$ and $\Delta s_3''$ are not straight lines, which means that we may not use conventional formulas for triangles covered by Euclidean geometry.

It is clearly emphasized that the incorrect measurement of the distance covered by the neutrino would not be a problem at all if there existed a direct method for measuring the distance[5].

Another problem, encountered in measuring the mean velocity v_m of a physical object is the measurement of time along the path where the gravitational field intensity $\vec{\gamma}$ is not constant, and the reason is the relationship $t(\vec{\gamma})$.

Therefore, either mean velocity should be measured along sections where the gravitational field intensity is constant, or a different lapse of time along its small sections, where the gravitational field intensity is approximately constant, should be taken into account.

The problem could be simplified according to a different approach, assuming that, since space is non-homogeneous and boundary hypersurfaces change their elastic properties depending on the gravitational field intensity, then velocity of light depends on the gravitational field intensity as well.

We explain that the above interpretation would lead to immense complications in all physical equations and would be unnatural because we, too, are embedded in the space we describe[6].

Now we will provide an example which argues for velocity of light to continue to be a constant and maximal velocity, on the condition that such velocity is found from the formula for instantaneous velocity.

Let us imagine a planet of huge dimensions and a huge mass, concentrated in its nucleus of a small radius. A certain company has its offices located on the surface of the planet and near its nucleus. The way the personnel working in the rooms located near the nucleus chose to travel is not the subject of our interest, though a very fast elevator could be an option[7].

Directly from the structure of the planet it follows that the gravitational field intensity is much higher in the rooms located near the nucleus of the planet, compared with that on the surface of the planet.

Furthermore, we will assume that time is only measured in the room located on the surface of the planet.

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[5] In the subsequent papers, we will attempt to roughly determine the distance covered by the neutrino.

[6] In that case, time would would be passing in the same way in every region of space, even irrespective of differences in the gravitational field intensities.

[7] We can also compare offices located on the geostationary orbit with those located on the surface of the planet. The "underground" option was selected in order to achieve a maximum similarity to the experiment involving the measurement of velocity of neutrinos, carried out at CERN.

Some very interesting anomalies will occur in this example: as soon as after the first day of work[8] it will show that the personnel working in the rooms with the gravitational field intensity is higher are more efficient compared with those in the rooms on the surface of the planet.

The company management will have to solve the sort of problems being coped with by the physicists at CERN at present. Namely, they will find that the personnel working in the rooms located near the nucleus of the planet are more efficient, compared with those who are on the surface of the planet all the time.

Unfortunately, after one year, those working in the rooms located near the nucleus of the planet will find themselves biologically 10 years older rather than just one year[9].

This clearly explains why we do not intend to introduce a variable velocity of light, because we would rather avoid this kind of unnatural phenomena.

This kind of anomaly can be eliminated by proceeding as in the presented theory, i.e., assuming that the maximum velocity of propagation of the disturbances of space is constant. At present we believe that it is the instantaneous velocity of light, propagating in free space.

The experiment carried out at CERN consisted in measuring the mean velocity v_e of a neutrino whose trajectory was passing across the regions of the Earth with different gravitational field intensities. Therefore, it is no wonder why contemporary physicists are having problems of the type described in the example above.

When discussing the neutrino experiment, an interesting idea arose concerning experimental validation of the theories presented in this sub-section. To be precise, very accurate clocks of a same type may be placed in regions of space with different gravitational field intensities. A deep pit shaft can be used to eliminate the impact of relative motion between the clocks.

The experiment is expected to provide different measurements from the clocks. However, the clocks may not be devices whose principle of operation is based on the processing of signals arriving from the Space (such as pulsar clocks). The clocks must be devices utilizing the properties of a given region of space, such as spring or quartz or laser clocks etc.

It should be emphasized that these deliberations are conformable with the General Theory of Relativity by A. Einstein who provided a rough

[8] Assuming that differences in gravitational field intensities are significant.
[9] The difference will depend on differences in gravitational field intensities.

description of gravitational interactions when introducing the notion of space-time and its curvature[10].

[10] Curvature of space-time in regions with variable gravitational field intensity is to be understood as a variable lapse of time. A. Einstein considered the complex structure of space through the perspective of the notion of time which, as we know from the Theory of Space, describes the properties of space.