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Geometry of the Dark Matter and Preliminary Analysis of Alpha and Beta Photons' Properties Based on Theory of Space

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Abstract: The article, based on the publication "Theory of Space" by DS Sobolewski, introduces initial results of analysis of the properties of space channels connecting the same border hypersurfaces of four-dimensional differential manifold immersed in a four-dimensional Euclidean space. It turns out that Doppler effects for space channels connecting boundary hypersurfaces $^{\beta}\aleph$ leading to an increase in their frequency ($^{\beta}\gamma$ photons which correspond to well-known photons) in the given field of space are completely different for the space channels connecting the $^{\alpha}\aleph$ boundary hypersurfaces (predicted by the theory particles called photons alpha $^{\alpha}\gamma$), because photons $^{\alpha}\gamma$ of this type are decreasing their frequency. However, in the fields of space in which photons $^{\beta}\gamma$ decrease their frequency, photons $^{\alpha}\gamma$ increase theirs. Provided photon properties are explained in this article. Additionally, this article shows that the TP theory enables interpretation of basic rules of modern physics, such as existence of inertial systems or the Mach's principle, by application of the model of space and elementary particles. The article contains also a curious reference to the so called dark matter, black holes and travel in the Universe.

Keywords: Hypersurfaces, Euclidean space, Doppler effects, Photons, Dark matter, Black holes, Travel in the Universe, Inertial systems, Theory of Space.

I. INTRODUCTION

According to the Theory of Space"[1], the alpha photon $^{\alpha}\gamma$ is the name of a space channel connecting hypersurface $^{\alpha}\aleph$, and beta photon $^{\beta}\gamma$ is a channel connecting hypersurface $^{\beta}\aleph$ [1,2,3]. Taking postulated by the TP theory diverse physical properties of three-dimensional boundary hypersurfaces $^{\alpha}\aleph$ and $^{\beta}\aleph$ and the diversity of properties of space in the direction from the $^{\beta}\aleph$ hypersurface to hypersurface $^{\alpha}\aleph$ into account, we conclude that alpha photons $^{\alpha}\gamma$ will have generally different properties from beta photons $^{\beta}\gamma$.

We identify beta photons $^{\beta}\gamma$ with the photons which are known to us, while the foreseen by the TP theory alpha photons $^{\alpha}\gamma$ have no equivalent among the known elementary particles, though we suppose the so called Higgs boson might contain an alpha photon $^{\alpha}\gamma$. In this publication we will only concentrate on selected properties of beta photons $^{\beta}\gamma$, and we will shortly describe the properties of alpha photons $^{\alpha}\gamma$, wherein the description will be of approximate nature, which is a consequence of not taking all of the factors revealed by the TP[2] theory into account.

[1]Theory of Space" by DS Sobolewski was published in book form by Cambridge Science International Publishing Ltd. VivaBooks Private Limited and latest version by HTS High Technology Solutions.

[2]The TP Theory changes epistemology of modern physics through the reveal of ontological structure of space and matter, which can be described in the form of a model because of it.

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One of such factors which we will omit in our considerations is the thickness of the boundary layers $^{\alpha}\aleph$i $^{\beta}\aleph$, which will be accounted for in subsequent publications [1].

Let us begin with a general analysis of beta photons. Their structure is presented in Fig. 1.

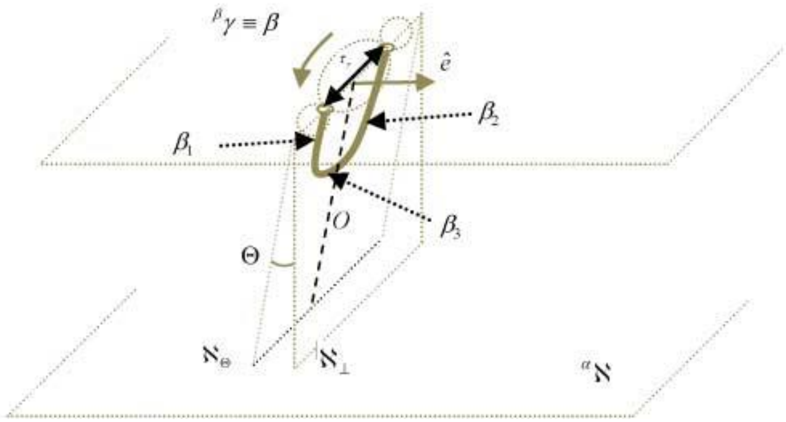

Fig. 1. General analysis of beta photons.

In Fig. 1, a beta photon's $^{\beta}\gamma$ space channel was marked with a bold line, which, as is apparent from the TP theory, connects border hypersurface $^{\beta}\aleph$ of the differentia manifold M^{Re} , creating a four – dimensional pipe limited by a three-dimensional hypersurface inside. Parts of the pipe, marked on the figure as β_1 i β_2 execute complex oscillations around the equilibrium inclined by angle Θ, which were described in the TP theory.

The plane of rotational movement of the ends of the space $^{\beta}\gamma$ describes the photon's polarization, which is not perfectly vertical. It results from the angle of inclination Θ of photons β, which is not equal $\pi/2$ in general:

$$0 < \Theta < \pi/2 \qquad (1)$$

Therefore, directly from correlation (1) we can imply that longitudinal polarization of quants of electromagnetic waves is different from zero.

Let us notice, that parts of the space channel β_1 i β_2 rotate relatively to each other around invariant hypersurface $\aleph_\Theta$[3] turning part of the channel marked as β_3[4]. Θ angle is different from zero ensuring permanent deformation of elastic border hypersurface $^{\beta}\aleph$, which is the cause of the photon's movement in the given direction.
Non - zero Θ angle can be the result of interaction of vortex disorder of space $^{\beta}\gamma$ with complex rotary motion of its components, however it needs to be proven by formulating appropriate motion equations for the space channel; we will

[3] In Fig.1, the invariant hypersurface was wrongly marked because of the analysis of correlation between four-dimensional objects. In reality, hypersurface $\aleph_\Theta$ is orthogonal to the surface, on which the ends of the space channel move, which is easy to imagine and should not lead to misconceptions.

[4] It is hard to imagine a stable space channel $^{\beta}\gamma$, in which only elements β_1 and β_2 oscillate around their own equilibriums, and element β_3 does not change its orientation. Nevertheless, the thesis accepted a priori needs to be proved using general equations of motion, which will be formulated after a grant will be obtained.

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leave this subject for subsequent publications. From the described picture, a very complex motion of space channel ${}^{\beta}\gamma$ emerges. Unfortunately, in this publication we are forced to deal only and exclusively with preliminary analysis of the described phenomena[5].

Most of all, let us notice that the stability of oscillation with frequency ν_r around an invariant hypersurface $\aleph_\Theta$ demands correlation with oscillations of parts of the space channel β_1 and β_2 around their equilibrium, which will be denoted as ν_{β_1} and ν_{β_2}, respectively. We will further assume, that frequencies ν_{β_1} and ν_{β_2} are equal to each other[6], and denote them as ν_β:

$$\nu_{\beta_1} = \nu_{\beta_2} \equiv \nu_\beta \quad (2)$$

The correlation of frequency ν_R and ν_β results directly from taking the condition of compatibility of space disturbance chase of space channel β_1 and β_2 after fully rotating one time around the invariant hypersurface $\aleph_\Theta$. Additionally, taking symmetry of space channels' location towards the invariant hypersurface $\aleph_\Theta$, and their equal distance from this hypersurface, we get to a situation shown in the figure below:

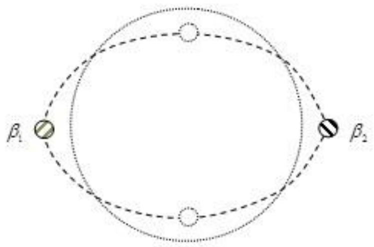

Fig. 2. Oscillations of parts of the space channel β_1 and β_2 around their equilibrium.

Directly from Fig. 2, we can conclude that the reliance between frequency ν_R and ν_β is as follows:

$$\nu_R = \frac{1}{2}\, n\, \nu_\beta \qquad (3)$$

Where $n \in \mathbb{N}$.

Let us turn our attention to the consequences of the complex motion of the parts of space channel β_1 i β_2 (Fig. 2), which leads to appearance of a three-dimensional vortex electric and magnetic field[7] of frequency ν.

Let us notice that in extreme positions of parts of the space channel β_1 i β_2, denoted in Fig. 3 with **B** letter, we are dealing with dominance of magnetic field because of their greatest inclination angle γ_B towards normal to the border hypersurface ${}^{\beta}\aleph$.

[5] The co-author of this publication, D.S. Sobolewski, has issued a notion to the EU under FP7 program, trying to obtain a grant (proposal no. 320751), which aims, amongst other things, at developing equations for the space channel; the notion was unsuccessful – surely the proposed subject was not so "attractive" as teleportation, time travel and "generating" space-time.

[6] Diverse frequencies would lead to the destabilization of the system.

[7] As is concluded from the TP theory, three – dimensional fields are a result of a cast of four – dimensional vector magnitudes to border hypersurfaces of the M^{Re} differential manifold.

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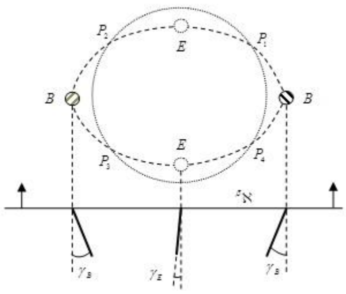

Fig. 3. Extreme positions of parts of the space channel.

Angles marked in Fig. 3 meet the following conditions[8]:

$$\gamma_B > \gamma_E > 0 \tag{4}$$

To determine the frequency of changes of vortex electric and magnetic field ν, it is enough to notice, that its value changes after a full rotation – from position "1" to "3" (Fig. 4).

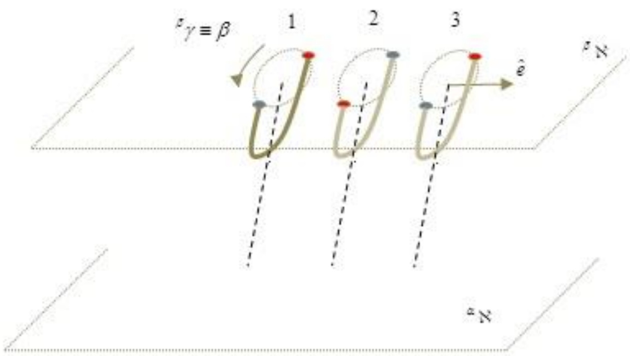

Fig. 4. Extreme positions of parts of the space channel.

Directly from this observation an equality is implied:

$$\nu = \nu_R \tag{5}$$

Let us notice that for photons, a whirling electric field of frequency ν coexists with whirling magnetic field once with domination of the magnetic field, and the other time with the advantage of the electric field, which is an implication from the following condition:

$$\gamma_B \neq \gamma_E \tag{6}$$

For photons, we have a following equation:

$$E(\nu) = E_J(\nu) + 2E_{\Delta J}(\nu) + 2E_S(\nu) + E_R(\nu) = h\nu = h\nu_R = \frac{1}{2} hn\, \nu_\beta \tag{7}$$

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[8]In the deliberations a case was discarded, in which parts of the space channel are orthogonal to the border hypersurface in points of intersection of curves P_i, because it does not have a physical interpretation.

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Where:

$E_J(\nu)$ – The kinetic energy of rotary motion of a space channel.
$E_{\Delta J}(\nu)$ – The energy of change of orientation of the fragments of the space channel β_1, β_2.
$E_S(\nu)$ – The elastic energy of the deformed border hypersurface.
$E_R(\nu)$ – The energy of relevant rotary motion of the fragments of space channel β_1, β_2 and β_3.
n – Natural number, which we will further assume to be equal to 1.

An analysis similar to the one presented above can be conducted for alpha photons $^{\alpha}\gamma$, wherein frequencies ν, ν_β, ν_R introduced for this space channel are in general of completely different values.

Introduced dependencies of energy from frequency $E_J(\nu)$, $E_{\Delta J}(\nu)$, $E_S(\nu)$, $E_R(\nu)$ will be a subject of incoming publications in which we will utilize facts revealed by the "Theory of Space" including the disclosed dependencies $E_J(\omega)$, $E_{\Delta J}(\Theta_\nu)$, $E_S(\Theta_\nu)$ for space channel connecting various border hypersurfaces which we shortly remind below.

The Dependence of Energy from Velocity Revealed by the Theory of Space

The dependence of energy on velocity $E(v)$for space channel connecting various border hypersurfaces revealed by the "Theory of Space" is given as a formula:

$$E(v) = m_0c^2 + E_{\Delta J} + E_S \tag{8}$$

Where $E_{\Delta J}$ stands for the energy released by the space channel during the change of its orientation towards orthogonal to the border hypersurface $^{\beta}\aleph$:

$$E_{\Delta J} = m_0c^2(1 - \cos\Theta_v) \tag{9}$$

$$E_S = m_0c^2(\cos^{-1}\Theta_v + \cos\Theta_v - 2) \tag{10}$$

Let us remind our readers that according to the TP theory, $\cos\Theta_v$ and $\sin\Theta_v$ are functions of velocity:

$$\cos\Theta_v = \sqrt{1 - \frac{v^2}{c^2}} \tag{11}$$

$$\sin\Theta_v = \frac{v}{c} \tag{12}$$

For photons, the above relations are not met, which was mentioned in the cited TP theory. However, with some additional assumptions, we are able to use the above formulas.

The Elastic Energy of the Border Hypersurfaces

Let us notice that the formula for the elastic energy E_S contains elastic energy $E_{S\alpha}$ of the border hypersurface $^{\alpha}\aleph$ and elastic energy $E_{S\beta}$ of the border hypersurface $^{\beta}\aleph$ of the physical space, which is described with a smooth differential manifold $M^{Re}(t)$ submerged in a four-dimensional Euclidean space E^4. This observation can be presented in a form of an equation:

$$E_S(\Theta_v) = E_{S\alpha}(\Theta_v) + E_{S\beta}(\Theta_v) = m_0c^2(\cos^{-1}\Theta_v + \cos\Theta_v - 2) \tag{13}$$

Directly from the above equation we can imply that the sum of reliance of elastic energies of mirror hypersurfaces is known. However, we do not know, how the dependencies $E_{S\alpha}(\Theta_v)$ and $E_{S\beta}(\Theta_v)$ look.

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In the following publications we will tend to the determination of dependency $E_{S\alpha}(\Theta, r, {}^{\alpha}K)$ using numeric calculations. It is necessary to notice, that we cannot use known software, because we are interested in the potential energy of the three-dimensional hypersurface ${}^{\alpha}\aleph$ with its deformations caused by a perfectly rigid rod attached orthogonally to it (where r denotes the radius of its cross - section), which is tilted by an angle of Θ, as shown in Fig. 5:

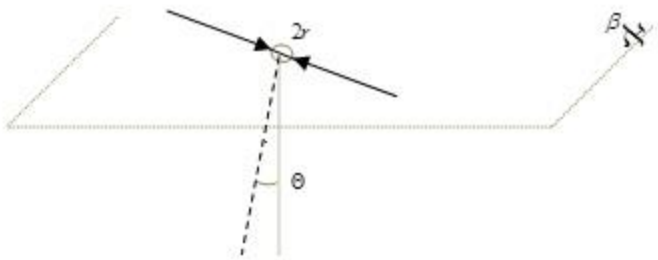

Fig. 5. Rigid rod attached orthogonal.

The dependency $E_{S\beta}(\Theta, r, {}^{\beta}K)$ is to be determined in a similar way, and the calculated sum is to be equated to the right side of (13).

The Notion of Relevant Motion

TP theory introduces the notion of relevant motion in a strict way, as the motion of elastic deformation from the geometry of a four-dimensional sphere of the differential manifold M.

$$M \approx \left\{ x : \sum_{i=1}^{4} x_i^2 \leq {}^{W}\Re \wedge \sum_{i=1}^{4} x_i^2 \geq {}^{W}\Re - {}^{\alpha}\tau(x) \right\} \subset E^4 \tag{15}$$

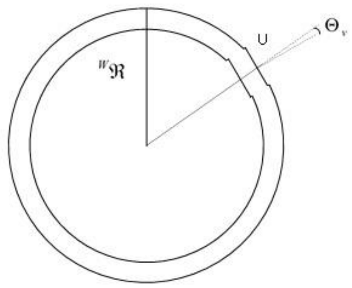

Fig. 6. Galaxy, moves with absolute velocity.

In Fig. 6, the set U tied, for example, to the galaxy, moves with absolute velocity v_u equal to:

$$v_u = c * \sin\Theta_v \tag{16}$$

At this moment we can clearly state that the TP theory is consistent with Isaac Newton in the philosophical dispute with GW Leibniz, G Berkeley and E Mach, because it proves that not only is there an absolute space, but also it proves the existence of absolute movement. Meanwhile the parameterization of the changes of the differential manifold ${}^{Re}M$

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being the mathematical model of the Universe can be identified with the absolute time t^U, which was property foreseen by I Newton.

The absolute movement of U set enables the passengers remaining in the same set to explore the Universe, which for the non-moving sets is only visible in half, because photons ${}^{\beta}\gamma$, spreading in the curved space are losing energy, which is represented in Fig. 6.

It means that the shaded area in Fig. 7 below is invisible from the U set because photons from that area do not reach it.

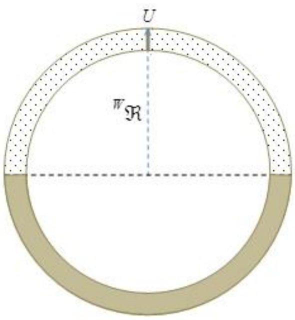

Fig. 7. Visibility of the Universe from the U set.

In summary, the U set, moving with absolute velocity v_u, enables its passengers to explore the shaded areas of the Universe, marked in Fig. 7.

The approximation of the Universe in the form of a sphere is not generally correct, which means that deformations of the border hypersurfaces disturbing their parallelism, which can be identified with the so called "dark matter" are possible.

A question emerges: how to measure the absolute movement? It turns out that the measurement of absolute velocity of the U set is impossible based on experiments proposed by Michelson-Morley and Fizou, because the Earth defines the shape of the border hypersurfaces in its vicinity.

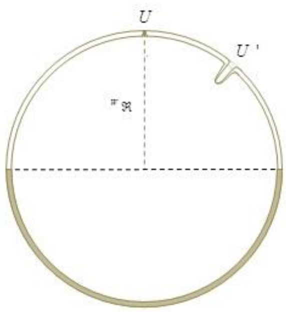

Fig. 8. Deformation of the border hypersurfaces by the black hole.

Towards the border hypersurfaces set by the Earth, photons disperse in all directions with the same velocity, because their velocity is determined by relative deformation of the border hypersurface, which is constant within the area of the laboratory.

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The easiest approximate method to determine the absolute velocity of a given set $\boldsymbol{U}$ is its measurement relative to the black holes, because as is implied from the TP theory, the Black holes deform the border hypersurface so adversely that it disables the asymmetric deformation of the border hypersurfaces in the direction of the movement - Fig. 8.

However, we should not take the absolute movement of the black holes for certainty – that is why the assumption of the velocity of black holes being equal to zero U_{BH} is supposed to be treated as a hypothesis, which needs to be verified by another method of determining the absolute velocity.

In the cited TP theory a hypothesis is given, which claims that within the area of a black hole swapping of the border hypersurfaces takes place, as presented in Fig. 9.

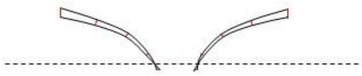

Fig. 9. Black hole swapping of the border hypersurfaces.

We would like to explain that the author of the swapping hypothesis, DS Sobolewski, wanted to assure the continuous change of orientation of space channel this way, and, therefore, also the continuous change of their potential energy of gravity. Let us notice that in the area below the dotted line, we would then be dealing with antimatter. The real space in TP theory is therefore the absolute space in the ontological space. Moreover, its existence is independent from its disturbances, which are identified with matter. With regard to the Mach principle, we have to remind the readers that according to the TP theory the change of velocity of the space channel is connected with the change of its orientation, which requires a change of its momentum and deformation of border hypersurfaces. It implies that instead of inertial mass and gravity we should be talking about the moment of inertia of the space channel, change of their orientation and their mutual interaction with the border hypersurfaces of the space, which are deformed by the space channels, but the lack of parallelism between the border hypersurfaces leads to a change of their orientation.

Inertial Frames

According to the TP theory, the cause of motion is the deformation of border hypersurfaces, which is asymmetric towards the Direction of the movement. Deformations of this type can be simulated in the state of weightlessness in liquids characterized by significant surface tension, like, for example, mercury, water, etc.

Asymmetric deformations of border hypersurfaces in the direction of the movement lead to dislocation of the U frame with absolute velocity v_U dependent on the angle of the deformation of the border hypersurfaces Θ_v according to the following formula:

$$v = c^*\sin\Theta_v \tag{16}$$

A question emerges, are the border hypersurfaces ${}^{\alpha}\varkappa$ i ${}^{\beta}\varkappa$ perfectly elastic, to provide uniform motion to the U frame with constant velocity v_U. Unfortunately, on the current level of knowledge we do not know if that is the case, but with all certainty we cannot assume that elastic deformations of the border hypersurfaces are perfectly elastic, because in the Real Word the so called "ideals" do not exist.

If it turned out that the border hypersurfaces are not perfectly elastic, bodies set into motion after a finite time would stop moving without any interaction with other bodies. Furthermore, it would mean that inertial frames do not exist unless we agree for balancing the breaking force resulting from the imperfecta border hypersurfaces with a force directed along the vector of speed v_U, which is of course acceptable. Unfortunately, it would mean that Newton's first law of dynamics is not met.

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Let us imagine a frame U moving within star space far away from sources of gravity, which moves relative to the black hole remaining, for example, in the center of the galaxy with initial velocity $v_1(0)$.

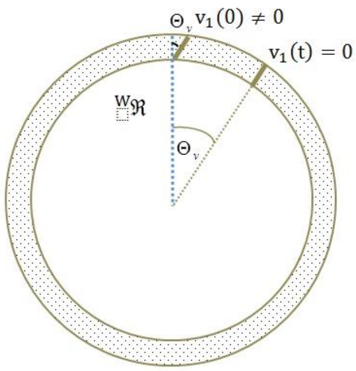

Fig. 10. Curved space.

From the figure above an implication can be made that deformation of border hypersurfaces decreases during the movement, up to its absolute disappearance after time t.

It turns out that U frame moving with absolute velocity v_U loses its velocity despite not interacting with other material bodies (we are considering a case of single body in an empty space, far away from galaxy clusters). The reason of losing velocity by physical frame U is the change of orientation of its space channels is change of orientation of its space channel towards the border hypersurfaces, due to the fact of moving in a curved space (Fig. 10).

The areas of space far away from galaxy clusters, or even areas between the galaxies have undisturbed orientation of the border hypersurfaces, which on the current level of knowledge are approximated by spherical surfaces of ${}^W\mathfrak{R}$ and ${}^W\mathfrak{R}-\tau$ radius, where:

$$
\begin{aligned}
{}^W\mathfrak{R} &\cong \frac{c}{H_0} \cong 4040,33\text{Mpc} \\
\tau &\geq 0,894\mu m \qquad (17)
\end{aligned}
$$

The Radius of the Universe is not in any way dependent on total energy contained within, and, moreover, the mater itself only and exclusively influences local deformations of the border hypersurfaces.

Let us calculate the maximum distance s_{max} after traversing which a body moving with velocity $v_{0,1}$ will stop its absolute movement, or in other words, deformation of the border hypersurface will be minimal.

Using formula equation (12), we get:

$$\Theta_v = \arcsin\frac{v}{c} \quad (18)$$

Therefore, s_{max} will be equal to:

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$$s_{max} = {}^{W}\mathfrak{R} * \Theta_v = {}^{W}\mathfrak{R} * \arcsin\frac{v}{c} \quad (19)$$

For example, a body moving with velocity $v = 1\frac{km}{h} = \frac{10}{36}\frac{m}{s}$ will stop after traversing a distance equal to:

$$s_{max} = 1,2468*10^{26}*\arcsin\frac{10}{36*2,99792458*10^{8}} \approx 1,2468*10^{26}*9,2657*10^{-10} \approx 1,155*10^{17}\,m = 1,155*10^{14}\,km = 115500000000000\ km \quad (20)$$

The resulting distance is enormous, which is why we can assume with good approximation, that the U system connected with the described material body is inertial.

Let us add that in the case of circulations of celestial bodies around the stars, the deformations of border hypersurfaces do not decline; if this deformation declines in certain cases, it is only a result of complex gravitational interaction of such objects, which are not perfectly rigid bodies (for example, tides change the circulation of the moon around the Earth and the Earth's movement itself), and as a result of imperfect elastic deformations of the border hypersurfaces, which was discussed above[9].

In summary, we could say, that inertial systems do not exist unless we settle for balancing the force resulting from the deformation of space with the thrust of the rocket engines.

Initial Analysis of Alpha and Beta Photons Spreading in Areas Characterized by Zero Vector of Asymmetry of the Mirror Spaces

Let us imagine a space shuttle, on board of which a source of single photons of constant frequency υ_0, sent in all possible directions is located. Measuring the frequency of a single photon on the shuttle flying in the opposite direction we state that the frequency of a single photon is greater than υ_0. We should not be surprised, after all the Doppler effect for acoustic waves is so clearly explained, so using the electromagnetic and acoustic waves analogy we should observe the same effects.

Unfortunately, as is revealed by the TP theory, the wave – particle duality of the elementary particles results from the vortex oscillations of space disturbances around their equilibrium; this is the source of misunderstanding and duality of interpretations. This is why we cannot use acoustic wave analogies to explain the Doppler effect for quants of electromagnetic waves.

A more appropriate approximation, which can be used for analysis of demonstrative character, is a comparison of a β photon to a disc whirling with frequency υ_0.

Using this approximation and taking the velocity of photon's movement in vacuum into account, which is equal to the speed of light c, we have a serious problem with interpreting the increased rotary speed of the disc in space shuttle's system, on which a detector is present, and which moves in a direction opposite to the movement of the shuttle with the source of photons (discs). Because of the constant speed of the disc we cannot speak about increased momentum, which could be converted to frequency. We also cannot proceed like in the case of acoustic waves, because the speed of the shuttle with the detector only influences an increase in the number of photons registered in time, and has nothing to

[9] Absorption of energy by inelastic border hypersurfaces has to be small, since the known matter, remaining in constant motion does not reveal this phenomenon – perhaps it is a matter of the order of magnitude, which can be seen in the analysis of a body moving with initial velocity equal to $1\frac{km}{h}$, capable of traversing $1,155 \times 10^{14}$ km.

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do with the frequency of β photons. Using the analogy of photons as discs rotating around their axes, we can clearly see the difficulties with interpretation of the Doppler phenomenon for photons.

Unfortunately, the current interpretation of the phenomenon known as the relativistic Doppler effect makes use of all of the "possibilities" described by us above, to fit the theory to experimental outcomes. Even an entirely wrong notion of time dilatation in inertial systems, which the TP theory proves to be non-existent, is used.

Let us move to the correct description of the Doppler effect for photons. Let us consider a space shuttle moving with constant speed v (inertial system) towards an astronomic object remaining at a very large distance from it, on board of which there is a source of electromagnetic waves A of very acute frequency v_0, spreading in all directions - Fig. 11.

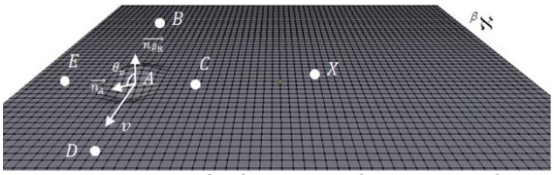

Fig. 11. Space shuttle moving with constant speed *v*.

As it is concluded from the TP theory, time flow in the shuttle is the same as in its vicinity, e.g. in an X point, because we have assumed that the shuttle remains far enough from sources of gravity.

Hypersurface marked in fig. 11 is a three-dimensional border hypersurface $^{\beta}\aleph$ determined by the astronomic object and deformed by the moving shuttle. The TP theory gives the dependence of angle Θ_v between the lines normal to border hypersurfaces $\overrightarrow{n_A}$ and $\overrightarrow{n_{\beta\aleph}}$ from the shuttle's velocity v in form of an equation:

$$\theta_v = arcsin\frac{v}{c} \tag{21}$$

According to the equation (21), a shuttle moving with constant speed v deforms the border hypersurfaces – Fig.12, which can be described with four differential sub-manifolds A_1, A_2, A_3, A_4 of diverse geometry.

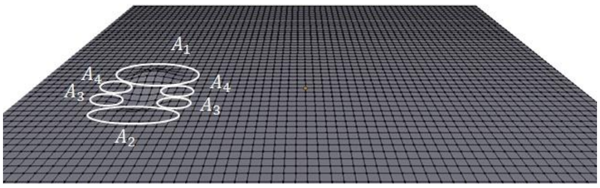

Fig. 12. Deformation of the border hypersurfaces by a moving shuttle A_2.

Observing versos $\overrightarrow{n^1_{\beta\aleph}}, \overrightarrow{n^2_{\beta\aleph}}, \overrightarrow{n^3_{\beta\aleph}}$ ortonormal to the border hypersurface $^{\beta}\aleph$ marked on the figure (Fig.13.) we conclude that the top part of the differential manifold M^4limited by$^{\beta}\aleph$ border hypersurface is stretched in area A_1, and compressed in area A_2.

Photons β spreading in area A_1 are "stretched" (the distance between their ends increases) independently from the return of the velocity vector – outside area A, or towards the inside of the area A.

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In area A_2, photons β are „compressed" (the distance between their ends decreases), and as before this effect is independent from the return of the velocity vector. Remarkably, β photons behave differently in a gravity field, which is because of the non-parallelism of the border hypersurfaces present in these areas[10] (Fig. 13).

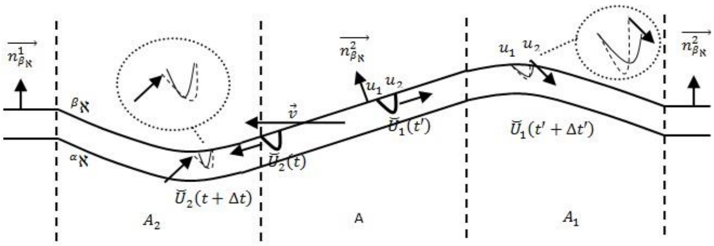

Fig. 13. Spreading photons β in area *A₁*, A and and *A₂*.

The picture $\breve{U}_1$ photon marked in Fig. 4 with broken lines is achieved by its parallel displacement from moment t' along the trajectory, which it traverses (a geodetic) in such a way that its end u_1 remains at all times on the border hypersurface $^\beta\aleph$. Directly from Fig. 4 we can see that the other end u_2 of the image of photon $\breve{U}_1$ produced this way in moment $t' + \Delta t'$ is not on the border hypersurface $^\beta\aleph$. Therefore, taking into account the fact, that β photo is a vortex disturbance of space, we will conclude that the geometry of differentia manifold M^4 in A_1 area enforces spinning of $\breve{U}_1$ and increase of the distance between its ends. As a result of this interaction, the momentum of specific elements of space channel $\breve{U}_1$ changes, which means that work was done by space channel over differentia manifold M^4, leading to its deformation through shrink of the downcast.

Using the dependence revealed by the TP theory, of photons energy $E_\beta(\tau_\beta)$ from the distance between its ends τ_β, we will conclude that "compressed" photons increase their energy through the increase of their frequencies and depths of their submergence in differential manifold M^4.

Areas of A_1 and A_4 type in Fig. 12 are similar because the top part of the differential manifold M^4 limited by border hypersurface $^\beta\aleph$ is stretched. On the other hand, in areas of A_2 and A_3 type in Fig. 12 the top part of differentia manifold M^4 limited by border hypersurface $^\beta\aleph$ is compressed.

In summary, we conclude that the frequency of the electromagnetic wave will meet the following conditions in points B, C, D, E:

$$\nu_D > \nu_0 > \nu_B \tag{22}$$

Let us add that the Doppler phenomenon for β photons will be entirely different for α photons, also denoted as $^\alpha\gamma$, predicted by the TP theory. Namely, α photons spreading in areas A_1 and A_2 will behave reversely than β photons, which means that they will decrease their frequencies in area A_1, and increase their frequencies in area A_2.

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[10] See chapter entitled "The photon in the gravitational field" from the "Theory of Space".