Albert Einstein: « Extra-spatial structures are necessary for the further development of physics»

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After unsuccessful arguments with N.Bohr about the incompleteness of the non-relativistic electron (NE) created by Schrödinger in wave quantum mechanics (WQM), Einstein said: " I am more and more inclined to think that extra-spatial structures are necessary for the further development of physics». And the extra-spatial structures predicted by Einstein had to be constants, since only constants were independent of the space-time continuum. Therefore, it was necessary to find an answer to the question: « How can constants be used as extra-spatial structures for the further development of physics?» The answer to this question arose naturally when we managed to find out that Planck's constant and other constants associated with it are the proper corpuscular-wave (CW) quantities of microparticles. At the same time, the newly discovered extra-spatial CW quantities of microparticles, being constants, turned out to be extra-spatial structures in relation to the Euclidean, Minkowski and Klein-Gordon spaces. In addition, it turned out that our newly discovered extra-spatial CW quantities of microparticles inside the space of Euclidean, Minkowski and Klein-Gordon appear in the form of corpuscular, mixed and wave quantities of microparticles that are generally known to this day. Moreover, the emergence within spatial corpuscular quantities from extra-spatial CW quantities made it possible to understand that the corpuscular quantities of Newton's corpuscular classical mechanics (CCM), which were considered the principles of physics, are not in fact the principles of physics. It turned out that the WQM of a NE created by Schrödinger is an incomplete version of the corpuscular-wave mechanics (CWM) of a NE. No matter how sensational the results we obtained may seem, nevertheless, we managed to discover the extra-spatial predicted by Einstein necessary for the further development of physics in the form of extra-spatial proper CW quantities and the CWM of real object of Nature.

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1. Extra-spatial proper CW quantities of the photon and their internal spatial forms.

The era of quantum concepts began with the discovery by M. Planck [1] of the photon as a quantum of light and a new constant called Planck's constant:

$$\hbar = 1{,}054 \cdot 10^{-54}\text{дж}\bullet\text{с} \tag{1.2}$$

Based on (1.1), Planck and A. Einstein [2] discovered the following formulas momentum and energy of a photon:

$$\boldsymbol{P} = \hbar\boldsymbol{k} \tag{1.2}$$

$$E = mc^2 \tag{1.3}$$

$$E = \hbar w \tag{1.4}$$

here, $\boldsymbol{k}$ – wave vector, m – relativistic mass, $\boldsymbol{c}$ – speed, w – cyclic frequency of a photon.

Due to the fact that two formulas (1.3) and (1.4) appeared for the photon energy, therefore Einstein suggested that the photon manifests itself both in the form a corpuscle and in the form of a wave. The duality of the formula for the photon energy was called by Einstein corpuscular-wave dualism (CWD) of the photon, and as the formula for the CWD of the photon, Einstein proposed the equality of formulas (1.3) and (1.4):

$$(\mathbf{P} \cdot \mathbf{c}) = \hbar\omega \tag{1.5}$$

Now, let us note that according to the experimental properties of ultraviolet and infrared photons, when the photon is long-wave (ultraviolet), then the relativistic mass of the photon has a small numerical value and vice versa, when the photon is short-wave (infrared), then the relativistic mass of the photon has a large numerical value. This experimental property of ultraviolet and infrared photons indicates that the relativistic mass of the photon m and its linear wavelength $\boldsymbol{ir}$ are two factors of one constant:

$$\mathbf{m}^* = mi\mathbf{r} = \frac{\hbar}{\mathbf{c}} \tag{1.6}$$

As we see, the experimental property of ultraviolet and infrared photons indicates that the photon has own CW quantity of the photon (1.6). In turn, based on the CW quantity (1.6), the set of proper CW quantities of the photon should have the form:

CW mass: $$\mathbf{m}^* = mi\mathbf{r} \tag{1.7}$$

CW impulse: $$P^* \equiv \hbar = (\mathbf{m}^*\mathbf{c}) \tag{1.8}$$

CW corpuscular energy: $$\mathbf{E}^* = \mathbf{m}^* c^2 \tag{1.9}$$

Thus, according to the experimental properties of ultraviolet and infrared photons, each photon has its own CW quantities (1.7)…(1.9), which in physics up to the present day were known as three fundamental constants. Due to the fact that the fact that a photon has its own CW quantities (1.7)…(1.9) follows from the experimental properties of ultraviolet and infrared photons, and therefore their existence in Nature is an indisputable. Of course, the explicit appearance of our newly discovered proper CW quantities of the photon (1.7)…(1.9) look unusual, and therefore, ahead of event, we note that they are the extra-spatial structures predicted by Einstein and necessary for the further development of physics. To verify this, let us consider how the newly discovered own CW quantities of the photon (1.7)...(1.9) are transformed under the influence of the differential operator applied by Schrödinger in WQM [3]:

$$\mathbf{k} \equiv -i\nabla \tag{1.10}$$

Under the influence of the differential operator (1.10), our newly discovered own CW quantities of the photon (1.7)…(1.9) are transformed in the form:

$$-i\mathbf{m}^*\nabla = m(i\mathbf{r}(-i\nabla)) = m \tag{1.11}$$

$$-iP^*\nabla = -i\hbar\nabla = (m\mathbf{c})_{1.2.3} - (m\mathbf{r}\omega)_4 \tag{1.12}$$

$$-i\mathbf{E}^*\nabla = \left(mc^2\right)_{1,2,3} - (m(\mathbf{r}\omega\mathbf{c}))_4 - (\hbar\omega)_0 \tag{1.13}$$

here, the subscripts 1,2,3,4,0 correspond to the five dimensions of the five-dimensional Klein-Gordon space:

$$R^2 = (x^2 + y^2 + z^2)_{1,2,3} - (ct)_4^2 - \left(\frac{\hbar}{mc}\right)_0 \tag{1.14}$$

Due to the fact that the corpuscular, mixed and wave quantities on the right side of the transformations (1.11)…(1.13) appeared as inside spatial structures in relation to the Euclidean, Minkowski and Klein-Gordon spaces, and therefore, the proper CW quantities of the photon (1.7)...(1.9) located on the left sides of the transformations (1.11)…(1.13) in relation to the Euclidean, Minkowski and Klein-Gordon spaces are extra-spatial structures. As we see, the unusualness of the explicit forms of the photon's own CW quantities (1.7)…(1.9) is generated by the fact that they are extra-spatial structures in relation to the Euclidean, Minkowski and Klein-Gordon spaces. The most important thing here is that until our days the quantities (1.7)…(1.9) were known as three fundamental constants, and therefore, like others, they were simply shocked when they first accidentally that they were extra-spatial proper CW quantities of the photon. Accordingly, we, like others, now do not know all their features and set out what we managed to notice.

First point. According to the correspondence principle the extra-spatial CW quantities of the photon (1.7)…(1.9) and their transformations (1.11)…(1.13) as their special cases must contain formulas (1.1)…(1.5) obtained by Planck and Einstein. Therefore, we note that one of the extra-spatial own CW quantities of the photon, namely, the extra-spatial own CW quantity of the photon (1.8) was discovered by Planck and was called Planck's constant (1.1), and until now it was known only in the form of a fundamental constant. The fact that the fundamental constant Planck's constant (1.1) is actually one of the extra-spatial proper CW quantities of the photon (1.7)…(1.9) remained undetected until the present day. Now, the situation has changed radically, since we accidentally managed to notice that the extra-spatial structures predicted by Einstein are the extra-spatial proper CW quantities of the photon (1.7)…(1.9), and one of them turned out to be Planck's constant (1.1).

Second point. The corpuscular momentum of the photon (1.2) discovered by Einstein appeared on the right side of the transformation (1.12) in the form of a three dimensional component of the photon momentum. Moreover, if transformation (1.12) is correct, then according to transformation (1.12) the photon momentum must have one more component corresponding to the fourth dimension of Minkowski and Klein-Gordon space. And to prove the existence of two different components in a photon pulse, let us turn to the relationship of wave optics [4], in which the speed of light (photon) is expressed using a wavelength and frequency:

$$\boldsymbol{c} = i\boldsymbol{r}\, w \tag{1.15}$$

If we multiply both parts of the wave optics relation (1.15) by the symbol of the relativistic mass, then the wave optics relation (1.15) takes on a pulse form:

$$mc = m\boldsymbol{ir}\, w \qquad (1.16)$$

Now, it is easy to notice that the two components of the photon momentum from relation (1.16) are those two components of the photon momentum that arose in the right side of the transformation (1.12). As we see, according to the wave optics relation (1.15), the transformation we obtained (1.12) is realized in Nature.

Here it should be especially noted that the relationship of wave optics (1.16) manifests itself in the form of equality due to the fact that in wave optics, like Newton's CCM [5], three dimensional Euclidean space and time are separate categories. But when the four dimensional Minkowski space and the five-dimensional Klein-Gordon space are used, then the equality of wave optics (1.16) appears on the right side of the transformation (1.12) in the form of two components of one photon momentum. In turn, from the left side of the transformation (1.12) it becomes obvious that the fundamental constant, which is generally known in the form of Planck's constant (1.1) is actually an extra-spatial intrinsic CW quantity of the photon (1.8).

Third point. The three dimensional of the photon energy that appeared on the right side of the transformation (1.13) was the discovered by Einstein in the form of the corpuscular energy of the photon (1.3), and the last component of the photon energy that arose on the right side of the transformation (1.13), corresponding to the fifth dimension of the five-dimensional Klein-Gordon space (1.14), was discovered by Planck in the form of the wave energy of the photon (1.4). As we see, according to the right side of transformation (1.13), formulas (1.3) and (1.4) discovered by Planck and Einstein turned out to be formulas for two different components of one photon energy. This position does not agree with the generally accepted interpretation of Einstein, since, according to Einsten's interpretation, formulas (1.3) and (1.4) are two formulas for the same photon. Therefore, Einstein proposed the equality of formulas (1.3) and (1.4) as a formula for the CWD of the photon (1.5). At the same time, Einstein himself, justifying formula (1.5) as a formula for the CWD of the photon, referred to the relationship of wave optics (1.15). But in the third point we were convinced that in the wave optics relation (1.15) two different components of one photon momentum appear, and therefore, in the formula of CWD of the photon (1.5) proposed by Einstein, two different components of one photon energy appear. In this regard, formula (1.5) proposed by Einstein is not a formula for the CWD of the photon, but is only a formula for the equality of two different components of one photon energy. Of course, the raises the question: « What does the formula for CWD of the photon look like in reality?» The real formula for the CWD of the photon is, newly discovered by us, the formula for the extra-spatial proper CW quantity of the photon (1.7). For the extra-spatial intrinsic CW quantity of the photon (1.7) that we discovered is indeed purely CW quantity, since its factors of the corpuscular quantity relativistic mass *m* and the wave quantity linear wavelength ***ir.*** Thus, the discovery of the extra-spatial proper CW quantities of the photon (1.7)…(1.9) made it possible to understand that the formula for the CWD of the photon (1.5) proposed by Einstein was in fact not a formula for the CWD of the photon. Of course, this course of events in incredibly annoying, and here we can reassure ourselves with the words of Aristotle: « Platon is my friend, but the truth is more precious».

Fourth point. The discovery of the extra-spatial intrinsic CW quantity of the photon (1.7) as a formula for the CWD of the photon has another unpleasant consequence. Historically, when it became obvious that the photon had both corpuscular and wave properties, then to describe the corpuscular and wave properties of the photon, Einstein used method of supplementing the corpuscular the provisions of Newton's CCM with the wave provisions of wave optics. Subsequently, the method used by Einstein of supplementing the corpuscular provisions of Newton's CCM with the wave provisions of wave optics was formulated in a strict by N. Bohr in the form of the principle of complementarity [6]. Now, the extra-spatial proper CW quantity of the photon (1.7) has become known as the formula for CWD of the photon. And then it turned out that to describe the extra-spatial proper CW quantity of the photon (1.7), both the method proposed by Einstein for supplementing the provisions of Newton's CCM with the provisions of wave optics, and Bohr's principle of complementarity, are insufficient. This is due to the fact our newly discovered extra-spatial proper CW quantity of the photon (1.7) turned out to belong to extra-spatial quantities, and the method proposed by Einstein of supplementing the provisions of Newton's CCM with the wave provisions of wave optics and Bohr's principle of complementarity were used within spatial quantities.

Fifth point. Historically, from the time of I. Newton himself until the present day, the corpuscular quantities of Newton's CCM were the beginning of physics. Therefore, according to Newton's CCM, the initial quantities of the photon should have been the corpuscular quantities of the photon:

Corpuscular mass: m (1.17)

Corpuscular impulse: $\boldsymbol{P} = m\,\boldsymbol{c}$ (1.18)

Corpuscular energy: $E = mc^{2}$ (1.19)

But now, the fact has become clear that there are extra-spatial CW quantities of the photon (1.7)…(1.9), and they turn out to be inside the space of Euclidean, Minkowski and Klein-Gordon, manifesting themselves in the form of corpuscular, mixed and wave quantities of the photon. Therefore, it became obvious that behind the well-known corpuscular quantities of the photon (1.17)…(1.19) the extra-spatial proper CW quantities of the photon (1.7)…(1.9) remained undetected. In this regard, the fact became clear that the corpuscular quantities of Newton's CCM, which for three hundred and fifty years were considered the principles of physics, are in fact not the principles of physics. Thus, all of our physics, which began with the corpuscular quantities of Newton's CCM, in reality turned out to be just an internal spatial part of a more general extra-spatial physics. Thus, the extra-spatial structures predicted by Einstein actually turned out to be necessary for the further development of physics.

Thus, those quantities that were known in the form of fundamental constants actually turned out to be extra-spatial own CW quantities of the photon (1.7)…(1.9) and they turned out to be manifested within the space of Euclidean, Minkowski and Klein-Gordon in the form of corpuscular, mixed and wave quantities of the photon. Due to the fact that the WQM of a NE was created without taking into account the extra-spatial CW quantities of the photon (1.7)…(1.9) and their transformations (1.11)…(1.13), and therefore, we will show how, when taking them into account, the WQM of a NE in reality turns out to be the CWM of a NE.

2. Extra-spatial proper CW quantities of the NE and their internal spatial forms.

Historically, the formulas of Einstein (1.3) and Planck (1.4) for the case of a NE were generalized by de Broglie [6] in the form:

$$\boldsymbol{P} = \hbar\boldsymbol{k} \tag{2.1}$$

$$E = \hbar w \tag{2.2}$$

here: $\boldsymbol{k}$– wave vector, w – cyclic frequency NE.

And the formula for CWD of the photon (1.5) took the form:

$$(\mathbf{P} \cdot \mathbf{v}) = \hbar\omega \tag{2.3}$$

here, $\mathbf{v}$ – speed NE.

In turn, based on de Broglie formulas (2.1) and (2.2), Schrödinger, using differential operator, obtained operator comparisons:

$$\hat{P} = i\hbar\nabla \tag{2.4}$$

$$\grave{E}_k = \frac{\hbar^2}{2m}\Delta \tag{2.5}$$

$$\hat{E} = i\hbar\frac{\partial}{\partial t} \tag{2.6}$$

here: $\hat{P}$, $\hat{E}_k$, $\hat{E}$— operators of momentum and energy of a NE.

Accordingly, formulas (2.1)…(2.6) obtained by de Broglie and Schrödinger became known as the initial relations of the WQM of a NE created by Schrödinger.

Due to the fact that from the formulas of Planck and Einstein (1.1)…(1.5) the initial relations of the WQM of a NE (2.1)…(2.6) were obtained, and therefore, from the extra-spatial CW quantities of the photon (1.7)…(1.9) and their transformations (1.11)…(1.13) we will determine the extra-spatial proper CW quantities of the NE and their transformations as the initial relations of the CWM of a NE. To do this, first of all, on the basis of Newton's CCM, we determine the corpuscular quantities of a NE by analogy with the corpuscular quantities of a photon (1.17)…(1.19):

Corpuscular mass: m (2.7)

Corpuscular impulse: $\boldsymbol{P} = m \cdot \boldsymbol{v}$ (2.8)

Corpuscular kinetic energy: $E \;\; = \frac{mv^2}{2}$ (2.9)

Corpuscular energy: $E = m \cdot v^2$ (2.10)

Related to the corpuscular quantities of a NE (2.7)…(2.10) will be the wave quantity of a NE, the linear wavelength of a NE:

$\boldsymbol{ir} = ir(1,2,3,4,0)$ (2.11)

Here: 1,2,3,4,0 are symbols of the five dimensions of the five-dimensional Klein-Gordon space (1.14).

By combining the corpuscular quantities of the NE (2.7)…(2.10) with the linear wavelength of the NE (2.11) we obtain the extra-spatial proper CW quantities of the NE in the form of analogues of the extra-spatial proper CW quantities of the photon (1.7)...(1.9):

$$\boldsymbol{m}^* = mi\boldsymbol{r} \tag{2.12}$$

$$P^* = \hbar = (\boldsymbol{m}^*\boldsymbol{v}) = m(i\boldsymbol{r}\boldsymbol{v}) \tag{2.13}$$

$$\boldsymbol{E}_k{}^* = (\boldsymbol{m}^* v^{\,2})/2 \tag{2.14}$$

$$\boldsymbol{E}^* = \boldsymbol{m}^* v^2 \tag{2.15}$$

In turn, transforming the extra-spatial proper own CW quantities of a NE (2.12)…(2.15) using the differential operator (1.10) we obtain analogues of transformations (1.11)…(1.13):

$$(\boldsymbol{m}^*\boldsymbol{k}) \to (\boldsymbol{m}^*(-i\nabla)) = m(i\boldsymbol{r}(-i\nabla)) = m \tag{2.16}$$

$$\hbar\boldsymbol{k} \to i\hbar\nabla = (m\boldsymbol{v})_{1,2,3} - (mi\boldsymbol{r}(-iw)_4 = \boldsymbol{P}_{1.2.3} - \boldsymbol{P}_4 \tag{2.17}$$

$$(\boldsymbol{E}_k^*\boldsymbol{k}) \to \quad (\boldsymbol{E}_k^*(-i\nabla) = E_{1,2,3} - (\frac{m*(-iwv)}{2})_4 - (hw/2)_0$$
(2.18)

$$(\boldsymbol{E}^*\boldsymbol{k}) \to (\boldsymbol{E} * (-i\nabla)) = E_{1.2.3} - (\boldsymbol{m}^*(-iw)\boldsymbol{v})_4 - (-i\hbar w)_0 \tag{2.19}$$

here:

$$(i\boldsymbol{r}(-i\nabla)) = 1 \tag{2.20}$$

$$(\boldsymbol{v}(-i\nabla)) = -iw \tag{2.21}$$

As we see, if we generalize the extra-spatial CW quantities of the photon (1.7)…(1.9) and their transformations (1.11)…(1.13) to the case of a NE, then the extra-spatial CW quantities of the NE (2.12)…(2.15) and their transformations (2.16)…(2.19) become known in the form of the initial relations of CWM of a NE (2.12)…(2.19).

Now, following the principle of correspondence, we will establish connections between the initial relations of the CWM of a NE (2.12)…(2.19) with the initial relations of the WQM of a NE (2.1)…(2.6). Pursuing this goal, we will express transformations (2.16)…(2.19) relative to the corpuscular quantities of a NE (2.7)…(2.10) and will not take into account the components corresponding to the fourth and fifty dimensions of the five-dimensional Klein-Gordon space:

$$m = (\boldsymbol{m}^{*}\boldsymbol{k}) \; \rightarrow \; \hat{m} = -i\boldsymbol{m}^{*}\nabla \tag{2.22}$$

$$\boldsymbol{P} = \hbar\boldsymbol{k} \; \rightarrow \quad \hat{P} = -i\hbar\nabla \tag{2.23}$$

$$E_k = (\boldsymbol{E}_k^{*}\boldsymbol{k}) \rightarrow \quad \widehat{E_k} = -i\boldsymbol{E}^{*}k\nabla$$
(2.24)

$$E = (\boldsymbol{E}^{*}\boldsymbol{k}) \; \rightarrow \quad \hat{E} = -i\boldsymbol{E}^{*}\nabla \tag{2.25}$$

As we see, the formula (2.1) obtained by de Broglie and the operator comparison (2.4) obtained by Schrödinger turned out to correspond to relation (2.23). The operator comparison (2.5) obtained by Schrödinger corresponds to relation (2.24). And the formula (2.2) obtained by de Broglie appeared on the right side of the transformation (2.19) in the corresponding to the fifth dimension of the five-dimensional Klein-Gordon space. Thus, formulas (2.1)…(2.5) obtained by de Broglie and Schrödinger were in fact special cases of relations (2.22)…(2.25). Now let us pay attention to the fact relations (2.22)...(2.25) arose when transformations (2.16)...(2.19) were expressed relative to the corpuscular quantities of a NE (2.7)...(2.10). This feature of relations (2.22)...(2.25) allows us to understand that de Broglie and Schrödinger in their formulas (2.1)...(2.5) to transformations (2.16)...(2.19) came from the side of the corpuscular quantities of the NE (2.7)...(2.10). At the same time, both the transformations themselves (2.16)...(2.19) and the extra-spatial proper CW quantities of the NE (2.12)...(2.15) remained undetected to this day.

Above, only the Schrödinger operator comparison (2.26) remained unconsidered, but it depends on time and therefore we will consider it in the framework of the third paragraph of this article together with the equation of motion of the WQM of a NE. We will also indicate there that the extra-spatial proper CW quantities of a NE (2.12)…(2.15) that we discovered are quantities of the equations of motion of WQM, just as corpuscular quantities are quantities of the equation of motion of Newton's CCM.

Thus, the initial relations of the WQM of a NE were obtained by de Broglie and Schrödinger in the form (2.1)...(2.16), and we showed above that the initial relations the WQM of a NE obtained by de Broglie and Schrödinger (2.1)...(2.5) can be derived from the initial relations of the CWM of a NE (2.12)...(2.19). And this is a clear sign that behind the initial relations of the

WQM of a NE (2.1)…(2.6) obtained by de Broglie and Schrödinger, the initial relations of the CWM of a NE (2.12)…(2.19) that we discovered remained unnoticed.

Now, let us note how the Heisenberg uncertainty relation (HUR) [7] is interpreted from the point of view of CW quantities of a NE (2.12)…(2.15):

$$\Delta P \Delta x \geq \hbar \tag{2.26}$$

On the left side of the HUR (2.26) there are momentum and coordinate determined using Newton's CC, which are determined independently of each other due to the fact that in Newton's CCM corpuscular quantities and space are independent of each other. According to the extra-spatial CW quantities of the NE (2.12)…(2.15), Planck's constant, located on the right side of the HUR (2.26), is the extra-spatial own CW quantities of the NE (2.13). In this case, the internal factors of the extra-spatial CW quantity of the NE (2.13), the mass the NE (2.7) and the linear wavelength of the NE (2.11) are interdependent quantities. Therefore, on the right side of the HUR (2.26), any change in linear wavelength of a NE (2.11) is accompanied by a change in the corpuscular quantities of a NE (2.7)…(2.10) and vice versa, any change in the corpuscular quantities of a NE (2.7)…(2.10) is accompanied by a change in the linear wavelength of a NE (2.11). As we can see, the left side of the HUR (2.26) refers to the CCM of Newton, and the right side refers to the CWM of a NE. Therefore, the HUR (2.26) is the relation of the transition from the quantities and space of Newton's CCM to the CW quantities of the CWM of a NE. Accordingly, HUR (2.26) indicate the lower limit of applicability of the quantities and space of Newton's CCM up to the manifestation of the intrinsic CW quantities of microparticles. Thus, HUR (2.26) clearly indicated that independent corpuscular quantities and the space of Newton's CCM in the microworld give way to independent corpuscular quantities and the proper space of microparticles.

Here, let us remember that the extra-spatial proper CW quantities of the photon (1.7)…(1.9) were fundamental constants. Therefore, like them, the extra-spatial own CW quantities of a NE (2.12)…(2.15) must be fundamental constants. In connection with this requirement, the speed of a N, appearing within the framework of the extra-spatial proper CW quantities of a NE (2.12)…(2.15) should be a fundamental constant like the speed of a photon:

$$c = 2{,}99792458 \cdot 10^{8} \quad \text{м/с} \tag{2.27}$$

In addition to the photon speed (2.27), we take into account one more fundamental constant, namely the fine structure constant:

$$\alpha = 7{,}297352 \cdot 10^{-3} \qquad (2.28)$$

Now, it is enough to remember that the product of two fundamental constants (2.27) and (2.28) is also a fundamental constant and it is known in the form of the first Bohr velocity of a NE [8]:

$$v_B = 2{,}187691 \cdot 10^{6}\ \text{м/с} \qquad (2.29)$$

Thus, we have obtained proof that the extra-spatial own CW quantities of the NE (2.12)…(2.15) like the extra-spatial CW quantities of the photon (1.7)…(1.9) are fundamental constants.

Of course, this arises, but where, then, is the classical variable speed? We will indicate the location of the classical variable speed within the framework of the third paragraph of this article, when from a unified point of view we consider the equations of motion of Newton's CCM, the WQM of a NE and the CWM of a NE.

Now, we will take into account that the following relationship holds:

$$m_e i r_e = m_p i r_p = \frac{\hbar}{\mathbf{v}_B} \qquad (2.30)$$

Where quantities with subscripts *e* are quantities of a NE, and quantities with subscripts *p* are quantities of a proton.

Relationship (2.30) allows us to understand that for the case of a proton it is possible to obtain analogs of the extra-spatial proper CW quantities of a NE (2.12)…(2.15) and their transformations (2.16)…(2.19), which will be the initial relations of the CWM of the proton. Thus, the stability of the photon, electron and proton was explained by the fact that their extra-spatial CW quantities were fundamental constants.

At the end of this section, we point out that if we take into account the NE own perpendicular radius-vector $r\,\perp$, then it becomes obvious that the NE has one more value between its values (2.12) and (2.13):

$$\boldsymbol{m}_{\perp}^{*} = [\boldsymbol{m}^{*} \times \boldsymbol{r}_{\perp}] = m[\boldsymbol{ir} \times \boldsymbol{r}_{\perp}] \qquad (2.31)$$

The intrinsic value of a NE (2.31) attracted our attention with its unusual feature, and we will talk about this feature at the end of the next paragraph of this article.

3. What was called the WQM of a NE for a hundred years actually turned out to be the CWM of a NE.

Newton's CCM is a full-fledged mechanics due to the fact that it contains both corpuscular quantities of a material point similar to the corpuscular quantities of a NE (2.7)…(2.10), and the equation of motion of Newton's CCM associated with the corpuscular quantities of material point:

$$\mathbf{F} = \frac{d\mathbf{P}}{dt} \tag{3.1}$$

Unlike Newton's CCM, in the WQM of a NE created by Schrödinger there are no analogues of the corpuscular quantities of a material poin, there is only an equation of motion of the WQM of a NE:

$$E\psi = i\hbar\frac{\partial\psi}{\partial t} \tag{3.2}$$

To detect quantities associated with the equation of motion of WQM of a NE (3.2), we first determine the explicit form of the equation of motion of CWM of a NE associated with extra-spatial proper CW quantities of a NE (2.12)…(2.15). For this purpose, let us consider how the extra-spatial own CW quantities of a NE (2.12)...(2.15) are transformed under the influence of the time operator from the Schrödinger operator comparison (2.6):

$$-i\frac{\partial}{\partial t} \tag{3.3}$$

Extra-spatial proper CW quantities of a NE (2.12)…(2.15) under the iinfluence of the time operator (3.3) are transformed in the form:

$$-i\mathbf{m}^*\frac{\partial}{\partial t} = -im\frac{\partial(i\mathbf{r})}{\partial t} = m\mathbf{v} = \mathbf{P} \tag{3.4}$$

$$-i\hbar\frac{\partial}{\partial t} = (\mathbf{P}\mathbf{v}) - (m^*\mathbf{a}) = E - F^* \tag{3.5}$$

$$\frac{-i\hbar v}{2}\frac{\partial}{\partial t} = \frac{\mathbf{P}v^2}{2} - \frac{((\mathbf{m}^*\mathbf{a})\mathbf{v})}{2} - \frac{\hbar\mathbf{a}}{2} \tag{3.6}$$

$$-i\hbar\frac{\partial}{\partial t} = \mathbf{P}v^2 - ((m^*\mathbf{a})\mathbf{v}) - \hbar\mathbf{a} \tag{3.7}$$

Now, if we introduce transformation (3.5) with respect to E , then we obtain the equation of motion of CWM of a NE related to the extra-spatial proper CW quantities of a NE (2.12)...(2.15):

$$E = -i\hbar\frac{\partial}{\partial t} + F^* \tag{3.8}$$

In 2010, when we first obtained the extra-spatial own CW quantities of the photon (1.7)...(1.9) and the extra-spatial own CW quantities of the NE (2.12)...(2.15), then we thought that we had managed discover the completely CWM of physics. But, when it was found out that the equation of motion of the CWM of a NE, associated with the extra-spatial CW quantities of a NE (2.12)...(2.15), has the form (3.8), then we noticed with great disappointment equation of motion of the CWM of a NE (3.8) is the equation of motion of the WQM of a NE (3.2) predicted by Schrödinger.

This circumstance becomes especially clear if the last component is not taken into account in relation (3.8), then we obtain the equation of motion of the WQM of a NE (3.2) without the wave function symbol:

$$E = -i\hbar\frac{\partial}{\partial t} \tag{3.9}$$

Thus, we first discovered the extra-spatial own CW quantities of the NE (2.12)...(2.15), and then, as the associated equation of motion, we discovered the equation of motion of the CWM of a NE (3.8). But then we noticed the equation of motion of CWM of a NE (3.8) that we discovered was known for a hundred years as the equation of motion of WQM of a NE (3.2), that is, the fact was discovered that what was called the WQM of a NE for a hundred years was actually the CWM of a NE. Moreover, the WQM of a NE created by Schrödinger turned out to be an incomplete version of the CWM of a NE.

For it became obvious that in the WQM of a NE created by Schrödinger, the extra-spatial CW quantities of the NE (2.12)...(2.15) and their transformations (2.16)...(2.19) that we had recently discovered were absent. Historically, the greatest physicist of mankind, Einstein, who was absolutely confident in the incompleteness of the WQM of a NE, was never able to prove the incompleteness of the WQM of a NE. Here, throwing us into shock, the incompleteness of the WQM of a NE itself appeared before us as a gift from God when we were looking for the equation of motion of the CWM of a NE. In this matter, Bell's theorem does not help, since the WQM of a NE created by Schrödinger remains intact and unharmed, but turns out to be an incomplete part of the CWM of a NE that we discovered.

Now that it has become obvious that the WQM of a NE and the CWM of a NE are two names for the same mechanics, and therefore, in the future we will use the name of one of them, meaning by it the other.

Here we will indicate how transformations (3.4)...(3.7) make it possible to find out how the WQM of a NE and the CCM of Newton relate to each other. To do this, first of all, we will take into account the fact that all transformations (3.4)…(3.7) are related to the WQM of a NE and they are all first-order differential operations in time *t.* And one of them, namely, transformation (3.5) is related to the equation of motion of WQM of a NE (3.2). In contrast to the equation of motion of WQM of a NE (3.2), the of equation of motion of Newton's CCM (3.1) is a second-order differential equation in time *t*. Therefore, contrary to the correspondence principle, it may seem that there is no connection between the equations of motion of the WQM of a NE (3.2) and Newton's CCM (3.1). But in fact, there is such a connection and now we will indicate it. To do this, let's pay attention to the impulse that arose on the right side of the transformation (3.4), because it is this impulse that appears in the equation of motion of Newton's CCM (3.1). But due to the fact that the equation of motion of Newton's CCM (3.1) is a mathematical formula of Newton's second law, and therefore, it becomes obvious that transformation (3.4) is actually a mathematical formula of Newton's first law. As we see, the mathematical formula of Newton's first law (3.4) and the equation of motion of WQM of a NE (3.2) refer to differential operations of the first order, and the equation of motion of Newton's CCM (3.1) refers to differential operations of the second order. Thus, the equation of motion of WQM of a NE (3.2) and the equation of motion of Newton's CCM (3.1) belong to two different levels, and the mathematical formula of Newton's first law (3.4) and the equation of motion of WQM of a NE (3.2) are on the same level. Therefore, the connecting link between the WQM of a NE and Newton's CCM is the mathematical formula of Newton's first law (3.4). Here we note that the well-known classical speed from Newton's CCM appeared in the form of an internal factor of the momentum that arose on the right side of the mathematical formula of Newton's first law (3.4).

Now, let us briefly explain the operator comparison (2.5), were a second-order differential operator is used so that the equation of motion of WQM of a NE (3.2) becomes a second-order differential equation similar to the equation of motion of Newton's CCM (3.1). To understand how Schrödinger managed express the right-hand side of the operator comparison (2.5) using a second-order differential operator, it is necessary to pay attention to the fact that in relation (2.24) the kinetic energy operator is expressed using a first-order differential operator (1.10). Now, it is easy to notice that the right-hand side of operator matching (2.5) proposed by Schrödinger is an equivalent representation of the right-hand side of relation (2.24), and such substitution is achieved by replaching the linear wavelength symbol from the right side of the relation (2.24) with the symbol of the first order differential operator (1.10) on the right side of the operator comparison (2.5). Thus, in reality, the equation of motion of WQM of a NE (3.2) is a first-order differential equation, and the second-order differential operator used by Schrödinger in the operator comparison (2.5) is obtained from relation (2.24) by replacing the symbol of the linear wavelength with the symbol of the first-order differential operator (1.10). The surprising thing about the situation is that Schrödinger did not know about the existence of relation (2.24)[9], however, Schrödinger was able to predict the right-hand side of the operator comparison (2.5).

Now, a the end of this section, we note how quantity (2.31) is transformed under the influence of the time operator from the Schrödinger operator comparison (3.3):

$$[\mathbf{m}^* \times \mathbf{r}_\perp]\left(-i\frac{\partial}{\partial t}\right) = [\mathbf{P} \times \mathbf{r}_\perp] = [\mathbf{m}^* \times (-i\mathbf{v}_\perp)] \tag{3.13}$$

Where, on the right side of transformation (3.13), two varieties of the intrinsic angular momentum of a NE arose:

$$L = [\mathbf{P} \times \mathbf{r}_\perp] \tag{3.14}$$

$$L_{\perp} = [\mathbf{m}^* \times (-i\mathbf{v}_{\perp})] \tag{3.15}$$

The emergence from one relation (3.13) of two varieties of the proper angular momentum (3.14).and (3.15) led us to the idea that between the two varieties of the proper angular momentum (3.14) and 3.15) in reality a spontaneous transition may take place. If such a spontaneous transition turns out to be realized in Nature, then this phenomenon may have practical applications and we will talk about it at the end of the fourth paragraph of this article.

4. Extra-spatial proper CW quantities and CWM based on them of real macroscopic objects of Nature.

The object of study of Newton's CCM, a material point, did not have its own spatial parameter. Unlike a material point, real objects of Nature, namely, microparticles, turned out to have a linear wavelength ***ir*** . In particular, we were able to discover the extra-spatial CW quantities of a NE (2.12)…(2.15) and the CWM of a NE based on them as a complete version of the WQM of a NE. Therefore, we have question: like microparticles, do real macroscopic objects of Nature (RMON) have extra-spatial own CW quantities and CWM based on them?

Accordingly, we decided to outline what the extra-spatial proper CW quantities of RMON and the CWM of RMON based on them should look like if they existed in Nature.

As analogues of the extra-spatial proper CW quantities of a NE (.12)…(2.15) there should be extra-spatial proper CW quantities of RMON:

$$\mathbf{m}^* = m\mathbf{r} \tag{4.1}$$

$$P^* = (\mathbf{m}^*\mathbf{v}) \tag{4.2}$$

$$\mathbf{E}_k^* = \frac{\mathbf{m}^* v^2}{2} \tag{4.3}$$

$$\mathbf{U}^* = \mathbf{m}^* v^2 \tag{4.4}$$

here, $\mathbf{r}$ – radius-vector of RMON, co-directed with is speed.

An analogue of the differential operator (1.10) will be the differentiation operation used within the framework of Newton's CCM:

$$\mathbf{k} = \frac{d}{d\mathbf{r}} \tag{4.5}$$

Accordingly, the analogues of transformations (2.16)…(2.19) will be transformations of extra-spatial proper CW quantities of a RMON (4.1)…(4.4) under the influence of spatial transformation (4.5):

$$\frac{d\mathbf{m}^*}{d\mathbf{r}} = m\frac{d\mathbf{r}}{d\mathbf{r}} = m \tag{4.6}$$

$$\frac{d\mathbf{P}}{d\mathbf{r}} = (m\mathbf{v})_{1,2,3} - (m\mathbf{r}w) = \mathbf{P}_{1,2,3} - \mathbf{P}_4 \tag{4.7}$$

$$\frac{d\mathbf{E}_k^*}{d\mathbf{r}} = \left(\frac{mv^2}{2}\right)_{1,2,3} - \left(\frac{(\mathbf{m}^* w\mathbf{v})}{2}\right)_4 - \left(\frac{P^*\omega}{2}\right)_0 \tag{4.8}$$

$$\frac{d\mathbf{U}^*}{d\mathbf{r}} = \left(mv^2\right)_{1,2,3} - \left(\mathbf{m}^* w\mathbf{v}\right)_4 - (P^* w)_0 \tag{4.9}$$

here, the subscripts 1,2,3,4,0 correspond to the five dimensions of the five-dimensional Klein-Gordon space (1.14).

The three dimensional components corresponding to three dimensional Euclidean space that appeared on the right-hand sides of transformations (4.6)…(4.9) were discovered three hundred and fifty years ago by I. Newton in the form of corpuscular quantities Newton's CCM:

Mass: m (4.10)

Impulse: $\mathbf{P} = m\mathbf{v}$ (4.11)

Kinetic energy: $E_k = \dfrac{mv^2}{2}$ (4.12)

Corpuscular energy: $U = mv^2$ (4.13)

The extra-spatial proper CW quantities of RMON (4.1)…(4.4) and their transformations (4.6)…(4.9) obtained by us are the initial relations of CWM of RMON.

In turn an analogue of (3.3) will be the time operation applied within the framework of Newton's CCM:

$$\frac{d}{dt} \tag{4.14}$$

Accordingly, analogues of transformations (3.4)…(3.7) will be the following transformations:

$$\frac{d\mathbf{m}^*}{dt} = m\frac{d\mathbf{r}}{dt} = m\mathbf{v} = \mathbf{P} \tag{4.15}$$

$$\frac{dP^*}{dt} = m\frac{d(\mathbf{rv})}{dt} = (\mathbf{Pv}) - (m^*\mathbf{a}) = U - F^* \tag{4.16}$$

$$\frac{d\mathbf{E}_k^*}{dt} = \frac{m}{2}\frac{d(\mathbf{r}v^2)}{dt} = \frac{\mathbf{P}v^2}{2} - \frac{F^*\mathbf{v}}{2} - \frac{P^*\mathbf{a}}{2} \tag{4.17}$$

$$\frac{d\mathbf{U}^*}{dt} = m\frac{d(\mathbf{r}v^2)}{dt} = \mathbf{P}v^2 - F^*\mathbf{v} - P^*\mathbf{a} \tag{4.18}$$

Thus, for hundred and fifty years, the corpuscular quantities of Newton's CCM (4.10)...(4.13), were known as the beginning of the physics human civilization. And then it turned out that behind the principles of physics by created by mankind (4.10)…(4.13) there are extra-spatial own CW quantities of RMON (4.1)...(4.4) and their transformations (4.6)...(4.9), as well as their transformations under the influence of time (4.15)...(4.18). Newton's CCM itself began with a verbal formulation of Newton's first law and axiomatically introduced the concept of impulse, and this axiomatic impulse unexpectedly arose naturally on the right side of the transformation (4.6) under the influence of time from the extra-spatial proper CW quantity of RMON (4.1). Therefore, contrary to the scientific physicist, it became obvious that transformation (4.6) is actually mathematical formula for the Newton's first law.

The existence of CWM of a RMON as a macroscopic version used in the microcosm of a WQM of a NE is confirmed by the result of the

Konstantin Batygin [10]. For, according to the result of Konstantin Batygin, the stellar disk behaves like a microparticle. On the other hand, let us pay attention to the fact that Newton's CCM itself, created by I. Newton, had one weakness when it did not take into account the own spatial parameter of the material point. In the CWM of RMON that we obtained, the own spatial parameter of a RMON was taken into account, and therefore, we were able to discover more general CW properties of RMO, and for them Newton's CCM turned out to be insufficient. If the CWM of a RMON that we have obtained is realized in Nature, then the existence of teleportation of RMON.

This is how we unexpectedly encountered signs that the fundamental mechanics of physics, namely, Newton's CCM, Einstein's special theory of relativity, geometric and wave optics are purely internal spatial theories of physics due to the fact that their corpuscular and wave quantities are internally spatial quantities. In contrast them, the WQM of a NE created by Schrödinger, as well as the CWM of real objects of Nature that we discovered turned out to be intermediate mechanics, since they studied extra-spatial proper CW quantities in the relation of the Euclidean, Minkowski and Klein-Gordon spaces. Accordingly, the fact of the existence of extra-spatial mechanics, which should be presented without invoking the concepts of Euclidean, Minkowski and Klein-Gordon spaces. Thus, thanks to Einstein's prediction about the need for extra-spatial structures for the further development of physics, we were able to discover the existence of extra-spatial, intermediate and intra-dimensional mechanics of physics.

At the end of this section, we note that the macroscopic analogue of value (2.31) will be the value of a RMON:

$$[\mathbf{m}^* \times r_\perp] \tag{4.19}$$

Based on value (4.19), an analogue of transformation (3.13) will be the transformation:

$$\frac{d[\mathbf{m}^* \times r_\perp]}{dt} = [\mathbf{P} \times \mathbf{r}_\perp] = [\mathbf{m}^* \times \mathbf{v}_\perp] \tag{4.20}$$

Due to the fact that from one transformation из (4.20) two varieties of the proper angular momentum of a RMON arose, and therefore a spontaneous transition can take place between these two varieties to the proper angular momentum. If such a spontaneous transition is realized in Nature, then it is possible to create aircraft that, after rotational momentum, will fly vertically upward.

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