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Theoretical Bases of Some Methods of Experimental Physics.

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The science of physics, having arisen during antiquity, has handed down a long and difficult methodology. In process of developing their skills, scientists became convinced that the physical world represents an objective reality that can be described theoretically. This provided an opportunity to understand the laws which operate complex physical processes and phenomena. The long period of accumulation of scientific knowledge has shown that the boundless variety of the physical phenomena devolves to a small number of fundamental laws. The laws do not depend on human will. Laws of nature cannot be independently conceived, cancelled or destroyed. They can, however, be studied and effectively used in the resolution of the most complicated techno-scientific problems.

Successful development of modern physics is substantially aided by human reason. The same laws can be explained on the basis of different theoretical concepts. Formulation is dependent on the level of knowledge and the mentality of the scientists generalizing the experimental facts. Fundamental experimental research is very complex and expensive. For successful resolution and correct interpretation of information, theories that adequately reflect the processes and the phenomena are necessary. In the beginning of 20-th century there was no the theory precisely describing the structure of ether and the character of its interaction with solid, liquid and gaseous objects. Therefore, in the analysis of key experiments, approximations were made that led to erroneous conclusions.

To exclude competing systems in support of Einstein's principle of relativity, it was necessary to disavow an ether. However such an approach in the resolution of scientific problems is doomed to failure. It is possible to refuse to believe in an ether, but this does not preclude its existence. Despite Einstein, the immense open spaces of the universe are occupied by a universal environment - an ether. The establishment of the wave nature of light and other radiations cancels any doubts about existence of an ether. Without a medium, the concept of a wave is senseless. The wave process is accompanied by energy, and it without the material carrier - an ether – it cannot be transferred. Radio waves come to us both from the farthest areas of the Universe and from the depths of atoms and nuclei. Hence all of space, macro- and microcosm is filled by an ether.

When the fact of the existence of ether became obvious, scientists directed their efforts to studying its properties. In 1851 Fizeau developed an experiment with the purpose of establishing the character of an interaction of ether with moving objects. The results of experiments have shown, that moving water partially carries ether with it. The factor for carrying away Γ for water is equal to 0,46, which is in accord with Fresnel's formula,

$$\alpha = 1 - 1/n^2 \qquad (1)$$

Where n = parameter of refraction. In water, n = 1,333 [19] and, hence, α = 0,437.

In view of the correspondence between theoretical and experimental values, Γ for water, scientists have come to conclusion that the degree of carrying ether in objects depends only on their parameter of refraction. In air, n = 1,000292 and according to formula (1), the factor of increase Γ = 0,0006 is very small. On the basis of it, the conclusion was reached, that the atmosphere of Earth should not carry the ether with it, providing a basic opportunity to define the speed of movement of the Earth within the ether. The Michelson experiment in 1881 had this as its objective but gave negative results. This was an inconsistent with the experiment of Fizeau where the ether is partially involved in the motion of objects.

Although Fizeau's experiment has been explained by the partial carrying of ether for moving water, it is possible to explain it believing that the ether is completely carried. The moving wave transfers energy. At the transition of waves from ether in objects of constant size, the stream of energy is

$$WC = W_1 C_1 \qquad (2)$$

Where $W = \left(\rho V_{\max}^2\right)/2$ - density of kinetic energy of the particles in wave; C- velocity of the light on ether; C_1 – velocity of the light in object; ρ- density of the ether; V_{max} – maximum value of the amplitude's velocity of the variable particles of the air.

Considering that the space between atomic nuclei and electrons is filled by ether, but the volume occupied by nuclei and electrons is very small, oscillatory energy of a unit of volume may be represented by the expression,

$$W_1 = \frac{(\rho + \rho_T)V_{1\max}^2}{2} = \frac{\rho_1 V_{1\max}^2}{2}$$

Where ρ_T - density of the object; ρ_1 - density of the object incorporating the ether; V_{1max} - maximum amplitude's velocity of the fluctuation of the particles in the object.

Substituting values of W and W_1 in equation (2):

$$\frac{\rho V_{\max}^2 C}{2} = \frac{(\rho + \rho_T)V_{1\max}^2 C_1}{2}$$

Supposing that V and V_1 accordingly are proportional to C and C_1 in the last equation, it is possible to write it in the form,

$$\rho C^3 = (\rho + \rho_T)C_1^3 \qquad (3)$$

Whence the density of the ether is:

$$\rho = \frac{\rho_T}{n^3 - 1} \qquad (4)$$

Where n – factor of refraction.
The atomic nuclei and electrons are in suspension in ether. Therefore the experimentally measured

density of objects is caused only by nuclei and electrons. The density of the ether is automatically excluded. For formula (4), values of ρ_T were taken from reference books. In spite of significant differences in density of selected objects, relatively stable values for the density of the ether were gotten. Average density of the ether is ρ = 1,08 g/sm^3. When spreading light in these objects the amplitude is really proportional to the velocities of the spreading waves. For fluid and gaseous objects, equation (4) is not used. For them it can be written in the form,

$$\rho = \frac{\rho_T}{n^x - 1} \tag{5}$$

Now we shall determine the dependency of the velocity of light in moving objects from the velocity of their motion. If a moving solid object completely carries away ether then for light, spreading in the object, it is possible to write the equality

$$\rho C^3 = (\rho + \rho_T)(1 \pm V/C_Д)C_Д^3 \tag{6}$$

Where $C_Д$ – the velocity of the light in moving object in the motionless ether. Having equated the right parts of equations (3) and (6) we find,

$$C_Д = \frac{C_1}{\sqrt[3]{1 \pm V/C_Д}}$$

If V<<C_1, then the $C_Д$ under the root is possible to change by C_1 and then

$$C_Д = \frac{C_1}{\sqrt[3]{1 \pm V/C_1}}$$

If for objects, correlation (4) is not executed, the last equation will be written in the form of

$$C_Д = \frac{C_1}{\sqrt[x]{1 \pm V/C_1}} \tag{7}$$

Computable by this fascinating factor, formula α is 0.438, but for air it is 0.244. Therefore moving objects completely carry the ether, not partially

Analysis of the phenomenon of star aberration has led to an erroneous conclusion regarding the carrying of ether in the atmosphere of the earth. If the ether is not carried, the shadow angle equal to the following would be formed at the forward wall of a telescope.

$$\delta = arctg \frac{V}{C}$$

Therefore the star will be displaced and to keep it on an axis, the telescope needs to be inclined. But this contradicts the laws of optics. The axis of a telescope should be directed perpendicular to the front of a wave of light. But in this case beams will gather in the focus of an eyepiece. Displacement of the front of the wave during passage of light of the distance from diaphragm to eyepiece is equal to parts of a millimeter and cannot render any appreciable influence on the image. The influence of such displacement of the front of a wave will be similar to the influence of a deviation of the aperture of a diaphragm of a telescope from the correct geometrical form. Aberration by means of no carried ether is not explained. From a position of carried ether, the phenomenon of aberration is explained as follows. Let the Earth moves with a speed in a direction specified by an arrow (pic.1). As can be seen from the scheme of vectors shown in the picture, velocity at the meeting of a ray of light with the Earth is equal to the geometric difference of the speed of light and the speed of the Earth.

$$C_1 = \sqrt{C^2 + V^2 - 2CV\cos\alpha}$$

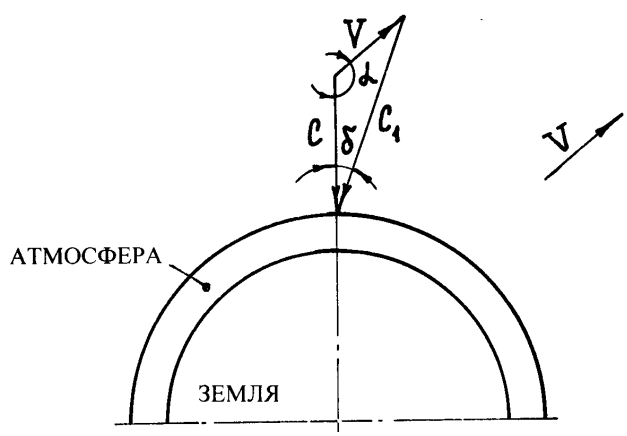
At $\alpha=0^0$, $C_1=C-V$; at $\alpha=180^0$ $C_1=C+V$, and at $\alpha=90^0$ $C_1 = \sqrt{C^2 + V^2}$.

From a triangle formed by vectors we shall find an angle of inclination of a beam C_1 to the Earth.

$$tg\delta = \frac{V\sin\alpha}{C - V\cos\alpha}$$

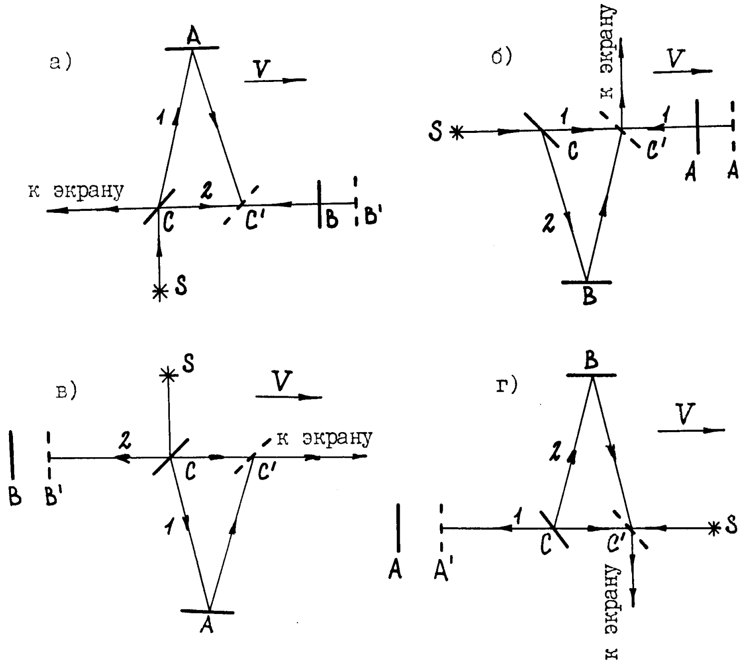
At $\alpha = 0^0$ and $\alpha = 180^0$, $tg\delta = 0$, and at $\alpha = 90^0$ $tg\delta = V/C$.

The ray of light is always perpendicular to the front of a wave. Change of a direction of a beam C_1 owing to movement of the Earth simultaneously speaks about the change of direction for the front of an approaching wave



Pic.1 Star aberration.

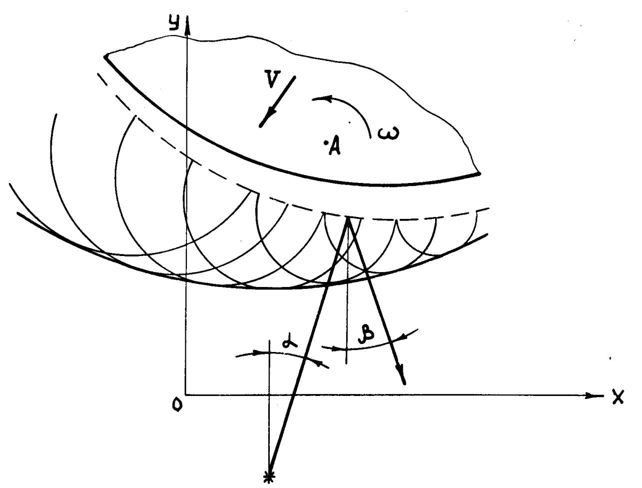
To contemporaries of Michelson, the law of reflection of waves from moving mirrors was not known. The accepted theories have no strict substantiation and therefore are approximate in character. For exact calculations we have deduced the general law of reflection and refraction of waves.



Pic.2: Michelson's Experiments.

At the reflection of waves from a mirror which is in complex movement, the equation for a group of secondary waves is:

$$(\chi - \chi_0)^2 + (y - y_0)^2 = (t - t_0)^2 C^2$$



Pic.3 Reflection of a wave from a mirror moving in any direction.

Where x_0, y_0 *u* t_0 – are coordinates and time of the meeting of each beam with the mirror; x and y – coordinates of points of secondary waves at the considering moment of time; t- time interval from the moment of radiation of waves untill the moment of formation of the given group.

The parametric equations of the bending around a given group:

$$\chi = \chi_0 + \frac{C(t-t_0)\left[Ct_0'\chi_0' \mp y_0'\sqrt{(\chi_0')^2 + (y_0')^2 - (Ct_0')^2}\right]}{(y_0')^2 + (\chi_0')^2};$$

$$y = y_0 + \frac{C(t-t_0)\left[Ct_0'y_0' \pm \chi_0'\sqrt{(\chi_0')^2 + (y_0')^2 - (Ct_0')^2}\right]}{(y_0')^2 + (\chi_0')^2}$$

Where χ_0', y_0' and – derived from x_0, y_0 and t_0

The direction of the reflected beam is defined by the direction of a normal to the front of the reflected wave.

$$\sin\beta = \frac{Ct_0'\chi_0' \mp y_0'\sqrt{(\chi_0')^2 + (y_0')^2 - (Ct_0')^2}}{(\chi_0')^2 + (y_0')^2}$$

The law of reflection of waves from forward moving mirrors is a special case of the general law. A conclusion can be drawn as follows. The mirror moving with speed V during the moment of radiation of a wave is at distance S from a source. Each point of the front of the wave will meet the mirror through a time interval:

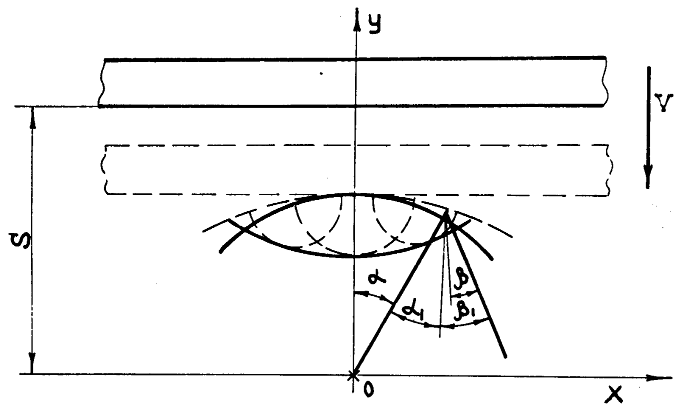
$$t_0 = \frac{S}{C\cos\alpha + V}.$$

The equation of a group of secondary waves from all points of a mirror is,

$$\left(\chi - \frac{SC\sin\alpha}{C\cos\alpha + V}\right)^2 + \left(y - \frac{SC\cos\alpha}{C\cos\alpha + V}\right)^2 = C^2\left(t - \frac{S}{C\cos\alpha + V}\right)^2.$$

The given group is a circle with coordinates of the center $\chi_1 = 0; y_1 = \frac{2C^2S}{C^2 - V^2}$, and radius $R_1 = C\left(t + \frac{2SV}{C^2 - V^2}\right)$ is bent around

$$\chi^2 + \left(y - \frac{2C^2S}{C^2 - V^2}\right)^2 = C^2\left(t + \frac{2SV}{C^2 - V^2}\right)^2$$



Pic.4 Reflection of spherical waves from a mirror moving forward.

Directions of the following and reflected beams are defined by normals accordingly to the front of the approaching and to the front of the reflected wave. The normal to the front of an approaching wave is expressed by the equation,

$$\chi = y tg \alpha$$

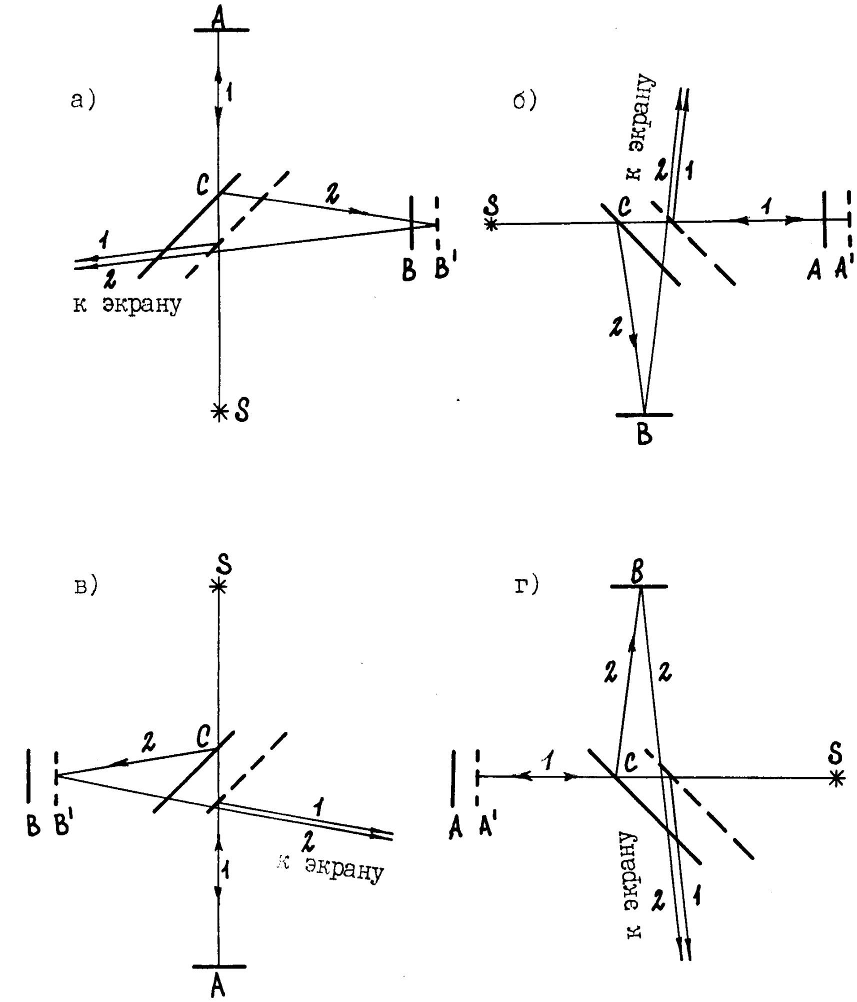
And to front of the reflected wave by the equation

$$\chi = -y \frac{(C^2 - V^2)\sin\alpha}{(C^2 + V^2)\cos\alpha + 2CV} + \frac{2SC^2 \sin\alpha}{(C^2 + V^2)\cos\alpha + 2CV}$$

Dependence between an angle of reflection β and an angle of approaching α is expressed by the formula:

$$\sin\beta = \frac{(C^2 - V^2)\sin\alpha}{\pm 2CV\cos\alpha + C^2 + V^2} \qquad (8)$$

In pic.5, the exact scheme of distribution of rays of light in Michelson's interferometer is displayed, by means of the law of reflection of waves from forward moving mirrors.



pic. 5 Schemes of beams in Michelson's interferometer in view of the law of reflection of waves from moving mirrors.

The schemes which were applied during the carrying out of experiment (pic.2), sharply differ from the schemes resulting in pic.5, but the expected effect according to both schemes is approximately identical. Thus, the Michelson experiment proves to a high degree of probability that the air environment of the Earth carries the ether with it.

In Sagnac's experiment, rays of light are reflected from mirrors which are being rotated. (pic. 6). If the ether did not take part in the rotation, the greatest difference in the path of counter beams would be observed in their movement in a circle with radius R:

$$\Delta l = \left(\frac{2\pi R}{C - V} - \frac{2\pi R}{C + V} \right) V = \frac{4\pi R V^2}{C^2 - V^2}$$

Where V- linear speed of points of installation at distance R from the center of rotation.
The actually observable difference of a path will be coordinated with formula (1):

$$\Delta l = \frac{4\omega S}{C} = \frac{4\pi R V}{C} \qquad (9)$$

Where ω-angular speed of rotation; S-the area limited by a circle with radius R. Thus, in the experiment the optical effect of the first order is observed. According to the theory that the ether is not carried, rotation causes optical effects of the second order.

Michelson's experiment shows, that the ether is carried with moving objects. At first sight, it seems that a difference in the path of beams in Sagnac's experiment should not exist. Actually it not so. Light in a rotating environment, performs oscillatory movements in particles and ether. Particles fluctuate in a plane perpendicular to the direction of a ray of light. Centrifugal and Coriolis forces simultaneously operate on them. Centrifugal forces do not influence the distribution of light. Coriolis forces cause an acceleration in particles in a direction perpendicular to the direction of fluctuations of the particles and the direction of rotation of the apparatus. The speed of light decreases in the direction of rotation under the action of Coriolis forces and increases in the opposite direction.

The object moving rectilinearly and in regular intervals on a rotating disk under the action of Coriolis forces gets an acceleration [2].

$$a = 2V\omega.$$

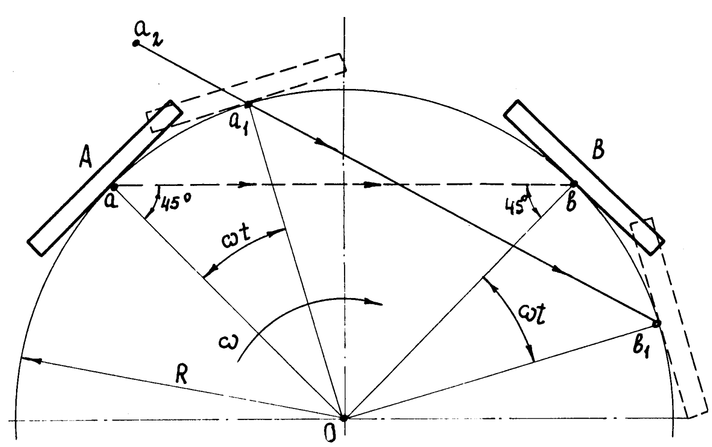
Believing that at distribution of light, the average peak speed of the fluctuating particles of ether is equal toC/2, it is possible to write,

$$a = C\omega.$$

If the apparatus does not rotate, a beam radiated from point A, would get to a point b1 and will traverse the ether over a distance, a1b1. Delay of the speed of light is equivalent to an increase in the path of a beam of,

$$\Delta l_1 = \frac{at^2}{2} = \frac{C\omega t^2}{2} = \frac{\omega l^2}{2C}$$

Where t- time is the interval from the moment of emission of the beam from point (a) until the moment of meeting with mirror B in point B1; L- direction of the beam.



Pic.6 The Scheme of beams of Sagnac's experience

At point b1 the ray of light is radiated as though not from point a1, but from point a2. The path of the beam will increase in size

$$4\Delta l_1 = \frac{2\omega l^2}{C} = \frac{2\omega S}{C}$$

Where S- the area of a segment.
The difference of the path between beams moving in opposite directions will be equal

$$\Delta l = \frac{4\omega S}{C}$$

That coincides with formula (9). Thus Sagnac's experiment proves that the ether is carried by moving objects.

After Newton's publication of the law of universal gravitation there was an opportunity to solve the problem of motion. In the beginning such problems were solved only in astronomy, and in 1913 Bohr successfully described the electron's motion in a hydrogen atom. In planetary systems, bodies move under the action of a central force. The problem of movement of a body in a central power field is not in all cases solved with elementary functions. Existing formulas are complex and inconvenient in practical use. They do not consider the effect of movement caused by the finiteness of speed of the interaction which is equal to the speed of light. Newton's and Coulomb's laws are precisely carried out only for objects considered motionless relative to an ether. For moving objects efficiency of interaction does not consider the influence of the speed of light and speed of movement. Formulas of the effect of movement are similar to formulas of Doppler's effect in optics and acoustics. For the case when both objects move, the formula for the effect of movement looks like:

$$a=a_0\sqrt{\frac{C^2+V^2+2CV\cos\alpha}{C^2+U^2-2CU\cos\beta}}, \qquad (10)$$

Where a- the size depending on speed of movement of objects; _ and _- angles between directions of movement of a source and the receiver and a line connecting a point from which the signal has been sent by a source, with a point in which it has been accepted by the receiver, V and U-speeds of movement of the receiver and a source. With movement of objects towards one another, the interaction between them amplifies, and in reverse, is weakened.

The exact formulas considering the effect of motion are deduced in an original way. Laws of conservation of energy and momentum are placed on the basis of conclusions. Thus is used a new concept-integral of energy of a system of two cooperating objects which can be expressed through the sizes of body m1 or through sizes, concerning object m2 (pic.7);

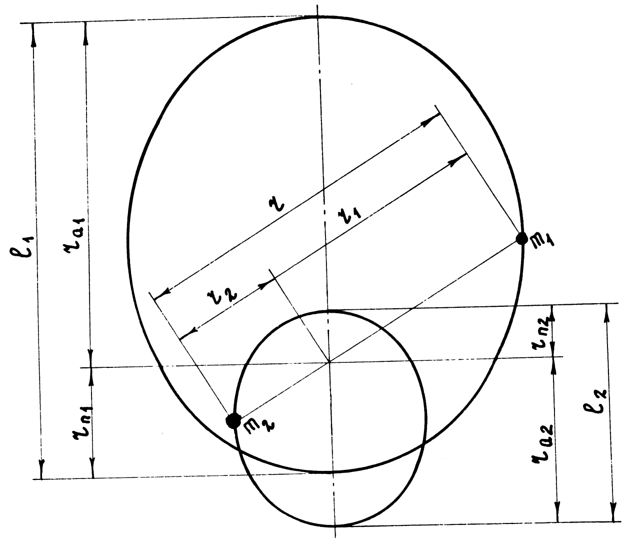


Рис.7 Trajectories of movement of cooperating objects

$$\frac{m_1 V_1^2 \beta_1}{2} - \frac{\mu_1 m_1}{r_1 \beta_1} = -\frac{\mu_1 m_1}{l_1 \beta_1}; \qquad \frac{m_2 V_2^2 \beta_2}{2} - \frac{\mu_2 m_2}{r_2 \beta_2} = -\frac{\mu_2 m_2}{l_2 \beta_2} \tag{11}$$

Where V_1-orbital speed of a object m1; r_1 and l_1- radius- vector and length of the major axis of an elliptic orbit of a object m1; V_2, r_2 and l_2 -sizes for object m_2; $r = r_1+r_2$ -distance between objects m_1 and m_2; $\mu_1= fm_2$; $\mu_2= fm_1$, f -a gravitational constant, $\beta_1=1+m_1/m_2$; $\beta_2=1+m/m_1$.
The equations of orbits can be deduced from parities

$$\frac{dr_1}{r_1 d\phi_1} = \frac{V_{r1}}{V_{t1}}; \qquad \frac{dr_2}{r_2 d\phi_2} = \frac{V_{r2}}{V_{t2}},$$

Where φ_1 and φ_2 - true anomalies of objects m_1 and m_2. Orbital speeds V_1, V_2 both their radial and tangential components Vr_1, Vr_2, Vt_1 and Vt_2, we find by means of integrals of energy (11). After integration in a general view it is received:

For an elliptic orbit $\qquad \varphi = \arccos\frac{2r_n r_a - lr}{r(r_a - r_n)}$ or $r = \frac{2r_n r_a}{(r_a - r_n)\cos\varphi + l}$

For a circular orbit $\qquad r = const$

For a parabolic orbit $\qquad \varphi = 2arctg\sqrt{\frac{r}{r_n} - 1}$ or $r = \frac{r_n}{\cos^2 \varphi/2}$;

For a hyperbolic orbit $\qquad \varphi = \arccos\frac{2r_n(l + r_n) - lr}{r(l + 2r_n)}$ or $r = \frac{2r_n(l + r_n)}{(l + 2r_n)\cos\varphi + l}$, Where r_n and r_a - pericentral and apicentral radiuses; l - length of major axes of an ellipse and a hyperbole.

At the movement of an object in orbit, the effect of movement should be considered by means of formula (10). In an atom, the movement of the nucleus can be neglected and then for the sizes describing the electron's movement in a circular orbit, it is possible to write in the form of:

$$\mathrm{a}' = \frac{\mathrm{a}\sqrt{C^2 + V'^2}}{C}; \qquad \mathrm{b}' = \frac{\mathrm{b}C'}{\sqrt{C^2 + V'^2}} \tag{12}$$

Where a and b - sizes who's values increase or decrease owing to the effect of movement. Primed letters designate the sizes when motion is taken into account and unprimed, without the effect of motion.

The lectron's speed in an atom also depends on the effect of motion. It is possible to write

$$V' = \frac{V\sqrt{C^2 + V'^2}}{C} \tag{13}$$

Let's transform this formula

$$V' = \frac{VC}{\sqrt{C^2 - V^2}} \tag{14}$$

We are convinced, that

$$\frac{\sqrt{C^2 + V'^2}}{C} = \frac{C}{\sqrt{C^2 - V^2}} \tag{15}$$

Formulas (12) allows calculation with high accuracy not only parameters of circular orbits of electrons in atoms, but also parameters of circular orbits of planets and their satellites. In these calculations, it is necessary to use sizes both in view of and without taking into account effect of movement. By means of formulas (13) and (14) it is possible to pass easily from one sizes to another if only one value of speed is known: either V, or V '. In view of equality (15) and formulas (12) it is possible to present in kind:

$$\mathrm{a}' = \frac{\mathrm{a}\sqrt{C^2 + V'^2}}{C} = \frac{\mathrm{a}C}{\sqrt{C^2 - V^2}}; \quad \mathrm{b}' = \frac{\mathrm{b}C}{\sqrt{C^2 + V'^2}} = \frac{\mathrm{b}\sqrt{C^2 - V^2}}{C} \tag{16}$$

The stated theory is very simple, but allows solving with high accuracy any problems in the nuclear physics. We shall initially show an example in physical constants. Some constants which earlier have been derived experimentally, it is possible to calculate precisely under formulas. As initial data we shall take the values of 4 constants [3]: speed of light $C = 2{,}99792458 \cdot 10^8$ m \with; an elementary charge $e' = 1{,}60217733 \cdot 10^{-19}$; weight of electron $m = 9{,}10938968 \cdot 10^{-31}$; Bohr's radius

$r_H^/ = 5{,}29177249 \cdot 10^{-11}$. In table 1 the calculated and help values of constants are given for comparison.

Table 1

Physical constants

Constant	Calculation	Experiment
Ionization potential, $E_H^/$, eV	13,59829218	13,5285
Speed of electron $V_H^/ \cdot 10^{-6}$,m/s	2,186500611	-
Constant of thin structure $1/\alpha_\infty^{'}$	137,0359895	137,0359895
Ridberg's Constant $R_\infty^/ \cdot 10^{-7}$, м$^{-1}$	1,097373153	1,097373153
Planck's constant $h \cdot 10^{34}$, Дж·с	6,626075438	6,6260755
Cycle time of electron $T_H \cdot 10^{16}$, с	1,520657574	-

Parameters of electron's orbit in atoms can be expressed through parameter of a Bohr orbit:

For circular orbit $$r^/ = \frac{k^2 r_H}{z^/}; \qquad V^/ = \frac{V_H \beta_H z^/}{k\beta} \qquad (17)$$

For elliptical orbit $$r_a^/ = \frac{r_H k^2 (1+\xi)}{z^/}; \qquad V_n^/ = \frac{V_H \beta_{H\text{н}} z^/ (1+\xi)}{n\beta}. \qquad (18)$$

$$r_n^/ = \frac{r_H k^2 (1-\xi)}{z^/}; \quad V_a^/ = \frac{V_H \beta_H z^/ (1-\xi)}{n\beta}$$

Where $\xi = \sqrt{1 - n^2/k^2}$ - excentricity of ellipse, Z'-effective charge number of a nucleusl, k-number of a stationary conditions, n-orbital number. In Index H we shall place the sizes describing movement of an electron in the first Bohr orbit. The full energy of the system « electron- atom » E and the cycle time of an electron around the nucleus, T are equal:

$$E = \frac{E_H \beta_H z^{/2}}{k^2 \beta}, \qquad T = \frac{T_H k^3 \beta}{z^{/2} \beta_H}. \qquad (19)$$

For example we shall calculate the parameters of the electron's orbits in an atom of helium at finding an external electron in the first and in the second stationary conditions [4].

For an electron in an atom of helium to reach an optical limit, it is required to expend energy equal to 198310, 76 or 39, Дж.

The power balance can be expressed by the following equation:

$$\frac{mV_1^{/2}\beta}{2}+\frac{mV_2^{/2}\beta}{2}-\frac{mV_{1b}^{/2}}{2}=39{,}3933902\cdot10^{-19}\text{ Дж}$$

Where V'_1 and V'_2 are speeds of electrons in internal and external orbits; $V'_{1в}$ - speed of electron in an internal orbit after removal an external electron on last of possible orbits in an atom of helium. Having expressed the speed of electrons through V_H, the last equation can be written down in the form of

$$\frac{mV_H^2\beta_H^2}{2\beta}(z_1^{/2}+z_2^{/2}-z_{1b}^{/2})=39{,}3933902\cdot10^{-19} \quad (20)$$

The multielectronic atom will be stable only in the event that cycle times of electrons will be multiples of the cycle time of the electron in the lowest orbit. In atom gels the cycle time external электрона T2 in 2 times is more than cycle time of internal electron T1. Formula (19) allows us to write

$$\frac{T_2}{T_1}=\frac{z_1^{/2}}{z_2^{/2}}=2 \quad (21)$$

Having expressed $z_1^/$ through $z_2^/$ and having substituted values of other known sizes in formula (20), we $z_2^/ = 1{,}391442257$. Under formulas (17) and (21) it is found, $r_2^/ = 0{,}380318565\cdot10^{-10}$ м, $V_2^/ = 3{,}043551045\cdot10^6$ м·с$^{-1}$, $z_1^/=1{,}967796512$, $r_1^/ = 0{,}268925832\cdot10^{-10}$ м,

$V_1^/ = 4{,}4231167\cdot10^6$ м·с$^{-1}$

The cycle time of an external electron in the second stationary condition to a cycle time of an electron in an internal orbit is equal to

$$\frac{T_2}{T_1}=\frac{k_2^3\cdot z_1^{/2}}{k_1^3\cdot z_2^{/2}}=\frac{8\cdot z_1^{/2}}{z_2^{/2}}=X \quad (22)$$

The approximate value $z_2^/$ can be defined under the formula

$$z_2^/\approx k\sqrt{\frac{E}{R}}=2\sqrt{\frac{198310{,}76-159856{,}07}{109677{,}583}}\approx1{,}2$$

Where E - energy which is required for the translation of an external electron to an excited condition.

Substituting in formula (22) the values $z_2^{/}$=1,2 и $z_1^{/}$=2, we find X=22, $z_1^{/2} = \frac{22 \cdot z_2^{/2}}{8}$.

Now the formula (20) can be written in the form of

$$\frac{mV_H^2 \beta_H^2}{2\beta} \left(\frac{z_2^{/2}}{k^2} + \frac{X \cdot z_2^{/2}}{k^3} - z_{1b}^{/2} \right) = E$$

Where E =38454,691 $см^{-1}$ =$7,63882226 \cdot 10^{-19}$Дж.

Substituting in last equation known sizes, we find

$z_2^{/}$=1,204345354; $z_1^{/}$=1,997180828; $V_2^{/}$=$1,31715367 \cdot 10^6 м \cdot c^{-1}$; $V_1^{/}$=$4,36850452 \cdot 10^6 м \cdot c^{-1}$;

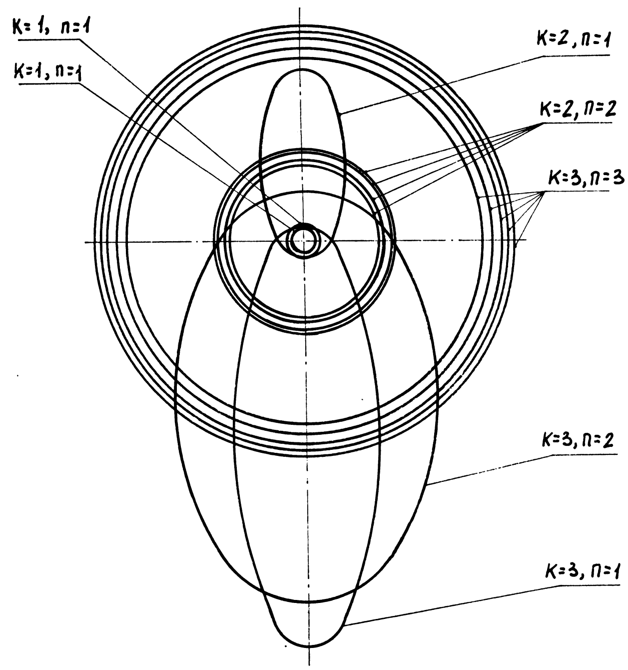
$r_2^{/}$=$1,75760656 \cdot 10^{-10}$м; $r_1^{/}$=$0,264969158 \cdot 10^{-10}$м.

In table 2, key parameters of electron's orbits in an atom of helium for two stationary conditions of external electrons are given. In pic.8 are represented in scale, an electron's orbit and an atom of helium.

Table 2

Parameters of electron's orbits in atom of helium

Stationary condition	Type of an orbit and its number	Number of electron	Charging number of a kernel	Full energy	Cycle time	Тк/Т1
1	2	3	4	5	6	7
	Circular	1 2	1,96779651 1,39144226	84,39361119 42,19680582	0,39256973 0,78513946	2
	1 circular	1 2	1,99718083 1,20434535	86,93286173 7,902989794	0,38110303 8,38426675	22
	2 circular	1 2	1,99918961 1,08822099	87,10782517 6,452431524	0,38033756 10,26911405	27
	3 circular	1 2	2,00012509 1,03286015	87,18936490 5,812624268	0,37998186 11,39945595	30
	4 circular	1 2	2,00012736 1,03286133	87,18956281 5,812637549	0,37998100 11,39943004	30
	5 circular	1 2	1,99965704 0,99982852	87,14856324 5,446785202	0,38015976 12,16511244	32



Pic.8 Orbits of electrons in atom of helium

Calculation of parameters of orbits of multielectronic atoms can be made, using values of ionization potentials and optical spectra and X-rays. At radiation of waves by multielectronic atoms, full energies not only at that electron which has made a transition from one orbit to another, but also all others electron changes. For such atoms Bohr's formula looks like:

$$1/\lambda = \frac{R_\infty}{\beta}\left(\frac{z_1^{/2}}{k_1^2} + \frac{z_2^{/2}}{k_2^2} + ... + \frac{z_i^{/2}}{k_i^2} - \frac{z_{1в}^{/2}}{k_{1в}^2} - \frac{z_{2в}^{/2}}{k_{2в}^2} - ... - \frac{z_{iв}^{/2}}{k_{iв}^2}\right) \qquad (23)$$

Where $z'_1, z'_2, \ldots, z'_i, k_1, k_2, \ldots, k_i$ - charging numbers and stationary conditions of electrons and $z'_{1B}, z'_{2B}, \ldots, z'_{iB}, k_{1в}, k_{2в}, \ldots, k_{iв}$ - corresponding sizes in excited atoms.

Formula (23) is used for definition of lengths of the waves radiated by excited atoms. After some transformations it can be applied to calculation of parameters of electron's orbits for complex atoms. Calculation is conducted in the following sequence. In the beginning the values of the ionization potentials expressed in wave numbers, there are approximate values of effective charging numbers

$$z' = k\sqrt{\frac{\mathrm{E}}{\mathrm{E_H}}}$$

Then frequency rates of cycle times of electrons under formulas are defined

$$x_{i,1} = \frac{k_i^3 z_i^{/2}}{k_1^3 z_i^{/2}}; \qquad x_{i,2} = \frac{k_i^3 z_2^{/2}}{k_2^3 z_i^{/2}} ..... \; x_{i,i-1} = \frac{k_i^3 z_{i-1}^{/2}}{k_{i-1}^3 z_i^{/2}}$$

Let's express by means of these formulas charging numbers of all electrons through charging number of external electrons. We shall substitute new expressions for charges in the formula (23). We shall derive the equation with one unknown

$$\mathrm{E} = \frac{R_\infty}{\beta}\left(\frac{x_{i,1}k_1 z_i^{/2}}{k_i^2} + \frac{x_{i,2}k_1 z_i^{/2}}{k_i^3} + \ldots + \frac{x_{i,i-1}k_{i-1} z_i^{/2}}{k_i^3} + \frac{z_i^{/2}}{k_i^2} - \frac{z_{1в}^{/2}}{k_{iв}^2} - \frac{z_{2в}^{/2}}{k_{2в}^2} - \ldots - \frac{z_{(i-1)в}^{/2}}{k_{(i-1)в}^2}\right)$$

Now it is possible to define exact values z'_2, z'_3, …, z'_i, solving consistently problems for the atoms having 2, 3, i electrons. As it is specified above, knowing value z' for the electron, it is possible to define all parameters of its orbit. Parameters of orbits in unexcited atoms of the first twelve elements of the table of Mendeleyev are shown in work [5].

For ions with identical number of electrons, but different charges of nuclei carry out the equality:

$$\mathrm{E}_{n+i}\beta_{n+1} = 2\mathrm{E}_n\beta_n + \frac{2\mathrm{E}_H\beta_H}{k^2} - \mathrm{E}_{n-1}\beta_{n-1}$$

Where E_H -ionization potential of atom of hydrogen, E_{n+1}, E_n и E_{n-1} - ionization potentials of ions of three elements located by a number, n-a serial number of an element, k-number of a stationary condition of external electrons in ions. The given formula does not consider the effect of movement. It can be used only in cases when electrons in atoms move with low speeds. To make exact calculations, in view of effect of movement, it is necessary to know the speeds of electrons in atoms. The peed of an electron without taking into account effect of movement can be calculated under the formula [6]

$$V_{n+1} = \frac{1}{\beta_{n+1}}\sqrt{2V_n^2\beta_n^2 + \frac{2V_H^2\beta_H^2}{k^2} - V_{n-1}^2\beta_{n-1}^2} \qquad (24)$$

Ionization potential in view of the effect of movement will be equal to

$$\mathrm{E} = \frac{mV'^2\beta}{2} = \frac{mV^2C^2\beta}{2(C^2 - V^2)} \qquad (25)$$

The last formula is derived by means of the integral of the speed of a system of two cooperating objects (11), but it can be deduced in another way.

The weight of the electron is a constant, and its speed depends on the effect of movement

$$V^{/} = \frac{V}{\sqrt{1 - V^2/C^2}} \qquad (26)$$

In view of it, the force acting on electron in atom is equal to

$$F = \frac{d}{dt}\left(mV'\right) = \frac{d}{dt}\left(\frac{mV}{\sqrt{1-V^2/C^2}}\right) = \frac{m\frac{dV}{dt}}{\left(\sqrt{1-V^2/C^2}\right)^3} \qquad (27)$$

The energy of the electron is equal to the work accomplished above it the electric field of a nucleus.

$$E = \int_0^x F dx = \int_0^V F V' dt$$

Having substituted instead of F and V ' their values in (27) and (26), we find

$$E = \int_0^V \frac{mVdV}{\sqrt{1-V^2/C^2}\left(\sqrt{1-V^2/C^2}\right)^3} = \frac{mV^2C^2}{2\left(C^2-V^2\right)} = \frac{mV'^2}{2}$$

The full energy of the system « electron- atom » will be equal to

$$\mathrm{E} = \frac{mV'^2\beta}{2}$$

(Coincides with the formula received earlier (25))

In work [6], values of ionization potentials for 36 elements calculated under formulas (24), (25) are derived. Results of the calculations are closely coordinated with experimental data. By the technique stated above, it is possible to calculate parameters of orbits for all 36 elements. No basic difficulties are present for calculation of ionization potentials and parameters of electron's orbits for all elements of a periodic table.

Chemical and a number of physical properties of elements are caused by the energy of communication of external electrons with atoms. Energy of communication and consequently, properties have the periodic dependence of a serial number of an element in Mendeleyev's table. If we compare the first potentials of ionization for all atoms [7] it is possible to allocate precisely 7 periods, as reflected in Mendeleyev's table. If we compare potentials of ionization for all ions to different charges of nuclei, but with an identical quantity of electrons as it is precisely possible to distinguish elements of 12 periods known to us which are displayed in table 3. In the table, a 13-th period for elements which is possible to also exist in the Universe in conditions which are distinct from those of the Solar system.

Table 3

The periodic law

The period	Number of an element in the period													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
I	H	He												
II	Li	Be	B	C	N	O	F	Ne						
III	Na	Mq	Al	Si	P	S	Cl	Ar						
IV	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni				
V	Cu	Zn	Ga	Ge	As	Se	Br	Kr						
VI	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd				
VII	Aq	Cd	Jn	Sn	Sb	Te	J	Xe						
VIII	Cs	Ba	La	Cl	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Ду	Ho	Er
IX	Tm	Yb	Lu	Hf	Ta	W	Rl	Os	Jr	Pt				
X	Au	Hq	Tl	Pb	Bi	Po	At	Rn						
XI	Fr	Ra	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm
XII	Md	No	Lr	Ku	Ns	106	107	108	109	110				
XIII	111	112	113	114	115	116	117	118						

Table 4 shows how there is a filling of electronic layers in atoms of elements of a 13-th period, but in it, it is possible to present, as there is a filling of electronic layers in atoms of all other elements. The number of layers in atom corresponds to the number of the period in which it is. The greatest possible number of electrons in a layer equals the number of elements in the period in which this layer is filled. In the first layer both electrons are in the first stationary condition. Eight electrons of the second layer are in the second stationary condition. Electrons the third and the fourth layers- in the third, and electrons of all other layers- in the fourth stationary condition.

Table 4

Distribution of electrons in atoms of 13-th period.

Number of the element	Number of the layer												
	1	2	3	4	5	6	7	8	9	10	11	12	13
	k=1	k=2	k=3		k=4								
111	2	8	8	10	8	10	8	14	10	8	14	10	1
112	2	8	8	10	8	10	8	14	10	8	14	10	2
113	2	8	8	10	8	10	8	14	10	8	14	10	3
114	2	8	8	10	8	10	8	14	10	8	14	10	4
115	2	8	8	10	8	10	8	14	10	8	14	10	5
116	2	8	8	10	8	10	8	14	10	8	14	10	6
117	2	8	8	10	8	10	8	14	10	8	14	10	7
118	2	8	8	10	8	10	8	14	10	8	14	10	8

One period contains two elements in the specified periodic table of elements. Six periods contain 8 elements. Four periods- on 10 elements, and two periods- on 14 elements. In some periods identical law of change of properties of elements is observed by an increase in number of electrons in an external layer of an atom. Such periods we shall name similar. So the second and third periods beginning with alkaline elements are similar; 5-th, 7-th, 10-th and 13-th which begin with elements of the group of copper; 4-th, 6-th, 9-th, 12 contain 10 elements; 8-th and 11-th contain 14 elements. For a particle, moving in the accelerator, the correct formula of kinetic energy can be deduced as follows. In process of increase in speed of a particle force from which the electric field on a particle operates, decreases and will be equal

$$F=\frac{d}{dt}\left(mV\sqrt{1-V^2/C^2}\right)=\frac{m\frac{dV}{dt}}{\sqrt{1-V^2/C}}.$$

Considering effect of movement, we find

$$E_k=\int_0^x Fdx=\int_0^V FV'dt=\int_0^V \frac{mV\sqrt{1-V^2/C^2}}{\sqrt{1-V^2/C^2}}dV=\frac{mV^2}{2}, \qquad (28)$$

Where x- the path passed by the accelerated particle. At the increase of speed of a particle to the speed of light, the kinetic energy of a particle will increase to mC^2/2, instead of to infinity as it follows from formula (1).

In producing powerful accelerators of the charged particles, owing to the application of incorrect theory, rather interesting situation was created. The cost of such accelerators is very great, and the effect in the increase in energy of particles is insignificant, therefore construction of such accelerators is not meaningful. The accelerator in Serpukhov can accelerate protons to the speed 0,999950C, and the accelerator in Batavia (state of Illinois, the USA) gives protons a speed equal to 0,999998C [8]. Using the formulas of the theory of a relativity, the Serpukhov's accelerator gives protons ane energy equal 76 GeV, and Batavian - 500 GeV. According to our formula (28), in Serpukhov's accelerators, protons get an energy of 469,089 MeV, and in Batavian - 469,134 MeV. Thus in comparison with Serpukhov, the Batavian accelerator is much more expensive to manufacture and service, and the additional energy is only 45 keV.

Thus, adhering to the uniform concept of knowledge of the world surrounding us, based on a true Newton's representation of space and time, we have created a theory, allowing us to solve all problems which now are solved by means of modern physics. Calculations under our theory yield exact authentic results, and under the theory of modern physics - deformed, mismatching reality.