

This work is dedicated to my dear daughter Liz Katsman

PHYSICAL MODEL OF THE PARALLEL ETHEREAL WORLD

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At the present time there is a lot of evidence that a wide spectrum of so called "paranormal phenomena" (such as telepathy, psychokinesis, clairvoyance, precognition) are real [1]. It is becoming readily apparent that a certain part of the universe is invisible to us. The most intriguing facts have to do with possible existence of life outside the body [2] and with the survival of a human mind after the physical death of the body. Experimental studies regarding contact with "dead" people were performed by two outstanding scientists, Sir William Crookes [3] and Sir Oliver Lodge [4], about one hundred years ago. They were repeated by Sir William Barret [5] and Artur Findlay [6]. Similar experiments have been performed by a number of researches in our time [7]. The first reasonable explanation of the results was apparently suggested by William Crookes: this invisible part of the world operates at higher frequencies than the ones in the world we are able to sense. Many investigators support this idea. However, the theoretical basis regarding such a world is absent.

The questions that usually arise in this respect are what physical object or radiation could be present and what possible physical signal could influence (move) distant objects and yet have no effect on scientific instruments?

The wave nature of our world, which is postulated by a number of modern theories [8-12], can be used to answer these questions and explain the existence of parallel worlds. Such parallel worlds are material to the same degree as our sensed world is. It means that they have the same wave nature with the same (or similar) physical laws. Their invisibility, however, suggests that some universal physical constants in the parallel worlds should be different.

With this idea as a starting point, one can develop a physical, quantum mechanics model of the higher frequency, parallel (ethereal) world that is usually invisible to us.

The Model

Based on experimental evidences the following main principles were used in the developing physical model:

- 1) Ethereal world is real and independent of our minds;
- 2) It exists in our 'SPACE' and in our 'TIME';
- 3) Ethereal world has the wave (field) nature;
- 4) Ethereal bodies have complex internal structure and consist of small elementary wave-particles;
- 5) Geometry sizes and energy values of etheric bodies are of the same order as ones in our part of the universe;
- 6) Ethereal world is usually invisible for us and for our devices.

According to the wave nature of the world, all energy in the universe is kinetic and particles, which have a non-zero rest mass, consist of photon-like or neutrino-like particles (or rotating vortexes) with zero rest mass moving at the speed of light [8-12].

Let us consider the structure of a photon. A photon is a moving wave package consisting of N harmonic waves with close wave lengths, in a narrow interval of λ_1 to λ_N , (or, equivalently, with close wave numbers $k=2\pi/\lambda$, from k_1 to k_N), with amplitudes A_1 , with total energy ε . Photons move at a constant velocity named the speed of light, c . This speed depends upon the properties of the medium in which the photon moves. For given speed, c , the corresponding frequencies of wave harmonics can be found:

$$v_i=c/\lambda_i=c \cdot k_i/2\pi \quad \text{and} \quad \omega_i=c \cdot k_i, \quad i=1, \dots, N \quad (1)$$

The energy of the wave package can be found as follows:

$$\varepsilon = \frac{s}{8} \cdot \frac{(A_1 \cdot N)^2}{\omega_N - \omega_1} \cdot c = \frac{s}{8} \cdot \frac{A^2(0)}{k_N - k_1}, \quad (2)$$

where s is the cross-section area of the wave package, $A(0)=A_1N$ is the amplitude of the package. As it can be seen from eq.(2), the energy of the wave package depends on geometrical parameters (k_i and A) and does not depend on the speed, c , and frequencies, ω_i . In the world with a certain speed of light, c , the energy of the package can be rewritten in the form:

$$\varepsilon = \frac{s}{8} \cdot \frac{A^2(0) \cdot (\omega_N + \omega_1)}{\omega_N^2 - \omega_1^2} \cdot c = \hbar \cdot \frac{\omega_N + \omega_1}{2} = \hbar \varpi, \quad (3)$$

where ϖ is the average, carrying frequency, $\hbar = h/2\pi$, where h is Planck's constant,

$$\hbar = \frac{s}{4} \cdot \frac{A^2(0)}{\omega_N^2 - \omega_1^2} \cdot c = \frac{s}{4} \cdot \frac{A^2(0)}{(k_N^2 - k_1^2) \cdot c}. \quad (4)$$

Since \hbar is constant for all average frequencies of photons (as was found in experiments), it should be concluded that $A^2(0) \propto (k_N^2 - k_1^2)$ for all photons, of any kind. Another consequence of the eq.(4) is that \hbar is inversely proportional to the speed of light, c , and that their product is constant:

$$\hbar c = \frac{s}{4} \cdot \frac{A^2(0)}{(k_N^2 - k_1^2)} = \text{const}. \quad (5)$$

It should be noted that this product is very important because it determines the elementary electrical charge, e :

$$e^2 = \frac{\hbar c}{137.09} \quad (6)$$

Let us now assume that the speed of light depends on structure and properties of the medium (ether). According to Pearson's theory, the ether (or i-ther) is an inhomogeneous medium consisting of two kinds of particles moving with different velocities. In this case the wave package can be constructed from harmonic waves spreading in a sub-space of a certain type of particle. Spreading speeds of different wave packages can be different (in the same manner as speeds of sound waves in a solid consisting of several types of atoms). So we may assume that at least two kinds of photons exist, and the corresponding speeds of light, c_1 and c_2 , may differ substantially:

$$c_2 = n \cdot c_1, \quad \text{and} \quad n \gg 1 \quad (7)$$

The geometry of the wave packages (an amplitude $A(0)$ and bordering wave lengths, λ_1 and λ_N) are determined by the geometry of the ether network and can be assumed to be similar. In this case the energy and the size of packages (average wave lengths) are the same, but the Planck's constants are different:

$$\hbar_1 c_1 = \hbar_2 c_2 \quad \Rightarrow \quad \hbar_2 = \hbar_1 \frac{c_1}{c_2} = \frac{\hbar_1}{n} \quad (8)$$

So, Planck's constant decreases with an increase in the speed of light. The carrying frequency of the wave package increases accordingly:

$$\varepsilon = \varpi_1 \hbar_1 = \varpi_2 \hbar_2 \quad \Rightarrow \quad \varpi_2 = \varpi_1 \frac{\hbar_1}{\hbar_2} = \varpi_1 \cdot n \quad (9)$$

According to the famous Einstein's equation for energy,

$$\varepsilon = m_1 \cdot c_1^2 = m_2 \cdot c_2^2 \quad \Rightarrow \quad m_2 = m_1 \frac{c_1^2}{c_2^2} = \frac{m_1}{n^2}, \quad (10)$$

photon mass is in inverse proportion to the square of the speed of light. Since the momentum of the photon is $p=\varepsilon/c$, increasing the speed of light leads to a decrease in the momentum:

$$p_2 = p_1 \frac{c_1}{c_2} = \frac{p_1}{n} \quad (11)$$

Thus, we have two kinds of photons, with the same range of energies and sizes, but with substantially different frequencies, momentums and masses, and moving with different speeds.

What now can be said about a particle consisting of photons or photon-like particles? Certainly, for such particles, previous statements about decreasing masses and increasing frequencies remain true. Take, for example, an electron with a non-zero

resting mass. According to Pearson's theory, this mass is a sum of kinetic masses of photon-like particles forming this electron. Therefore its resting mass will obey the law of eq.(10). The resting energy of this electron, ϵ_{0e} , is the same in both worlds as well as its Compton's radius:

$$\lambda = \hbar c / \epsilon_{0e} = \hbar / mc \quad (12)$$

According to quantum mechanics, every moving particle has wave properties. The corresponding wavelength is determined by the de Broglie relation $\lambda = h/p = h/mv$, where m is the mass of the particle and v is its velocity. The frequency of the particle, f , is given by the relation $f = W_{\text{kin}}/h$, where W_{kin} is the kinetic energy (in usual meaning) of the particle. Wave behavior of electrons manifests itself, for example, in such phenomena as diffraction of electrons passing through metal film. However, these are probability waves, and diffraction patterns are the result of statistics. Statistical behavior of particles (described by quantum mechanics) is connected with their space extent: a particle can be considered as a wave package of harmonic waves. This package can be described as a quantum liquid drop with infinite degrees of freedom [13,14]. By the way, all particles have a field, wave nature, but real lengths of harmonic waves forming the particle are determined by relations similar to eq.(12) and not by de Broglie relation.

Assuming that typical energies of free elementary particles in both cases have the same order we may conclude that typical frequencies of particles in the second world (we'll name this the ethereal world) are much higher than ones in our first, "physical" world :

$$\frac{v_{\text{ether}}}{v_{\text{our}}} \sim \frac{h_{\text{our}}}{h_{\text{ether}}} = \frac{c_{\text{ether}}}{c_{\text{our}}} = n \quad (13)$$

This is true for all elementary particles (electrons, protons, neutrino, etc.): typical frequencies of the moving elementary particles increase proportionally to the speed of light and their masses decrease proportionally to the square of the light speed.

New electrons, protons and neutrons may form new atoms in the second world. Since the elementary charge, e , does not change (see eq.(6)), the geometrical structure of atoms is conserved. For example, Bohr radius, which determines the hydrogen atom size, does not change:

$$r_0 = \frac{\hbar_2^2}{m_{e2} e^2} = \frac{\hbar_1^2}{m_{e1} e^2} = \frac{(137 \cdot e)^2}{\epsilon_{0e}} = \text{const} \quad (14)$$

This is true also for the Bohr magneton, which determines the magnetic properties of elementary particles and atoms:

$$\mu_B = \frac{e \cdot \hbar_2}{m_{e2} c_2} = \frac{e \cdot \hbar_1}{m_{e1} c_1} = \frac{137 \cdot e^3}{\epsilon_{0e}} = \text{const} \quad (15)$$

Energy levels and the radii of the circular orbits of the electron in the hydrogen atom are computed by the formulas:

$$E_n = -\frac{m_{e2}e^4}{2\hbar^2n^2} = -\frac{m_{e1}e^4}{2\hbar_1^2n^2} = -\frac{\epsilon_{0e}}{2 \cdot (137)^2 n^2} \quad , \quad (16)$$

$$r_n = n^2 r_0, \quad n = 1, 2, 3 \dots \quad (17)$$

As can be seen, they are the same in both worlds.

An atom can absorb a discrete portion (quantum) of electromagnetic energy (photon) equal to the difference between the levels of energy in spectrum (16) if an electron "jumps" from a closer orbit to a farther one. An excited atom radiates a photon when an electron returns to a closer orbit from a farther one. The magnitude of the emitted or absorbed quantum of energy, $\hbar \omega_k$, is given by the condition:

$$\hbar \omega_k = E_{k+1} - E_k \quad (18)$$

The same conditions hold valid for many-electron atoms.

So, the energy spectrum of electromagnetic waves – photons – emitted and absorbed by atoms in our world and in the supposed ethereal one is the same. But the frequency spectrums are different:

$$\omega_k^{\text{ether}} = \frac{\hbar_{\text{our}}}{\hbar_{\text{ether}}} \omega_k^{\text{our}} = \frac{c_{\text{ether}}}{c_{\text{our}}} \omega_k^{\text{our}} \quad (19)$$

This is most likely the main reason for the fact that we cannot sense or record the electromagnetic waves from the ethereal world with our devices: photons emitted by ethereal atoms have appropriate energies, but much higher frequencies. An atom as an oscillatory system can absorb energy of the waves with resonance frequencies only. It means that our atoms cannot absorb photons emitted by analogous ethereal atoms. On the other hand, ethereal photons with appropriate (low) frequencies (created, for example, during braking of ethereal electrons) may be absorbed by our atoms, but they have too little energy (because of small Planck's constant) in comparison with "our" photons, and transfer less momentum than "our" photons by a factor of n^2 . This makes it difficult to recognize them in the total signal.

A heated solid body emits and absorbs electromagnetic waves in a wide range of frequencies due to the vibrations of its atoms (thermal emission). The spectral ability of the "absolutely black body" to emit radiation is described by Planck's formula:

$$r_\nu = \frac{2\pi\nu^2}{c^2} \cdot \frac{h\nu}{\exp(h\nu/kT) - 1} \quad (20)$$

where k is the Boltzman's constant. The maximum radiation is obtained at the frequency denoted by ν_m (Vin's law):

$$\nu_m = \frac{4.965k}{h} T \quad (21)$$

Because of the difference in Planck's constant, most of the electromagnetic energy emitted by etheric bodies is emitted at very high frequencies:

$$\nu_m^{\text{ether}}(T) = \frac{h_{\text{our}}}{h_{\text{ether}}} \nu_m^{\text{our}}(T) = n \nu_m^{\text{our}}(T) \gg \nu_m^{\text{our}}(T) \quad (22)$$

Because of their much lower frequency spectrum, the bodies in our part of the universe cannot absorb this irradiation. On the other hand, emission of an etheric body (heated for temperature T) at low frequencies can be written as follows:

$$r_\nu = \frac{2\pi\nu^2}{c_{\text{ether}}^2} \cdot kT = \frac{2\pi\nu^2}{c_{\text{our}}^2 n^2} \cdot kT = \frac{2\pi\nu^2}{c_{\text{our}}^2} \cdot k \frac{T}{n^2} \quad (23)$$

It is equivalent to the emission of 'our' bodies, but with temperature $T^*=T/n^2$. If, for example, $T=1000^\circ\text{K}$ and $n=1000$, then $T^*=0.001^\circ\text{K}$. Such irradiation can, in principle, be absorbed by our bodies, but it is very weak and, in fact, is not something we are normally able to detect. However, special experiments can be arranged in order to detect thermal emission or absorption by etheric bodies. In particular, the scattering of the coherent laser beam by the DNA phantom [15] can be interpreted as an example of interaction between our electromagnetic waves and the etheric body by means of its thermal vibrations.

Thus, the parallel, ethereal world has the following features:

- 1) The speed of light is much higher, than in our world, eq.(7);
- 2) Typical frequencies of elementary particles (photons, electrons, protons, neutrino, etc.,) are much higher, than the corresponding ones in our world, eqs.(9), (13), (19);
- 3) Planck's constant is much smaller, eq.(8);
- 4) Masses of elementary particles as well as atoms are much smaller, eq.(10);
- 5) Elementary charge is the same, eq.(6);
- 6) Structure of atoms: size, geometry and energy spectrum of atoms are the same as in our world;
- 7) Ethereal solid, liquid and gaseous matter can be formed from ethereal atoms in the same manner as in our world;
- 8) Ethereal photons as well as the other ethereal elementary particles are invisible to us because of their high frequencies; this is true also for ethereal atoms and for solid matter built from these atoms.

The last statement should be considered the most carefully because of its great importance. It is based on the assumption that the world has a fully wave nature, and all elementary particles are constructed from photon-like or neutrino-like particles

with zero rest mass. In this case two different wave objects may occupy the same place. They influence each other, leading to an interference picture, only in the case where their frequencies are similar. In the quantum mechanics language the condition for mutual influence of atoms is the appropriate frequencies of the electromagnetic fields carried by the photons which are absorbed and emitted by those atoms.

In ordinary life we feel surrounding things due to electromagnetic interaction between our own atoms (in our eyes, skin, and neurons, for example) and photons emitted by atoms of surrounding bodies. Since our atoms cannot absorb photons emitted by ethereal atoms, the ethereal world is invisible to us.

The second type of interaction we have with surrounding bodies is gravitational. We feel the attraction of the Earth, and most likely the main reason for our need of energy is necessity to overcome the force of gravitation. It is interesting to note that the evolution of life on Earth can be considered as a history of struggle for food that, in turn, is required for the energy needed to overcome gravitation! All our digestive, blood and respiratory systems are needed to provide energy for muscle systems – again – to overcome gravitation!

In the supposed ethereal world the gravitational forces are very weak. Actually, the gravitational force between two bodies, F_{grav} , is proportional to product of their masses, $m_1 m_2$, and in the ethereal world it will be n^4 times less than the force between analogous bodies in the our world. For example, if $n=100$, $F_{grav}^{ether} = 10^{-8} F_{grav}^{our}$. It means that living etherians, if they exist, don't need energy to overcome gravitational attraction.

This conclusion is, however, true only if the gravitational constant, G , is the same in both worlds. To clear this question we should know the nature of gravitation.

Recently gravitation is often considered as non-fundamental interaction, but as residual electromagnetic interaction of bodies with zero-point fluctuations of vacuum [16]. According to this idea, suggested firstly by Andrew Sakharov, gravitational constant, G , is determined by the formula:

$$G = \frac{\pi \cdot c^5}{\hbar \omega_c^2} \quad (24)$$

where ω_c is the Planck's frequency, usually determined through G : $\omega_c = (\pi c^5 / \hbar G)^{1/2}$.

Introducing corresponding Planck's wavelength, $\lambda_c = 2\pi c / \omega_c$, one can rewrite (24):

$$G = \frac{\lambda_c^2 \cdot c^4}{4\pi(\hbar c)} \quad (25)$$

Since $(\hbar c)$ and λ_c do not change, (elementary charge and geometrical parameters are the same in both "worlds"), gravitational constant, $G \sim c^4$, and gravitational attraction between analogous bodies remains the same:

$$F_{grav}^{ether} = G^{ether} \frac{m_1^{et} m_2^{et}}{R^2} = (Gn^4) \frac{m_1 m_2}{n^4 R^2} = F_{grav}^{our} \quad (26)$$

Electromagnetic nature of gravitation is still not proven. However, united origin of all natural interactions is very likely. So, the presence of attractive forces similar to our gravitation between etheric bodies seems to be very possible.

Gravitational interaction of "our" bodies with the etheric ones may be the reason of the appearance of so-called "dark matter" found recently in the Universe and manifested only through its gravitational effects.

What would life be like in the ethereal world? If gravitational constants are the same in both "worlds", or etherians may shield electromagnetic zero-point fluctuations of vacuum, they have no to struggle with gravitation. We may suppose that etherians have no problems with food because they don't need nearly as much energy as Earth people. They may possibly receive appropriate chemical energy (mainly for brain and nervous activity) immediately from electromagnetic fields (fluxes of ethereal photons) and neutrino flows. If so, they don't need digestive and blood systems, nor a respiratory system. They can move very quickly because of the absence of gravitational forces and atmosphere resistance, small mass and high light velocity. So, they have no problems with territory and struggle for existence. At least, not in the same way as in our world.

Can we interact with this world? Might there exist a number of parallel worlds with different constants c and \hbar ? These are interesting questions...

Parallel ethereal world and the principle of relativity

According to the special theory of relativity we live in 4-dimensional world in which three coordinates are spatial, and the fourth one is connected with time, t , and should be taken in the form (ict), where c is the light velocity and i is the imaginary unit. In this space every material body or system has a 4-dimensional energy-momentum vector, (cp_x, cp_y, cp_z, imc^2). The square of this vector is invariant for all inertial (that is, non-accelerated) frames of reference:

$$p^2c^2 - m^2c^4 \equiv p^2c^2 - E^2 = -m_0^2c^4 \quad (27)$$

If, for example, a frame of reference is connected with the particle moving along axis X with the velocity v , coordinates and momentums in this new reference are connected with ones in the initial frame of reference by the Lorentz's relations:

$$\begin{cases} x' = (x - vt) \cdot \beta, & y' = y, & z' = z, & t' = \left(t - \frac{xv}{c^2} \right) \cdot \beta \\ p'_x = \left(p_x - \frac{vE}{c^2} \right) \cdot \beta, & p'_y = p_y, & p'_z = p_z, & E' = (E - vp_x) \cdot \beta \end{cases} \quad (28)$$

$$\beta = \frac{1}{\sqrt{1 - v^2 / c^2}} \quad .$$

The speed of light, c , is the same for all such frames of reference, independent of the motion of the observer, and it is the maximum possible velocity for all material bodies in our world.

Special theory of relativity does not consider, however, the possibility of relative motion along the forth, time-axis. Our world can be considered as moving along this axis with the speed of light.

Let us introduce a new frame of reference which moves along the time-axis with the speed c_1 . Coordinate transformation which conserves a square of energy-momentum vector is given by:

$$\begin{cases} x' = x, & y' = y, & z' = z, & t' = t \cdot \frac{c}{c_1} \\ p'_x = p_x \frac{c}{c_1}, & p'_y = p_y \frac{c}{c_1}, & p'_z = p_z \frac{c}{c_1}, & E' = E \end{cases} \quad (29)$$

The last equation requires also the change of masses:

$$m_{10} = m_0 \frac{c^2}{c_1^2}, \quad m_1 = m \frac{c^2}{c_1^2}, \quad (30)$$

that exactly coincides with eqs.(10). In this case the square of energy-momentum vector is invariant of the transformation (29):

$$p'^2 c_1^2 - E'^2 = -m_{10}^2 c_1^4 = p^2 c^2 - E^2 = -m_0^2 c^4. \quad (31)$$

Velocities of a body in the new and the old frames of reference are connected by the relation:

$$\frac{v_1}{c_1} = \frac{v}{c} \Rightarrow \beta_1 = \beta. \quad (32)$$

So, we obtained the same results as previously, eqs.(10), (11). The new result is the change in the rate of time: with increasing the light velocity the rate of time decreases. But what is the physical meaning of time?

With the help of time we characterize: a) space transference of material objects; b) the rate of processes such as transformations of elementary particles, nuclear and chemical reactions. Transference in space is characterized by the product $(v \cdot t)$. According eqs. (29) and (32), this product does not change:

$$v_1 t' = \left(v \frac{c_1}{c}\right) \left(t \frac{c}{c_1}\right) = vt. \quad (33)$$

As about nuclear and chemical reactions as well as transformations of elementary particles, their rates, apparently, are also connected with the light velocity in the given frame of reference, namely, they are proportional to it. If K is the rate of a certain reaction in the system with the light velocity c , and K_1 is the rate of the same reaction in the system with the light velocity c_1 , the following equality can be assumed:

$$\frac{K}{c} = \frac{K_1}{c_1}, \quad (34)$$

and the quantity of the reaction products $K \cdot t = K_1 t'$ does not change. By this means the slow down of the rate of time is compensated by acceleration of all processes with increasing the light velocity. As a result, all processes, including vital activity, occur by the same manner, in both frames of reference, in accordance with general principle of relativity.

Parallel ethereal world and "paranormal" phenomena

Let us consider, from the point of view of the parallel world's existence, some phenomena usually called as "paranormal". By this it means that they have no normal physical explanation, so they are result of somebody imagination, or simply deliberate fraud. We say about such phenomena as appearance and disappearance of material objects ("materialization" and "dematerialization"), levitation, free penetration of solid objects through each other, telepathy, remote healing, and so on.

From the point of view of the proposed physical model, these phenomena can be described as normal physical processes. Actually, every elementary particle and hence every atom may have several *almost* equivalent energy states, but with different frequency-speed characteristics. *Almost* – because they have different masses and consequently, their gravitational energies are different. Apparently, gravitational binding energy provides an energy barrier which divides different states (see below). In the presence of some energy quantum flow (for example, of electromagnetic quanta - photons) which can be absorbed by *our* atoms, and under condition that absorbed energy corresponds to gravitational barrier, we may expect transition of *our* atoms to another, excited state corresponding to ethereal world. In this state a body turns out to be invisible for us (though it remains to be at the same place), it can easily move or be transferred (possibly, by etherians) to another place, it freely penetrates through *our* matter (because does not interact with *our* bodies), it can levitate (since its mass is close to zero) and it can return to initial state with emission of energy in the same form as it was initially absorbed. These processes are in good line with "dematerialization" and "materialization"

of material objects which were repeatedly described by participants of spirit seances (with physical mediums).

Let us evaluate the energy needed to be transferred to the particle of mass, m , being near the Earth's surface, in order to transform it to the etheric state. This energy equals to gravitational binding energy of the particle, and hence it equals to work which should be done to move this particle away the Earth to infinite distance:

$$\varepsilon = \int_{R_E}^{\infty} G \frac{M_E m}{r^2} dr = G \frac{M_E m}{R_E} = mgR_E, \quad (35)$$

where g – free fall acceleration near the Earth surface. For an electron this value equals to $\sim 3.55 \cdot 10^{-4}$ eV. For comparison, the difference between two first energy levels in the hydrogen atom is 10.3 eV. In order to transfer the energy $3.55 \cdot 10^{-4}$ eV to the electron in the hydrogen atom we should use photons with frequency $\nu = (0.000355 \text{ eV}/h) = 8.5 \cdot 10^{10} \text{ Hz}$. But *our* hydrogen atoms cannot absorb photons of such frequency! First possible frequency of absorption is $\nu_1 = (3/4)R' = 2.47 \cdot 10^{15} \text{ Hz}$ (R' – Ridberg's constant) corresponds to the energy 10.3 eV. Analogous situation appears for quarks which are apparently the elementary "bricks" from which protons and neutrons (and atomic nuclei as a whole) are built. Gravitational barrier for quarks comes to 0.2 eV, but minimum energy of nuclei excitation is about hundreds MeV. Using γ -photons with such energies we can excite the nuclei (and transfer hundreds MeV to a quark) but we cannot pass a so small energy as 0.2 eV.

Who and how does it? The answer can be found in the etheric photons. The etheric photons having appropriate frequencies for absorption by *our* atoms, at the same time have a small energy (much smaller than analogous *our* photons). And this energy is well sufficient to overcome the gravitational barrier. For example, with the frequency $\nu_1 = 2.47 \cdot 10^{15} \text{ Hz}$ and the Planck's constant $h_{\text{ether}} = 10^{-3} h_{\text{our}}$ the photon energy is equal to 0.0103 eV. Wrapping the etheric photon, *our* atom cannot jump to its usual excited state (since there is no enough energy for it), it may emit back this photon and return to initial state, or, absorbing sufficient number of etheric photons, jump to a new, etheric state. For a hydrogen atom the total energy needed for this transformation, according to eq.(35), is about 0.65eV.

The problem is that: in order to "dematerialize" a body, all its atoms should be transformed to etheric state simultaneously. For this a very short pulse of etheric electromagnetic waves should have a total energy exceeding the total gravitational binding energy of the body. Who can send such pulses? It is not improbable that these are inhabitants of the etheric world – etherians. How they do it? They say (through mediums and by means of ITC [19,20]) they do it by thoughts. Using this statement as a work hypothesis we may suppose that an etheric brain radiates electromagnetic waves and may modulate them by own thoughts. It opens a possibility for transferring thoughts for a long distance (telepathy). These modulated electromagnetic waves can, in principle, be received by our electronic devices, however the power which they pass to *our* oscillating contours is very small (it is inversely proportional to the speed of light) so it is usually at

the level of apparatus noise. Nevertheless, the experiments with receiving "voices" by usual radio receivers, computers, television sets, video cameras and even by usual tape recorders and telephone answer machines [17-19] show that such trans-communication is possible. Apparently, for implementation of contacts etherians have to enlarge substantially the intensity of the electromagnetic signals sent to us (number of photons per the time unity). How they do it we may only guess. What is known from etherian informants, they have special stations for this [19].

Some people living on the Earth can also effect on the material objects by means of their thoughts. We may recall different examples demonstrated by Uri Geller, Philippines healers operating without scalpel (it can be considered as example of temporary "dematerialization" of the part of a patient's body, and more exactly, transformation of this part to another state), remote healing carried out by different mediums and healers. How it can be explained?

To my mind, two answers are possible: 1) such people are helped by their etheric guides [20]; 2) all earth people possess an etheric body; most of people don't use it (or cannot use it, or don't understand that use it); but in some cases the etheric body, and especially etheric brain, actively operates: it may send etheric electromagnetic waves which influence on other people by changing the state of their atoms (possibly the healing effect is accomplished through the etheric bodies of the recipients). Etheric brain may receive the thoughts of other people and to decode them in the same manner as a radio receiver – the phenomenon known as telepathy.

Existence of the etheric body is connected with the most exciting question – continuation of the individual life after the death of his physical body.

Existence of the second body

According to many religious doctrines, and in views of many parapsychologists, mediums and extrasensors, we possess a second body, or soul, which leaves our physical body at the moment of death. Some people have told that they saw themselves from above while in the state of clinical death.

Let us assume that we really possess a second body that exists in the parallel ethereal world. Let us also assume that this second body is an exact (or almost exact) copy of our first, "physical" body: it consists of analogous atoms, molecules, cells, organs, brains and nervous system. What should be the mass of this body? According to eq.(10),

$$M_{second} = \frac{M_{body}}{n^2} \quad (36)$$

There is some information that at the moment of death the weight of the human body decreases by several grams. If we associate this decrease with the release of the second body, it can be used for evaluation of n . For example, if $M_{body}=100\text{kg}$ and $\Delta M=M_{second}=0.1\div 10\text{g}$, $n = \sqrt{M_{body} / M_{second}} = 100 \div 1000$. Unfortunately, the data about

weight decrease is not reliable because the weight may decrease due to different reasons. But it gives us a principal possibility to evaluate n and correspondingly the speed of light in the ethereal world.

The statement that the second body is tightly bound to the "physical" body and leaves it during the death leads to the following conclusions:

- 1) Our two worlds may interact: a) change in the weight manifests gravitational interaction of an ethereal body with the Earth; b) attractive interaction between our ethereal and "physical" bodies, $F_{\text{et-ph}}$, exists;
- 2) The force of interaction $F_{\text{et-ph}}$ depends on vital functions of our body: when they cease or fall off substantially, this force vanishes (or weakens, as in the case of clinical death);
- 3) This is a long-range interaction: the second body may return to the "physical" one if the last resumes the vital functions.

Existence of this force of interaction can be connected with energy flows in our body as well as in the second one as long as we are alive. But this will be the topic of future work.

Conclusions

Thus, the invisible part of the universe has a physical structure similar to the world we sense: the matter is built from atoms, which, in turn, are constructed from nucleons and electrons, with the same elementary electrical charge. The size, structure and energy spectrum of ethereal atoms and presently detected atoms are the same.

The ethereal world is invisible to us because of different "universal" constants such as the speed of light, c , and Planck's constant, h , while their product, $c \cdot h$, which determines the elementary charge, is conserved. The ethereal speed of light is much higher than the one in our world, and Planck's constant is much smaller. It leads to higher frequencies in the ethereal elementary particles, and in particular, photons, which realize the electromagnetic interaction between atoms. Our atoms cannot absorb ethereal photons, and the ethereal world remains invisible to us.

Gravitational interaction between ethereal and our worlds apparently exists, but it is very small because of the very small masses of ethereal bodies.

References

1. Dean Radin, *The Conscious Universe*, 1997, HarperEdge.
2. Brian D. Josephson, *String Theory, Universal Mind, and the Paranormal*, <http://www.tcm.phy.cam.ac.uk/~bdj10>
3. Sir William Crookes FRS, *Researches into the Phenomena of Spiritualism*, Two Worlds Publishing Company Ltd, 1904.
4. Sir Oliver Lodge FRS, *The Mode of Future Existence*, 1933 Lecture.
5. Sir William Barrett, *Death-Bed Visions –The Physical Experience of the Dying*
6. Arthur Findlay, *On the Edge of the Etheric*, The Headquarters Publishing CO LTD, London, 209 p., 1931 .

7. Montague Keen, Arthur Ellison, David Fontana, The Scole Report: Proc.Soc.of
Psychical Res. Vol.58, Part 220, 1999.
8. Ronald Pearson, Consciousness as a Sub-Quantum Phenomena, Frontier Perspectives, the
magazine of The Center for Frontier Perspectives at Temple University. Volume 6, Number 2.
Spring/Summer 1997.
9. Shipov G. I., Theory of physical vacuum, "Nauka", Moscow, 1997.
10. Sidhart B.G., Quantum Mechanical Black Holes: Towards a Unification of Quantum
Mechanics and General Relativity, Centre for Applicable Mathematics&Computer
Sciences, B.M. Birla Science Centre (India), arXiv:quant-ph/9808020 v.1, 12 Aug
1998.
11. Kaivarainen A., Unified Theory of Bivacuum, Particles duality, Fields&Time,
University of Turku, Department of Physics, Finland, H2o@karelia.ru.
12. Pitkänen M., Topological Geometrodynamics, Department of Physical Science, High
Energy Physics Division, University of Helsinki, Finland, June, 2003.
13. Madelung B. Zetshr.Phys., 1926, Bd.40, 332
14. Alekseev B.V., Abakumov A.M., DAN USSR, 1982, v.262, No.5, p.1100.
15. Poponin V., The DNA phantom effect: direct measurement of a new field in the
vacuum substructure, **TWM**
16. Puthoff H.E., Gravity as a zero-point fluctuation force, Physical Review A, vol.39,
No.5, p.2333, 1989.
17. Raudive K., *Breakthrough*. Gerrards Cross: Colin Smythe, 1971
18. Senkowski E., *Instrumentelle Transkommunikation*. Frankfurt: R. G. Fischer, 1989
19. Anabela Cardoso, Survival Research, Part I: *Some Background to Survival Research
and an Introduction to Instrumental Transcommunication (ITC)*.
Part II: *Personal Experience in ITC*, *ITC Journal*, No.1-3, 2000.
20. Harry Edwards, Life in Spirit, The Healer Publishing Co.Ltd, 238p., 1996