Particle Resolution

Philipp M. Kanarev
Pushkin Str. 11, Apt. 19, 350063 Krasnodar, RUSSIA
e-mail: kanphil@mail.ru

Current probability theories limit the theoretical size of elementary particles. The current resolution of an electron microscope is around 10^{-9} m. The classical equations in this paper allow for deterministic resolution with a theoretical resolution of around 10^{-15} m, a millionfold more accurate.

1. Introduction

Faraday theorized useful knowledge in electricity and magnetism. Later, Maxwell proposed equations to describe electricity and magnetism.

$$rot\,\bar{E} = -\frac{1}{C}\frac{\partial \bar{B}}{\partial t}, \quad (1)$$

$$div\,\bar{E} = 4\pi\rho, \quad (2)$$

$$rot\,\bar{B} = \frac{1}{C}\frac{\partial \bar{E}}{\partial t} + \frac{4\pi}{C}\bar{I} \quad (3)$$

$$div\,\bar{B} = 0. \quad (4)$$

$\bar{E} = \bar{E}(\bar{r},t)$, electric field

$\bar{B} = \bar{B}(\bar{r},t)$, magnetic field

$\frac{1}{C}\frac{\partial \bar{E}}{\partial t}$, displacement current

$\frac{4\pi}{C}\bar{I}$, conduction current.

It is falsely believed that Maxwell equations describe the propagation of the so-called electromagnetic waves. Fig. 1 is a depiction of Maxwell's electromagnetic wave [1].

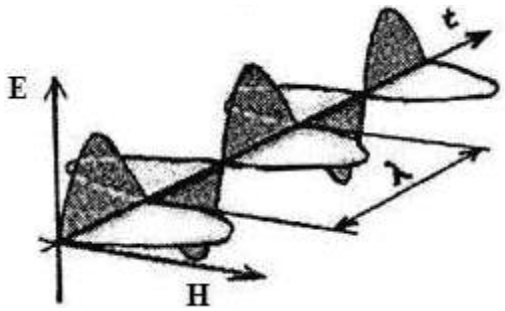

Fig. 1. Maxwell's electromagnetic wave

Maxwell equations are represented in partial derivatives. Partial derivatives are usually taken based on both time and a coordinate. Both variables are changed synchronously in the implementation of any process. Mathematicians set the time parameters equal to zero and differentiate with respect to the coordinate. This is not reality. Reality is a simultaneous change in the coordinate $(\vec{r})$ and time (t). One cannot leave the coordinate $(\vec{r})$ constant when the equation is differentiated with respect to time (t) and one cannot stop time (t) when the equation is differentiated with respect to the coordinate $(\vec{r})$. Such process does not exist in reality. Time cannot be stopped, and the variable coordinate is always a function of time [1].

An analysis of Maxwell equations shows that they distort reality; time cannot be stopped and the coordinate of the displacement of any object in space is always a function of time. Do Maxwell's equations describe reality or mysticism? [1].

The "approximation" methods for the solutions to Maxwell's equations can provide a result that agrees with experiments. The "approximation" methods for the solutions to Maxwell's equations are based on the use of the Fourier series. This means that the physical meaning of the electromagnetic wave is not given. These waves can have various physical interpretations, which are not recorded in the measuring instruments. Using approximation methods, the interpretation can be completely erroneous.

Maxwell's equations describe only a part $(1<4$ to $1>6$ meters; 0.0001 to 1,000,000 meters) of the full photon range $(1<18$ to $1>6$ meters) of the so-called electromagnetic radiation (Table 1). Maxwell's equations fail to describe photons in the range of $(1<18$ to $1>6$ meters). Why? The answer is given below.

Frequencies	**Radii, wavelength** r,λ (m)	**Mass** m (kg)
1. Low-frequency	$3>6$ to $3>4$	$0.7<48$ to $0.7<46$
2. Broadcast	$3>4$ to $3<1$	$0.7<46$ to $0.7<41$
3. Microwave	$3<1$ to $3<4$	$0.7<41$ to $0.7<38$
4. Relic	$r=\lambda\approx 1<3=0.001$	$2.2<39$
5. Infrared	$3<4$ to $7.7<7$	$0.7<38$ to $0.3<35$
6. Light (visible)	$7.7<7$ to $3.8<7$	$0.3<35$ to $0.6<35$
7. Ultraviolet	$3.8<8$ to $3<9$	$0.6<35$ to $0.7<33$
8. Roentgen X-ray	$3<9$ to $3<12$	$0.7<338$ to $0.7<30$
9. Gamma	$3<12$ to $3<18$	$0.7<30$ to $0.7<24$

Table 1. Changes of radii/wavelengths (λ) and masses (m) of photon radiations.

2. Waves and Particles

Examining Louis de Broglie's wave equation [1]

$$y = A\sin 2\pi\left(vt - \frac{x}{\lambda}\right) \quad (5)$$

The mathematical symbols used in this equation are well known:

1. (λ) is wavelength,
2. (v) is wave velocity,
3. (t) is time,
4. (x) is the coordinate.

The coordinate (x) and time (t) in equation (5) are independent variables. They do not describe reality. Where did such contradictory equations come from? They came from the study of surface water waves (Fig. 2) [1].

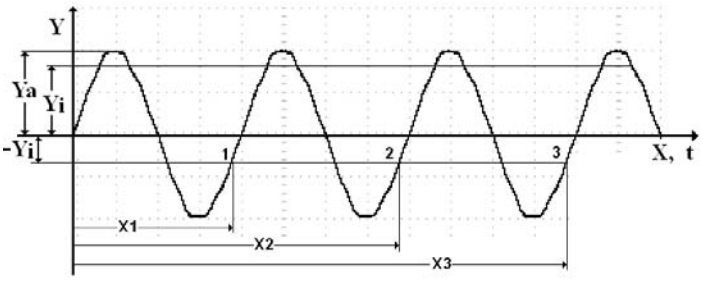

Fig. 2. Independence of coordinate (x) and time (t)

Q: If a water wave moves 1000 meters, can equation (5) provide the time of travel?

A: The answer is no.

Q: How far will the wave have traveled in 60 seconds?

A: There is no answer.

Q: Why?

A: The coordinate (x) and time (t) are independent variables.

Q: At what moment from the wave formation, does its amplitude equal $(+Y_A)$?

A: Equation (5) gives innumerable quantities of the distances (x) where the amplitude has the value $(+Y_A)$.

Q: Why does de Broglie's equation not determine the coordinate (x) of the wave at a specified instant in time (t)?

A: Equation (5) only determines the ordinate of a wave. From the start to the end of the wave, there are numerous (x_i) coordinates. All the $(-Y_i)$ ordinates have the same value [1].

Q: Can de Broglie's equation be used to describe an electromagnetic wave motion?

A: The answer is univocal: no, it cannot. The equation does not determine the number of propagating waves (called a wave packet); we cannot know the coordinates of the center of this packet at any instant in time. de Broglie's equation is guesswork [1].

The next equation that is used to describe the behavior of atoms and nuclei is Schrodinger's equation [1].

$$\frac{h^2}{8\pi^2 m}\left(\frac{\partial^2\psi}{\partial x^2}+\frac{\partial^2\psi}{\partial y^2}+\frac{\partial^2\psi}{\partial z^2}\right)-P\psi=\frac{h}{2\pi i}\frac{\partial\psi}{\partial t} \qquad (6)$$

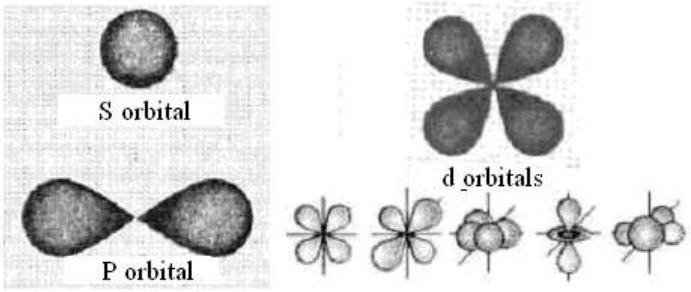

Fig. 3. Schrodinger's electron clouds

Coordinates and time are independent variables in Schrodinger's equation (6). Schrodinger's equation does not describe reality because a coordinate is always a function of time. Nevertheless, orthodox people are proud of the theory and believe that it describes the behavior of atoms and nuclei. Schrodinger's equation makes it possible to determine only a probabilistic position of electrons and elementary particles in the atom. Fig. 3 shows some electron orbitals calculated using Schrodinger's equation.

The electron clouds have little in common with the orbits; chemists have called them orbitals without further ado.

Fig. 4 shows Schrodinger's model of a few atoms [1].

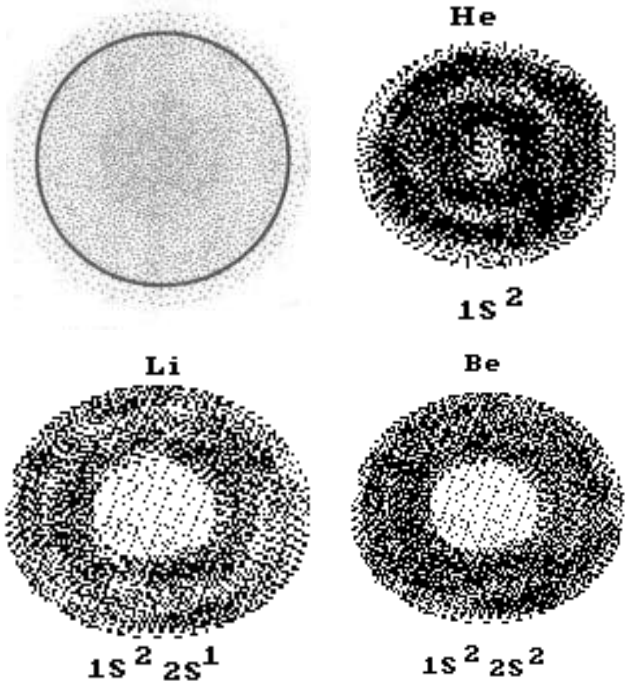

Fig. 4. Hydrogen, helium, lithium and beryllium using Schrodinger's equation

In Fig. 5a, the hydrogen molecule using Schrodinger's equation is shown. In Fig. 5b, the hydrogen molecule using Kanarev's theory is shown [1].

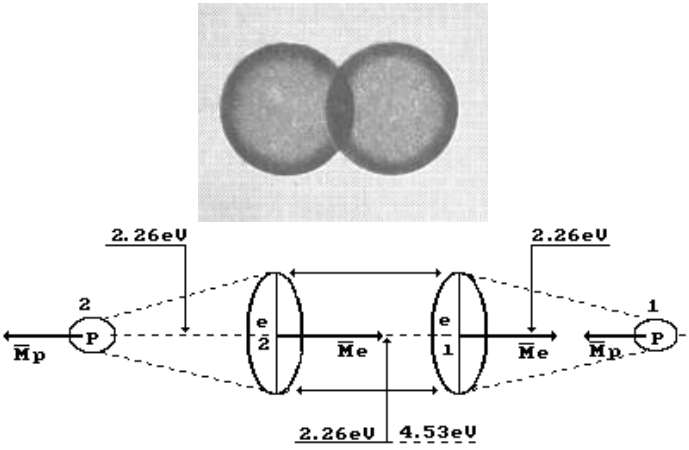

Fig. 5. Schrodinger's and Kanarev's model of the hydrogen molecule

The latest incorrect theory on nuclei, by orthodox people, is shown in Fig. 6 [2]. As the author notes, the dark and bright balls on the nuclei rings are the protons and the neutrons [2]. The protons and neutrons are interconnected on sealed rings. Nevertheless, it seems to satisfy the orthodox people [2].

This is the astonishing results obtained from the probabilistic Schrodinger equation. The atoms (Fig. 4) are misty spots. The nuclei (Fig. 6) are rings of an unknown nature that bond protons

and neutrons with a mysterious bonding mechanism between them. It is a fairy tale and nothing more.

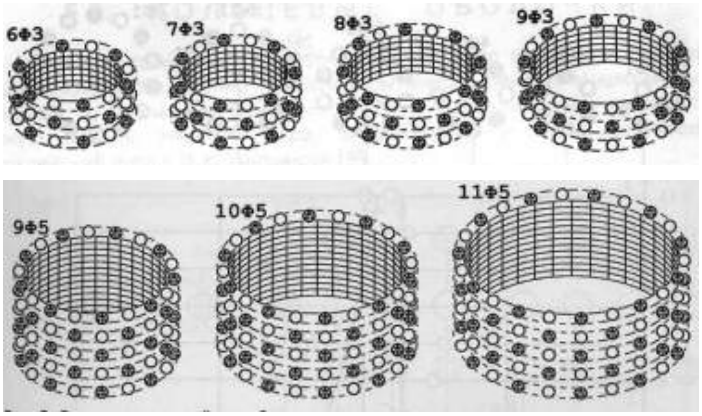

Fig. 6. Orthodox model of the external ring shells of nuclei

Where is reality? Since global errors are abundant, the only way to return to reality is by using the Unity Axioms. The three primary axioms of the Unity Axioms deal with the connection between space, matter and time. The Unity Axioms for space, matter and time predict that reality exists only when space, mater and time are in all mathematical equations.

All phenomena and processes in Nature take place within the framework of the Unity Axiom. The displacement of any objects in space is inseparable from time flow. All displacements are time functions. If we ignore this fact, we get an approximations or complete distortion of the phenomenon. Maxwell's, de Broglie's and Schrodinger's equation are examples of equation that distort reality [1].

Until the middle of the 19th century, scientist worked in the framework of the Unity Axiom. It was violated with the introduction of wave theories. No attention was paid to the fact that all experiments take place within the framework of the Unity Axiom; and are not subject to human interpretation and control. A correct interpretation of experiments is possible only when the theories and mathematical equations operate within the framework of the Unity Axiom [1].

When mathematical equations and theories operate outside the framework of the Unity Axiom, as in Eqs. (1-6), we get, at best, approximations and, at worst, complete distortions [1].

Photons were introduced into science after electromagnetic radiation. The equations currently being used in electromagnetic radiation do NOT describe reality. Let's develop equations that describe the photon!

All existing mathematical equations which describe a photon result in the magnetic model shown in (Fig. 6a). It is a formation which is localized in space, not the probabilistic Maxwell wave (Fig. 1). The equations of the motion of the center of mass (M) of the photon operate within the framework of the Unity Axiom, whose coordinates are a function of time [1]:

$$x = Ct + 0.067r\sin 6\omega_0 t \tag{7}$$

$$y = 0.067r\cos 6\omega_0 t \tag{8}$$

These equations predict that the center of mass M of the photon (Fig. 7 a) circumscribes a curate cycloid with a very small amplitude:

$$A = \rho_M = \frac{r}{2}\left(1 - \cos\frac{\alpha}{2}\right) = 0.067r \tag{9}$$

The average velocity of the center of mass M of the photon remains constant and equals C (Fig. 7b).

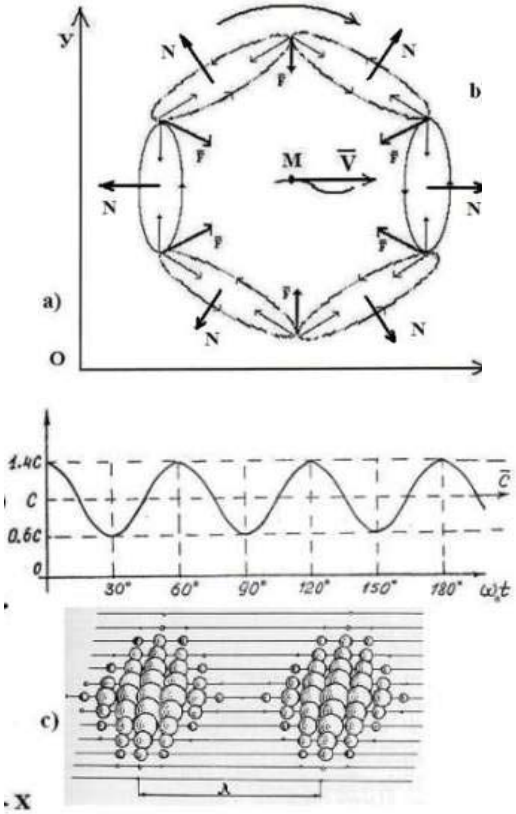

Fig. 7. Magnetic fields of the photon and a graph of the change of its center of mass M.

The velocity of the center-of-mass of photons *should not depend on their radius* (r). The derivative of equations (7) and (8) predicts the correct velocity and motion of the center of mass (M) of photons.

$$V_M = \sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2} = \sqrt{C^2 + 0.85C^2\cos 6\omega_0 t + 0.18C^2}$$
$$= \sqrt{\frac{1.18 + 0.85C^2\cos 6\omega_0 t}{\varepsilon_0\mu_0}} \tag{10}$$

Equation (10) shows that the velocity of the center-of-mass (M) of the photon does not depend on its radius, which changes over 15 orders of magnitude $(1<3$ to $1<18$ meters$)$. Photons with a radius larger than $(1<3$ meters); interval of $(1<3$ to $1>6$ meters$)$, form an aggregate of photons (Fig. 7c). When photons are reflected from an aerial, they become polarized in the plane of incidence. The reflecting polarized photons orientate the free electrons in the aerial and form an electric potential in the aerial. This potential can be measured and processed by a receiving device [1].

The next important particles are protons and neutrons [1].

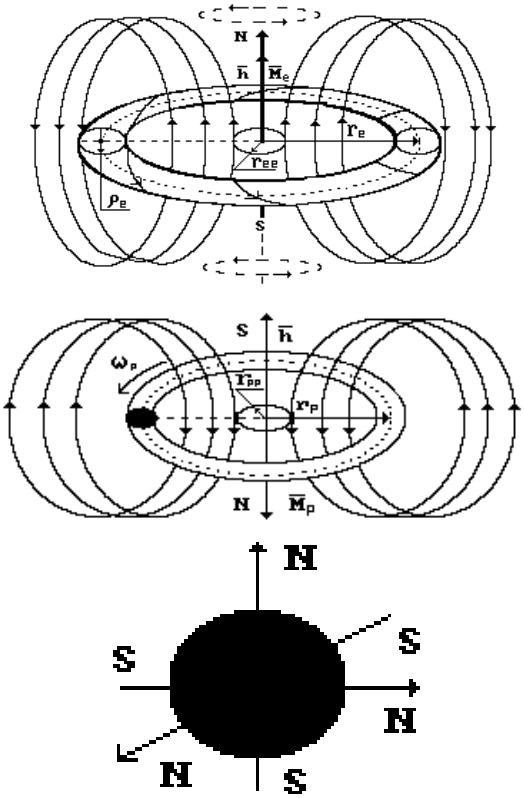

Fig. 8. a) electron; b) proton; c) neutron

The electron is a hollow torus with two revolutions: around the central axis and around the ring axis of the torus. It has two magnetic poles: a north N and the south S. The vectors of its spin $\bar{h}$ and magnetic moment $\bar{M}_E$ are in the same direction along the central axis.

The proton is a solid torus. The vectors of its spin $\bar{h}$ and magnetic moment $\bar{M}_P$ are in opposite direction along the central axis.

The neutron has six magnetic poles, which are aligned along the coordinate axes.

The electromagnetic structures of the electron, proton and neutron are described by dozens of mathematical equations, which include nearly 30 constants.

The interaction of electrons with the nucleus is observed in spectroscopy. Kanarev's theory of the microworld developed equations that accurately describe binding energies $\bar{E}_b$ of electrons to protons. Kanarev's equations calculate the spectra of all atoms and ions. His equations also show that electrons bond linearly with protons. Kanarev's equation for spectra formation has the simple form

$$E_f = E_i - \frac{E_1}{n^2} \tag{11}$$

Kanarev's equation for the binding energies of electrons with protons is even simpler

$$E_b = \frac{E_i}{n^2} = \frac{E_1}{n^2} \tag{12}$$

Kanarev's equation for the energy difference between energy levels in atoms and ions is:

$$E_f = E_1\left(\frac{1}{{n_1}^2} - \frac{1}{{n_2}^2}\right). \tag{13}$$

The interpretation of the terms before the brackets:

- E_f are energies of the emitted or absorbed photons;
- E_i are energies of ionization of the atoms;
- E_1 are binding energies of electrons with the nucleus, which correspond to the first energy levels.

(Table 2 to 8) are calculations using equation (11) and (12) for a few elements.

Values	n	2	3	4	5	6
E_f (exp)	eV	10.20	12.09	12.75	13.05	13.22
E_f (theor)	eV	10.198	12.087	12.748	13.054	13.220
E_b (theor)	eV	3.40	1.51	0.85	0.54	0.38

Table 2. Spectrum of the hydrogen atom spectrum

Values	n	2	3	4	5	6
E_f (exp)	eV	21.22	23.09	23.74	24.04	24.21
E_f (theor)	eV	21.22	23.09	23.74	24.05	24.21
E_b (theor)	eV	3.37	1.50	0.84	0.54	0.37

Table 3. Spectrum of the first electron of the helium atom

Values	n	2	3	4	5	6	7
E_f (exp)	eV	4.96	6.82	7.46	7.75	7.92	8.02
E_f (theor)	eV	4.96	6.81	7.46	7.76	7.93	8.02
Values	n	8	9	10	11	12	13
E_f (exp)	eV	8.09	8.13	8.16	8.18	8.20	8.22
E_f (theor)	eV	8.09	8.13	8.16	8.18	8.20	8.22
Values	n	14	15	16	17	18	19
E_f (exp)	eV	8.23	8.24	8.25	8.25	8.26	...
E_f (theor)	eV	8.23	8.24	8.25	8.25	8.26	...

Table 4. Spectrum of the first electron of the boron atom

Values	n	2	3	4	5	6
E_f (exp)	eV	123.7	140.4	146.3	149.0	150.5
E_f (theor)	eV	123.7	140.5	146.3	149.0	150.5
E_b (theor)	eV	30.22	13.43	7.56	4.84	3.36

Table 5. Spectrum of the third electron of the beryllium atom

Values	n	2	3	4	5	6
E_f (exp)	eV	7.68	9.67	10.37	10.69	10.86
E_f (theor)	eV	7.70	9.68	10.38	10.71	10.88
E_b (theor)	eV	3.58	1.58	0.89	0.57	0.39

Table 6. Spectrum of the first electron of the carbon atom

Values	n	2	3	4	5	6
E_f **(exp)**	eV	14.12	25.83	29.81	31.73	32.88
E_f **(theor)**	eV	14.12	25.79	29.87	31.76	32.78
E_b **(theor)**	eV	21.00	9.33	5.25	3.36	2.33

Table 7. Spectrum of the second electron of the oxygen atom

N	1	2	3	4	5	6	7	8	9
e_H	13.6	3.40	1.51	0.85	0.54	0.38	0.28	0.21	0.17
1	16.17	4.04	1.80	1.01	0.65	0.45	0.33	0.25	0.20
2	16.17	4.04	1.80	1.01	0.65	0.45	0.33	0.25	0.20
3	16.17	4.04	1.80	1.01	0.65	0.45	0.33	0.25	0.20
4	16.17	4.04	1.80	1.01	0.65	0.45	0.33	0.25	0.20
N	10	11	12	13	14	15	16	17	18
e_H	0.14	0.11	0.09	0.08	0.07	0.06	0.05	0.05	0.04
1	0.16	0.12	0.10	0.08	0.07	0.06	0.05	0.05	0.04
2	0.16	0.12	0.10	0.08	0.07	0.06	0.05	0.05	0.04
3	0.16	0.12	0.10	0.08	0.07	0.06	0.05	0.05	0.04
4	0.16	0.12	0.10	0.08	0.07	0.06	0.05	0.05	0.04

Table 8. Binding energies E_b of the electron of the hydrogen atom e_H and the electrons (1, 2, 3, 4) of the beryllium atom Be with the nucleus at the time when all of them are in the atom.

The equations of spectra of atoms and ions (11), (12) and (13) and Tables 2-8 show that there are no energy of orbital motion of the electrons in atoms! There are only energies of linear interaction of electrons with protons. The four electrons of the beryllium atom (Table 8) proves a linear interaction of its electrons with the protons; it proves an arrangement of the protons (white balls) on the surface of the nucleus (Fig. 9).

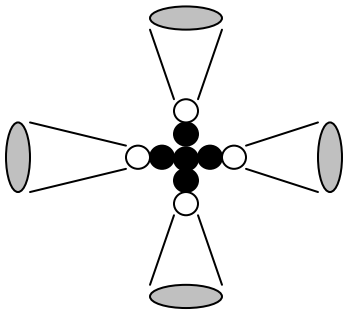

Fig. 9. Electrons, protons and neutrons of beryllium. 1, 2, 3 and 4 are the electrons.

Kanarev's equations explain why 100% of all naturally occurring beryllium contains five neutrons and four protons. The central neutron has four contacts with the adjacent neutrons. This allows a greater energy bonding efficiency between the proton to proton repulsion and the magnetic proton to neutron attraction.

A symmetric structure of the carbon protons and neutrons (diamond – Fig. 10a), proves that the central neutron has six contact poles. Other neutrons have the same number of contact poles, but not all their contacts participate in the interactions.

Diamond: The linear bonding of electrons to protons and the magnetic bonding of protons to neutrons provides an ideal spatial symmetry for carbon to form diamond. Diamonds strength comes from this ideal spatial symmetry (Fig. 10a). Diamond's optimum symmetry structure makes it extremely hard and able to cut glass.

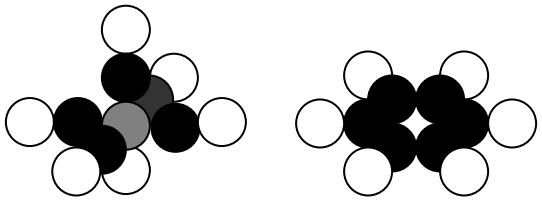

Fig. 10. Nucleus of the carbon atom: a) spatial nucleus (diamond); b) flat nucleus (graphite).

Graphite: The flat carbon atom arrangement produces graphite (Fig. 10b). Graphite soft flat structure allows it to writes on paper.

Fig. 11 shows a three dimensional model of the atoms of graphite, diamond, nitrogen, oxygen and the molecule and the cluster of water.

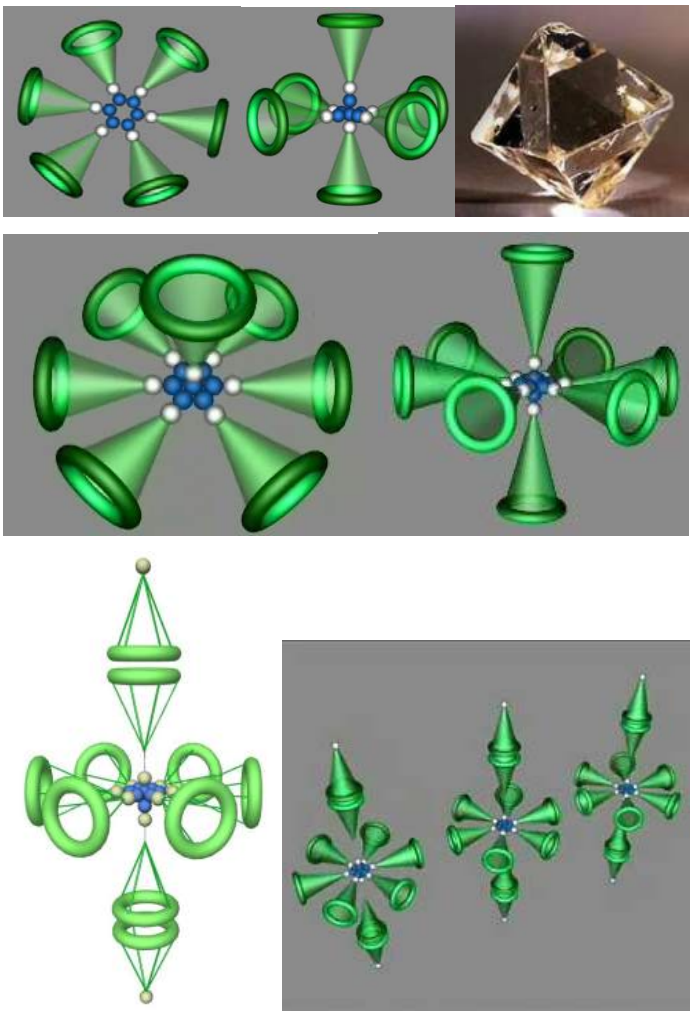

Fig. 11. Atoms of graphite, diamond, nitrogen, oxygen, water molecule and water clusters

(Figs.12 & 13) shows clusters of graphene and benzene and their theoretical structures resulting from the Kanarev's new theory of the microworld. The theoretical resolution needed to see these structures is one million times higher than the resolution limit of the modern electron microscope. (Figs. 12 &, 13).

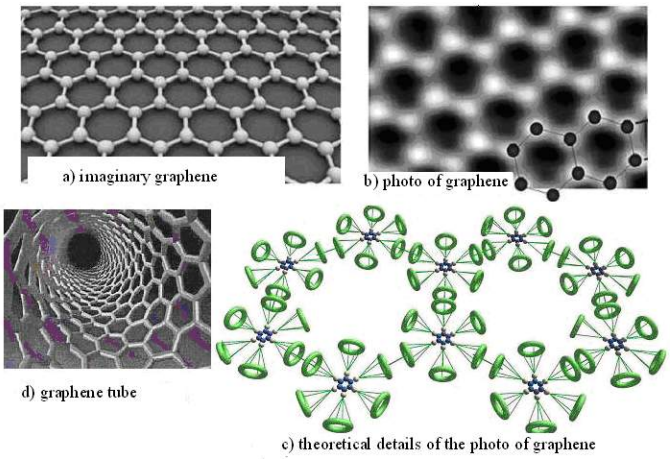

Fig. 12. Theoretical Photo of graphene if its atomic nucleus structures could be seen

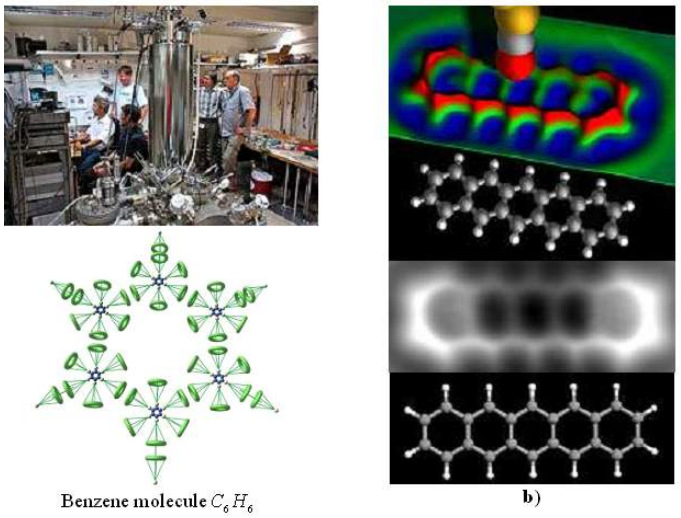

Fig. 13. Left drawing is theoretical benzene; right: photo of the benzene clusters

The white spots of the photo of graphene (Fig. 12b) are graphite atoms whose dimensions are close to $(1<8\ meters)$. Kanarev's new theory of the microworld shows them (Fig. 12c) in the form of distinct atoms with dimensions close to $(1<15\ meters)$. The resolution of Kanarev's new theory of the microworld exceeds the resolution of the electron microscopes by $(1>7)$ orders of magnitude.

Some Russian chemists have agreed that electrons have no orbital motions in the atoms. Kanarev's linear water molecule (Fig. 14a) and the 105° (Fig. 14b) current theory have evoked special interest.

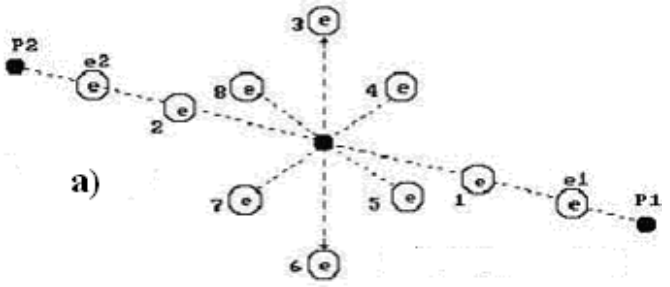

Fig. 14 a. Structures of the water molecule: linear.

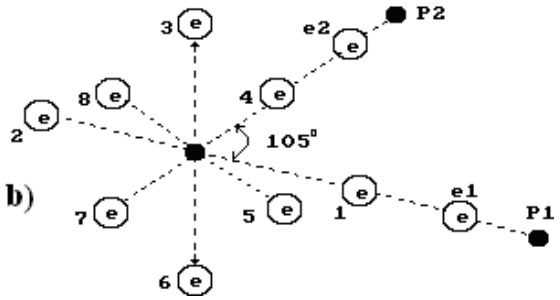

Fig. 14 b. Structures of the water molecule: 105°

Kanarev's linear water molecule (Fig. 14a) is implemented in water crystals in snowflakes (Fig. 15). The protons (P) of the hydrogen atoms of six linear water molecules join in with six ring electrons of the oxygen atom of the base water molecule and form six-radial structures, which grow a large variety of six-radial sided crystals and water clusters (Fig. 15).

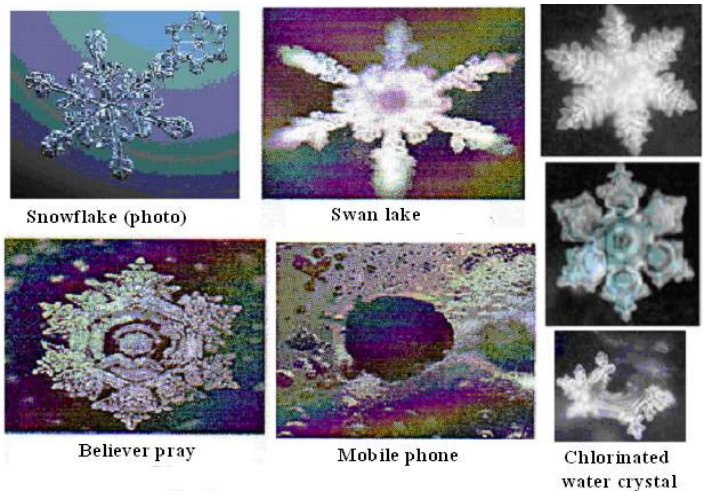

Fig. 15. Crystals of the water molecules

- Russian photos of snowflakes;
- Japanese photos of the crystals formed by music
  - Praying voice
  - Mobile phone

Here is the copper nucleus resulting from the Kanarev's new theory of the microworld (Fig. 16).

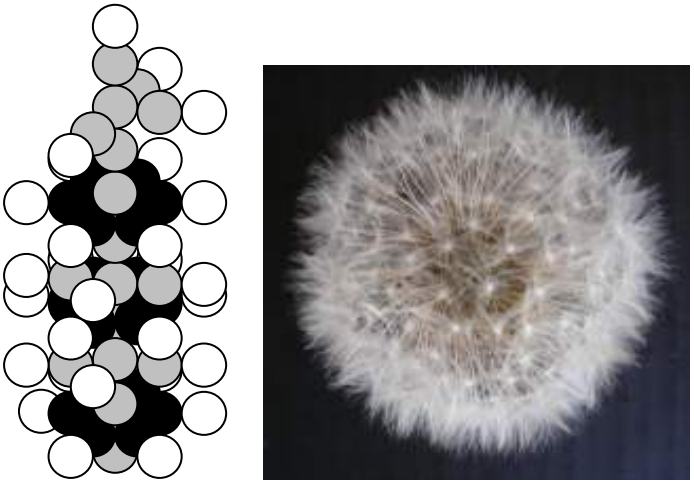

Fig. 16. a) the copper atom nucleus model; b) possible electronic architectonics of the surface of the multielectron atom.

Neutrons (the dark balls) and protons (the bright balls) are arranges in the nucleus according to strict rules. These rules start with the hydrogen atom an build all the other chemical elements.

3. Conclusion

The old theory of the microworld (Figs 1, 3, 4 and 5), and their probabilistic mathematical equations cannot achieve maximum resolution. Probabilistic information results in images with almost any size. Photographs (Figs-12, 13) show that the resolution ability of the modern electron microscopes is around $(1<6$ to $1<8$ meters$)$.

Kanarev's new theory of the microworld reproduces images and photos with a greater resolution; nucleus structures with a resolution of $(1<15$ meters$)$. Kanarev's resolution in his new theory of the microworld exceeds the resolution of the modern electron microscopes by $(1>6$ meters$)$.

References

[1] Ph.M. Kanarev, **The Foundations of Physchemistry of Microworld**, 15th Ed., in Russian: http://www.micro-world.su/, English: http://www.micro-world.su/index.php/english.

[2] V. N. Demidenko, **Discrete Structures of Microworld**, 142pp (Knizhny dom LIBROKOM, 2011).

[3] A. N. Nikitin, "Structure of a kernel and electronic covers of atoms", http://atom21.ru/.