

On gravitational belts in atoms.

Y.G. Klyushin, University of Civil Aviation, St. Petersburg, Russia, e-mail: science@shaping.org

In previous papers of the author there were proposed toroidal models of electron and proton. Tangential velocities of the particles drawing torus surface are equal to light velocity c in free ether. Therefore electron does not induce additional vortexes in the surrounding ether at least as a first approximation. Proton meridional rotation velocity is equal to $\sqrt{2} \cdot c$. Therefore proton induces a vortex series in the surrounding ether. Local light velocity in the closest to proton 194 vortexes decrease to $c/137$ and then increase up to c making 137 steps.

Nuclear 194 vortexes have mass of proton and atomic 137 vortexes have mass of electron. There is a series containing 1836 vortexes between the 194-th nuclear and the first atomic vortex. Local velocity in these 1836 vortexes is stable and equal to $c/137$. Their masses decrease from proton to electron one. Such gravitational belts are essential in multielectronics atoms. In particular they define boundaries of hulls and characteristics of X-ray radiation.

1. Main Characteristics of Electron and Proton.

Main facts from papers [1] and [2] are reminded in this paragraph. Electron and proton are massive toruses. The particles drawing these toruses performs two movements: in equatorial and meridional planes of the toruses. Meridional rotation defines spin and equatorial movement defines charge.

Angular velocity of equatorial rotation of electron

$$\omega_e = 7,8 \cdot 10^{20} \text{ rad / s} \quad (1.1)$$

Radius of the bigger circumference of the electron torus

$$r_e = 3,8 \cdot 10^{-13} \text{ m}, \quad (1.2)$$

i.e. 137 times bigger than electron classic radius.

Electron mass

$$m_e = 9,1 \cdot 10^{-31} \text{ kg} \quad (1.3)$$

coincides with experimentally found.

The lesser circumference radius

$$\rho_e = r_e / 2 = 1,9 \cdot 10^{-13} \text{ m} \quad (1.4)$$

Angular velocity of meridional rotation

$$\Omega_e = 2 \cdot \omega_e = 15,6 \cdot 10^{20} \text{ rad / s} \quad (1.5)$$

$$r_e \cdot \omega_e = \rho_e \cdot \Omega_e = c \quad (1.6)$$

where c is light velocity in free ether. This is essential and means that electron does not induce additional vortexes in the surrounding ether. The charge sign is defined by the screw which vector product of the angular velocities define

$$\vec{e} = m_e \cdot \frac{\vec{\omega}_e \times \vec{\Omega}_e}{\Omega_e} \quad (1.7)$$

$$e = 7,1 \cdot 10^{-10} \text{ kg / s} \quad (1.8)$$

This electron charge is a pseudovector directed along radius of the torus bigger circumference inside or outside depending on the directions of $\overline{\omega_e}$ and $\overline{\Omega_e}$.

Proton characteristics are as follows.

The bigger circle radius

$$r_p = 2.1 \cdot 10^{-16} m \quad (1.9)$$

Its angular velocity

$$\omega_p = \omega_e / 1836 = 4,25 \cdot 10^{-17} rad / s \quad (1.10)$$

The lesser circle radius

$$\rho_p = 6,39 \cdot 10^{-17} m \quad (1.11)$$

Its angular velocity

$$\Omega_p = 6,1 \cdot 10^{24} rad / s \quad (1.12)$$

Electron and proton spins are defined by rotation of the lesser circles

$$\overline{S_e} = m_e \cdot [\overline{\rho_e} \times \overline{\Omega_e} \times \overline{\rho_e}] = m_e \cdot \rho_e^2 \cdot \overline{\Omega_e} \quad (1.13)$$

$$S_e = \frac{1}{2} \cdot h \quad (1.14)$$

$$\overline{S_p} = m_p \cdot [\overline{\rho_p} \cdot (\overline{\Omega_p} \cdot \overline{\rho_p})] = m_p \cdot \rho_p^2 \cdot \overline{\Omega_p} \quad (1.15)$$

$$S_p = \frac{1}{2} \cdot h \quad (1.16)$$

Tangential rotation velocity of lesser torus circle of proton

$$u_p = \rho_p \cdot \Omega_p = \sqrt{2} \cdot c \approx 4,242 \cdot 10^8 m / s \quad (1.17)$$

2. Gravitational Belt is Hydrogen Atom.

Proton torus lesser circle tangential velocity excess over light velocity in free ether results in appearance of two series of vortexes in the surrounding ether (details in [3]). Just from proton a series of 194 vortexes begins. Angular velocities of these vortexes decrease as n^2 , their radii increase as n . This means that their local light velocities decrease as n from u_p in (1.16) to $c/137$.

Radius of the first vortex

$$r_1 = \frac{h}{m_p \cdot u_p} = 1,479 \cdot 10^{-16} m \quad (2.1)$$

Accordingly

$$r_{194} = 194 \cdot r_1 = 2,87 \cdot 10^{-14} m \quad (2.2)$$

Angular velocity of the first vortex

$$\omega_1 = u_p / r_1 = 2,87 \cdot 10^{24} rad / s \quad (2.3)$$

$$\omega_{194} = \omega_1 / 194^2 = 0,763 \cdot 10^{20} rad / s \quad (2.4)$$

Tangential velocity of the last 194-th vortex

$$u_{194} = r_{194} \cdot \omega_{194} = 2,19 \cdot 10^6 m / s = c / 137 \quad (2.5)$$

This is the last nuclear vortex.

Radius of the first vortex in atomic series

$$\rho_1 = 5,27 \cdot 10^{-11} m \quad (2.6)$$

Its angular velocity

$$v_1 = \frac{c}{137 \cdot \rho_1} = 4,16 \cdot 10^{16} \text{ rad / s} \quad (2.7)$$

Its local light velocity

$$c_1 = v_1 \cdot \rho_1 = c/137 = 2,19 \cdot 10^6 \text{ m / s} \quad (2.8)$$

Radii ρ_n of atomic vortexes decrease as n

$$\rho_n = \rho_1 / n, n = 1, 2, \dots, 137 \quad (2.9)$$

In particular

$$\rho_{137} = \rho_1 / 137 = 3,85 \cdot 10^{-13} \text{ m} \quad (2.10)$$

Their angular velocities increase as n^2

$$v_n = v_1 \cdot n^2 \quad (2.11)$$

In particular

$$v_{137} = 7,8 \cdot 10^{20} \text{ rad / s} \quad (2.12)$$

Characteristic quality of 137 atomic vortexes is that their radii are bigger and their angular velocities are lesser then of electron. Their mass is equal to electron mass. In other terms electron can be inside these and only these vortexes.

Local light velocities of the last nuclear vortex (2.5) and the first atomic vortex (2.8) are equal. But their radii and angular velocities essentially differ. Vortexes' masses also differ. This aspect is investigated in [3] in greater details. Nuclear vortexes has mass of proton and atomic vortexes has mass of electron. There exists a transition zone between these runs with angular vortexes from $0,762 \cdot 10^{20} \text{ rad / s}$ up to $4,16 \cdot 10^{16} \text{ rad / s}$, i.e. from wave length $1,479 \cdot 10^{-16} \text{ m}$ up to $5,27 \cdot 10^{-11} \text{ m}$.

Characteristics of nuclear and atomic vortexes were obtained under condition that their impulse moment was equal to h . This condition is preserved for the investigating zone as well. These vortexes are named gravitational because their mass is variable.

The first problem is these vortexes number. Their local light velocities are constant. This means that their radii must decrease in the same tempo.

$$R_n \cdot \varphi_n = c/137 \approx 2,19 \cdot 10^6 \text{ m / s} \quad (2.13)$$

Here R_n is radius and φ_n is angular velocity of the n -th vortex.

The number of vortexes may be found from conditions (2.2) and (2.6) or (2.4) and (2.7).

$$n = \rho_1 / r_{194} = \omega_{194} / v_1 = 1836 \quad (2.14)$$

Constant condition of impulse moment for gravitational vortexes looks as follows

$$m_n \cdot R_n^2 \cdot \varphi_n = h, n = 1, 2, \dots, 1836 \quad (2.15)$$

$$m_1 = m_p, m_{1836} = m_e, R_1 = r_{194}, R_{1836} = \rho_1, \varphi_1 = \omega_{194}, \varphi_{1836} = v_1.$$

Electron in Hydrogen atom is apparently inside the first atomic vortex with radius $5,27 \cdot 10^{-11} \text{ m}$ and angular velocity $4,16 \cdot 10^{16} \text{ rad / s}$. Experiment shows that its orbital impulse is null, i.e. it is in rest. This state is a stable equilibrium because electron in it possesses minimal energy. It needs external energy in order to move as inside to proton as outside to free ether. It must overcome gravitational vortexes with increasing mass in order to move to proton and atomic vortexes with increasing local light velocities in order to move outside.

Let us evaluate energy necessary for a massive particle for n -step penetration into gravitational belt. Lifting energy up to n -th vortex is $h \cdot \varphi_n$. Let the particle posses kinetic

energy $\frac{1}{2} \cdot m \cdot V^2$. In general the depth of penetration depends on the angle between the particle impulse and vortexes' light velocities. One has for a head-on collision

$$h \cdot \varphi_n = \frac{1}{2} \cdot m \cdot V^2 \quad (2.16)$$

Just this correlation we have for continuous X-ray radiation: frequency is proportional to energy of raiding electron. In the case of charged particles we must investigate the problem of atomic gravitational and nuclear vortexes charge. It was said that electric charge is defined by equatorial rotation of toroidal vortexes.

The problem with atomic vortexes seems to be clear. All 137 a vortexes is unified system with unique positive charge. Just this system defines charge of ionized Hydrogen atom. When electron with opposite direction of its equatorial rotation appears in the system it neutralizes this rotation and makes the whole system electrically neutral.

Charge problem of nuclear vortexes system is less evident. But K-capture of electron by proton and some other experiments say in favor of this system positive charging. If this is so we are compelled to prescribe negative charge to gravitational belt.

Physically this means that electron need additional energy to penetrate this barrier and proton needs less energy. Now a days it is difficult to evaluate this energy quantitatively. It is not clear even with Coulomb formula.

In addition we must take velocities and accelerations in consideration, i.e. we must use generalized force formula [4]. We leave this problem for future investigation. Qualitatively one can assert that this additional force must be exhibited when charged particle overcome the belt. This means that absorbtion coefficient must jump on the belt boundary. Just this effect is observed in X-ray spectrum.

3. Gravitational Belts in Multielectronic Atoms.

If atom nucleus includes several protons there should be several nuclear belts. Let us take Helium as an example.

Two oscillators with equal frequencies do not change frequency of the sum oscillation but double amplitude, i.e. enlarge energy four times. There something like this in our case. But here instead of making amplitude twice bigger the number of nuclear vortexes become twice less.

Sum frequency induced by two protons in ether is equal to frequency induced by one proton. But the first gravitational belt appears not in 194 but in 97 steps. Nuclear vortexes frequency decrease as n^2 , i.e.

$$\omega_{97} = 4 \cdot \omega_{194} \quad (3.1)$$

Correspondingly minimal angular velocity of atomic vortexes increases in four times. One obtains for Helium

$$\psi_1 = 4 \cdot \nu_1 \quad (3.2)$$

Here ψ_1 is minimal angular velocity of the deepest atomic vortex and ν_1 is minimal (Bohr) angular velocity in Hydrogen atom, i.e. Rydberg constant. Experiment shows that this number for Helium is a little more than for Hydrogen. It is believed that the cause of this result is bigger mass of Helium nucleus and corresponding increasing of gravitational attraction.

The proposed point of view explains it by superposition of neutrons' vibrations: their oscillations slightly differ from protons' ones. The same effect explains deviation of X-ray radiation from quadratic law with atoms' number increase. Actually it increases a little slower. This slowing is defined by nucleus construction which defines accurate location of gravitational belts. We shall return to this problem. And now formal calculations from paper [3] concerning electrons in Hydrogen atom will be reproduced and compared with Helium. Energy increment when electron in Hydrogen atom comes from the first force line up to the last before take-off 137-th force line

$$W_1 - W_{137} = \frac{1}{2} \cdot h \cdot (\nu_1 - \nu_{137}) / 137^2 = 7,5 \cdot 10^{-4} \text{ ev} - 13,6 \text{ ev} \quad (3.3)$$

One obtains for Helium taking (3.2) into consideration

$$W_1 - W_{137} = \frac{4}{2} \cdot h \cdot (\nu_1 - \nu_{137}) / 137^2 = 3 \cdot 10^{-3} \text{ ev} - 54,4 \text{ ev} \quad (3.4)$$

One obtains for Litium in the same way

$$W_1 - W_{137} = \frac{9}{2} \cdot h \cdot (\nu_1 - \nu_{137}) / 137^2 = 6,75 \cdot 10^{-3} \text{ ev} - 122,4 \text{ ev} \quad (3.5)$$

We have obtained spectroscopic law for Hydrogenshaped atoms. Existence of additional neutrons in atoms leads to slight deviations from quadratic law.

We have the same situations with X-ray spectra but with certain essential difference. Spectral lines are observed for X-rays only in emission spectra and are never observed in absorption spectra. And what is more in order X-rays could be absorbed they always must completely ionize one of the shells K,L,M,.. at the expense of their $h \cdot \nu$. On the framework of the proposed approach the most deep electrons in K,L,M,.. shells are inside vortexes which are based on gravitational belts. In order to achieve these vortexes the external photon or electron must spare some energy to overcome external vortexes. Only later it can pull out the internal electron from its vortex and move up to another vortex. This problem is investigated in greater details in [3].

This is the picture in Hydrogen type atoms. The difference with X-ray is that raiding electron or photon must previously knock out the external electrons and only after they knock out the last electron near gravitational barrier. The rest of the raiding photon energy penetrates the gravitational barrier showing continuous absorption spectrum.

But up to what atomic number can we construct Hydrogen type atoms? On a strict accord with the said above we can do this up to number 97 atom. There are not less than 2 force lines around atoms' nucleus from which gravitational belts can begin. But because of neutrons influence this number is less and equal to 92, i.e. to Uranium. Therefore artificial atoms with greater numbers are not stable.

Let us investigate Helium atom in greater details. It is well known that there exist two kinds of Helium: Parahelium with ionization energy of the second electron 24,5 ev and ordinary spectrum lines and Orthohelium with triple lines.

In the framework of the proposed approach two different nucleus structures correspond to these two kinds of Helium. Helium atom nucleus consists of 2 protons and 2 neutrons. In accord with [5] neutron possesses stability because of hoops which adjacent proton produces. In other terms in order to be stable neutron must have as neighbor at least one proton, i.e. one proton can serve only one or two neutrons and not more. Therefore Deuterium and Tritium exist but does not exist Hydrogen isotope with three neutrons. Paper [5] is

devoted to more detailed investigation of this problem. Therefore we are not able to create neutron substance. Cores made of proton do not exist on “electric causes”. Special paper devoted to quantitative analyses of the problem will be written later.

Here these problems are mentioned only to qualitatively explain peculiarities of α -particles and cores in general.

Thus theoretically accepted look include three types of α -particles. The first is puff-pastry when protons and neutrons alternate. The second and the third types are models with two internal protons and external neutrons and two internal neutrons and external protons. These differences do not influence on the position of the first gravitational belt but changes position of the second one and define differences in Ortho- and Parahelium. Experiment will give us the final answer. Here we curb ourselves with some preliminary considerations.

Triple spectrum of Orthohelium apparently corresponds puff-pastry structure because it contains more contacts between neutrons and protons. Just these contacts define super thin structure of spectra.

One of the other construction corresponds to Parahelium. The model with two internal protons seems to be more truth like because Helium has no stable isotopes with three neutrons.

Conclusion. Let us shortly repeat everything said above. Cores' and correspondingly atoms' construction is defined by vortexes which protons and neutrons create interacting with each other in the surrounding ether. The system of vortexes starting in the vicinity of nucleus is made of high frequency vortexes with mass of protons and neutrons. The system of external atomic vortexes consists of lower frequency vortexes with electron mass. Therefore nuclear interactions are highly energetic and atomic and molecular interactions are less energetic.

Transition from nuclear system to atomic one takes place not by jump but through a series of vortexes with decreasing mass. In multielectronic atoms these gravitational belts define X-ray radiation and their position in the system of nuclear vortexes define type of electronic hulls in atoms. The position of gravitational belts are defined by nucleus construction.

REFERENCES.

- [1]. J.G.Klyushin. Electro-and-Gravy-dynamics. Journal of New Energy, vol. 7, number 3, p. 57.
- [2]. J.G.Klyushin. Proton Structure: an Experimental Approach. Proceedings of the Natural Philosophy Alliance, vol. 1, number 1, Spring 2004, p. 51.
- [3]. J.G.Klyushin. Hydrogen Atom Construction: Non-Bohr Approach, Ibid, p. 45.
- [4]. J.G.Klyushin. A Field Generalization for the Laurentz Force Formula, Galilean electrodynamics, vol. 11, number 5, p. 83, 2000.
- [5]. J.G.Klyushin. Neutron Construction. Proceedings of the Natural Philosophy Alliance, vol. 2 (is to appear).