MNK Publication

*International Journal of Latest Research in Science and Technology* **ISSN (Online):2278-5299**
*Vol.1,Issue 3 :Page No.229-233 ,September-October 2012*
*https://www.mnkpublication.com/journal/ijlrst/index.php*

# ETHER EQUATIONS - A CLASSICAL ALTERNATIVE TO THE SCHRÖDINGER EQUATION

**Nikolai A. Magnitskii**
LLC "New Inflow", LLC ,www.newinflow.ru , nikmagn@gmail.com
Russia

***Abstract* — From the equations of the ether deduced on the basis of laws of classical mechanics, values of power levels of the ground and excited states of atom of hydrogen, corresponding to well-known experimental values, are obtained. It is shown, why and how the atom of hydrogen in the excited states is capable to absorb and radiate photons, and in the ground state - only to absorb. It is proved, that except for the ground and the excited states the atom of hydrogen can be in hydrino nonradiative states that cannot be described by the Schrödinger equation. It is proved, that transition of atom of hydrogen into hydrino states should be accompanied by liberation of a significant amount of energy. The hypothesis about hydrino states of a dark matter in the Universe is theoretically confirmed.**

***Keywords*** — *ether equations; ground, excited and hydrino states of atom of hydrogen.*

## I. INTRODUCTION

Modern theoretical physics postulates a significant difference in the approaches to description of the dynamics of motion of micro and macro-objects. If the motion of macroscopic objects obey the laws of classical Newtonian mechanics, the state of microparticle is usually described by the Schrödinger equation - the fundamental equation of nonrelativistic quantum mechanics. In the case of the hydrogen atom Schrödinger equation has the form

$$i\hbar\frac{\partial\psi}{\partial t}+\frac{\hbar^2}{2m_e}\Delta\psi+\frac{q^2}{r}\psi=0, \qquad (1)$$

where $m_e$ is the mass of electron, $q$ is the value of the universal charge, $-q^2/r$ is the potential energy of interaction of the electron with the nucleus (proton) in a hydrogen atom, $r$ is the distance between the electron and the nucleus.

The so-called wave function $\psi$ has no physical sense. Some, but not a physical sense, has a square of the wave function $|\psi(\vec{r},t)|^2$ - the probability density of finding an electron at a point with coordinates $\vec{r}=(x,y,z)^T$ at time $t$. Representation of the solution of equation (1) in the form

$$\psi(x,y,z,t)=g(x,y,z)e^{-\frac{i}{\hbar}Et}, \qquad (2)$$

and further solving of the eigenvalue problem for the obtained stationary Schrödinger equation relatively to the function $g(\vec{r})$ allows us to determine the levels of certain discrete energy values:

$$E_n=-\frac{1}{n^2}\frac{m_eq^4}{2\hbar^2}=-\frac{1}{n^2}\frac{\alpha^2m_ec^2}{2}=-\frac{\alpha^2E_e}{2n^2},\ n=1,2,3... \qquad (3)$$

where $\alpha=q^2/\hbar c\approx 1/137$ is the fine structure constant, $E_e$ is the electron energy.

The difference in the obtained values of the energy levels surprisingly coincides to the energy of the emitted photon in the transition of the hydrogen atom from state $n$ to state $m$ with lower energy

$$\hbar\nu=E_n-E_m=\frac{\alpha^2E_e}{2}\left(\frac{1}{m^2}-\frac{1}{n^2}\right)=R\left(\frac{1}{m^2}-\frac{1}{n^2}\right),\ n>m, \qquad (4)$$

where $R$ is the Rydberg constant. This experimentally confirmed fact is the main argument in favour of the applicability of the physically senseless Schrödinger equation to describe the hydrogen atom and the other similar atoms. However, the Schrödinger equation does not explain the structure of the hydrogen atom, or the essence of the processes of absorption and emission of photons or causes of appearance of squares in the denominators of the energy levels, or the physical nature of the energy levels themselves. Equation itself does not appear either from any of the more general physical laws and postulates physically senseless finding of microparticle simultaneously in different regions of space. Furthermore, as it will be shown below, it does not describe the full structure of even the simplest hydrogen atom, namely, its hydrino nonradiative states.

Naturally, the question arises whether there are any more common equations with a simple physical sense, which give in the case of the hydrogen atom the same experimental values of the energy levels (3) as the Schrödinger equation? It is shown in this paper that such equations exist, and they are the equations of physical vacuum (ether), the foundations of the mathematical theory of which is laid in the author's papers [1-5]. In these papers, the only postulate of the existence of the ether in the form of dense inviscid compressible medium in three-dimensional Euclidean space is proposed. At each time $t$ ether has density $\rho(\vec{r},t)$ and the velocity vector $\vec{u}(\vec{r},t)=(u_1(\vec{r},t),u_2(\vec{r},t),u_3(\vec{r},t))^T$ of propagation of densities perturbations. It is shown that the

**Publication History**
***Manuscript Received*** : ***5 October 2012***
***Manuscript Accepted*** : ***11 October 2012***
***Revision Received*** : ***18 October 2012***
***Manuscript Published*** : ***31 October 2012***

basic equations and the laws of classical electrodynamics, quantum mechanics, the theory of electromagnetism and gravitation theory can be derived from two nonlinear equations of the dynamics of ether, which follow from equations of classical Newtonian mechanics and are invariant under Galilean transformations

$$\frac{\partial \rho}{\partial t} + div(\rho \vec{u}) = 0, \; \frac{\partial (\rho \vec{u})}{\partial t} + (\vec{u} \cdot \nabla)(\rho \vec{u}) = 0, \qquad (5)$$

where the first equation is the equation of continuity, and the second equation is the momentum equation.

In [1-5] the Maxwell and Dirac equations, the laws of Coulomb, Ampere and Biot-Savart-Laplace are derived from the system of equations (5). Also the basic formulas of quantum mechanics, the formulas for magnetic induction and for electric and magnetic fields of an element of a current are obtained. From the standpoint of classical mechanics the appearance of the Ampere force and the Lorentz force is explained. It is shown in [6] that dimensions of all physical variables, which are defined from the system of equations (5), coincide with the dimensions of these variables in the CGS system.

In this paper, the values of the energy levels (3) for the excited states of the hydrogen atom are obtained from the system of ether equations (5). Moreover, new stable nonradiative hydrino states of the hydrogen atom are obtained. It is shown also that transition into hydrino states is accompanied by the release of significant amounts of energy, that fully supports the hypothesis of L.Mills [7] on the existence of such hydrogen states and about rather probable hydrino origin of a dark matter in the Universe.

## II. STRUCTURE OF THE HYDROGEN ATOM

As is known, the hydrogen atom is the simplest atom, consisting of a proton and an electron. From the point of view of the theory of ether (see [1-6]) the proton is a small ball with the radius $r_p$ and it is more dense than the average density of ether $\rho_0$. Motion of compression - tension wave of ether density on the angle $\varphi$ inside the ball is with a constant angular velocity $\omega_p$ (linear velocity $\omega_p r$, so that $\omega_p r_p = c$, where $c$ is the speed of light). Electron is a large ball with a radius $r_e >> r_p$ which is less dense than the average density of ether $\rho_0$. Motion of compression - tension wave of ether density on the angle $\varphi$ inside the ball is with a constant angular velocity $\omega_e$ (linear velocity $\omega_e r$, so that $\omega_e r_e = c$) in the opposite direction to the proton wave. Thus, the electron in a hydrogen atom can be only in a connected state with an energy $\tilde{E} < E_e$.

Let us formulate a hypothesis, which allows us to describe the structure of the hydrogen atom and justify the experimentally observed energy levels (4).

**Hypothesis.** The hydrogen atom in the ground and any excited state is composed of two elementary particles besides proton, one of which is an electron with the energy of $E_e = \omega_e \hbar / 2$ and another particle (call it nikron) has spin ½, and the motion of compression - tension wave of ether density occurs in it along the angle $\varphi$ in the opposite to the electron direction with an angular velocity $\omega$ and by the law

$$\rho = \rho_0 (1 + e^{i(\nu t + \alpha\varphi / 2)} g(r)), \; r = |\vec{r}|.$$

Thus, the hydrogen atom in the ground and in any excited state has a structure of three of nested balls: proton, electron and nikron (Fig.1). Note that nikron, unlike the proton and electron, is not truly an elementary particle, that is, it is not formed from the half-wave of the curled photon (see [1-5]). Nikron is a quasi-particle, which is a wave of ether density perturbations as a result of interaction of the waves of ether density perturbations inside of the electron and outside of the proton.

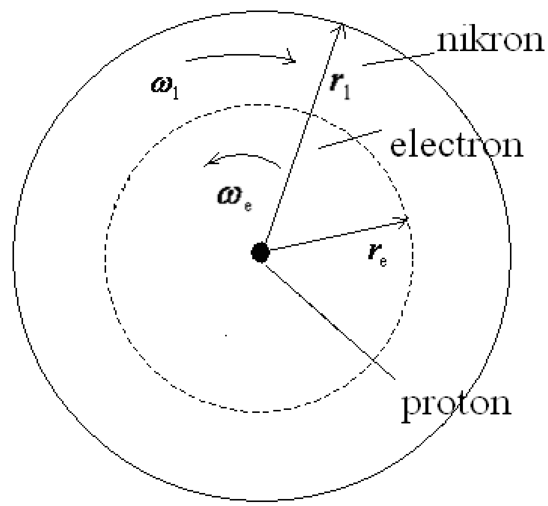


**Fig. 1 Ether structure of a hydrogen atom**

## III. GROUND STATE OF THE HYDROGEN ATOM

As follows from the author's papers [1-5], for an elementary particle with the spin ½, the relation $mcr_1 = \hbar / 2$ takes place, where $m$ is the mass of the particle, and $\hbar = 4\pi^2 c \rho_0^2 V_0^2 / 3$ is the Planck constant. Radius $r_1$ of nikron in the ground state can be found from the formal reasoning of N.Bohr. Let us introduce a formal rate of electron $u$ by the relation $mc = m_e u / 2$ .Then $m_e u r_1 = \hbar$ and $m_e u^2 / r_1 = q^2 / r_1^2$, where $q$ is the value of the universal charge (the charge of the electron and proton). The second equation is the classical equation of forces acting on the electron which is in the field of the proton and is moving with the velocity $u$ along the formal orbit of the radius $r_1$. Eliminating a formal electron velocity from the last two equations, we can find that $r_1 = \hbar^2 / (m_e q^2)$. This is the common value of the radius of the ground state of the hydrogen atom $r_1 = r_a$.

Further, it follows from the hypothesis expressed above that in the ground state

$$\nu_1 = -\frac{\alpha}{2}\frac{d\varphi}{dt} = -\alpha\omega_1/2 \quad ,$$

$$\omega_1 = c/r_1 = cm_e q^2/\hbar^2 = \alpha E_e/\hbar .$$

Hence, the next expression for energy of the nikron in the ground state holds $E_1 = (\tilde{E} - E_e) = \hbar\nu = -\alpha^2 E_e/2$ , that coincides with the energy of the ground state of the hydrogen atom in (3). Thus, the energy levels in (3) are not the energy levels of the electron in the hydrogen atom, but they are the energy levels of a quasiparticle nikron. Negative values of the energy levels of nikron have a clear physical sense - its wave in the hydrogen atom is directed against the wave of the electron.

Note that similar formal arguments can be apply only to the ground nonradiative state of the hydrogen atom. In the excited states in which hydrogen atom can radiate and absorb photons the exchange of energy with the external medium occurs, and therefore the above formal arguments become inapplicable. .

## IV. EXITED STATES OF THE HYDROGEN ATOM

It is shown above that the excited states of the hydrogen atom correspond to excited states of a quasiparticle nikron. If nikron transfers to a higher level of excitement with a large radius, that is with a smaller angular velocity of the wave of ether density perturbations and, therefore, with less energy, then the energy of the hydrogen atom increases. Conversely, if nikron transfers to a lower level of excitement with a smaller radius, it is with large angular velocity of the ether waves of density perturbations and, therefore, with more energy, then the energy of the hydrogen atom decreases. Consequently, transition of the hydrogen atom to a higher level of excitement with a large radius of nikron requires extra energy, and transition of the hydrogen atom to a lower level of excitement with a smaller radius of nikron releases a certain amount of energy.

It is natural to assume that the angular velocities of the compression-tension waves of ether density on the angle $\varphi$ inside the nikron in the excited states come into resonance with the angular velocity of the wave in nikron in the ground state, i.e. $\omega_n = \omega_1/n,\ \lambda_n = n\lambda_1$ , and $r_n = nr_1$ . Let us show that the system of ether equations (5) holds exactly such solutions, and the energy levels $E_n$ of the excited states of nikron have the values which described by the formula (3) with $n = 1,2,...$ .

Differentiating the first equation of the system (5) with respect to time and substituting the result into the second equation, we obtain the system of equations

$$\frac{\partial\rho}{\partial t} = -div(\rho\vec{u}),\ \frac{\partial^2\rho}{\partial t^2} = div((\vec{u}\cdot\nabla)(\rho\vec{u})). \qquad (6)$$

**Definition.** We define a vector $\vec{F} = (\vec{u}\cdot\nabla)(\rho\vec{u})$ as a vector of tension of united gravielectromagnetic field.

As it is shown in [1-5], linearized field $\vec{F}$ or its individual components written in different coordinate systems are the classic electric, magnetic and gravitational fields.

We write the system of equations (6) in spherical coordinates, assuming that $\vec{u} = V\vec{r} + W\vec{\varphi}$ :

$$\begin{aligned} &1)\ \frac{\partial\rho}{\partial t} = -\frac{1}{r^2}\frac{\partial(r^2\rho V)}{\partial r} - \frac{1}{r\sin\theta}\frac{\partial(\rho W)}{\partial\varphi},\\ &2)\ \frac{\partial^2\rho}{\partial t^2} = \frac{1}{r^2}\frac{\partial}{\partial r}\left(r^2 V\frac{\partial(\rho V)}{\partial r} + \frac{Wr}{\sin\theta}\frac{\partial(\rho V)}{\partial\varphi}\right) + \\ &\quad + \frac{1}{r\sin\theta}\frac{\partial}{\partial\varphi}\left(V\frac{\partial(\rho W)}{\partial r} + \frac{W}{r\sin\theta}\frac{\partial(\rho W)}{\partial\varphi}\right) \end{aligned} \qquad (7)$$

We will search for solutions of the resulting system of equations in the form

$$\rho = \rho_0(1 + e^{i(\nu t + \alpha\varphi/2)}g(r)),\ V = V_*(1 - e^{i(\nu t+\alpha\varphi/2)}g(r)),\ |g| << 1,$$

$$W = \omega r\sin\theta(1+\psi),\ |\psi| << 1.$$

Substituting the desired form of solutions to the system (7) and neglecting by the terms of higher than first order, we obtain the following system of equations:

$$\begin{aligned} &1)\quad i\nu g = -\frac{i\alpha\omega}{2}g - e^{-i(\nu t+\alpha\varphi/2)}\left(\omega\frac{\partial\psi}{\partial\varphi} + \frac{2V_*}{r}\right),\\ &2)\ -\nu^2 g = -\frac{i\alpha\omega V_*}{2r}g + \frac{i\alpha\omega V_*}{2r}\frac{\partial(gr)}{\partial r} - \frac{\alpha^2\omega^2}{4}g + \\ &\quad + e^{-i(\nu t+\alpha\varphi/2)}\left(\frac{\omega V_*}{r}\frac{\partial^2\psi r}{\partial\varphi\partial r} + \omega^2\frac{\partial^2\psi}{\partial\varphi^2}\right). \end{aligned}$$

Now we set

$$\psi = -\frac{2V_*\varphi}{\omega r} - \frac{2kV_*}{\alpha\omega}g(r)e^{i(\nu t+\alpha\varphi/2)},$$

where $k$ is a wave number with the dimension which is inverse to the length. Then

$$\begin{aligned} &1)\quad i\nu g = -\frac{i\alpha\omega}{2}g + ikV_* g,\\ &2) -\nu^2 g = \frac{i\alpha\omega V_*}{2}g' - \frac{ikV_*^2}{r}(gr)' - \frac{\alpha^2\omega^2}{4}g + \frac{\alpha\omega kV_*}{2}g, \end{aligned}$$

where the derivative is taken in the second equation in the variable $r$ . It follows from the first equation in the latter system, that

$$\nu = kV_* - \frac{\alpha\omega}{2}. \qquad (8)$$

From the second equation we obtain

$$(\nu^2 - \frac{\alpha^2\omega^2}{4} + \frac{\alpha\omega kV_*}{2})g + \frac{i\alpha\omega V_*}{2}g' - ikV_*^2 g' - \frac{ikV_*^2}{r}g = 0.$$

We now set $g(r) = e^{-ikr} f(r)$, and substitute this representation in the last equation:

$$(\nu^2 - \frac{\alpha^2\omega^2}{4} + \alpha\omega kV_* - k^2V_*^2)f + i\,V_*(\frac{\alpha\omega}{2} - kV_*)f' - \frac{ikV_*^2}{r}f = 0.$$

From the last equation, using (8), we obtain:

$$(\frac{\alpha\omega}{2} - kV_*)f' - \frac{kV_*}{r}f = 0. \qquad (9)$$

Equation (9) has solutions $f(r) = dr^{n-1}$ for

$$(\frac{\alpha\omega}{2} - kV_*)(n-1) - kV_* = 0, n = 1,2,... \quad (10)$$

where $d$ is an arbitrary constant. Then we find from (8) and (10) that

$$\nu_n = -\frac{\alpha\omega}{2n},\ kV_{*n} = \frac{\alpha\omega(n-1)}{2n}, n = 1,2,... \qquad (11)$$

Taking into account that $\omega_n = \omega_1 / n$, we obtain the final solutions for the compression-tension waves of ether density and for energies of nikron in excited states of the hydrogen atom

$$E_n = \nu_n \hbar = -\frac{\alpha\omega_1\hbar}{2n^2} = -\frac{\alpha^2 E_e}{2n^2}, \qquad (12)$$

$$\rho = \rho_0(1 + de^{i(\nu_n t + \alpha\varphi/2 - kr)}r^{n-1}), n = 1,2,...$$

Solutions (12) derived from the equations of ether (5) are fully consistent with experimental data (3) and have a simple and clear physical sense. Specifically, the hydrogen atom is in excited state only by the influx of external energy and by the transition of radial waves of ether density perturbations into the azimuthal waves.

In addition, it is clear why the hydrogen atom in the excited state can absorb and radiate photons with the frequency $\nu_{nm} = \nu_n - \nu_m$ for $n > m$, but in the ground state - just absorb. For $n > 1$ this follows from the equality

$$e^{i(\nu_n t + \alpha\varphi/2 - kr)}r^{n-1} = e^{i(\nu_m t + \alpha\varphi/2 - kr)}r^{m-1}e^{i((\nu_n - \nu_m)t - a(r))},$$

the last factor of the right side of which is a radial wave of photon with the frequency $\nu_{nm} = \nu_n - \nu_m$ and the energy $E_{nm} = \hbar\nu_{nm}$.

In the case $n = 1$ the hydrogen atom is in the ground state in which $\nu_1 = -\alpha\omega_1 / 2$ and $kV_{*1} = 0$, that is, there is no exchange of energy with the environment in the form of the spatial distribution of the radial wave of compression - tension of ether density.

## V. Hydrino States of the Hydrogen Atom

It is clear that the angular velocities of the compression-tension waves of the ether density in nikron can enter into resonance with the angular velocity of the wave in nikron in the ground state not only when $\omega_n = \omega_1 / n,\ \lambda_n = n\lambda_1$ and, $r_n = nr_1$, but when $\omega_n = n\omega_1,\ \lambda_n = \lambda_1 / n$ and. $r_n = r_1 / n$. In this case, as it follows from (8) and (11)

$$\nu_n = -\frac{\alpha\omega_1}{2} = const,\ kV_{*n} = \frac{\alpha\omega_1(n-1)}{2},\ n = 1,2,...$$

Consequently, in such states of the hydrogen atom, called hydrino states, there is no radiation and absorption of photons, and the energy exchange with the environment occurs in some other way, for example, with the participation of catalysts (see [7]). Transition of nikron in hydrino state with a smaller radius and higher energy must be accompanied decreasing energy of the hydrogen atom and, therefore, the release of energy into the environment. This is fully confirmed by numerous experiments performed under the direction of L.Mills and described in [7]. In addition, the above theoretical results, arising from the single postulate of the existence of ether, fully confirm the conjecture formulated in [7] about the nature of a dark matter in the Universe as clusters of hydrogen in hydrino nonradiative states.

Note also that the Schrödinger equation (1) not only describes hydrino states of the hydrogen atom, but also not describes the processes of absorption and radiation of photons by the hydrogen atom because of the boundary-value problem for the stationary Schrödinger equation requires an exponential damping of the radial component of the solution while the common physical sense requires the oscillatory solutions of the radial component. Such a solution in full accordance with the common sense and laws of classical Newtonian mechanics is obtained in the present work.

## VI. Conclusion

In this paper, based on the ether equations which are derived from the laws of classical mechanics, the values of energy levels of the ground and excited states of the hydrogen atom are obtained, which coincide with known experimental values. It is shown why and how the hydrogen atom in an excited state is able to absorb and radiate photons, but in the ground state - just absorb.

It is proved that in addition to the ground and excited states the hydrogen atom can be also in hydrino nonradiative state, which can not be described by the modern quantum mechanics and, in particular, the Schrödinger equation. It is also shown that the transition of the hydrogen atom into hydrino state must be accompanied by the release of significant amounts of energy. Hypothesis about the nature of a dark matter in the Universe as clusters of hydrogen lying in hydrino nonradiative states is theoretically confirmed.

## References


[1] N.A.Magnitskii, *Mathematical theory of physical vacuum*, Moscow, Russia: Inst Microelectronics, 24 p., 2010.

[2] N.A.Magnitskii, "Mathematical theory of physical vacuum", *Comm. Nonlin. Sci. and Numer. Simul.*, Elsevier, 16, pp. 2438-2444, 2011.

[3] N.A.Magnitskii, "To electrodynamics of physical vacuum," *Complex systems*, vol.1(1), pp. 83-91, 2011. (in Russian)

[4] N.A.Magnitskii, "Physical vacuum and electromagnetic laws," *Complex systems*, vol.1(2), pp. 80-96, 2012. (in Russian)

[5] N.A. Magnitskii, *Theory of elementary particles based on Newtonian mechanics*, Quantum Mechanics/Book 1, InTech, pp.107-126, 2012.

[6] F.S. Zaitsev and N.A. Magnitskii, "On the dimensions of variables and some properties of the system of physical vacuum (ether) equations," *Complex systems*, vol.2(3), pp. 93-97, 2012. (in Russian)

[7] L. Mills. *The grand unified theory of classical physics*. Blacklight Power Inc., v.1-3, 2010.