

Fundamentals of aetherodynamics of the Universe

The hidden meaning of the formula $E = mc^2$

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This article briefly outlines without mathematical calculations the fundamental conceptions of the Universe, which are based on the assumption that all of the Universe filled with aether which is a space pervading medium that behaves in accordance with the rules of continuum mechanics. It is also assumed that the flows of aether are the cause of gravitation and electromagnetism as well as the source of nuclear processes, and other phenomena observed in nature.

Keywords: Aether theory, baryonic matter, elementary particles, fluid dynamics, stellar aberration, Michelson's experiment, Sagnac effect, Doppler's effect, Fizeau experiment.

From Aristotle to the present day multiple attempts of aether theory creation have been made (an overview on aether theory see in [1]). But the authors of aether theories are not able to make ends meet and are limited only to declaration of general ideas without quantitative estimates and without considering linkage to well established physical laws.

All of the aether theories have a common drawback which is the absence of clear understanding of the mechanism of interaction between baryonic matter and aether. Indeed, elementary particles of baryonic matter are not simple aethereal clots or aethereal vortices. The rarefaction inside aethereal vortices contradicts to the experimental data about the value of the density of elementary particles of matter. In particular, the density of proton and neutron is $10^{18} \text{ kg} / \text{m}^3$, like the density of neutron stars. Remind that neutron stars consist of protons and neutrons, having no electron shells. That is why such material is called "neutron liquid". Its density is by 15 orders of magnitude higher than the density of usual baryonic matter.

Therefore, from the very beginning we assume that the matter in the Universe exists in two general states: as the ocean of aether and as the particles of baryonic matter which are floating in the ocean of aether. Now let us try to answer the question about structural arrangement and about interaction between these two states of matter.

The concept of aether appeared in science is not due to a good life. Not all scientists can accept the absurd ideas of modern physics about electromagnetic waves and about light being propagated in the empty space. Modern physics considers not the waves in matter, but just abstract immaterial waves described by functions of the mathematical equations. Many scientists are not satisfied by the idea of disembodied fields (gravitational, electro-magnetic, etc.) and they cannot accept the idea of inertia forces acting themselves without clear reason. Modern physics says nothing about the reason for the positive and negative charges to attract and repel each others, as if it is some kind of magic. The Einstein's theory of relativity contradicts to all human experience, which has been generalized

as the Galileo-Newton's law of the addition of speeds for any material bodies, including photons (photons of light are matter particles and they must obey to Galileo-Newton's law).

The mentioned above phenomena manifest themselves as real interaction forces, which are generally described by mathematical laws quite sufficiently for the practical activities of mankind. However, the nature of these phenomena is still not clearly understood. At present, many scientists keenly feel the hypocrisy of modern concepts of space and time. Everyone can see the development tendency of current fundamental physical research towards the direction of purely mathematical description of nature ignoring the material content of phenomena. Often, from the equations, and not from observations, experiments, and human practices are trying to determine the evolution of the Universe in the past, present and future. In order to mask the drawbacks of the concept of empty space, many physicists use the replacements the forbidden term "aether" with the new physical terms "physical vacuum", "matter of the transition state" and the like. However, there is a Russian proverb: "Call me a pot, only do not put into the stove". Let us follow this folk wisdom and let us use clear word "aether".

Some remarks should be made about the concept of aether. Aether is seen as a primal continuum consisting of the simplest, indivisible particles - atoms that are not endowed with gravitational and electro-magnetic properties. Aether is an ideal (non-viscous) continuum medium. Atoms of aether (atoms of the aether should not be confused with atoms of material bodies) are apparently of spherical shape and are in a constant state of motion and collisions with each other. Collisions of aether atoms occur without energy loss at full accordance with the kinetic theory of gases.

The behavior of aether is assumed to be described by the set of usual gas dynamics functions of the density, pressure, temperature, velocity etc. Aether obeys to known laws of gas dynamics. Each atom of the aether has a mass, is moving at a certain speed and has a kinetic energy. The sum of the kinetic energies erratic movements of atoms of aether per unit volume represents the specific internal energy (The concepts of internal and thermal energy for gaseous aether are equivalent). It is assumed that the aether, to even greater extent than conventional gases, has the ability to self-organization, which is expressed by means of phase transitions of the aether from the gaseous state to the liquid and solid states, similar to that observed in water.

The elementary particles of baryonic matter are the condensation nuclei and consist of aether in liquid and solid state. Each elementary particle of baryonic matter causes a radial flow of gaseous aether to the center of the particle. Due to phase transition at the surface of the particle the volume of gaseous aether is decreased at 10^{17} times which is much more than the decrease of volume in the case of phase transition of baryonic matter (hundreds times). In the result the elementary particles contain enormous amount of compressed aether. The density of the atomic nucleus reaches density of $10^{18} \text{ kg} / \text{m}^3$ (density of neutron fluid).

It is quite understandable, that due to condensation the area of low pressure is situated near particle surface and that the rarefaction is the reason of radial gaseous aether flows. This leads to the fact that near all the elementary particles and near all material bodies arise radial flows of aether. Radial flows to the centers of material bodies (they may be treated as ethereal wind) are unstable and therefore the flows take the form of a vortex. A similar picture can be reproduced during water release from the bath through the drain hole. The peripheral speed of ethereal jets near the nuclei of atoms increases and the pressure decreases - the greater the speed, the less the pressure.

If the temperature of the nucleus of atom (proton or neutron) rises then transition from the solid into the liquid state and then into gaseous state occur. We all know that the water boiler could explode if it is closed because gas occupies a much larger volume than the water from which it was formed. The destruction of the atomic nuclei of the baryonic matter and partial transition of aether

from liquid into gaseous state can occur as a result of the strong collisions of nuclei friend other. This is observed in accelerators (such as Large Hadron Collider), in atomic explosions and in nuclear reactions in stellar interiors. A large amount of released energy propagates from source in all directions in the form of weak and strong perturbations in the environmental aether.

Thus, to explain the phenomenon of absorption of aether by material bodies, the aether theory does not need artificial methods and representations which are attracted by relativists such as the concept of "singularity" (the stars - "black holes") through which everything is absorbed and allegedly is transported to some other spatial dimensions. The theory of aether is based on human experience, for which it is not unusual that the substance of the gaseous phase can be transformed into the liquid phase, and then from the liquid phase to the solid state and vice versa. Radial and vortex flows of aether around the condensation centers take place due to the energy of ethereal continuum. The flows of aether and the phase transitions of aether represent never-ending cycle of matter and energy in the Universe.

So any body absorbs gaseous aether at its surface. Being absorbed the aether presents its mass momentum and energy to definite elementary particle. The flow of aether has non zero velocity components which correspond to the flows caused by radial flows of all other barionic matter particles in the Universe. The components of flow to the center of the Earth provide the force of Earth gravity. Aether around the Earth also has a non-zero velocity component toward the center of the Sun. The amount of momentum absorbed by the Earth is proportional to its mass. The momentum is transferred to the Earth and creates a force of attraction between the Earth and the Sun. This force keeps the Earth in its orbit. The ethereal flows towards the center of the Milky Way support Solar system in its motion around the center of our galaxy, etc.

This raises the legitimate question of why, creating a force of gravity, ethereal wind can not sweep away everything that exists on the surface of the Earth while it is moving in an orbit around the Sun at a speed of 30 km/s ? Reply to this question may only be understood if remember that the aether is a gas and use fluid dynamics laws about flow around bluff bodies. If the bodies interact with gas flow without friction, we have the well known paradox of d'Alembert – Euler that the drag force is zero for a body moving with constant velocity relatively to the fluid. This paradox is proved rigorously by the two great mathematicians who are mentioned above. This explains the fact that ethereal winds are not able to sweep out all of the bodies and objects from the Earth's surface. Thus, the force of gravity is produced by the flow of aether to the centers of material bodies. These jets drag away any body caught in these radial flows by gravity to the centers of large bodies. Taking into account of the mechanism of interaction between material bodies and aether it is possible to obtain a mathematical expression of the Newton's law of universal gravitation [1] by using the classical theorem of momentum. As in the case of Newton's law, the force of gravity will be directly proportional to the masses and back proportional to the square of the distance there between. There always exists a point between masses at which the velocity of the aether is zero. Gravity force is zero at this point.

The electro-magnetic interaction forces act between closely spaced atoms due to ethereal vortices around the nuclei of atoms of the baryonic matter. These forces provide association of elementary particles in atoms and association of atoms into molecules and more complex structures. Such vortices are formed around the conductors to the electric current, and around space objects with metal cores inside, providing huge electromagnetic fields. (For more on the mathematical definition of these forces can be found in [1]).

Nature of the forces of inertia also can be easily understood if imagine that you plunged into the water on the neck and tried to start moving forward. The motion is very difficult to start because all the surrounding water should be involved in the motion. When you reach the desired motion with constant speed, inertial force resistance of the water instantly disappear. Only a small force of

friction may be felt. Then if you decide to stop motion then again you start to feel the inertia force because you will be stopping the motion of all the surrounding water. This is brief idea how the inertia forces operate. The surrounding aether is involved into motion by elementary particles of baryonic matter only in the moments of acceleration and braking. The straight-line motion with constant velocity occurs without resistance according to paradox of d'Alembert – Euler. The aether has no viscosity friction. Therefore, we do not feel the resistance to its straight-line motion with constant speed. Clearly, the gravity and inertia forces can only be provided by a very dense aether, not the feather-light, thin aether, which was proposed by the scientists of past centuries. In fluid dynamics the resistance to accelerated motion associated with the notion of "added mass." That which we call a baryon mass of bodies, and there are "added mass" of aether into motion during acceleration or braking elementary particles of baryonic matter (mathematically more convincingly this problem is discussed in [1]).

According to the kinetic theory of gases, temperature characterizes the specific intensity of the random motion of molecules in fluids or vibrations of molecules in solids. It is assumed that the temperature of undisturbed aether is equal to $T_0 = 3^\circ K$ (physics associates this experimentally determined value with temperature of dark matter).

The nuclei of baryonic matter atoms are very quickly rotating because they are absorbing the aether, which is moving with a great circumferential speed. A phase transition from gaseous to liquid state (solid state) condition is fulfilled when the velocity of the aether jets greater than the speed of light ("in vacuum"). It is known that with the velocity growth the temperature goes down (law of energy conservation for fluid jets). In aether this causes to a phase transition from gaseous to liquid state. Peripheral speed at the outer boundary of the nucleus, according to our estimates, should reach a value: $V = c_e = 3,875 \cdot 10^8 m / c$. The maximum speed for the jets of aether read [1]: $V_{MAX} = 5,477 \cdot 10^8$. This will decrease the temperature of aether at two times according to a known isentropic ratio

$$\frac{T}{T_0} = \left(1 - \frac{V^2}{V_{MAX}^2}\right) = 1 - \frac{(3,875 \cdot 10^8)^2}{(5,477 \cdot 10^8)^2} = 0,5$$

Thus, temperature of aether on the outer edge of the nucleus is equal to $T = 1,5^\circ K$. During the absorption of aether the peripheral speed of ethereal atoms leads to unwinding of the nucleus up to the angular velocity of the order of

$$\omega = \frac{C_e}{r_0} = \frac{3,875 \cdot 10^8}{10^{-15}} = 3,875 \cdot 10^{23} rad / s$$

where nuclear radius is $r_0 = 10^{-15} m$. Tremendous amount of energy is stored in the form of rotational kinetic energy of atomic nuclei. For hydrogen atom this energy can be written as the rotational energy of a ball

$$E_0 = J \cdot \omega_0^2 = 1,002 \cdot 10^{-57} \cdot 15 \cdot 10^{46} = 15 \cdot 10^{-11} J$$

where the moment of inertia for a ball (proton or neutron) of mass $m = 1,67 \cdot 10^{-27} kg$ is

$$E = E_0 n_0 = 15 \cdot 10^{-11} \cdot 0,6 \cdot 10^{27} = 0,9 \cdot 10^{17} J.$$

One kg of baryonic matter has $n_0 = 0,6 \cdot 10^{27}$ atoms. Therefore, the stored kinetic energy of rotation in one kg of substance will be $E = E_0 n_0 = 15 \cdot 10^{-11} \cdot 0,6 \cdot 10^{27} = 0,9 \cdot 10^{17} J$. The formula of the

theory of relativity, linking energy with a mass $E = mc^2$ gives the amount of energy in 1kg of matter $E = (3 \cdot 10^8)^2 \cdot 1 = 0,9 \cdot 10^{17} J$ (where $c = 3 \cdot 10^8 m/s$ is the speed of light in vacuum). Thus the results of calculation of energy by using the Einstein formula (the formula confirmed in practice), and the formula written above for calculating the rotational energy, stored in the nucleus of an atom, completely agreed. This may mean that nuclear energy is stored within the atom in the form of rotational kinetic energy of the nucleus of atom. Explosions of nuclear bombs, as well as nuclear processes in interior of the Sun and other stars, this energy is converted into the energy of chaotic motion of the atoms of aether in full accordance with the kinetic theory of gases.

Astrophysics, rejecting the aether, can not explain what happens to enormous amount of radiant energy that is continuously emitted by Sun and other stars. In accordance with the Einstein's principle of equivalence mass and energy this energy under certain conditions would have to born at least some electrons, protons and neutrons and then atoms. However, this is not observed. Modern science, in contrast to the aether-dynamics is here in the next impasse. In aether theory, the possibility of complete conversion of baryonic matter into energy is quite natural, because the baryonic matter itself is considered as a form of aether motion, and the energy is treated as kinetic energy of the random motion of aether atoms, rotational kinetic energy of atomic nuclei, energy of the weak and strong waves propagating in aether, and kinetic energy of convective flows (jets) of aether.

According to our theory in the Universe there occurs continuous formation of a new mass (new material) in the process of absorption of aether by nuclei of the atoms from the surrounding space. Gaseous aether has a huge internal energy. Naturally, between aether and baryonic matter, there is a permanent exchange of energy and mass. Therefore, the energy and mass of the Universe do not appear from nowhere and disappear to nowhere but only moves from one species to another. So there is no mystery in these transformations. Although aether is invisible, has no smell, no taste, we feel it through the force of gravity, inertia and electromagnetism. Ethereal continuum pervades an entire Universe, it rages and boils, and we are part of it, we are inside this raging sea of aether. And instead of serious study we have to believe in the stories about disembodied fields, about the beginning and the end of the Universe. Modern physical concept invites us to take on faith horror stories about the "black holes" which absorb matter into a "singularity" directing it into some mysterious extra dimension, i.e. to nowhere, on the corridors of time. We can also remember the horror story about "Heat Death of the Universe", the "Expanding Universe" (it is not clear just where it expands, as if there is something besides the Universe), and others absurdity. By a big account there is no principal difference between stories about creation of the Universe according to Bible and "Big Bang theory". By and large, these stories are equally plausible and justified.

It should be noted that any theory must explain and reconcile the phenomenon of stellar aberration, Michelson's experiment, Sagnac effect, Doppler's effect and Fizeau experiment, observations of binary stars and etc. All these experiments are relevant to the notion of "ether wind". Aether theory should answer on question is about how aether interacts with moving matter, in particular, with the Earth in its motion around the Sun. It is known that any wave propagates in continuum medium at a constant speed which is independent on the velocities of radiation source and reflecting surface. Transposing this property of the waves on the propagation of light, the theory of relativity states that the speed of light is constant. This is major postulate of relativity (with no experimental confirmation) on which this theory is constructed, brushing aside any objections against it. With this property of the speed of light the Michelson's experiment indicated that aether is entirely dragged by the Earth while it moves in its orbit. The phenomenon of stellar aberration, on the contrary, shows that aether is not dragged by the Earth while it moves in its orbit at all. The theory of relativity is not able to explain this contradiction and that is why the concept of aether was abandoned and the propagation of light and electromagnetic waves in the void is been

allowed. Thus, the questions of the nature of gravity, inertia and electro-magnetic fields as well as many other questions about mysterious phenomena occurring in the Universe are left without answers.

Now physicists-relativists, feeling lack of foundation for their theoretical constructs, modestly without noise replace the concept of empty space onto concepts of physical vacuum, dark matter, etc. The contradiction between interpretations of Michelson-Morley's experiment and the phenomenon of stellar aberration exists only for as long as the physicists consider that the speed of light does not obey law of addition of speeds according to our regular practice. If the motion of photons is the cause of the propagation of light then the speed of light should be represented as a sum of the speed of photon at the radiation source and the speed of the reflecting surface. In this case, the contradiction between the Michelson's experiment and star aberration phenomenon naturally disappears, and concept of the aether has right to exist. Any researcher himself, refusing from Einstein's postulate on the constancy of speed of light, can reconsider reasoning and to see that the phenomenon of stellar aberration and the experiments of Michelson and Sagnac do not contradict each others. This is discussed in detail in [1] and [2].

A common misconception is the failure to understand that the aether atoms are very small. Due to the fact that their own size by many orders smaller than the size of any atomic nucleus, they can easily move inside atoms and inside any material bodies as meteorites fly inside the Solar system between the planets. The aether flows around the atomic nuclei but not around atoms. That is why the aether freely flows thru any material bodies and thru the planets like Earth in particular. That is why the Earth does not drag with it the aether and phenomenon of stellar aberration is observed as if the motion of the Earth and propagation of light take place in vacuum. To this there is nothing to add. It is convincingly shown [1] that the displacement of fringes in Michelson's experiment should not happen under any speeds of the Earth relative to the aether. Michelson's experiment can not detect the motion of aether relative the Earth. The Bradley's phenomenon of stellar aberration and the Michelson's experiment did not contradict each other. We must remember that all material bodies of baryonic matter are made up of atoms. The density of baryon matter in states of solids, liquids and gases has the magnitude of the order of several units, measured in kg / m^3 , and only the density of atomic nuclei (set of protons and neutrons) has a huge density of the order of $10^{18} kg / m^3$ and a very small size with radii of the order of $10^{-15} m$. The radii of the atoms of material bodies have the magnitude of the order of $10^{-10} m$. According to our estimates [1], the mass of the atom of aether $m_A^* = 2.09 \cdot 10^{-57} kg$, the radius of the atom of aether $r_{0e}^* = 0.62 \cdot 10^{-25} m$, the number of atoms of aether within the nucleus of the hydrogen which are packed close to each other $n_{0z}^* = 0.8 \cdot 10^{30}$. As a result the material bodies of baryonic matter for gaseous aether behave like a sieve thru which the gaseous aether is flowing free.

Thus there is a paradox for scientists who are not specialists in fluid dynamics. Atoms of the baryonic matter are penetrable by the flows of gaseous aether which is freely passed between the atomic nuclei. Gaseous aether interacts only with nuclei and with elementary particles of baryonic matter.

In the end of article some words should be said about the possible expansion of aether-dynamics into the area of quantum mechanics. The major question is concerned with the stability of radial flow and the vortices near condensation centers of aether, representing the elementary particles of baryonic matter. The solution of this problem is important for the determination of stable elementary particles, their lifetime duration and physical properties. The solution to this problem may be obtained only by taking into account phase transitions at the external borders of the elementary particles.

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