Introduction

In Newton's time nothing was yet known about the matter structure and internal quiescent energy. The very energy the mankind has learnt to use only in the twentieth century. The scientists, while observing the planetary motion, have found out that Newton's law of universe gravitation does not correspond to the data they observed. Let's amend the gravitation law using the following true data as reference points: fundamental constant, light velocity c and Mercury irregular perihelion advance equal to 43 seconds per 100 years.

Chapter 1

Let's try to answer the question, what matter internal energy is and why it is so huge. It took more than ten years to contemplate the nature of the internal energy and to mature the ideas. Perhaps, I was able to lift the veil. It's well known that the energy of the gravitational interaction is determined by the formula:

$$E = m\phi,$$

where m is a mass of some body, and ϕ is gravity potential of other body.

Let's rewrite this formula for some body, which interacts with the whole mass of the Universe. Some readers may doubt the legitimacy of such actions, especially since Newton showed equality of forces acting on the body inside the gravitating sphere. The forces are equal, but what about the energy? Let's have a look:

$$E_u = m\phi_u,$$

Where m is a mass of some body in the Universe, and ϕ_u is gravity potential of the Universe.

$$\phi_u = G\frac{M_u}{R_u},$$

Where M_u is the Universe mass, R_u is the Universe radius, and G is the gravity constant.

Let's write then the gravity energy of body interaction with all bodies in the Universe as:

$$E_u = G\frac{mM_u}{R_u} \tag{1}$$

In the formula (1)we know only two values G and m. Let's try to find the others. We shall right as follows:

$$E_u = mc^2 \tag{2}$$

By assuming that, the internal energy of the body with the mass m is its energy of interaction with all the mass of the Universe. Then:

$$G\frac{mM_u}{R_u} = mc^2 \rightarrow G\frac{M_u}{R_u} = c^2$$

Then it goes that the ratio of Universe mass to its radius is given in the formula:

$$\frac{M_u}{R_u} = \frac{c^2}{G} \tag{3}$$

So, we found out, that the square of the light speed is nothing else but the gravity potential of the Universe:

$$\boxed{\phi_u = c^2 = G\frac{M_u}{R_u}} \tag{4}$$

Also this implies the understanding, why the speed of the light is so. Now we try to find out other fundamental or valid fundamental constants. Let's find out Hubble's constant. Knowing that the volume of the sphere is calculated using the formula:

$$V_u = \frac{4}{3}\pi R_u^3$$

And the substance density inside the sphere with $\frac{M_u}{R_u} = \frac{c^2}{G}$ is determined as:

$$\rho_u = \frac{M_u}{V_u} = \frac{M_u}{\frac{4}{3}\pi R_u^3} = \frac{3}{4\pi R_u^2}\frac{c^2}{G} \tag{5}$$

We get the formula for the matter density in the Universe:

$$\rho_u = \frac{3}{4\pi R_u^2}\frac{c^2}{G} = \frac{3}{4\pi G}\frac{c^2}{R_u^2} \tag{6}$$

We will not be fast with calculation of the Universe density, because of all accurate values we have only the speed of the light. We know little about the Universe radius. Knowing that the Hubble's constant is written in the form as mentioned below:

$$H = \frac{c}{R_u}$$

Let's square both parts of the expression:

$$H^2 = \frac{c^2}{R_u^2}$$

And change in (6) for Hubble's constant:

$$\rho_u = \frac{3H^2}{4\pi G} \tag{7}$$

And we get:

$$H^2 = \frac{c^2}{R_u^2} = \frac{4}{3}\pi G \rho_u \tag{8}$$

(8) evidences, that Hubble's constant is the function of the Universe density. Let's set the expressions (7) and (5):

$$\rho_u = \frac{3H^2}{4\pi G} = \frac{3}{4\pi R_u^2}\frac{M_u}{R_u}$$

where from we express:

$$\boxed{H^2 = G\frac{M_u}{R_u^3}} \qquad \text{and} \qquad H = \sqrt{G\frac{M_u}{R_u^3}} \tag{9}$$

and in this stage we have expressed two fundamental constants, over mass and radius of the Universe. Let's put the constant analyses aside and get deal with the forces, acting in the Universe.

Chapter 2

Let's calculate the maximal force F_u, which the Universe forms with its whole mass. For that using the Newton's formula we will let the sample mass m to the Universe mass M_u taking into consideration (3):

$$F_m = G\frac{mM_u}{R_u^2} \xrightarrow{m \to M_u} F_u = G\frac{M_u M_u}{R_u^2} = G\frac{M_u^2}{R_u^2} = G\left(\frac{c^2}{G}\right)^2 = \frac{c^4}{G}, \tag{10}$$

where F_m is force with which the mass m interacts with the Universe mass M_u.

Let's find the formula for the force, with which the body interacts with the Universe. From (4) we will get an equation for the radius:

$$c^2 = G\frac{M_u}{R_u} \to R_u = G\frac{M_u}{c^2}$$

and insert it into the Newton's equation of gravity:

$$F_m = G\frac{mM_u}{R_u^2} = G\frac{mM_u}{\left(G\frac{M_u}{c^2}\right)^2} = G\frac{mM_u}{G^2\frac{M_u^2}{c^4}} = \frac{m}{M_u}\frac{c^4}{G} \tag{11}$$

As we see (10), is an extreme case of the formula (11). The formula (11) shows us the procedure which is similar to the weighing procedure but only in relation to the mass. I.e. while measuring the body mass, we measure the mass ratio of the sample body and the Universe. Also it can be written down as follows:

$$F_m = \frac{m}{M_u}F_u\ , \qquad \text{then} \qquad \frac{m}{M_u} = \frac{FG}{c^4} = \frac{F_m}{F_u} \tag{12}$$

Now we obtain the laws of interaction of two sample bodies. Let us assume having two bodies with mass m_1 and m_2, Then the forces of interaction with the Universe will be written down as follows:

$$F_1 = \frac{m_1}{M_u}\frac{c^4}{G} \qquad \text{and} \qquad F_2 = \frac{m_2}{M_u}\frac{c^4}{G}$$

And correspondingly we have difference $$F_1 - F_2 = \frac{m_1}{M_u}\frac{c^4}{G} - \frac{m_2}{M_u}\frac{c^4}{G} = (m_1 - m_2)\frac{c^4}{M_u G}$$ and relation of forces $$\frac{F_1}{F_2} = \frac{\frac{m_1}{M_u}\frac{c^4}{G}}{\frac{m_2}{M_u}\frac{c^4}{G}} = \frac{m_1}{m_2} \tag{13}$$

Now taking the Newton's law we have:

$$F_u = M_u a_u\ ,$$

where a_u — is the acceleration of the free fall in the Universe and considering that

$$R_u = \frac{GM_u}{c^2}\ , GM_u = R_u c^2, H = \frac{c}{R_u}$$

where R_u is the Universe radius, H H is Hubble's constant, and Ω_u is the Universe rotation speed. Then:

$$a_u = \frac{F_u}{M_u} = G\frac{M_u}{R_u^2} = \frac{GM_u}{\frac{G^2M_u^2}{c^4}} = \frac{c^4}{GM_u} = \frac{c^2}{R_u} = cH = \Omega_u^2 R_u \tag{14}$$

Now, in a similar way we will write the Newton's law for proofmass, interacting with the Universe through acceleration made by all bodies of the Universe $F_m = ma_u$, where a_u is abnormal acceleration or acceleration of free fall in the Universe and considering, that $r_m = \frac{Gm}{v_m^2}$, where r_m is gravitational radius of the mass, v_m^2 is gravitational potential of the mass. Then:

$$a_u = \frac{F_m}{m} = G\frac{m}{r_m^2} = \frac{Gm}{\frac{G^2m^2}{v_m^4}} = \frac{v_m^4}{Gm} = \frac{v_m^2}{r_m} = \omega_m^2 r_m \tag{15}$$

Combining (14) and (15), we get:

$$\boxed{a_u = \frac{F_u}{M_u} = G\frac{M_u}{R_u^2} = \frac{c^4}{GM_u} = \frac{c^2}{R_u} = \Omega_u^2 R_u = cH = \frac{F_m}{m} = G\frac{m}{r_m^2} = \frac{v_m^4}{Gm} = \frac{v_m^2}{r_m} = \omega_m^2 r_m} \tag{16}$$

Some useful formulas we will separate. Abnormal acceleration made by the Universe $a_u = cH$:

$$\boxed{a_u = cH = G\frac{M_u}{R_u^2}} \tag{17}$$

Then the mass of some part of the Universe (galaxy, galactic cluster) of the radius r_m will be equal to:

$$cH = G\frac{m}{r_m^2} \rightarrow m = \frac{cH}{G} r_m^2 \tag{18}$$

$$cH = \frac{v_m^4}{Gm} \rightarrow m = \frac{1}{cHG} v_m^4 \tag{19}$$

The gravity potential of some part of the Universe φ_m (galaxy, galactic cluster) of the radius r_m will be equal to:

$$cH = \frac{v_m^2}{r_m} \to \varphi_m = v_m^2 = cHr_m \tag{20}$$

The rotation speed of some part of the Universe (galaxy, galactic cluster) of the radius r_m will be equal to:

$$cH = \frac{v_m^2}{r_m} \to v_m^2 = cHr_m \to v_m = \sqrt{cHr_m}$$

The radius of some part of the Universe (galaxy, galactic cluster) is determined as:

$$cH = \frac{v_m^2}{r_m} \to r_m = \frac{1}{cH} v_m^2 \tag{21}$$

The angle speed of the external boundary of some part of the Universe (galaxy, galactic cluster) is:

$$cH = \omega_m^2 r_m \to \omega_m^2 = \frac{cH}{r_m} \tag{22}$$

Also a virial theorem follows out of (16):

$$cH = G\frac{m}{r_m^2} = \frac{v_m^2}{r_m} \to G\frac{m}{r_m} = v_m^2 \tag{23}$$

As, a consequence, the mass of some part (galaxy, galactic cluster) of the Universe of the radius r_m and the speed v_m^2 is:

$$m = \frac{r_m v_m^2}{G} \tag{24}$$

We will have some more formulas out of (16):

$$cH = G\frac{m}{r_m^2} = \omega_m^2 r_m \to m = \frac{\omega_m^2 r_m^3}{G} \tag{25}$$

$$cH = \frac{v_m^4}{Gm} = \omega_m^2 r_m \to m = \frac{1}{G}\frac{v_m^4}{\omega_m^2 r_m} \tag{26}$$

$$cH = \frac{c^2}{R_u} = \frac{v_m^2}{r_m} \to \frac{r_m}{R_u} = \frac{v_m^2}{c^2} \tag{27}$$

$$cH = \frac{c^4}{GM_u} = \frac{v_m^4}{Gm} \to \frac{m}{M_u} = \frac{v_m^4}{c^4} \tag{28}$$

The angle speed of matter rotation at the boundary of the Universe is equal to the Hubble's constant, the motion speed of this substance is equal to the speed of the light:

$$a_u = \frac{c^2}{R_u} = \Omega_u^2 R_u \to \Omega_u^2 = \frac{c^2}{R_u^2} \to \Omega_u = H \tag{29}$$

Let's transform the formula (16), and multiply all the parts by M_u :

$$F_u = M_u a_u = G\frac{M_u^2}{R_u^2} = \frac{c^4}{G} = \frac{M_u c^2}{R_u} = \Omega_u^2 R_u M_u = cHM_u = \frac{F_m}{m} M_u = G\frac{mM_u}{r_m^2} = \frac{v^4 M_u}{Gm} = \frac{v_m^2}{r_m} M_u = \omega_m^2 r_m M_u \tag{30}$$

We will get some formulas out of (30). The maximal (total) gravity force, existing in the Universe and compressing the Universe:

$$F_u = G\frac{M_u^2}{R_u^2} = \frac{c^4}{G} \tag{31}$$

The centrifugal force, compressing the gravitational compression of the Universe:

$$F_u = M_u \frac{c^2}{R_u} = \Omega_u^2 R_u M_u = cHM_u$$

The formula $\Omega_u^2 R_u M_u = cHM_u$ results in $\Omega_u^2 R_u = cH$ where from comes $\Omega_u^2 = \frac{cH}{R_u}$. Knowing that $H = \frac{c}{R_u}$ we have $\Omega_u^2 = H^2$ или $\Omega_u = H$. The rotation speed of the Universe is equal to Hubble's constant!

The gravitational potential of the Universe is:

$$F_u = G\frac{M_u^2}{R_u^2} = \frac{c^4}{G} \to G\frac{M_u}{R_u} = c^2 \tag{32}$$

The Universe mass is expressed through three fundamental constants:

$$F_u = \frac{c^4}{G} = cHM_u \to M_u = \frac{c^3}{HG} \tag{33}$$

From which the full energy of the whole Universe mass is:

$$E_u = M_u c^2 = \frac{c^3}{HG}\, c^2 = \frac{c^5}{HG}$$

Also the Universe mass we can get by letting the speed v_m to the light speed in (19):

$$m = \frac{1}{cHG} v^4 \xrightarrow{v_m \to c} M_u = \frac{c^3}{HG} \tag{34}$$

$$F_u = \frac{F_m}{m} M_u \to \frac{F_m}{F_u} = \frac{m}{M_u} \tag{35}$$

From(16), (27), (28) and (35) we have the ratio:

$$\frac{1}{D_x} = \frac{F_m}{F_u} = \frac{m}{M_u} = \frac{r_m^2}{R_u^2} = \frac{v_m^4}{c^4} = \frac{\Omega_u^4}{\omega_m^4} \tag{36}$$

were D_x is Dirac's big number. Now we change the formula (16). Let's multiply all its parts by m, , then the force, affecting the body mass m, , from the Universe will be:

$$F_m = ma_u = \frac{mF_u}{M_u} = G\frac{mM_u}{R_u^2} = m\frac{c^4}{GM_u} = \frac{mc^2}{R_u} = \Omega_u^2 R_u m = cHm = G\frac{m^2}{r_m^2} = \frac{v_m^4}{G} = \frac{mv_m^2}{r_m} = \omega_m^2 r_m m \tag{37}$$

Here we are interested in some formulas. The abnormal force, caused by abnormal acceleration or free fall acceleration in the Universe, affecting any body in the Universe: $F_m = cHm$. This is the same force which affects any body in the Universe $F_m = \frac{mc^2}{R_u}$.

Let's analyze $F_m = \frac{mc^2}{R_u}$. Here we see in the right part of the equation the famous mc^2, the so-called "inner energy" of the matter. Now we can assert precisely, what this expression means, its physical meaning to be exactly. mc^2 is nothing else but interaction energy of the body with the whole mass of the Universe. It's hard for me to determine precisely, if it is kinetic of potential. On the one hand, this is the energy of the body hanging in the Universe at the distance of R_u, as Newton's apple, on the tree limb. On the other hand, there is a light speed $c$in this energy, which is evidence of kinetic energy. What kind of energy this one is, we will make clear later. Now, let us express the inner energy of the body as follows:

$$E_m = mc^2 = F_m R_u \tag{38}$$

The inner energy of the body E_m is the energy of interaction of the body mass m with the Universe of the radius R_u and possessing the gravitational potential c^2.From (37) we will have the mass value of some part of the Universe (galaxy, galactic cluster):

$$m = \frac{F_u}{GM_u} r_m^2 = \frac{M_u}{R_u^2} r_m^2 = \frac{c^4}{G^2 M_u} r_m^2 = \frac{c^2}{GR_u} r_m^2 = \frac{\Omega_u^2 R_u}{G} r_m^2 = \frac{cH}{G} r_m^2 = \frac{r_m v_m^2}{G} = \frac{\omega_m^2 r_m^3}{G}$$

In conclusion of this chapter let's summarize. From large amount of the deduced formulas, let's write out the main ones, which will help us to describe the dynamics of the substance in the Universe:

$$\boxed{\begin{array}{c} m = \frac{cH}{G} r_m^2 \quad (18), \qquad m = \frac{1}{cHG} v_m^4 \quad (19), \qquad m = \frac{r_m v_m^2}{G} \quad (24), \qquad m = \frac{\omega_m^2 r_m^3}{G} \quad (25), \qquad m = \frac{1}{G} \frac{v_m^4}{\omega_m^2 r_m} \quad (26), \\ r_m = \frac{1}{cH} v_m^2 \quad (21), \qquad \omega_m^2 = \frac{cH}{r_m} \quad (22), \qquad G \frac{m}{r_m} = v_m^2 \quad (23), \end{array}}$$

Equation (19), is the exact solution of the well-known empirical relationship of Tally-Fisher:

$$\boxed{L \propto m \propto v^4}$$

i.e. luminosity of a spiral galaxy is proportional to the galaxy mass and proportional to the fourth degree of stars linear velocities on the periphery. The full set of equations for the Tally-Fisher relationship, deduced from (37) will look like as follows:

$$\boxed{\begin{array}{c} m = \frac{1}{cHG} v_m^4 \quad (19), \qquad m = \frac{M_u}{c^4} v_m^4 \quad (39), \\ m = \frac{R_u^2}{G^2 M_u} v_m^4 \quad (40), \qquad m = \frac{M_u}{GF_u} v_m^4 \quad (41), \\ m = \frac{R_u}{Gc^2} v_m^4 \quad (42), \qquad m = \frac{1}{GR_u \Omega_u^2} v_m^4 \quad (43), \qquad m = \frac{1}{G\omega_m^2 r_m} v_m^4 \quad (26), \end{array}}$$

Getting a little bit ahead, the formulas (19), (39), (40), (41), (42), (43) can be rewritten as follows $m = \lambda v_m^4$, where $\lambda = 1.23609 \cdot 10^{20} (kg \cdot s^4 \cdot m^{-4})$ is the dynamic parameter of our Universe.

Chapter 3

In the previous chapter we have deduced some interesting formulas:

$$\boxed{c^2 = G\frac{M_u}{R_u}} \tag{4}$$

$$\boxed{cH = G\frac{M_u}{R_u^2}} \tag{17}$$

$$\boxed{H^2 = G\frac{M_u}{R_u^3}} \tag{9}$$

Let's transform these three formulas. Let's denote $\zeta = GM_u$, then the formulas will look like:

$$c^2 = \zeta\frac{1}{R_u^1}; \quad cH = \zeta\frac{1}{R_u^2}; \quad H^2 = \zeta\frac{1}{R_u^3}$$

Here we see the conception of fundamental constant formation. The squared light speed is inversely related to the Universe radius. The new fundamental constant cH, the abnormal acceleration, formed by the Universe, is inversely related to squared Universe radius. The squared Hubble's constant is inversely proportional to the cubed Universe radius. We can continue this conformity. Let's write series down:

$$R_u^1; \quad \frac{1}{R_u^0}; \quad \frac{1}{R_u^1}; \quad \frac{1}{R_u^2}; \quad \frac{1}{R_u^3}; \quad \frac{1}{R_u^4}; \quad \frac{1}{R_u^5} \tag{45}$$

And fundamental constants for it:

$$\sigma^2 = \zeta R_u^1 \tag{46}$$

$$\gamma^2 = \zeta \frac{1}{R_u^0} \tag{47}$$

$$c^2 = \zeta \frac{1}{R_u^1} \tag{48}$$

$$\psi^2 = \zeta \frac{1}{R_u^2} \tag{49}$$

$$H^2 = \zeta \frac{1}{R_u^3} \tag{50}$$

$$\chi^2 = \zeta \frac{1}{R_u^4} \tag{51}$$

$$\eta^2 = \zeta \frac{1}{R_u^5} \tag{52}$$

In general the law for the fundamental constants looks as follows:

$$\boxed{\varepsilon_n^2 = \zeta R_u^{2-n} = GM_u R_u^{2-n} \left(m^{5-n} s^{-2}\right)}$$

Where ε_n is a random fundamental constant, G is gravitational constant, $\zeta = GM_u$, M_u is Universe mass, R_u is the Universe radius, n is fundamental constant order number, any whole number.

For $n = 3$ we have $\varepsilon_3^2 = \zeta R_u^{2-3} = GM_u R_u^{2-3} \left(m^{5-3} s^{-2}\right)$ or $c^2 = \varepsilon_3^2 = \zeta R_u^{-1} = GM_u R_u^{-1} \left(m^2 s^{-2}\right)$ or $\phi_u = c^2 = G\frac{M_u}{R_u}\left(\frac{m^2}{s^2}\right)$ (4).

For $n = 4$ we have $\varepsilon_4^2 = \zeta R_u^{2-4} = GM_u R_u^{2-4} \left(m^{5-4} s^{-2}\right)$ or $\psi^2 = \varepsilon_4^2 = \zeta R_u^{-2} = GM_u R_u^{-2} \left(m s^{-2}\right)$ or $a_u = \psi^2 = G\frac{M_u}{R_u^2}\left(\frac{m}{s^2}\right)$ (17), etc.

Observing, that in our row of fundamental constants there is $\Psi^2 = cH$ between c^2 and H^2, we can write down:

$$... = \sigma^2 = \zeta R_u^1 \ \left(\frac{m^4}{s^2}\right)$$

$$\sigma c = \gamma^2 = \zeta \frac{1}{R_u^0} \ \left(\frac{m^3}{s^2}\right)$$

$$\gamma\psi = c^2 = \zeta \frac{1}{R_u^1} \ \left(\frac{m^2}{s^2}\right)$$

$$cH = \psi^2 = \zeta \frac{1}{R_u^2} \ \left(\frac{m}{s^2}\right)$$

$$\psi\chi = H^2 = \zeta \frac{1}{R_u^3} \ \left(\frac{1}{s^2}\right)$$

$$H\eta = \chi^2 = \zeta \frac{1}{R_u^4} \ \left(\frac{1}{ms^2}\right)$$

$$... = \eta^2 = \zeta \frac{1}{R_u^5} \ \left(\frac{1}{m^2 s^2}\right)$$

I.e. squared fundamental constant is equal to the product of the previous constant on the following

$$\boxed{\varepsilon_n^2 = \varepsilon_{n-1}\varepsilon_{n+1} = \zeta R_u^{2-n} \left(m^{5-n} \cdot s^{-2}\right)} \tag{53}$$

Where ε_n is a random fundamental constant, $\zeta = GM_u$, M_u is the mass of the Universe, R_u is the Universe radius, n is fundamental constant order number, any integer.

Let's introduce the notion of the elementary mass m_0. Multiply all fundamental constants by m_0. Then the elementary mass features can be described using the laws:

$$\boxed{\alpha_n = m_0 \varepsilon_n^2 = m_0 \zeta R_u^{2-n} \left(kg \cdot m^{5-n} \cdot s^{-2}\right)} \tag{54}$$

Let's re-write the elementary mass features in expanded form:

$$\alpha_1 = \mu_0 = m_0 \sigma^2 = m_0 \zeta R_u^1 \left(\frac{kg \cdot m^4}{s^2}\right) \qquad \text{- unknown property}$$

$$\alpha_2 = e_0^2 = m_0 \gamma^2 = m_0 \zeta \frac{1}{R_u^0} \left(\frac{kg \cdot m^3}{s^2}\right) \qquad \text{- elementary charge}$$

$$\alpha_3 = E_0 = m_0 c^2 = m_0 \zeta \frac{1}{R_u^1} \left(\frac{kg \cdot m^2}{s^2}\right) \qquad \text{- elementary energy}$$

$$\alpha_4 = F_0 = m_0 \psi^2 = m_0 \zeta \frac{1}{R_u^2} \left(\frac{kg \cdot m}{s^2}\right) \qquad \text{- elementary force}$$

$$\alpha_5 = K_0 = m_0 H^2 = m_0 \zeta \frac{1}{R_u^3} \left(\frac{kg}{s^2}\right) \quad \text{-is more likely} \quad rot\vec{E} = -\frac{\partial \vec{B}}{\partial t} \left(\frac{kg}{s^2}\right),$$

Rotation of the elementary mass forms the magnetic field

$$\alpha_6 = P_0 = m_0 \chi^2 = m_0 \zeta \frac{1}{R_u^4} \left(\frac{kg}{m s^2}\right) \qquad \text{- unknown property}$$

$$\alpha_7 = J_0 = m_0 \eta^2 = m_0 \zeta \frac{1}{R_u^5} \left(\frac{kg}{m^2 s^2}\right) \qquad \text{- unknown property}$$

Observing the regularity in formation of fundamental constants and elementary mass properties, we will build a table of Universe property formation.

	$=\alpha_1=\mu_0$ $\frac{kg\cdot m^4}{s^2}$	$=\alpha_2=e_0^2$ $\frac{kg\cdot m^3}{s^2}$	$=\alpha_3=E_0$ $\frac{kg\cdot m^2}{s^2}$	$=\alpha_4=F_0$ $\frac{kg\cdot m}{s^2}$	$=\alpha_5=K_0$ $\frac{kg}{s^2}$	$=\alpha_6=P_0$ $\frac{kg}{m\cdot s^2}$	$=\alpha_7=J_0$ $\frac{kg}{m^2\cdot s^2}$
$\alpha_1\times\ldots=\mu_0\times\ldots\frac{kg\cdot m^4}{s^2}$	$\ldots\times R_u^0$	$\ldots\times R_u^{-1}$	$\ldots\times R_u^{-2}$	$\ldots\times R_u^{-3}$	$\ldots\times R_u^{-4}$	$\ldots\times R_u^{-5}$	$\ldots\times R_u^{-6}$
$\alpha_2\times\ldots=e_0^2\times\ldots\frac{kg\cdot m^3}{s^2}$	$\ldots\times R_u^1$	$\ldots\times R_u^0$	$\ldots\times R_u^{-1}$	$\ldots\times R_u^{-2}$	$\ldots\times R_u^{-3}$	$\ldots\times R_u^{-4}$	$\ldots\times R_u^{-5}$
$\alpha_3\times\ldots=E_0\times\ldots\frac{kg\cdot m^2}{s^2}$	$\ldots\times R_u^2$	$\ldots\times R_u^1$	$\ldots\times R_u^0$	$\ldots\times R_u^{-1}$	$\ldots\times R_u^{-2}$	$\ldots\times R_u^{-3}$	$\ldots\times R_u^{-4}$
$\alpha_4\times\ldots=F_0\times\ldots\frac{kg\cdot m}{s^2}$	$\ldots\times R_u^3$	$\ldots\times R_u^2$	$\ldots\times R_u^1$	$\ldots\times R_u^0$	$\ldots\times R_u^{-1}$	$\ldots\times R_u^{-2}$	$\ldots\times R_u^{-3}$
$\alpha_5\times\ldots=K_0\times\ldots\frac{kg}{s^2}$	$\ldots\times R_u^4$	$\ldots\times R_u^3$	$\ldots\times R_u^2$	$\ldots\times R_u^1$	$\ldots\times R_u^0$	$\ldots\times R_u^{-1}$	$\ldots\times R_u^{-2}$
$\alpha_6\times\ldots=P_0\times\ldots\frac{kg}{m\cdot s^2}$	$\ldots\times R_u^5$	$\ldots\times R_u^4$	$\ldots\times R_u^3$	$\ldots\times R_u^2$	$\ldots\times R_u^1$	$\ldots\times R_u^0$	$\ldots\times R_u^{-1}$
$\alpha_7\times\ldots=J_0\times\ldots\frac{kg}{m^2\cdot s^2}$	$\ldots\times R_u^6$	$\ldots\times R_u^5$	$\ldots\times R_u^4$	$\ldots\times R_u^3$	$\ldots\times R_u^2$	$\ldots\times R_u^1$	$\ldots\times R_u^0$

Table 1

As we see, we managed to express all known and unknown properties of the Universe. The table size is limited to seven fundamental constants. It is worthless to search for the constants with the number $n > 7$, because the real values for the properties of the elementary mass will be expressed by very small values with their powering more than hundred. Most probably the impact of these constants on the Universe will be insignificant. But that does not mean that there is a ban on their presence in the Universe. To make the picture of the world complete, we should get the numerical values of the fundamental constants.

Chapter 4

Let's deal with the determining the numerical value of the world constants. At the moment, we know precisely the fundamental constant

$$c^2 = \gamma\psi = \zeta\frac{1}{R_u^1} = (299792458)^2\left(\frac{m^2}{s^2}\right) \tag{48}$$

We actually need minimum two precisely measured constants to calculate all constants. As for the rest constants, then as we see, the humanity now is familiar with two of them: light speed and Hubble's constant. At that the Hubble's constant has changed minimum 6 times during the last C-change. That's why we cannot base our calculation on the numerical value of the Hubble's constant. We shall find the second fundamental constant, following the light ($n = 3$), i.e. with the order number equal $n = 4$.

$$\psi^2 = cH = \zeta\frac{1}{R_u^2} =???\left(\frac{m}{s^2}\right) \tag{49}$$

For that one could use the formula:

$$m = \frac{1}{cHG}v_m^4 \tag{19}$$

with its being transformed into:

$$\psi^2 = cH = \frac{v_m^4}{mG}$$

Where m is the mass of spiral galaxy, v_m is the stars speed on the galaxy periphery.

But I do not have accurate data for stars speed in galaxies and galaxies masses. Besides the mass will have to be calculated from the $v_m^2 = G\frac{m}{r_m}$ (23), i.e. the galaxy radius should also be known. That's why we shall find out the abnormal acceleration in the Universe by other means. Let's look for abnormalities in the vicinity of the Sun.

As we have found out, there is abnormal acceleration in the Universe $a = \psi^2 = cH$. It seems logic to imagine, that it affects the planets of sun system. The discrepancies between Newton's theory prediction and the observed Mercury perihelion position is called the Mercury perihelion abnormal shift and numerically is equal to $\alpha\frac{''}{100years} = 43$ angle seconds per 100 years. . This abnormality has different values compared to the given one with different authors, but as a base we will take the above mentioned one. Simplifying the calculation, we will consider planet orbit motion to be circular. To calculate the abnormal acceleration a_u, , I used the formulas from the book of B.I. Makarov "Laws ruling the Universe", «§11. About planet perihelion shift».In the part, that the abnormal acceleration affect the planet causing its braking, resulting in disequilibrium between planet gravity force and centrifugal force. Then the planet starts approaching the sun. At that the radial velocity of the planet will increase. Based on these hypotheses:

$$a_u = \frac{\Delta S}{t^2}; \Delta S = \Delta\phi \cdot r; \Delta\phi = \frac{\frac{\alpha \frac{''}{100 years}}{100 years} \cdot \pi}{3600 \frac{''}{\circ} \cdot 180^\circ} \rightarrow a_u = \frac{\Delta\phi \cdot r}{t^2} \rightarrow a_u = \psi^2 = cH = \frac{\frac{\frac{43 \frac{''}{100 years}}{100 years} \cdot \pi}{3600 \frac{''}{\circ} \cdot 180^\circ} \cdot 57909227000 m}{\left(365,2564 \frac{day}{year} \cdot 24 \frac{hour}{day} \cdot 3600 \frac{sec}{hour}\right)^2} = 1,2122 \cdot 10^{-10} \left(\frac{m}{s^2}\right)$$

Where $\Delta S = a_u t^2$ — is abnormal shift of the Mercury, caused by abnormal acceleration affecting the planet,, t is sidereal Earth year, expressed in seconds, r is semimajor axis of Mercury orbit, $\Delta\phi$ is the angle of Mercury abnormal shift per year.

In such a way, we have received the numeric value of abnormal acceleration:

$$a_u = \psi^2 = cH = 1.2122 \cdot 10^{-10} \frac{m}{s^2}$$

To find all fundamental constants, let's use the formula:

$$\varepsilon_n^2 = \varepsilon_{n-1}\varepsilon_{n+1} = \zeta R_u^{2-n} \left(m^{5-n} \cdot s^{-2}\right) \tag{53}$$

For that we should find the mass M_u and radius R_u of the Universe. Knowing that

$$H = \frac{c}{R_u} \rightarrow \psi^2 = cH = \frac{c^2}{R_u} \rightarrow R_u = \frac{c^2}{\psi^2} = \frac{\left(299792458 \frac{m}{s}\right)^2}{1.2122 \cdot 10^{-10} \frac{m}{s^2}} = 7,41425 \cdot 10^{26} (m)$$

Let's find the mass of the Universe from $c^2 = G\frac{M_u}{R_u}$ (4) we will get:

$$M_u = \frac{c^2 R_u}{G} = \frac{\left(299792458 \frac{m}{s}\right)^2 \cdot 7,41425 \cdot 10^{26} m}{6,67384 \cdot 10^{-11} \frac{m^3}{kg \cdot s^2}} = 9,985 \cdot 10^{53} (kg)$$

This way we have found the mass of the Universe and its radius. Now, we can use the formula (53) to find the numeric values of the fundamental constants (Table 2).

n	value ε_n^2	dimension ε_n^2	value ε_n	dimension ε_n	Name of the fundamental constant
...	...	...	...	...	
-7	4,5114E+285	$m^{12} \cdot s^{-2}$	6,7167E+142	$m^{6} \cdot s^{-1}$	No name
-6	6,0848E+258	$m^{11} \cdot s^{-2}$	2,4667E+129	$m^{\frac{11}{2}} \cdot s^{-1}$	No name
-5	8,2069E+231	$m^{10} \cdot s^{-2}$	9,0592E+115	$m^{5} \cdot s^{-1}$	No name
-4	1,1069E+205	$m^{9} \cdot s^{-2}$	3,327E+102	$m^{\frac{9}{2}} \cdot s^{-1}$	No name
-3	1,4929E+178	$m^{8} \cdot s^{-2}$	1,22186E+89	$m^{4} \cdot s^{-1}$	No name
-2	2,0136E+151	$m^{7} \cdot s^{-2}$	4,48734E+75	$m^{\frac{7}{2}} \cdot s^{-1}$	No name
-1	2,7159E+124	$m^{6} \cdot s^{-2}$	1,64799E+62	$m^{3} \cdot s^{-1}$	No name
0	3,66305E+97	$m^{5} \cdot s^{-2}$	6,05231E+48	$m^{\frac{5}{2}} \cdot s^{-1}$	No name
1	4,94055E+70	$m^{4} \cdot s^{-2}$	2,22274E+35	$m^{2} \cdot s^{-1}$	No name
2	6,66359E+43	$m^{3} \cdot s^{-2}$	8,16308E+21	$m^{\frac{3}{2}} \cdot s^{-1}$	No name
3	8,98755E+16	$m^{2} \cdot s^{-2}$	299792458	$m^{1} \cdot s^{-1}$	Light speed
4	1,2122E–10	$m^{1} \cdot s^{-2}$	1,101E-05	$m^{\frac{1}{2}} \cdot s^{-1}$	Abnormal acceleration, Milgrom's constant
5	1,63496E–37	s^{-2}	4,04346E-19	s^{-1}	Hubble's constant
6	2,20516E–64	$m^{-1} \cdot s^{-2}$	1,48498E-32	$m^{-\frac{1}{2}} \cdot s^{-1}$	No name
7	2,97422E–91	$m^{-2} \cdot s^{-2}$	5,45364E-46	$m^{-1} \cdot s^{-1}$	No name
8	4,0115E–118	$m^{-3} \cdot s^{-2}$	2,00287E-59	$m^{-\frac{3}{2}} \cdot s^{-1}$	No name
...	...	...	...	...	

Table 2

Let's calculate the value of the elementary mass m_0. One of the known characteristics of the elementary mass, which we know, is the electric elementary charge e_0^2. We use the formula (54), for $\alpha_2 = e_0^2 = m_0\gamma^2 = m_0\zeta R_u^0 \left(\frac{kg \cdot m^3}{s^2}\right)$, then

$$m_0 = \frac{e_0^2}{\gamma^2} = \frac{e_0^2}{\zeta R_u^0} = \frac{e_0^2}{GM_u R_u^0} = \frac{e_0^2}{GM_u} = \frac{2,30708 \cdot 10^{-28} \frac{kg \cdot m^3}{s^2}}{6,66359 \cdot 10^{43} \frac{m^3}{s^2}} = 3,46222 \cdot 10^{-72}\,(kg)$$

Then the energy of the elementary mass can be calculated:

$$E_0 = m_0 c^2 = 3,46222 \cdot 10^{-72} kg \cdot 8,98755 \cdot 10^{16} \frac{m^2}{s^2} = 3,11168 \cdot 10^{-55} \left(kg \frac{m^2}{s^2}\right) \tag{55}$$

Now, let's calculate the total number of the elementary particles in our Universe:

$$N_{m_0} = D_x = \frac{M_u}{m_0} = \frac{M_u}{\frac{e_0^2}{\zeta}} = \frac{\zeta M_u}{e_0^2} = G\frac{\frac{c^4 R_u^2}{G^2}}{e_0^2} = \frac{\frac{c^4 R_u^2}{G}}{e_0^2} = \frac{F_u R_u^2}{e_0^2} = \frac{E_u R_u}{e_0^2} = \frac{e_u^2}{e_0^2} = \frac{9,985 \cdot 10^{53} kg}{3,46222 \cdot 10^{-72} kg} = 2,8839 \cdot 10^{125} \tag{56}$$

Where e_u is the charge of the Universe. So the number of the particles in our Universe is equal to $2,8839 \cdot 10^{125}$. From the given formula we can also find out Universe full charge.

From (56) we get:

$$\frac{m_0}{M_u} = \frac{e_0^2}{e_u^2} \rightarrow e_u^2 = e_0^2 \frac{M_u}{m_0} = N_{m_0} e_0^2 = 2,8839 \cdot 10^{125} \cdot 2,30708 \cdot 10^{-28} \frac{kg\ m^3}{s^2} = 6,65337 \cdot 10^{97} \frac{kg\ m^3}{s^2}$$

We have found the value of the elementary mass. Now we can determine the fundamental properties of the elementary mass. Using the formula (54) and Table 1, построим новую таблицу, we shall make a new table, substituting the calculated value of the elementary mass.

	$=\alpha_1=\mu_0$ $\frac{kg\cdot m^4}{s^2}$	$=\alpha_2=e_0^2$ $\frac{kg\cdot m^3}{s^2}$	$=\alpha_3=E_0$ $\frac{kg\cdot m^2}{s^2}$	$=\alpha_4=F_0$ $\frac{kg\cdot m}{s^2}$	$=\alpha_5=K_0$ $\frac{kg}{s^2}$	$=\alpha_6=P_0$ $\frac{kg}{m\cdot s^2}$	$=\alpha_7=J_0$ $\frac{kg}{m^2\cdot s^2}$
$\alpha_1\times\ldots=\mu_0\times\ldots\frac{kg\cdot m^4}{s^2}$	$\ldots\times R_u^0$ $0,17097267$	$\ldots\times R_u^{-1}$ $2,306E-28$	$\ldots\times R_u^{-2}$ $3,11023E-55$	$\ldots\times R_u^{-3}$ $4,19494E-82$	$\ldots\times R_u^{-4}$ $5,6579E-109$	$\ldots\times R_u^{-5}$ $7,6312E-136$	$\ldots\times R_u^{-6}$ $1,0293E-162$
$\alpha_2\times\ldots=e_0^2\times\ldots\frac{kg\cdot m^3}{s^2}$	$\ldots\times R_u^{1}$ $0,17097267$	$\ldots\times R_u^{0}$ $2,306E-28$	$\ldots\times R_u^{-1}$ $3,11023E-55$	$\ldots\times R_u^{-2}$ $4,19494E-82$	$\ldots\times R_u^{-3}$ $5,6579E-109$	$\ldots\times R_u^{-4}$ $7,6312E-136$	$\ldots\times R_u^{-5}$ $1,0293E-162$
$\alpha_3\times\ldots=E_0\times\ldots\frac{kg\cdot m^2}{s^2}$	$\ldots\times R_u^{2}$ $0,17097267$	$\ldots\times R_u^{1}$ $2,306E-28$	$\ldots\times R_u^{0}$ $3,11023E-55$	$\ldots\times R_u^{-1}$ $4,19494E-82$	$\ldots\times R_u^{-2}$ $5,6579E-109$	$\ldots\times R_u^{-3}$ $7,6312E-136$	$\ldots\times R_u^{-4}$ $1,0293E-162$
$\alpha_4\times\ldots=F_0\times\ldots\frac{kg\cdot m}{s^2}$	$\ldots\times R_u^{3}$ $0,17097267$	$\ldots\times R_u^{2}$ $2,306E-28$	$\ldots\times R_u^{1}$ $3,11023E-55$	$\ldots\times R_u^{0}$ $4,19494E-82$	$\ldots\times R_u^{-1}$ $5,6579E-109$	$\ldots\times R_u^{-2}$ $7,6312E-136$	$\ldots\times R_u^{-3}$ $1,0293E-162$
$\alpha_5\times\ldots=K_0\times\ldots\frac{kg}{s^2}$	$\ldots\times R_u^{4}$ $0,17097267$	$\ldots\times R_u^{3}$ $2,306E-28$	$\ldots\times R_u^{2}$ $3,11023E-55$	$\ldots\times R_u^{1}$ $4,19494E-82$	$\ldots\times R_u^{0}$ $5,6579E-109$	$\ldots\times R_u^{-1}$ $7,6312E-136$	$\ldots\times R_u^{-2}$ $1,0293E-162$
$\alpha_6\times\ldots=P_0\times\ldots\frac{kg}{m\cdot s^2}$	$\ldots\times R_u^{5}$ $0,17097267$	$\ldots\times R_u^{4}$ $2,306E-28$	$\ldots\times R_u^{3}$ $3,11023E-55$	$\ldots\times R_u^{2}$ $4,19494E-82$	$\ldots\times R_u^{1}$ $5,6579E-109$	$\ldots\times R_u^{0}$ $7,6312E-136$	$\ldots\times R_u^{-1}$ $1,0293E-162$
$\alpha_7\times\ldots=J_0\times\ldots\frac{kg}{m^2\cdot s^2}$	$\ldots\times R_u^{6}$ $0,17097267$	$\ldots\times R_u^{5}$ $2,306E-28$	$\ldots\times R_u^{4}$ $3,11023E-55$	$\ldots\times R_u^{3}$ $4,19494E-82$	$\ldots\times R_u^{2}$ $5,6579E-109$	$\ldots\times R_u^{1}$ $7,6312E-136$	$\ldots\times R_u^{0}$ $1,0293E-162$

Table 3

So we can see, how the Universe physical properties are formed. All physical properties depend on the only one parameter, which is the radius of the Universe. In similar way, where all fundamental constants are interconnected with one another, the physical properties of the matter are directly interconnected with each other. Besides, we see that in the law of matter properties formation $\alpha_n = m_0\varepsilon_n^2 = m_0\zeta R_u^{2-n}\,(kg\cdot m^{5-n}s^{-2})$ (54), there are unknown properties, which we will examine in the future.

Chapter 5

Let's return from micro world into macro one. We have found out the law under which the substance rotates in the galaxy. Let's refer to one of the galaxy laws.

$$r_m = \frac{1}{cH} v_m^2 \tag{21}$$

It was obtained from general organization principles of our Universe and, it affects not only galaxies, but some area of space in the whole, where there is a substance with a mass, including the whole Universe. As a consequence, we can expand this law to any scale (stellar system, galaxies, group of galaxies, galaxy cluster and cluster union), limited only by the Universe radius. So the law (21) is responsible for substance movement in the Universe and for the picture we observe from the Earth. Let's transform the formula:

$$r_m = \frac{1}{cH} v_m^2 \rightarrow v_m^2 = cHr_m \rightarrow \frac{v_m^2}{c} = Hr_m$$

$$\boxed{\frac{v_m^2}{c} = Hr_m} \tag{57}$$

Let's compare it to Hubble's law $v_m = Hr_m$.As we see this law is a linear function. I.e. the far the space area is the faster the object moves. At the same time the formula (57) shows non-linear type of speed- on- distance dependance. Both functions has only two points, where their curves cross each other with $r_m = 0$ and $r_m = R_u$. . Let's add to both formulas the value of the Universe radius. The Hubble's law will look then: $c = HR_u$ or $H = \frac{c}{R_u}$ for

$$\frac{v_m^2}{c} = Hr_m \rightarrow \frac{c^2}{c} = HR_u \rightarrow c = HR_u$$

or

$$H = \frac{c}{R_u}$$

The formula (57), in extreme case, transforms into classic formula, expressing the Hubble's constant.

Not so long ago, there was disclosed a phenomena of nonlinear galaxy movements in the space. The formula (57), unlike the linear Hubble's law gives us precise, nonlinear dependence of the galaxy speed from the distance to the observer.

Let's find out the law of red shift. We shall get it from the Doppler effect:

$$z = \frac{f_0 - f_m}{f_0} = \frac{v_m}{c}$$

Let's apply the Hubble's law $v_m = Hr_m$, then we have:

$$z = \frac{v_m}{c} = \frac{Hr_m}{c} = \frac{r_m}{R_u} \to cz = Hr_m$$

The law "red shift - distance" for the Hubble's law will look as follows:

$$r_m = \frac{cz}{H}$$

The classical linear Hubble's law:

$$r_m = zR_u$$

Теперь проведем те же вычисления с использованием формулы (57).

$$\frac{v_m^2}{c} = Hr_m \to v_m^2 = cHr_m \to v_m = \sqrt{cHr_m}$$

Let's apply the obtained speed to в $z = \frac{v_m}{c}$. We have:

$$z = \frac{v_m}{c} = \frac{\sqrt{cHr_m}}{c} \to z^2 = \frac{cHr_m}{c^2} \to z^2 = \frac{Hr_m}{c} = \frac{r_m}{R_u} \to cz^2 = Hr_m \tag{58}$$

Then the law "red shift - distance" will look like $r_m = \frac{cz^2}{H}$. I would like to draw you attention one more time to the formula

$$z^2 = \frac{r_m}{R_u} \tag{59}$$

The distance to the target in the Universe will be expressed by a nonlinear formula:

$$r_m = z^2 R_u \ , \tag{60}$$

where z can be changed in number range from 0 to 1.

Chapter 6

Let's calculate the Universe density. The simplest variant is to calculate using the (5) with the Universe mass and radius known.

$$\rho_u = \frac{M_u}{V_u} = \frac{M_u}{\frac{4}{3}\pi R_u^3} = \frac{9,98465 \cdot 10^{53} kg}{\frac{4}{3}\pi \left(7,41425 \cdot 10^{26} m\right)^3} = 5,84848 \cdot 10^{-28} \frac{kg}{m^3}$$

Now let's use the formula (6) 'and calculate the density of the Universe by light speed and Universe radius.

$$\rho_u = \frac{3}{4\pi R_u^2} \frac{c^2}{G} = \frac{3}{4\pi G} \frac{c^2}{R_u^2} = \frac{3}{4\pi G} \frac{\left(299792458 \frac{m}{s}\right)^2}{\left(7,41425 \cdot 10^{26} m\right)^2} = 5,84848 \cdot 10^{-28} \frac{kg}{m^3}$$

The third variant of density calculation is by Hubble's constant. Let's use the formula (7).

$$\rho_u = \frac{3H^2}{4\pi G} = \frac{3\left(4,04346 \cdot 10^{-19} \frac{1}{s}\right)^2}{4\pi \left(6,67384 \cdot 10^{-11} \frac{m^3}{kg \cdot s^2}\right)} = 5,84848 \cdot 10^{-28} \frac{kg}{m^3}$$

Mr. Oort, the astronomer, dealt with the action-oriented determination of Universe density in the last century. His density value, calculated by luminance of some areas of the Universe is equal to:

$$\rho_{uOort} \approx 3 \cdot 10^{-28} \frac{kg}{m} \; ,$$

Under condition that $H = 75 \frac{km}{s}$ per Mpc.

As we see, my evaluation of Universe density is similar enough to the value obtained by Mr. Oort and differs twice. Most probably it is connected with the Hubble's constant inaccurate definition. The difference between my evaluation and evaluation used in modern cosmology can be calculated mathematically. Let's compare two values, my value $\rho_u = \frac{3H^2}{4\pi G}$ and $\rho_c = \frac{3H^2}{8\pi G}$:

$$\Omega = \frac{\rho_u}{\rho_c} = \frac{\frac{3H^2}{4\pi G}}{\frac{3H^2}{8\pi G}} = 2,$$

then

$$\rho_u = 2\rho_c$$

It means, that the real density of the Universe is twice higher than the critical one. We shall no analyze the obtained relationship. It is not in the scope of this book. I just note, that having multiplied the density by Oort twice, we will receive the value, I obtained. It is mentioned above.

Let's make one more evaluation of the density. Let's find the Universe density for lookup value of the Hubble's constant:

$$H = 2,54 \cdot 10^{-18} s^{-1},$$

then

$$\rho_c = \frac{3H^2}{8\pi G} = \frac{3\left(2,54 \cdot 10^{-18} \frac{1}{s}\right)^2}{8\pi G} = 1,1539 \cdot 10^{-26} \frac{kg}{m^3},$$

then

$$\Omega_{relativ} = \frac{\rho_u}{\rho_c} = \frac{5,84848 \cdot 10^{-28} \frac{kg}{m^3}}{1,1539 \cdot 10^{-26} \frac{kg}{m^3}} \approx 0,05$$

As we see, the substance density we obtained amounts only 5% of crucial density, calculated from the modern value of the Hubble's constant, which coincides with the modern value of baryonic matter in the Universe. The only difference is that we have received the density value without using the notion of dark energy and dark material. This might be the evidence that the whole Universe is filled with the baryonic matter.

Chapter 7

As far as the scope of this book is concerned the only thing left for us is to deduce the gravity law. Considering the above mentioned, we know, that any body with a mass is affected by all the bodies existing in the Universe, regardless of the distance $F_m = ma_u = \frac{mc^2}{R_u} = cHm$ (37). Но, на это же тело может действовать сила Ньютона со стороны другого тела $F_{Newton} = G\frac{mM}{r^2}$, where M is the mass of the other body, planet, star and r is the distance between the sample mass m and the body M. Then we can write:

$$F = F_{Newton} - F_m = G\frac{mM}{r^2} - cHm \tag{61}$$

Or

$$F = G\frac{mM}{r^2} - \frac{mc^2}{R_u} \tag{62}$$

Or the same law of gravitation (61) in vector form will be:

$$\vec{F} = m\left(\frac{GM - cHr^2}{r^3}\right)\vec{r} \tag{63}$$

Now for gravity law (61) we will obtain the law (18), making the Newton's force F_{Newton} equal to abnormal force F_m, i.e. $F = 0$. Then,

$$F = 0 = G\frac{mM}{r^2} - cHm \rightarrow G\frac{mM}{r^2} = cHm \rightarrow G\frac{M}{r^2} = cH \rightarrow M = \frac{cH}{G}r^2 \ , \tag{18}$$

Where M is the galaxy mass and и r is its radius.

Also from (62) we can get the law (4), forwarding the mass M to M_u and r to R_u . Then

$$F = 0 = G\frac{mM_u}{R_u^2} - \frac{mc^2}{R_u} \rightarrow G\frac{mM_u}{R_u^2} = \frac{mc^2}{R_u} \rightarrow G\frac{M_u}{R_u^2} = \frac{c^2}{R_u} \rightarrow G\frac{M_u}{R_u} = c^2 \tag{4}$$

So we see, that the only one formula or the new gravity law $\vec{F} = m\left(\frac{GM-cHr^2}{r^3}\right)\vec{r}$ provide us a complete picture of gravity interconnection in the whole Universe, starting from Mercury rotation and ending up with the galaxy clusters and the complete Universe in the whole.

Let's draw the diagrams of gravity potential of the Sun for Newton's theory and my gravity theory. For the Sun under the Newton's theory we have:

$$E_{Newton} = m\phi_{Newton} = F_{Newton}r = G\frac{mM}{r^2}r \rightarrow m\phi_{Newton} = F_{Newton}r = G\frac{mM}{r} \rightarrow \phi_{Newton} = v^2 = G\frac{M}{r}$$

For gravity law (61):

$$E = m\phi = Fr = \left(G\frac{mM}{r^2} - cHm\right) r \rightarrow \phi = v^2 = G\frac{M}{r} - cHr$$

As we see on the diagram 1, the gravity potential of the Sun, calculated from the Newton's classic law, will never be lower 0. At the same time, the potential crosses x-axis under the new law. The crossing point with x -axis gives us the equation of the Sun gravitational potential and outer potential, generated by all the bodies of the Universe. This point is the border of the solar system, the distance from the Sun center is $r \approx 10^{15}$ m or light days. As we see from the diagram any body in the Solar system will move a little bit slower then we have from the calculation under the Newton's law. I.e. that while comparing calculated speed with the real ones, we will observe "violet" shift. That was noticed while observing the sondes "Pioneer", at that the abnormal acceleration of the sondes should be close to the value $a_u = cH = 1,2122 \cdot 10^{-10} \left(\frac{m}{s^2}\right)$. While observing the objects beyond the Solar system border, we will notice inverse effect, i.e "red" Doppler shift $a_u = cH = 1,2122 \cdot 10^{-10} \left(\frac{m}{s}\right)$.

If calculating the diagram for the scale of our galaxy, then, knowing the speed of the galaxy center in relation to the Sun, or Sun, in relation to the galaxy centre, the distance to the galaxy center from the Sun. $\phi = v^2 = G\frac{M}{r} - cHr$ is the first component or potential of Newton, aiming at zero, then:

$$\phi = v^2 = cHr \rightarrow r = \frac{v^2}{cH} = \frac{\left(220000\frac{m}{s}\right)^2}{1,2122 \cdot 10^{-10}\frac{m}{s^2}} = 3,99 \cdot 10^{20} m$$

See diagram 2.

Using $m = \frac{cH}{G} r_m^2$ (18), we shall find the mass of our galaxy inside the radius "Sun - the center of galaxy mass":

$$m = \frac{cH}{G} r_m^2 = \frac{1,2122 \cdot 10^{-10}\frac{m}{s^2}}{6,67384 \cdot 10^{-11}\frac{m^3}{kg \cdot s^2}} \cdot \left(3,99 \cdot 10^{20} m\right)^2 = 2,89 \cdot 10^{41} (kg)$$

or immediately from

$$m = \frac{1}{cHG} v_m^4 = \frac{1}{1,2122 \cdot 10^{-10}\frac{m}{s^2} \cdot 6,67384 \cdot 10^{-11}\frac{m^3}{kg \cdot s^2}} \cdot \left(220000\frac{m}{s}\right)^4 = 2,89 \cdot 10^{41} (kg) \tag{19}$$

The radius of the Andromeda galaxy is $1,039 \cdot 10^{21} m$, then its mass is $1,96 \cdot 10^{42} kg$, i.e. Andromeda is 6,7 times heavier of the Milky Way.i.e. Andromeda is 6,7 times heavier of the Milky Way. As we have determined earlier, the gravitational potential of the Universe is equal to c^2 at the distance R_u and full size diagram of gravitational potential dependence on the distance from the observation point will be as shown in diagram No.3. From the observation point, the gravitational potential is linear to the distance, excluding some small areas where dominant the Newton's solar gravitational potential. The same cannot be mentioned about objects speeds, as $\phi = v^2$,the diagram of the observed speed is analogical to the linear diagram of Hubble (speed – distance), will have nonliner, squared dependence. I.e. recently discovered and observed nonlinear "red" shift in the spectrum of the space object, existing beyond the Solar system. See diagram No 4.

New gravity law allows understanding the origin of the abnormal speed both in Solar system and beyond its borders. The empire relationship of Tally-Fisher $L \propto m \propto v^4$ becomes clear. Also huge speed of galaxy clusters, as well as the speed of the mysterious objects of quasi-stellars with sub light speed and at the distance commensurable with Universe scale. The scope of this book does not allow me a more detailed dynamics analysis of galaxy and galaxy clusters, as well as a more detailed explanation for other events in the Universe. But possibly a fuller edition with a detailed explanation of Universe mass dynamics will follow.

Sincerely yours, Yuri Rabyshko . February 2015 . e-mail: aeromash@gmail.com www.turbidium.com +375-297-51-88-60

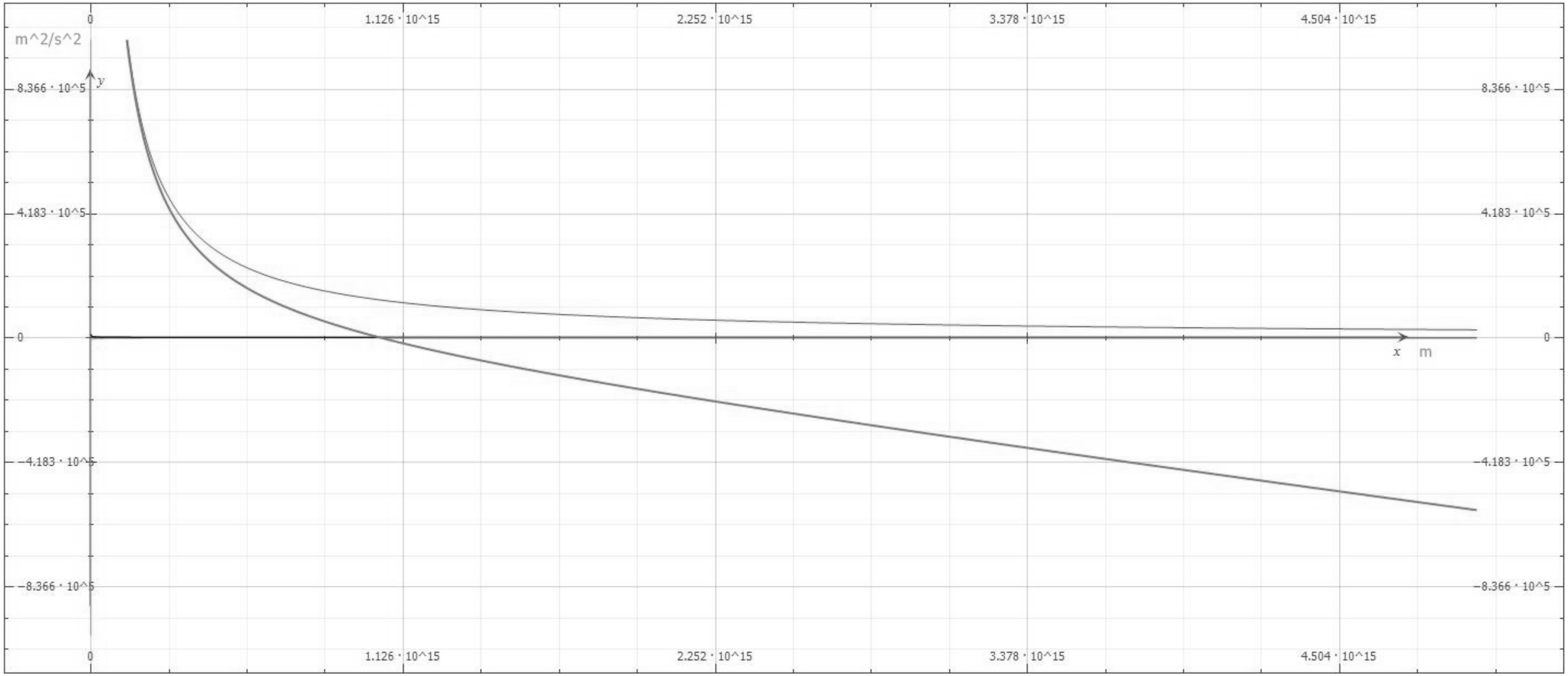
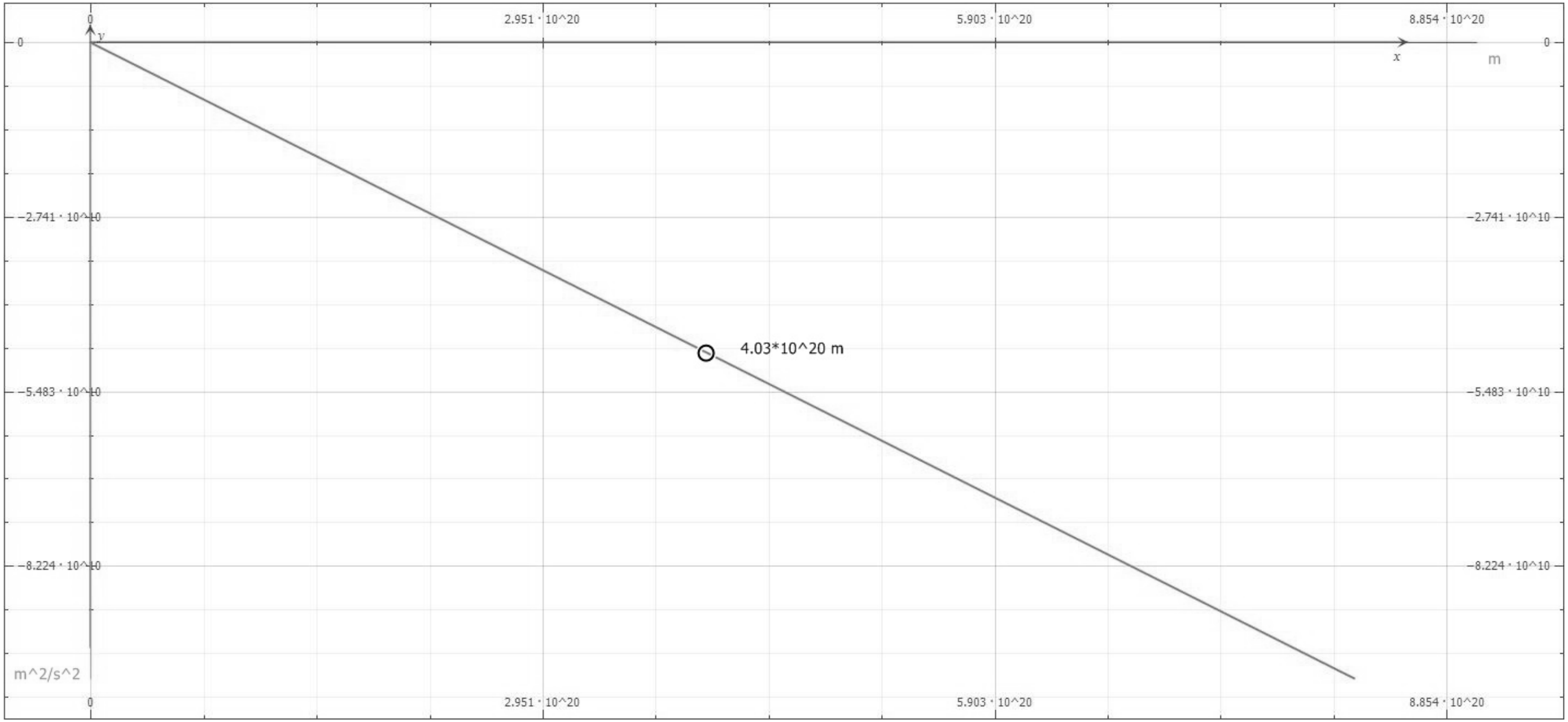


Diagram 1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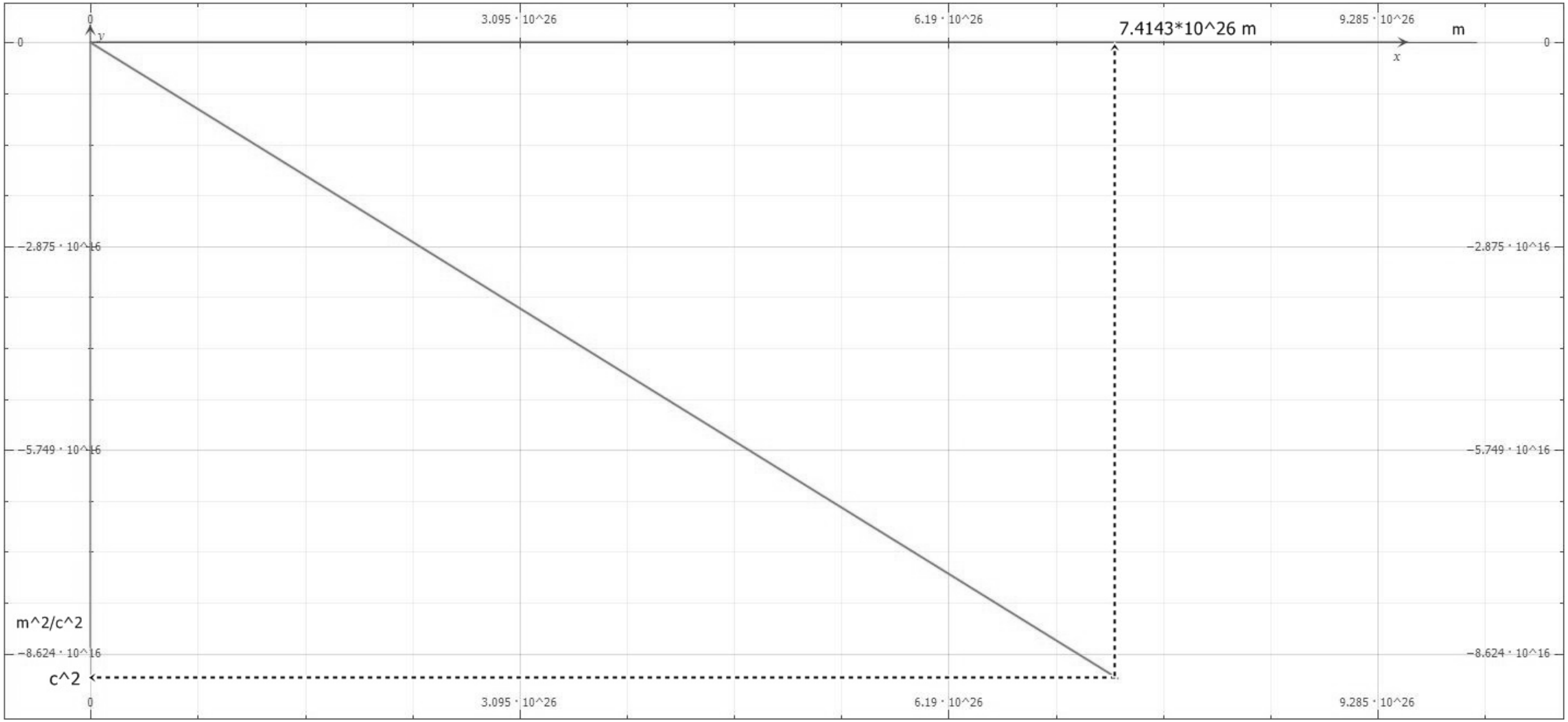
5.903 · 10^20
8.854 · 10^20
0
−2.741 · 10^10
−5.483 · 10^10
−8.224 · 10^10
y
x
m
m^2/s^2
4.03*10^20 m

Diagram 2



0
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6.19 · 10^26
9.285 · 10^26
7.4143*10^26 m
m
x
y
−2.875 · 10^16
−5.749 · 10^16
−8.624 · 10^16
m^2/c^2
c^2

Diagram 3

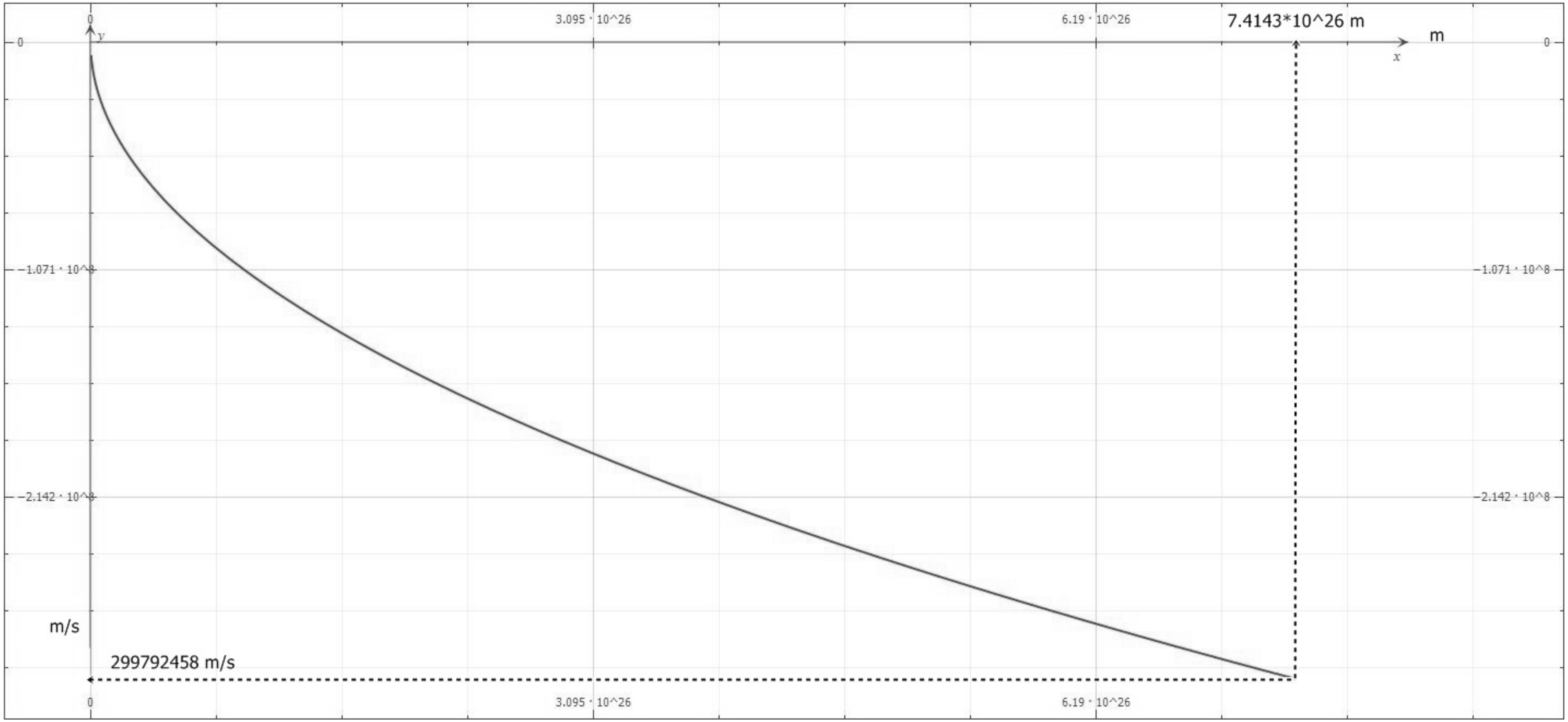
0
3.095 · 10^26
6.19 · 10^26
7.4143*10^26 m
m
x
y
0
0
−1.071 · 10^8
−1.071 · 10^8
−2.142 · 10^8
−2.142 · 10^8
m/s
299792458 m/s
0
3.095 · 10^26
6.19 · 10^26

Diagram 4