Determining the mass of the universe from the mass of the Earth using flow and gravity laws, based on the dualistic model of a dynamic and static Earth

Tibor Endre Nagy

Department of Infectology, Faculty of Medicine, University of Debrecen, Bartok Bela u. 2-26, 4031 Debrecen, Hungary

Email: nagytibore@hotmail.com

Keywords: cosmological parameters, high redshift galaxies, Earth, gravitation, general relativity, Euclidean geometry, flow laws, earth's surface gravity, mass of the universe

Abstract

Based on the dualistic model of Earth moving with the expanding universe and considered static at the same time, the total mass of the universe can be determined using the flow laws and Newton's law of universal gravitation. A concentric sphere can be drawn in three dimensions around the Earth moving in the opposite direction compared to the receding galaxies. A tubular geometric shape can be fitted into this sphere in all directions from the center to the periphery. By increasing the radius of the tube of radius h expressed from the Einstein formula to the size of the radius of the universe (i.e. H), a continuous, axisymmetric cylinder can be formed. The speed according to Hubble's law, at a redshift of 3.14, is equal to the speed of light in a volume of radius h. Maintaining, this speed with respect to the universe, we can study the changes in the parameters of the cosmos through the flow laws of matter moving in one direction in a tube of varying cross-section. This approach, together with the application of gravitational attraction, can lead to the determination of the mass of the universe.

Introduction

According to the phenomenon named after E. Hubble [1], the spectral lines of galaxies shift towards the red as they move radially away from the Earth. The degree of redshift is greater the further away they are in the universe. The frequency shift is proportional to their speed, which indicates the expansion of the universe [2]. Going back in time, this expansion process culminates in a pattern leading up to the formation of the cosmos. In this context, a similar phenomenon occurs with the Earth moving in the opposite direction to the receding galaxies. In one dimension, an Earth is drawn moving away by the same amount from a central location. In three dimensions, this movement represents an Earth moving at the speed of light in all directions at a redshift of 3.14, similar to the expansion of the universe [3]. The size of a sphere of radius h, which can be determined from the shift of the spectral line, can be increased to the size of the sphere of radius H of the cosmos in the ratio of the total angle (2π) to the angle of deflection of the light beam (α) passing by the Earth [4]. The age of the universe can be determined from the cosmic radius determined in this way by dividing it by the speed of light. From these data, by introducing the laws of flow of liquids and gases, and based on the law of universal gravitation, the total mass of the universe can be calculated. From this mass, knowing the volume of the cosmos, its average density and gravity can be expressed.

Determining the radius of the universe with the "dualistic Earth model" derived from general relativity and Euclidean geometry

Based on the relative motion of the Earth and galaxies, the radius of the universe can be determined using general relativity and Euclidean geometry. A special model, a so-called "dualistic Earth model" [3], can be set up based on Einstein's formulas describing the redshift and the bending of light. This means that the Earth's state of motion can be both moving and stationary at the same time. To apply Einstein's redshift formula to the Earth, we must consider our celestial body as moving. Conversely, to use Einstein's light deflection formula, we must consider the planet as stationary. The combination of the two formulas requires the dual nature or dualistic presence of the Earth. The Einsteinian redshift formula [4] is as follows:

$$\nu = \nu_0 \left(1 + \frac{\Phi}{c^2} \right) , \quad (1)$$

where ν_0 is the initial frequency, ν is the changed frequency, Φ is the gravitation potential difference and c is the speed of light.

Φ is the product of gravity (g) and a distance (h) between different gravities: $\Phi = g \cdot h$ [4]. Therefore:

$$\nu = \nu_0 \left(1 + \frac{g \cdot h}{c^2} \right) . \quad (2)$$

If, in accordance with the above, the redshift (3.14) of distant galaxies [5] is assigned to the Earth and the value of g is taken to be that of the Earth's surface, then the unknown distance ($h_{past,present}$) can be expressed, which can be called a "short evolving distance":

$$h_{past,present} = \frac{\nu - \nu_0}{\nu_0} \cdot \frac{c^2}{g_{Earth,stand}} , \quad (3)$$

where $(\nu-\nu_0)/\nu_0 = 3.141592653$ is the redshift of the Earth, c is the speed of light ($2.99792458 \cdot 10^8$ m·s^{-1}) and g is the average earth surface gravity (9.80665 m·s^{-2}).

Numerically:

$$h_{past,present} = 3.141592653 \cdot \frac{8.98755178 \cdot 10^{16} m^2 \cdot s^{-2}}{9.80665 m \cdot s^{-2}} = 2.879191841 \cdot 10^{16}\, m \ . \quad (4)$$

This distance depends both upon the ratio of the shift of the spectrum line, which matches to the motion of the Earth, and of the gravity of Earth (Figure 1).

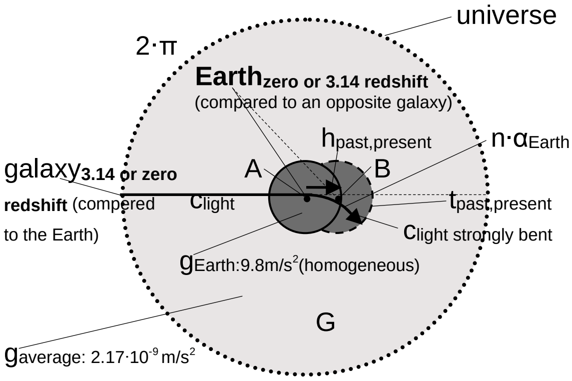

Figure 1. The diagram shows the movement of the Earth relative to the galaxy in the opposite direction in one dimension from left to right. This distance forms a circle in two dimensions and a sphere in three dimensions in the universe. The distance traveled during the movement from A to B is written as $h_{past,present}$, while the time taken to do is: $t_{past,present}$. The notation $g_{average}$: average gravity for the total mass of the universe, G: gravitational constant.

The deviation angle (α) of a light beam, which passes near a celestial body's surface, in this case the Earth, according to Einstein's formula [4] is:

$$\alpha_{Earth} = \frac{2 \cdot G \cdot M_{Earth}}{c^2 \cdot R_{Earth}} \quad . \quad (5)$$

The "short evolving distance" ($h_{past,present}$) can be given by the ratio of the entire plane angle (2·π) and the deviating angle (α) of a light beam passing near the Earth's surface caused by the gravitational field: h/α=H/2·π [3]. With the ratio calculated from the known "short evolving distance" (h) and the known two angles (α, 2·π), an enormous unknown distance can be calculated which might be termed "long evolving distance" ($H_{past,present} = H_{universe}$) (Figure 2).

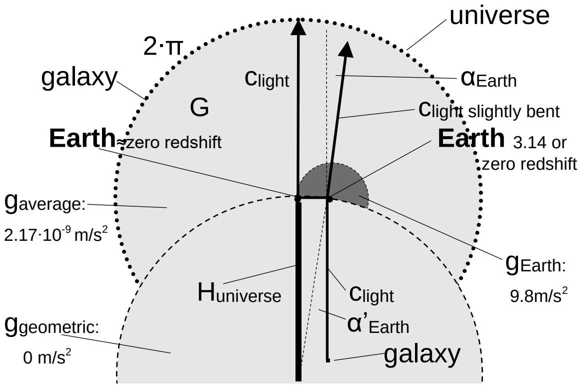

Figure 2. Relationship between the entire plane angle (2·π) represented by the expanding universe (here the Earth is at the center) and the deviating angle (α) of a light beam (c) passing through the gravitational field of the Earth's surface (g). When the Earth is in motion (n·α) (as a component of our high redshifted galaxy) along h,

from A to B, or is comparatively (almost) static (α) while in orbit; $g_{geometric}$: geometrically interpreted gravity, $g_{average}$: average gravity for the total mass of the universe. Therefore:

$$H_{universe} = \frac{\nu - \nu_0}{\nu_0} \cdot \frac{c^4}{g_{Earth,s\tan d}} \cdot \frac{\pi \cdot R_{Earth,mean}}{G \cdot M_{Earth}} \quad . \quad (6)$$

Where $H_{universe}$ is the radius of the universe, $(v-v_o)/v_o = 3.141592653$ is the redshift of the Earth (as a component of high redshifted Milky Way Galaxy), c is the speed of light ($2.99792458 \cdot 10^8$ $m \cdot s^{-1}$), π is the ratio of a circle's circumference to its diameter (3.141592653). R is the volumetric mean radius of the Earth ($6.371005 \cdot 10^6$m), g is the standard gravity of the Earth (9.80665 $m \cdot s^{-2}$). M is the mass of the Earth ($5.97219 \cdot 10^{24}$kg) [6] and G is the gravitational constant ($6.673848 \cdot 10^{-11} m^3 \cdot kg^{-1} \cdot s^{-2}$) [7].

Numerically:

$$H_{universe} = 3.141592653 \cdot \frac{80.77608713 \cdot 10^{32} m^4 \cdot s^{-4} \cdot 3.141592653 \cdot 6.371005 \cdot 10^6 m}{9.80665 m \cdot s^{-2} \cdot 6.673848 \cdot 10^{-11} m^3 \cdot kg^{-1} \cdot s^{-2} \cdot 5.97219 \cdot 10^{24} kg} =$$

$$= 12.99451 \cdot 10^{25} m \quad . \qquad (7)$$

The "long evolving distance" ($H_{universe\ past,present}$) can be transformed into "evolving time" ($T_{universe\ past,present}$) by dividing it by the speed of light (c). When considering the large redshift ($(\nu-\nu_o)/\nu_o = 3.141592$) which may be measured from farther stars, the distance equals $12.994509 \cdot 10^{25}$ m, which in time ($T_{universe\ past,present} = H_{universe\ past,present}/c$) is $4.3345010 \cdot 10^{17}$s. Since one tropical year is $3.1556926 \cdot 10^7$s [8], this equates to 13.7355010 billion years the age of the universe [9].

Geometric appearance of Bernoulli's principle in calculating the radius of the universe

Moving a sphere of radius h around the Earth (Eq.4 and Figure 1) from left to right creates a tubular space (Figure 3). However, this geometric shape is also created when moving in a different direction along h.

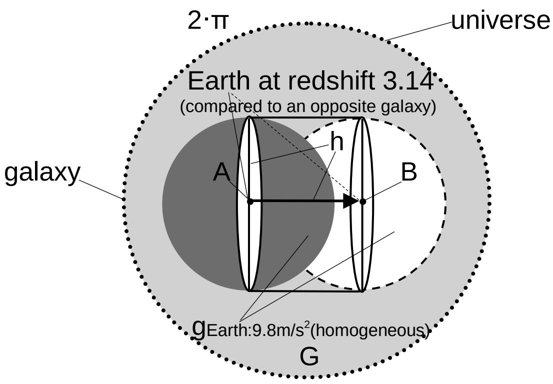

Figure 3.

The initial part of the tube is formed by the largest cross-sectional area ($A_{h,initial}$) of the sphere with radius $h_{past,present}$. The length of the tube is formed by the displacement distance ($h_{past,present}$) corresponding to the radius of the sphere. The end of the cylinder ($A_{h,terminal}$) is formed by a surface of the same size as the initial surface and parallel to it (Figure 4).

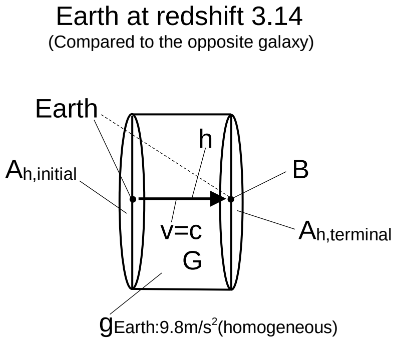

Figure 4.

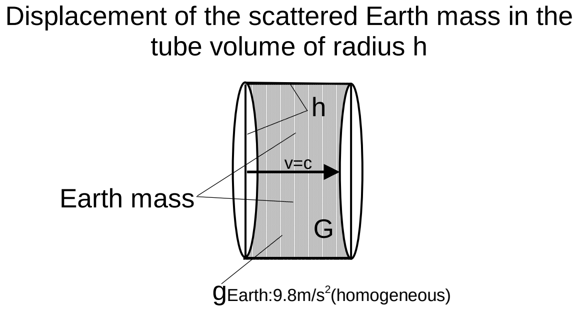

Figure.5

We assume that the volumetric displacement of the Earth's scattered mass in a tube from left to right can be compared with the relations known from the laws of matter flow in a similar tube (Figure 5). The Earth can be present everywhere in the volume of radius h due to its movement in the opposite direction to the galaxies. From this almost infinite number of possibilities, choosing the left-right direction, we can relate the Earth's mass to the entire volume of the tube of radius h. In this case, the density of the evenly distributed Earth decreases significantly.

Utilizing the ratio of angles ($2\pi/\alpha$) used to determine the radius of the universe ($H_{universe}$), an extremely large volume that also forms a tube can be constructed. The size of this cylinder can be compared to the radius of the universe ($H_{universe}$) (Figure 6).

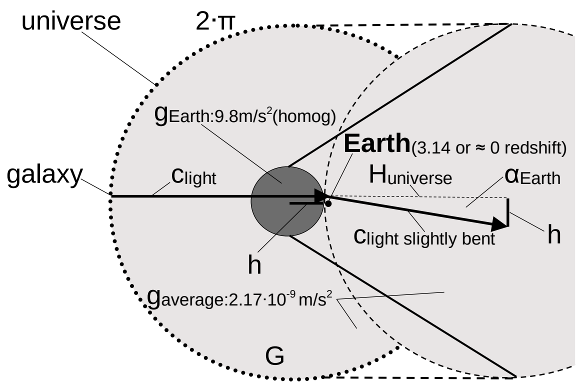

Figure 6

By connecting the small and large tubes axisymmetrically, a continuous flow of material can be created in both tubes, during which the volumetric displacement occurs from left to right, similar to Bernoulli's principle.

The increase in the size of the universe from a radius of size h to a radius of size H and the displacement and expansion of the material in the tubes from left to right are shown in the following figure (Figure 7):

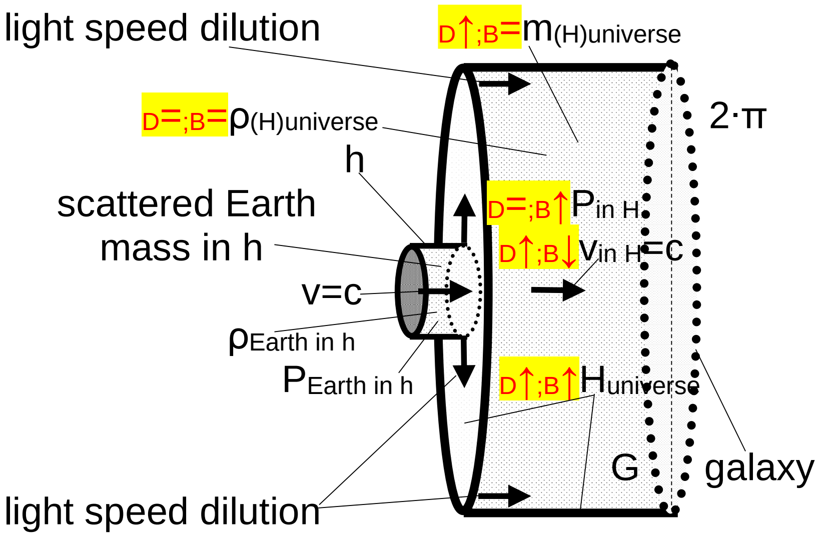

Figure 7.

In Figure 7, in addition to the traditional Bernoulli's flow factors of the universe (marked B), the parameters according to the dualistic Earth model (marked D) are shown. Differences in pressure (P), volume (V), velocity (v), or material density (ρ) are marked with red arrows.

The mass of the universe interpreted according to flow laws

In the law of flow of liquids and gases (Bernoulli's law), the product of the pressure (P) and the velocity (v) of the flowing substance is constant. According to this, the pressure of the flowing substance (P_1) in a pipe with a smaller cross-section (A_1) is lower than the value (P_2) measured in a pipe with a larger cross-section (A_2). Conversely, the flow velocity (v_1) in a thinner pipe is higher, and the flow in a thicker pipe is slower (v_2). This fact is contained in the following formula:

$$P_1 \cdot v_1 = P_2 \cdot v_2 \qquad (8)$$

According to our hypothesis, the relationship determined by the flow laws can also be applied to the universe deduced from the "dualistic Earth model":

$$P_h \cdot v_h = P_H \cdot v_H \qquad (9)$$

Where, P_h is the pressure of the substance flowing in the pipe with a smaller cross-section (radius h), v_h is the flow velocity in the same system. P_H is the pressure in the pipe with radius H, and v_H is the flow velocity of the substance moving in it.

Based on fluid mechanics, the pressure (P_h) within the cylinder of radius h, called the "short evolutionary distance", should be lower ($P_h < P_H$) than in the tube of radius H

(P_H), which represents the volume of the universe ($V_{universe}$). However, this inequality can be modified by changing the parameters.

The flow velocity (v_h) in the volume of radius h is equal to the speed of light (c_h) according to the Einstein formula (Eq.3 and Eq.4) based on the redshift $(\nu-\nu_0)/\nu_0$ = 3.141592653):

$$\nu = \nu_0\left(1+\frac{\Phi}{c^2}\right) \;, \quad and \quad \nu = \nu_0\left(1+\frac{g\cdot h}{c^2}\right) \;. \quad (10)$$

Arranging the equation for c:

$$c = \sqrt{\frac{\nu_0}{\nu-\nu_0}\cdot g_{Earth,s\tan d}\cdot h} \quad . \quad (11)$$

Numerically:

$$c = \sqrt{\frac{1}{3.141592}\cdot 9.80665\frac{m}{s^2}\cdot 2.879191\cdot 10^{16}m} = 2.997924142\cdot 10^8\frac{m}{s} \;. \; (12)$$

According to previous expectations (Bernoulli's law), the velocity of the matter in the volume of the universe with radius H should decrease compared to the velocity in the smaller (h) diameter tube (v_h>v_H). The velocity in the small tube can take any value in the cosmos depending on the magnitude of the redshift. In the larger pipe, the velocity is difficult to estimate. Consequently, the number of unknown parameters can only be reduced by assuming the velocity of the matter flowing in the tubes to be the same. Since the redshift value of 3.14 is mandatory for calculating the maximum value of the distance h, which gives the value of the speed of light (Eq.11). Otherwise, the cosmic radius derived from h will differ from the real one. If the velocity in the tube with radius h is c, then the velocity in the cylinder with radius H must also be known, so this must also be raised to the value of the speed of light:

$$P_h\cdot c_{(v_h\to c)} = P_H\cdot c_{(v_H\to c)} \;. \; (13)$$

If the velocity on both sides of the equation is the same (c), then two unknown parameters become known. After simplifying with the speed of light, only the pressures on both sides of the equation remain in the flow law:

$$P_h = P_H \;. \; (14)$$

The equality of the two pressures, after taking into account the following factors, allows us to calculate the mass of the universe. The pressures can only be equal on both sides of the equation, or in the tubes of different diameters representing it, if the different forces resulting from the same pressure act on surfaces of different sizes. A smaller force acting on a smaller surface can represent the same pressure as a larger force acting on a larger surface. The ratio of forces to surfaces can therefore be equal:

$$\frac{F_{Earth}}{A_h} = \frac{F_{universe}}{A_{universe}} \quad . \qquad (15)$$

In addition, the compressive forces (F_{Earth}, $F_{universe}$) inherent in the pressures (P_h and P_H) can be decomposed into the product of the masses (m_{Earth}, m_H) and the acceleration forces, in this case the gravities (g_{Earth}, $g_{universe}$). The magnitude of the forces (F_{Earth}, $F_{universe}$) acting on the cross-sectional area ($A_h=h^2\cdot\pi$; $A_H=H^2\cdot\pi$) of the given cylindrical part is different. In this way, further breaking down the equation in the numerator, on the left side there is a known mass, which is the same as the mass of the Earth ($F_{Earth}=m_{Earth}\cdot g_{Earth}$). On the right side there will be a mass of unknown origin, which can be compared with the mass of the universe ($F_H=m_{universe}\cdot g_{universe}$):

$$\frac{m_{Earth}\cdot g_{Earth}}{h^2\cdot\pi} = \frac{m_{universe}\cdot g_{universe}}{H_{universe}{}^2\cdot\pi} \quad . \qquad (16)$$

The mass difference between the two sides can be enormous. The difference between them, i.e. the unknown mass of the universe, can be determined from the mass of the Earth based on Newton's general gravitational attraction.

Despite the expansion of universe equal to the speed of light determined based on redshift of 3.14, gravitational attraction also prevails in the cosmos. In the case of a left-to-right displacement (v=c; blue arrows in Figure 8), two opposing vectors also persist in the tubes (red arrows). These two forces and, as attractive forces, are established between the mass of the Earth ($F_{Earth}=m_{Earth}\cdot g_{Earth}$) and the mass of the universe ($F_H=m_{universe}\cdot g_{universe}$) and act on each other.

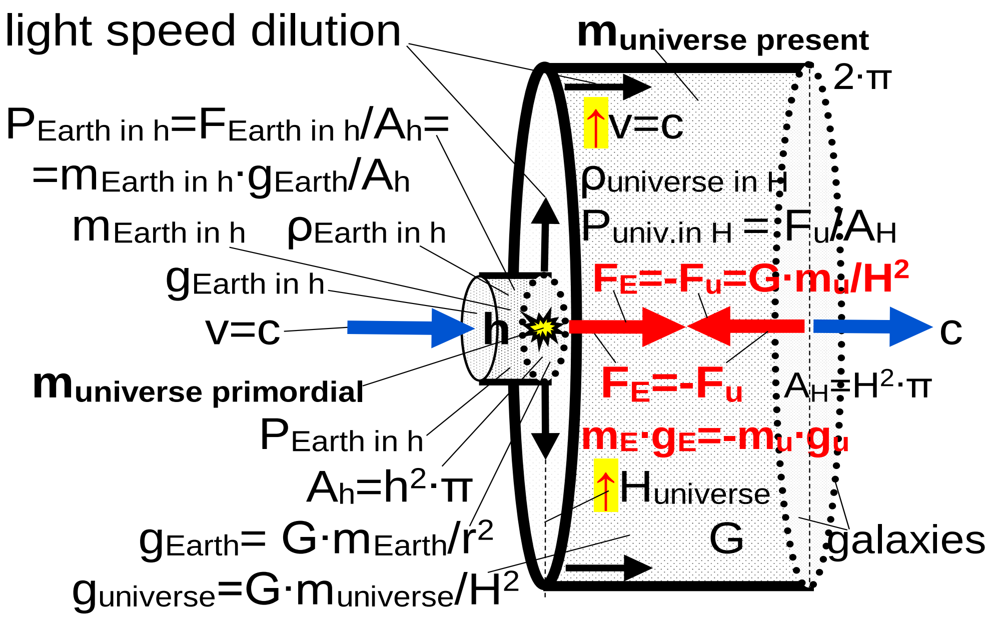

Figure 8.

The Earth, moving at the speed of light, directs the mass in front of it to the periphery, and then moving away towards a common point in the past. This receding planetary motion pointing into the past evokes the ancient mass of the universe and as such becomes equal to the present mass of the cosmos. In this sense, the present mass of the universe does not arise from zero, but from the primordial mass of the cosmos. This does not violate the law of conservation of matter; the same mass is present in each volume in the equation but also in the existing physical world. The amount of matter in the universe does not change in the two tubes, but at most it appears in different forms, provided that the flow velocity (v_h and v_H) in both volumes (V_h and V_H) is the same, i.e. the speed of light ($c_h = c_H$). The individual parameters are shown in Figure 8 above.

Newton's law of universal gravitation within the laws of flow of liquids and gases

The parameters on the left side of the previous equation (Eq.16) are known, m is equal to the mass of the Earth, g is the gravity at the surface of the Earth. The factors on the right side of the formula are unknown, but based on geometry they may be equal to the mass of the universe ($m_{universe}$) and its gravity ($g_{universe}$). Their determination requires knowledge of the value of g present in the tube and the mass behind it. The value of g in the cylinder of radius H, i.e. in the cosmos, is unknown, but according to Newtonian universal gravitation it can be decomposed into its elements ($g_{universe} = G \cdot m_{universe} / H^2$). Then the formula changes as follows:

$$\frac{m_{Earth} \cdot \frac{G \cdot m_{Earth}}{r_{Earth}{}^2}}{h^2 \cdot \pi} = \frac{m_{universe} \cdot \frac{G \cdot m_{universe}}{H_{universe}{}^2}}{H_{universe}{}^2 \cdot \pi} \quad . \qquad (17)$$

The masses (m_{Earth}, $m_{universe}$) representing the forces (F_{Earth}, $F_{universe}$) and the masses behind gravity (g_{Earth}, $g_{universe}$) can be considered the same on both sides of the equation, forming the square of their masses. By multiplying the masses on both sides, we finally get an equation with one unknown from an equation with two unknowns on the right side. In this way, the value of the unknown mass of the universe can be determined, since the other parameters (r_{Earth}, h, and $H_{universe}$) are known.

$$\frac{\frac{G \cdot m_{Earth}{}^2}{r_{Earth}{}^2}}{h^2 \cdot \pi} = \frac{\frac{G \cdot m_{universe}{}^2}{H_{universe}{}^2}}{H_{universe}{}^2 \cdot \pi} \quad . \qquad (18)$$

Dropping the parameters G and π on both sides of the equation further simplifies the formula:

$$\frac{m_{Earth}{}^2}{r_{Earth}{}^2 \cdot h^2} = \frac{m_{universe}{}^2}{H_{universe}{}^4} \quad . \qquad (19)$$

The gravitational force of attraction (F_{Earth} and $F_{universe}$) between the masses (m_{Earth} and $m_{universe}$) is inversely proportional to the square of the distance (‘$H_{universe}$’) between them, which can be observed in the following figure with separated masses and mass not to scale (Figure 9):

Representation of the attractive force between the mass of the Earth and the mass of the universe

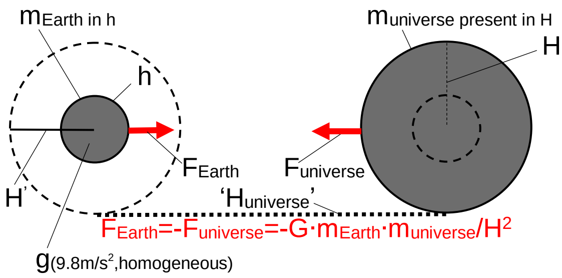

Figure 9

Arranging formula 19 for the square of the mass of the universe ($m_{universe}^2$):

$$\frac{m_{Earth}{}^{2} \cdot H_{universe}{}^{4}}{r_{Earth}{}^{2} \cdot h^{2}} = m_{universe}{}^{2} \quad . \qquad (20)$$

Taking the square root of both sides of the equation, the mass of the cosmos ($m_{universe}$) is:

$$m_{universe} = \sqrt{\frac{m_{Earth}{}^{2} \cdot H_{universe}{}^{4}}{r_{Earth}{}^{2} \cdot h^{2}}} \quad . \qquad (21)$$

As a result, taking the radical on the right side of the equation, the actual mass of the universe ($m_{universe}$) is:

$$m_{universe} = \frac{m_{Earth} \cdot H_{universe}{}^{2}}{r_{Earth} \cdot h} \quad . \qquad (22)$$

Quantifying this, the total mass of the universe ($m_{universe\ total\ mean}$) [10] will be:

$$m_{universe\ total\ mean} = \frac{5.97219 \cdot 10^{24}\,kg \cdot (12.994509779 \cdot 10^{25}\,m)^{2}}{6.371005 \cdot 10^{6}\,m \cdot 2.879191841 \cdot 10^{16}\,m} = 5.497621 \cdot 10^{53}\,kg \quad . \qquad (23)$$

If we use the Earth's smaller, polar radius instead of the Earth's average radius, the mass of the cosmos becomes slightly larger than the average:

$$m_{universe\ total\,(polar\ radius)} = \frac{5.97219 \cdot 10^{24}\,kg \cdot (12.994509779 \cdot 10^{25}\,m)^{2}}{6.3567523 \cdot 10^{6}\,m \cdot 2.879191841 \cdot 10^{16}\,m} = 5.509948 \cdot 10^{53}\,kg \quad . \qquad (24)$$

Furthermore, if we consider the larger radius of the Earth at the equator instead of the average radius of the planet, the mass of the universe will be slightly smaller than average:

$$m_{universe\ total\,(equatorial\ radius)} = \frac{5.97219 \cdot 10^{24}\,kg \cdot (12.994509779 \cdot 10^{25}\,m)^{2}}{6.378137 \cdot 10^{6}\,m \cdot 2.879191841 \cdot 10^{16}\,m} = 5.491474 \cdot 10^{53}\,kg \quad . \qquad (25)$$

The difference between the universe masses calculated based on the Earth's polar and equatorial radii is as follows:

$$m_{universe\ polar} - m_{universe\ equatorial} = 0.018473826 \cdot 10^{53} kg = 1.8473826 \cdot 10^{51} kg \ . \quad (26)$$

The result is two orders of magnitude smaller than the original universe mass. The mass difference therefore arises from the slightly flattened shape of the Earth. It is a consequence of the curvature of an ellipse that is slightly different from a circle.

The ratio of the masses of the cosmos, calculated based on the smaller polar radius of the Earth, and the larger equatorial radius of the planet, is as follows:

$$\frac{m_{universe\ total(polar\ radius)}}{m_{universe\ total(equatorial\ radius)}} = \frac{5.509948311 \cdot 10^{53} kg}{5.4914744851 \cdot 10^{53} kg} = 1.00336409 \ . \quad (27)$$

The ratio of the masses of the cosmos, calculated based on the Earth's larger equatorial radius and the planet's smaller polar radius, is as follows:

$$\frac{m_{universe\ total(equatorial\ radius)}}{m_{universe\ total(polar\ radius)}} = \frac{5.4914744851 \cdot 10^{53} kg}{5.509948311 \cdot 10^{53} kg} = 0.99664718 \ . \quad (28)$$

If there were no difference in the value of radii in formula (e.g., in the case of a perfectly spherical Earth), which is closely related to its shape, then only the total mass of cosmos could be determined, not the mass difference resulting from changes [11].

Calculating the average density and gravity of the universe

In the cylinder of smaller radius h, the density is given by the relation ρ=m/V, if the volume of the tube is $V_h = A_h \cdot h$, or $h^2 \cdot \pi \cdot h$:

$$\rho_h = \frac{m_{Earth}}{V_h} = \frac{m_{Earth}}{h^3 \cdot \pi} \ . \quad (29)$$

Numerically:

$$\rho_h = \frac{5.97219 \cdot 10^{24} kg}{23.867768 \cdot 10^{48} m^3 \cdot 3.141592653} = 7.9647 \cdot 10^{-26} \frac{kg}{m^3} \ . \quad (30)$$

The density of the larger cylindrical part of the universe (ρ_H):

$$\rho_H = \frac{m_{universe}}{V_H} = \frac{m_{universe}}{H^3 \cdot \pi} \ . \quad (31)$$

Numerically:

$$\rho_H = \frac{5.497621 \cdot 10^{53} kg}{(12.99451 \cdot 10^{25} m)^3 \cdot 3.141592653} = 7.9752 \cdot 10^{-26} \frac{kg}{m^3} \ . \quad (32)$$

Thus, the density of the matter in the tubes with radii h and H is the same.

According to the mass determined based on formula 23, the magnitude and distribution of gravity in the tube with a larger radius H is as follows:

$$\frac{m_{Earth} \cdot g_{Earth}}{h^2 \cdot \pi} = \frac{m_{universe\ in\ H} \cdot g_{universe\ in\ H}}{H_{universe}{}^2 \cdot \pi} \quad . \qquad (33)$$

Numerically:

$$g_{universe\ in\ H} = \frac{5.97219 \cdot 10^{24} kg \cdot 9.80665 m \cdot s^{-2} \cdot \left(12.99451 \cdot 10^{25} m\right)^2}{\left(2.879191841 \cdot 10^{16} m\right)^2 \cdot 5.497621 \cdot 10^{53} kg} \quad . \qquad (34)$$

Finally, the average gravity of the cosmos is:

$$g_{universe\ in\ H} = 2.1699918 \cdot 10^{-9} m \cdot s^{-2} \quad . \qquad (35)$$

In contrast, the value of gravity in the small part of the cosmos, i.e., the tube of radius h ($g_{Earth\ in\ h}$), will be equal to the surface gravity of the Earth (g_{Earth}). In the case of the Earth receding at the speed of light, i.e., with a redshift of 3.14, compared to the galaxy on the opposite side, this value is:

$$g_{Earth\ in\ h} = \frac{m_{universe} \cdot g_{universe} \cdot h^2}{m_{Earth} \cdot H_{universe}{}^2} \quad . \qquad (36)$$

The value of gravity, which develops due to the Earth's receding motion from all galaxies and can therefore be considered homogeneous, is numerically the following in the tube of radius h:

$$g_{Earth\ in\ h} = \frac{5.497621 \cdot 10^{53} kg \cdot 2.1699918 \cdot 10^{-9} m \cdot s^{-2} \cdot \left(2.879191841 \cdot 10^{16} m\right)^2}{5.97219 \cdot 10^{24} kg \cdot \left(12.99451 \cdot 10^{25} m\right)^2} = 9.806686\ m \cdot s^{-2}. \ (37)$$

Conclusion

By using the relationships between distances determined based on general relativity and geometric shapes found in the flow laws, and by applying the law of universal gravitation together, the mass of the universe can be determined. By integrating these three laws, a comprehensive concept can be developed that meets all three principles. This model, based on geometric considerations and verifiable by calculations, is able to provide more detailed answers to the questions of macrocosm that have not been sufficiently answered so far.

Reference

1. Hubble, E.P. (1929) A relation between distance and radial velocity among extra-galactic nebulae. Astronomy **15** (3):168-173.

2. Lemaître, G. (1933) l'Universe en expansion. Annales de la Société Scientifique de Bruxelles. A53:51–85.
3. Nagy, E.T. (2020) Earth in the Expanding Universe: A Dualistic Approach to Determine Their Physical Parameters based on a Combined Einstein Gravity Field Equation Using the Hubble Law. v1.0, *vixra*. https://vixra.org/pdf/2004.0648v1.pdf
4. Einstein, A. (1911) Über den Einfluß der Schwerkraft auf die Ausbreitung des Lichtes. Ann Phys. **35**: 898-908.
5. Bennett, C.L., Larson, D., Weiland, J. L., Jarosik N., Hinshaw, G. et al. (2013) Nine-year Wilkinson Microwave Anisotropy Probe (WMAP) Observations: Final Maps and Results. *AJ*, Supplement Series, 208:20 p. 54.
6. Dunford B. (2012) Solar System Exploration: Earth: Facts & Figures. http://solarsystem.nasa.gov/planets/earth/facts.
7. Committee on Data for Science and Technology (2010) (CODATA). Recommended Values of the Fundamental Physical Constants.
8. Convert Units (2021) Measurement Unit Converter. Convert tropical year to seconds.
9. Bacon, R., Conseil, S., Mary, D., Brinchmann, J., Shepherd, M. et al. (2017) The MUSE Hubble Ultra Deep Field Survey. *A&A*, 608 A1.
10. Gaztañaga E. (2023) The mass of our observable Universe Monthly Notices of the Royal Astronomical Society: Letters.
11. Nagy, E.T. (2016) Determining the size, mass, gravity and density of the present and primordial universe by means of a modified Einstein's gravitational field equation. vixra. http://vixra.org/abs/1609.0299