The effect of surface gravity, tilt, and motion of the Earth on the age of the universe based upon the theory of General Relativity and Euclidean geometry

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Abstract

When applying the formula of light propagation in moving systems to the motion of the Earth (as a component of the Milky Way Galaxy), the radius of the universe and the time period required for the development of the cosmos can be estimated. With the rate of this expansion and the alterations in surface gravity, tilt, and motion of the Earth, a ‘short evolving distance’ can be determined. Knowledge of the entire plane angle (2π) and the deviating angle of a light beam (α) passing through different value of Earth’s surface gravity renders it possible to determine large distances by utilizing the rules of trigonometry. This ‘long evolving distance’ can be converted into ‘evolving time’ by dividing it by the speed of light. Based upon this dating method, at a figure of 3.1415 redshift, the universe may have been formed 13.6879 to 13.8498 billion years ago, with a mean value of around 13.7536 billion years. In this model the alterations in the parameters of the Earth affects the radius of cosmos, modifying its size and shape.

Key words: radius of the universe, high redshift galaxies, shape of the Earth, surface gravity of the Earth, tilt and precession of the rotation axis of the Earth, Earth’s orbital motion around the Sun, general relativity, Euclidean geometry

1. Introduction

If motion due to a rapid expansion of space to the Earth is associated with the Theory of General Relativity and the rules of geometry, it is possible to calculate the point in the past when the universe was formed. When considering the alteration of the Earth surface gravity, the tilt of the Earth’s rotational axis, as well as its axial/orbital motions, a dating method described in the former article [1] can be made further developed.

2. Determination of the size and age of the universe

Knowing that there is also time shift behind redshift, it is possible to calculate the exact point in time due to the rapid expansion of space in a manner to estimate the time interval involved by invoking the basic laws of physics. Alterations in either the acceleration or the gravitational field results in changes the frequency of light. This shift to a smaller frequency of the spectrum line [2] is demonstrated by the formula:

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

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

The gravitation potential difference (Φ) is equal to the product of the acceleration of free fall (g) and the distance (h) between two points of different gravitational potential: $\Phi = g \cdot h$ [2]. Therefore:

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

If the same extent of redshift of a light beam measured at farther galaxies [3] is equated to the acceleration of the Earth (as a component of our galaxy), the above formula may also be applied. In this manner, a distance (h) can be calculated pointing towards the origin of the universe. This ‘short evolving distance’ ($h_{past,present}$) is:

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

where $h_{past,present}$ is the unknown distance between two points of a gravitational field, $(\nu-\nu_o)/\nu_o$ = 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·s^{-1}) and g is the standard gravity of the Earth (9.80665 m·s^{-2}).

Numerically:

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

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 (Fig.1.a). The 'short evolving distance' ($h_{past,present}$) can be given by the ratio of the entire plane angle (2π) and the deviating angle (α) of a light beam passing near the Earth's surface caused by the gravitational field: h/α=H/2π. With the ratio calculated from the known 'short evolving distance' (h) and the known two angles (α, 2π), an enormous unknown distance can be calculated which might be termed 'long evolving distance' ($H_{past,present}=H_{universe}$) (Fig.1.b).

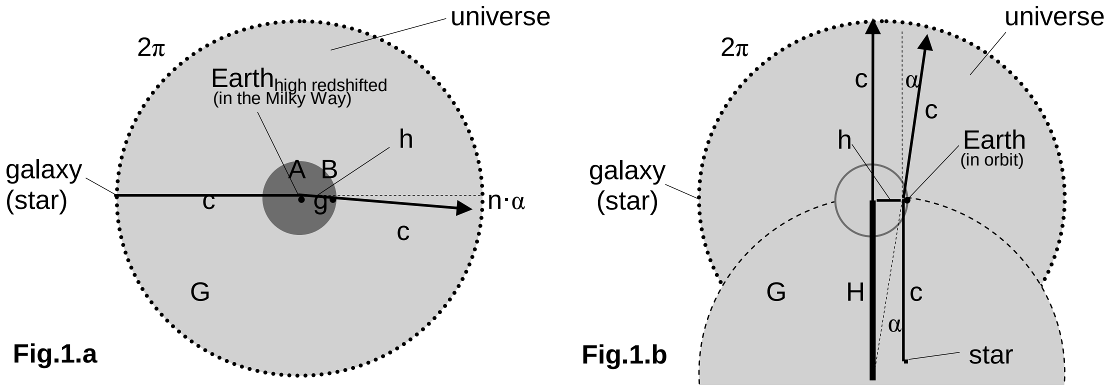

Fig.1 Relationship between the entire plane angle (2π) represented by the extending universe (with the Earth in the center), and the deviating angle (α) of a light beam (c) passing through the gravitational field of the Earth's surface (g) when the Earth is in motion (n·α) (as a component of our high redshifted galaxy) along h, from A to B (Fig.1.a), or is comparatively static (α) while in orbit (Fig.1.b).

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 [2] is:

$$\alpha = \frac{2G \cdot M}{c^2 \cdot R}. \quad (3)$$

Therefore:

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

where $H_{universe}$ is the radius of the universe, $(\nu-\nu_o)/\nu_o$=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·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·s^{-2}), M is the mass of the Earth ($5.97219 \cdot 10^{24}$kg) [4] and G is the gravitational constant ($6.673848 \cdot 10^{-11}$m^3·kg^{-1}·s^{-2}) [5].

Numerically:

$$H_{universe} = 3.141592653 \cdot \frac{80.77608713 \cdot 10^{32} m^4 \cdot s^{-4} \cdot 3.141592653 \cdot 6.371005 \cdot 10^6 m}{9.80665 m \cdot s^{-2} \cdot 6.673848 \cdot 10^{-11} m^3 \cdot kg^{-1} \cdot s^{-2} \cdot 5.97219 \cdot 10^{24} kg} = 12.994509779 \cdot 10^{25} m. \ (5)$$

The 'long evolving distance' ($H_{past,present}$) can be transformed into 'evolving time' ($T_{past,present}$) 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 ($T_{pa,pr}=H_{pa,pr}/c$) is $4.3345010 \cdot 10^{17}$s. Since one year is $3.1556926 \cdot 10^{7}$s [6], this equates to 13.7355010 billion years the age of the universe according to our present knowledge [7].

2.1 The size and age of the universe calculated by two times the Earth standard gravitation

The value calculated by the equation 4 is solely determined on the basis of Einstein's formulas and small variations of it would result in an increase. This model requires that the exact value of the surface gravity of the Earth be known for the calculations. Einstein's original equation (3) does not contain g directly, but it may be substituted for by use of Newtonian equation of gravity ($g=M \cdot G \cdot R^{-2}$ and $M=g \cdot R^2 \cdot G^{-1}$):

$$\alpha = \frac{2 \cdot G \cdot M_{Earth}}{c^2 \cdot R_{Earth,mean}} = \frac{2 \cdot G \cdot g_{Earth,s\tan d} \cdot R_{Earth,mean}{}^2}{c^2 \cdot R_{Earth,mean} \cdot G} = \frac{2 \cdot g_{Earth,s\tan d} \cdot R_{Earth,mean}}{c^2}, \quad (6)$$

therefore:

$$H_{universe} = \frac{\nu - \nu_0}{\nu_0} \cdot \frac{c^2}{g_{s\tan d}} \cdot \frac{2 \cdot \pi \cdot c^2}{2 \cdot g_{s\tan d} \cdot R_{Earth,mean}} = \frac{\nu - \nu_0}{\nu_0} \cdot \frac{c^4 \cdot \pi}{g_{s\tan d} \cdot g_{s\tan d} \cdot R_{Earth,mean}}, \quad (7)$$

numerically:

$$H_{universe} = 3.141592653 \cdot \frac{80.77608713 \cdot 10^{32} m^4 \cdot s^{-4} \cdot 3.141592653}{9.80665 m \cdot s^{-2} \cdot 9.80665 m \cdot s^{-2} 6.371005 \cdot 10^6 m} = 13.011676584 \cdot 10^{25} m. \quad (8)$$

When following this model, this in time equals 13.753646749 billion years [8]. This calculated value is larger than that of calculated by equation 4 and equation 5 with only one g standard. The difference between the presence of one g standard and two g standards in equation 5 and equation 8 is $0.017166805 \cdot 10^{25}$m, which in time is 0.01814575 billion years (≈18.15 million years). (Fig.2)

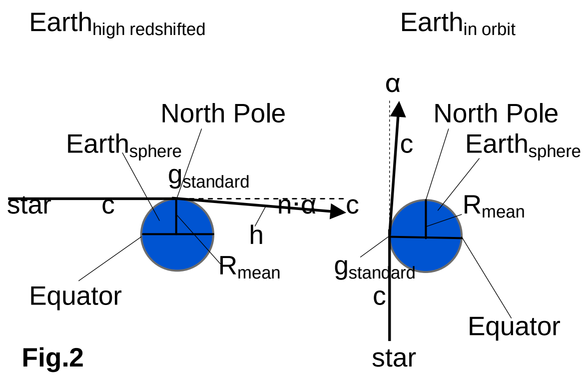

Fig.2

There are some other possibilities to calculate the size of the universe depending of the position, size and shape of the Earth. These characteristics are in close correlation with the surface gravity, which are needed to calculate the precise radius of cosmos.

The subsequent figures display light shining on the earth from the left side, but conceptually the same phenomenon takes when the light beam arrives from another direction. When light beams approach from all directions at the same time in correlation with the Earth's shape is measured, the distance and absolute value of the age can be determined.

2.2 The size and age of the universe by the shape of the Earth calculated by twice the polar gravitation

When equation 7 contain g twice, the radius of the cosmos can have a minimal and maximal value. This occurs when the shape of Earth is elliptical as in Fig.3. At the poles, g has a maximal value (g=9.83221m·s^{-2}) [9], where the radius of universe is minimal. This can be seen on the right side in Fig. 4 with the Earth turned 90^o clockwise:

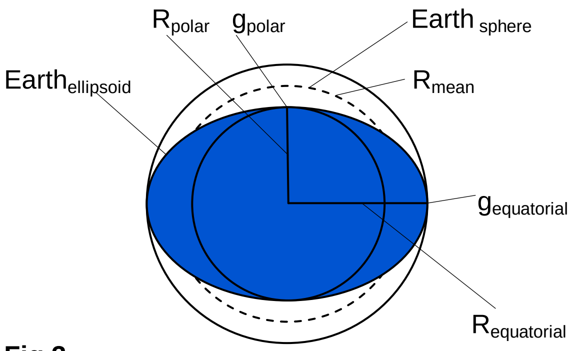

Fig.3

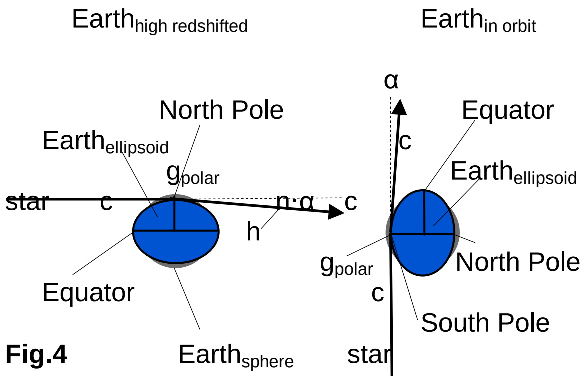

Fig.4

In the case of two times polar g and polar radius:

$$H_{universe} = \frac{\nu - \nu_0}{\nu_0} \cdot \frac{c^2}{g_{polar}} \cdot \frac{2 \cdot \pi \cdot c^2}{2 \cdot g_{polar} \cdot R_{polar}} = \frac{\nu - \nu_0}{\nu_0} \cdot \frac{c^4 \cdot \pi}{g_{polar} \cdot g_{polar} \cdot R_{polar}} \,. \quad (9)$$

Numerically:

$$H_{universe} = 3.141592653 \cdot \frac{80.77608713 \cdot 10^{32} m^4 \cdot s^{-4} \cdot 3.141592653}{9.83221 m \cdot s^{-2} \cdot 9.83221 m \cdot s^{-2} 6.3567523 \cdot 10^6 m} = 12.973136171 \cdot 10^{25} m. \quad (10)$$

This distance in time is 13.712908630 (≈13.71) billion years (the speed of light is 2.99792458·10^{8}m·s^{-1} and 1 year is 3.1556926·10^{7}s).

The lower limit of the age of the universe on the basis of the extreme limit gravitation of the Earth, when g=9.83366 m·s^{-2} [10] at the surface of the Arctic Ocean at latitude 86.71°N and at longitude 61.29°E is:

$$H_{universe} = 3.141592653 \cdot \frac{80.77608713 \cdot 10^{32} m^4 \cdot s^{-4} \cdot 3.141592653}{9.83366 m \cdot s^{-2} \cdot 9.83366 m \cdot s^{-2} \cdot 6.366450538 \cdot 10^6 m} = 12.949554 \cdot 10^{25} m. \quad (11)$$

As m·g=G·m·M·R^{-2}, so R^2=G·M·g^{-1}, the radius of the Earth (R) when g=9.8337m·s^{-2} is:

$$R_{Earth} = \sqrt{\frac{6.673848 \cdot 10^{-11} m^3 \cdot kg^{-1} \cdot s^{-2} \cdot 5.97219 \cdot 10^{24} kg}{9.83366 m \cdot s^{-2}}} = 6.366450538 \cdot 10^6 m. \quad (12)$$

This is in time 13.687981 (≈13.69) billion years.

2.3 The size and age of the cosmos of an elliptical Earth calculated by twice the equatorial gravitation

At the equator, g has a minimal value (g=9.78033 m·s^{-2}) [9], where the radius of universe is maximal. Both models in Figure 5 represent Earth turned 90^o clockwise from those in Figure 4:

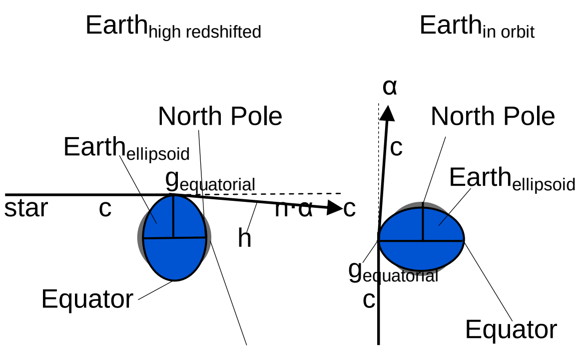

Fig.5

In the case of two times the equatorial g and equatorial radius:

$$H_{universe} = \frac{\nu-\nu_0}{\nu_0} \cdot \frac{c^2}{g_{equat}} \cdot \frac{2\cdot\pi\cdot c^2}{2\cdot g_{equat}\cdot R_{equat}} = \frac{\nu-\nu_0}{\nu_0} \cdot \frac{c^4\cdot\pi}{g_{equat}\cdot g_{equat}\cdot R_{equat}}. \quad (13)$$

Numerically:

$$H_{universe} = 3.141592653 \cdot \frac{80.77608713\cdot 10^{32}\, m^4 \cdot s^{-4} \cdot 3.141592653}{9.78033 m\cdot s^{-2} \cdot 9.78033 m\cdot s^{-2}\, 6.378137\cdot 10^6\, m} = 13.067174667\cdot 10^{25} m. \quad (14)$$

This in time is 13.812309522 (≈13.81) billion years (the speed of light is $2.99792458\cdot 10^8$ $m\cdot s^{-1}$ and 1 year is $3.1556926\cdot 10^7$s).

The extreme upper limit of the age of the cosmos at g=9.76392 $m\cdot s^{-2}$ [10] on the Nevado Huascarán mountain in Peru (6382.279 m from the center of the Earth at latitude 9.12°S and at longitude 77.60°W) is:

$$H_{universe} = 3.141592653 \cdot \frac{80.77608713\cdot 10^{32}\, m^4 \cdot s^{-4} \cdot 3.141592653}{9.76392 m\cdot s^{-2} \cdot 9.76392 m\cdot s^{-2}\, 6.382279\cdot 10^6\, m} = 13.1026626\cdot 10^{25} m. \quad (15)$$

This is in time 13.849782480 (≈13.85) billion years [11].

2.4 The size and age of the universe when calculated by both polar and equatorial gravitation with an equatorial radius

When the Earth is in the same position as in Fig.6, its equatorial plane is horizontal and g's value contains both the polar and equatorial values:

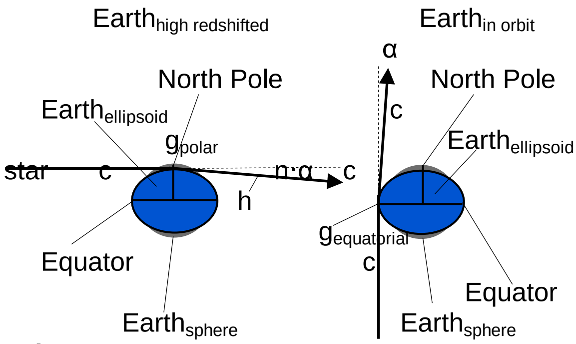

Fig.6

In this case the calculated radius of universe:

$$H_{universe} = \frac{\nu-\nu_0}{\nu_0} \cdot \frac{c^2}{g_{polar}} \cdot \frac{2\cdot\pi\cdot c^2}{2\cdot g_{equat}\cdot R_{equat}} = \frac{\nu-\nu_0}{\nu_0} \cdot \frac{c^4\cdot\pi}{g_{polar}\cdot g_{equat}\cdot R_{equat}}. \quad (16)$$

Numerically:

$$H_{universe} = 3.141592653 \cdot \frac{80.77608713\cdot 10^{32}\, m^4 \cdot s^{-4} \cdot 3.141592653}{9.83221 m\cdot s^{-2} \cdot 9.78033 m\cdot s^{-2}\, 6.378137\cdot 10^6\, m} = 12.998225263\cdot 10^{25} m. \quad (17)$$

This in time is 13.739428387 (≈13.74) billion years.

2.5 The size and age of the cosmos when calculated by both equatorial and polar gravitation with a polar radius

When the Earth is in the same position as in Fig.7, yet its equatorial plane is both vertical and parallel, and g's value contains both the equatorial and polar values, the radius of the cosmos can be calculated:

$$H_{universe} = \frac{\nu-\nu_0}{\nu_0} \cdot \frac{c^2}{g_{equat}} \cdot \frac{2\cdot\pi\cdot c^2}{2\cdot g_{polar}\cdot R_{polar}} = \frac{\nu-\nu_0}{\nu_0} \cdot \frac{c^4\cdot\pi}{g_{equat}\cdot g_{polar}\cdot R_{polar}}. \quad (18)$$

Numerically:

$$H_{universe} = 3.141592653 \cdot \frac{80.77608713 \cdot 10^{32} m^4 \cdot s^{-4} \cdot 3.141592653}{9.78033 m \cdot s^{-2} \cdot 9.83221 m \cdot s^{-2} 6.3567523 \cdot 10^6 m} = 13.041952489 \cdot 10^{25} m. \quad (19)$$

This in time is 13.785649089 (≈13.79) billion years.

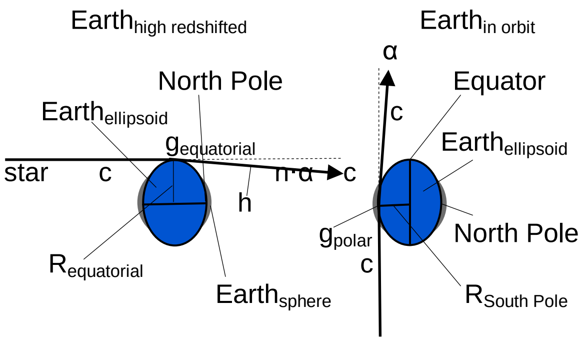

Fig.7

2.6 The effect the Earth's tilt rotational axis on the radius of the universe.

The Earth tilts at a rotational axis of 23.5^o [12]. Considering the values of Earth's surface g at latitude 66.5^{o}N and latitude 23.5^{o}S (Fig.8), which is together 90^o on the basic conception (Fig.1.a and 1.b), the radius of the cosmos can be determined by:

$$H_{universe} = \frac{\nu - \nu_0}{\nu_0} \cdot \frac{c^2}{g_{polar(66.5^o N)}} \cdot \frac{2 \cdot \pi \cdot c^2}{2 \cdot g_{equat(23.5^o S)} \cdot R_{equat(23.5^o S)}} = \frac{\nu - \nu_0}{\nu_0} \cdot \frac{c^4 \cdot \pi}{g_{polar(66.5^o N)} \cdot g_{equat(23.5^o S)} \cdot R_{equat(23.5^o S)}}. \quad (20)$$

Where $g_{(66.5^o N)}$ is 9.82391 m·s^{-2} and $g_{(23.5^o S)}$ is 9.78854 m·s^{-2} [13].

As m·g=G·m·M·R^{-2}, so R^2=G·M·g^{-1}, the radius of the Earth (R) at latitude 23.5^{o}S:

$$R_{Earth} = \sqrt{\frac{6.673848 \cdot 10^{-11} m^3 \cdot kg^{-1} \cdot s^{-2} \cdot 5.97219 \cdot 10^{24} kg}{9.78854 m \cdot s^{-2}}} = 6.381106656 \cdot 10^6 m, \quad (21)$$

where g is 9.78854m·s^{-2} at latitude 23.5^{o}S.

In this case the radius of the universe can numerically be calculated as:

$$H_{universe} = 3.141592653 \cdot \frac{80.77608713 \cdot 10^{32} m^4 \cdot s^{-4} \cdot 3.141592653}{9.82391 m \cdot s^{-2} \cdot 9.78854 m \cdot s^{-2} 6.381106656 \cdot 10^6 m} = 12.9922467 \cdot 10^{25} m. \quad (22)$$

This distance in time is 13.733108907 (≈13.73) billion years.

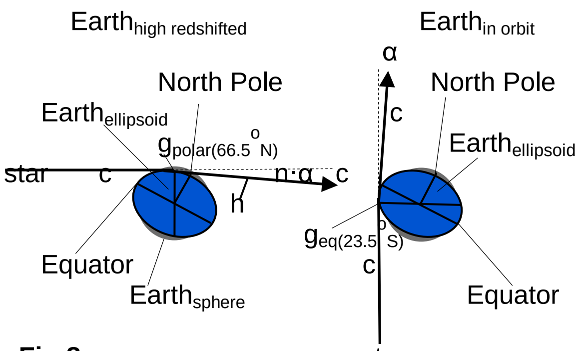

Fig.8

In addition to the stated methods to determine the size of the universe, it is also possible to calculate it on the basis of the Earth's known motion.

2.7 The effect of the Earth's orbital motion on the radius of universe

The Earth tilts at a rotational axis of 23.5^o. This tilt may be doubled due to the orbital motion of the Earth around the Sun and this is together 47^o, which is measured twice when its rotational axis places the area farther from the Sun and also when the axis places it closer to the Sun. In this case {(90^oN - 2·23.5^oN = 90^oN - 47^oN = 43^oN and 43^oN + 90^o = 133^o, so 2·|90^o| = 180^o – 133^o = 47^oS.)} the radius of cosmos is:

$$H_{universe} = \frac{\nu - \nu_0}{\nu_0} \cdot \frac{c^2}{g_{polar(43^o N)}} \cdot \frac{2 \cdot \pi \cdot c^2}{2 \cdot g_{equat(47^o S)} \cdot R_{equat(47^o S)}} = \frac{\nu - \nu_0}{\nu_0} \cdot \frac{c^4 \cdot \pi}{g_{polar(43^o N)} \cdot g_{equat(47^o S)} \cdot R_{equat(47^o S)}}. \quad (23)$$

(Due to the basic concept in Figure 1.a and 1.b, the two angles should together equal 90^o.)

The radius of the Earth (R^2=G·M·g^{-1}) at latitude 47^oN:

$$R_{Earth} = \sqrt{\frac{6.673848 \cdot 10^{-11} m^3 \cdot kg^{-1} \cdot s^{-2} \cdot 5.97219 \cdot 10^{24} kg}{9.80801 m \cdot s^{-2}}} = 6.37477 \cdot 10^6 m. \quad (24)$$

In this case, the radius of the cosmos is:

$$H_{universe} = 3.141592653 \cdot \frac{80.77608713 \cdot 10^{32} m^4 \cdot s^{-4} \cdot 3.141592653}{9.80439 m \cdot s^{-2} \cdot 9.80801 m \cdot s^{-2} 6.37477 \cdot 10^6 m} = 13.00518572 \cdot 10^{25} m, \quad (25)$$

where $g_{(43^o N)}$ is 9.80439 m·s^{-2} and $g_{(47^o S)}$ is 9.80801m·s^{-2} [13].

This distance in time is 13.746785 (≈13.75) billion years (the speed of light is 2.99792458·10^8 m·s^{-1} and 1 year is 3.1556926·10^7s).

2.8 The effect of the Earth's precession and nutation rotational axis on the radius of the cosmos

Over a long period of time, the tilt of the rotational axis of the Earth may fluctuate between 22^o and 24.5^o [14]. The minimal and maximal limits formed by their precession and nutational axis along with other factors, when doubled falls between 44^o and 49^o. In this manner, the minimal value is: 90^oN - 2·22^oN = 90^oN - 44^oN = 46^oN and 46^oN + 90^o = 136^o, so 2·|90^o| = 180^o – 136^o = 44^oS.

With this information, the radius of the cosmos is:

$$H_{universe} = \frac{\nu - \nu_0}{\nu_0} \cdot \frac{c^2}{g_{polar(46^o N)}} \cdot \frac{2 \cdot \pi \cdot c^2}{2 \cdot g_{equat(44^o S)} \cdot R_{equat(44^o S)}} = \frac{\nu - \nu_0}{\nu_0} \cdot \frac{c^4 \cdot \pi}{g_{polar(46^o N)} \cdot g_{equat(44^o S)} \cdot R_{equat(44^o S)}}. \quad (26)$$

The radius of the Earth (R^2=G·M·g^{-1}) at latitude 44^oS:

$$R_{Earth} = \sqrt{\frac{6.673848 \cdot 10^{-11} m^3 \cdot kg^{-1} \cdot s^{-2} \cdot 5.97219 \cdot 10^{24} kg}{9.8053 m \cdot s^{-2}}} = 6.375650775 \cdot 10^6 m, \quad (27)$$

numerically:

$$H_{universe} = 3.141592653 \cdot \frac{80.77608713 \cdot 10^{32} m^4 \cdot s^{-4} \cdot 3.141592653}{9.8071 m \cdot s^{-2} \cdot 9.8053 m \cdot s^{-2} 6.375650775 \cdot 10^6 m} = 13.003388767 \cdot 10^{25} m. \quad (28)$$

This distance in time is 13.744886332 (≈13.74) billion years (the speed of light is 2.99792458·10^8m·s^{-1} and 1 year is 3.1556926·10^7s).

The maximal value can be found by: 90^oN - 2·24.5^oN = 90^oN – 49^oN = 41^oN and 41^oN + 90^o = 131^o, so 2·|90^o| = 180^o – 131^o = 49^oS.

Therefore the radius of cosmos is:

$$H_{universe} = \frac{\nu - \nu_0}{\nu_0} \cdot \frac{c^2}{g_{polar(41^o N)}} \cdot \frac{2 \cdot \pi \cdot c^2}{2 \cdot g_{equat(49^o S)} \cdot R_{equat(49^o S)}} = \frac{\nu - \nu_0}{\nu_0} \cdot \frac{c^4 \cdot \pi}{g_{polar(41^o N)} \cdot g_{equat(49^o S)} \cdot R_{equat(49^o S)}}. \quad (29)$$

When the Earth radius at 49°S is:

$$R_{Earth}=\sqrt{\frac{6.673848\cdot10^{-11}m^3\cdot kg^{-1}\cdot s^{-2}\cdot5.97219\cdot10^{24}kg}{9.80981m\cdot s^{-2}}}=6.374185024\cdot10^6m,\ (30)$$

thus:

$$H_{universe}=3.141592653\cdot\frac{80.77608713\cdot10^{32}m^4\cdot s^{-4}\cdot3.141592653}{9.80259m\cdot s^{-2}\cdot9.80981m\cdot s^{-2}6.374185024\cdot10^6m}=13.006380564\cdot10^{25}m.\ (31)$$

This distance in time is 13.748048731 (≈13.75) billion years.

The difference between the maximum and minimum values is equal to 0.0031624 billion years (3.16 million years). The rate of the distances between the maximum and minimum limits is equal to 1.00023.

2.9 Effect of the relief of the Earth on the radius of the universe

The differences between the maximal and minimal radius of the ellipsoid Earth ($R_{equatorial}$ – R_{polar}) and the differences between the polar and equatorial g (g_{polar} – $g_{equatorial}$) are the main causes of fluctuation in the value of the radius of the cosmos (Fig.9 and Fig.10).

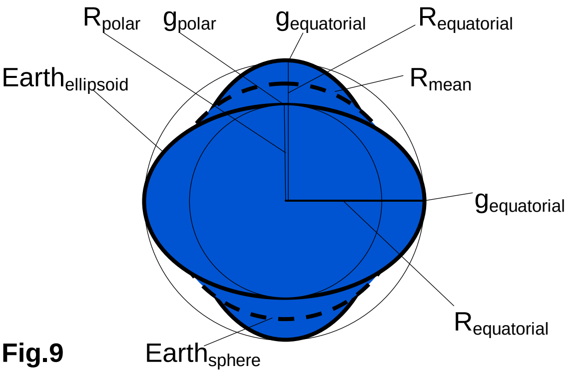

Fig.9

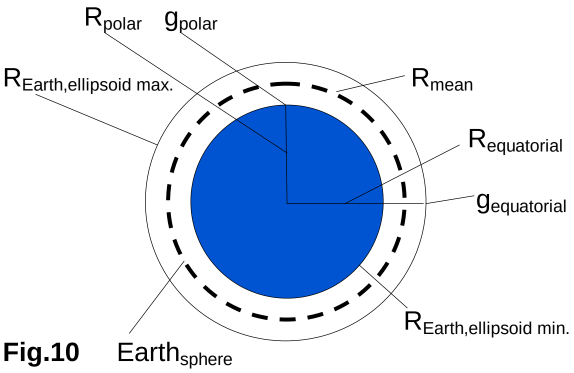

Fig.10

From the above model, there is a small difference when considering the relief of the Earth. For instance, alterations of the topography as well as the Earth bulge at the Equator result in a difference in value of the radius of cosmos at a rate of 1:1000 or 1:10000.

For instance at sea level at latitude of 45°N the radius of universe is:

$$H_{universe}=\frac{\nu-\nu_0}{\nu_0}\cdot\frac{c^2}{g_{p(45^oN,sea\ lev.)}}\cdot\frac{2\cdot\pi\cdot c^2}{2\cdot g_{e(45^oS,sea\ lev.)}\cdot R_{e(45^oS,sea\ lev.)}}=\frac{\nu-\nu_0}{\nu_0}\cdot\frac{c^4\cdot\pi}{g_{p(45^oN,sea\ lev.)}\cdot g_{e(45^oS,sea\ lev.)}\cdot R_{e(45^oS,sea\ lev.)}}.\ (32)$$

The radius of the Earth (R^2=G·M·g^{-1}) at sea level and at latitude 45°N is:

$$R_{Earth}=\sqrt{\frac{6.673848\cdot10^{-11}m^3\cdot kg^{-1}\cdot s^{-2}\cdot5.97219\cdot10^{24}kg}{9.8062m\cdot s^{-2}}}=6.3753582\cdot10^6m,\ (33)$$

Numerically:

$$H_{universe}=3.141592653\cdot\frac{80.77608713\cdot10^{32}m^4\cdot s^{-4}\cdot3.141592653}{9.8062m\cdot s^{-2}\cdot9.8062m\cdot s^{-2}\cdot6.3753582\cdot10^6m}=13.0039854032\cdot10^{25}m.\ (34)$$

From this, the calculated cosmos age is: 13.745517 (≈13.74) billon years (the speed of light is 2.99792458·10^8 m·s^{-1} and 1 year is 3.1556926·10^7s).

When the radius of the universe is calculated at high altitudes of 3000 meters and at the latitude of 45°N, it is equal to:

$$H_{universe}=\frac{\nu-\nu_0}{\nu_0}\cdot\frac{c^2}{g_{p(45^oN,3000m)}}\cdot\frac{2\cdot\pi\cdot c^2}{2\cdot g_{e(45^oS,3000m)}\cdot R_{e(45^oS,3000m)}}=\frac{\nu-\nu_0}{\nu_0}\cdot\frac{c^4\cdot\pi}{g_{p(45^oN,3000m)}\cdot g_{e(45^oS,3000m)}\cdot R_{e(45^oS,3000m)}}.\ (35)$$

Thus:

$$H_{universe} = 3.141592653 \cdot \frac{80.77608713 \cdot 10^{32} m^4 \cdot s^{-4} \cdot 3.141592653}{9.79694 m \cdot s^{-2} \cdot 9.79694 m \cdot s^{-2} \cdot 6.3783582 \cdot 10^6 m} = 13.022451707 \cdot 10^{25} m. \quad (36)$$

Which in time is equal to 13.765036305 (≈13.76) billion years.

The difference in distance between equation 36 and equation 34 is $0.018466303 \cdot 10^{25}$m. When this is translated to time, it is 19.52 million years. The ratio of equation 34 to equation 36 is: 0.99858.

When there is only a few hundred meter difference between the upper altitude limits, the fluctuation of gravity between these points is minimal. Therefore, the variation in the radius of the cosmos under these conditions is also minimal.

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Figures are non proportionate.

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