The age of the universe, the size of the Sun and planets based upon the Theory of General Relativity and Euclidean geometry

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Abstract

If rapid motion is added in the form of redshift to the Earth as a result of expansion of space which in turn complements the notion of an expanding universe, the information may be used to calculate both distances and time periods. In this same manner, by applying the known formula for 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. When the above is combined with Einstein's principle of equivalence and it is applied to situations when an accelerated system and gravitational field exist together at the same time, a 'short evolving distance' pointing towards the origin of the universe can be calculated. Furthermore, knowledge of the entire plane angle and the deviating angle of a light beam grazing the surface of the Earth renders it possible to determine enormous distances by utilizing the rules of trigonometry. This 'long evolving distance' in the range of the radius of the universe can be converted into 'evolving time' by dividing it by the speed of light. Based upon this alternative dating method, at a figure of 3.1415 redshift, the universe may have been formed 13.7355 billion years ago. In the case of the inverse ratio of the angles, the size of the Sun and the planets equates to what is known.

Key words: cosmology parameters, galaxies, high redshift, Solar System, Earth, gravitation, general relativity, Euclidean geometry

1. Introduction

If motion due to a rapid expansion of space to the Earth is equated, it is possible to calculate the point in the past when the universe was formed. These motions complement the notion of an expanding universe, wherein every celestial body (galaxy) recedes from every other, the Earth included. In this manner the Earth along with its gravitation field forms a three dimensional expanding sphere. Since these motions relate to a time shift, the Theory of General Relativity and the rules of Euclidean geometry can be used to devise a dating method.

2. Determination of the size and age of the universe

Since there is a time shift behind redshift, it is also possible to calculate the time due to the rapid expansion of space in order to estimate the time interval involved. This can be solved using the basic laws of physics. Alterations in the acceleration or gravitation field results in changes in the frequency of light. This shift to a smaller frequency of the spectrum line can be demonstrated by the formula [1]:

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

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) equals the product of the acceleration of free fall (g) and the distance (h) between two points of different gravitational potential: $\Phi = g \cdot h$ [1]. Therefore:

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

If the same extent of redshift of a light beam measured at farther receding galaxies [2] is equated to the acceleration of the Earth (as a component of our galaxy), the above formula can be employed once again. When using Einstein's principle of equivalence and applying it in situations when an accelerated system and gravitational field exist together at the same time, an unknown distance (h) can be calculated pointing towards the origin of the universe (Fig.1).

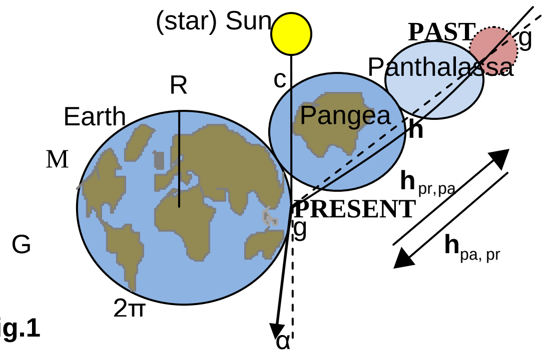

Fig.1

Fig.1 Looking back into the past. The distance ($h_{present,past}$, $h_{past,present}$) represented by a light beam grazing the surface of the Earth may possess two opposing directions pointing from the present to the past and from the past to the present. *

The distance (h) extending from the cosmos today towards the birth of the universe might be termed 'short evolving distance':

$$h = \frac{\nu - \nu_0}{\nu_0} \cdot \frac{c^2}{g_{stand}}, \quad (2)$$

where h is the unknown distance between two points of a gravitational field, $(\nu-\nu_o)/\nu_o$ is the redshift of the Earth as a component of high redshifted Milky Way Galaxy, c is the speed of light ($2.99792458 \cdot 10^8$ $m \cdot s^{-1}$) and g is the standard gravity of the Earth (9.80665 $m \cdot s^{-2}$).

As g's value is small around the surface of the Earth, h will be relatively long. Bent by g, the distance (h) represented by a light beam is long enough to calculate the radius of the sphere pointing towards the origin of the universe. This distance depends upon the ratio of the shift of the spectrum line, which matches to the motion of the Earth (Fig.2.a).

Selecting a value of $(\nu-\nu_o)/\nu_o$=3.141592 redshift of the Earth and the Milky Way (which is numerically equal to π) the calculated length is:

$$h = 3.141592 \cdot \frac{8.98755178 \cdot 10^{16} m^2 \cdot s^{-2}}{9.80665 m \cdot s^{-2}} = 2.879191 \cdot 10^{16}\, m. \quad (2.a)$$

(The use of this value of redshift is important for both mathematical and physical aspects, which will be made apparent through this article.)

The 'short evolving distance' (h) can be given (H) by the ratio of the entire plane angle (2π) and the deviating angle (α) of a light beam which passes near the Earth's surface as a result of the gravitational field: h/α=H/2π. With this 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) (Fig.2.b).

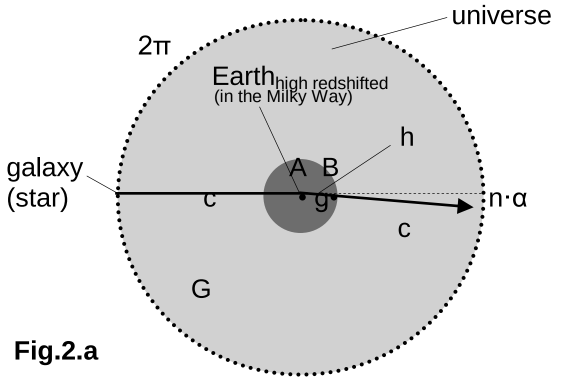

Fig.2.a

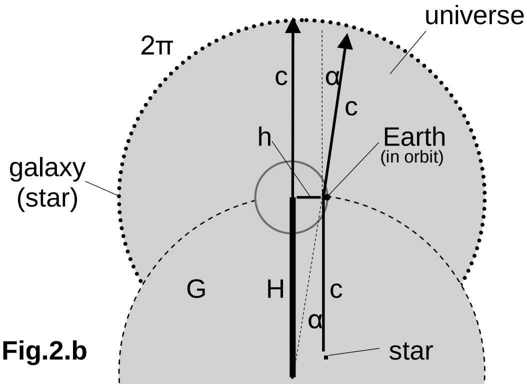

Fig.2.b

Fig.2 Relationship between the entire plane angle (2π) represented by the expanding 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 (**a**), or is comparatively static (α) while in orbit (**b**). *

The deviation angle (α) of a light beam which passes near a celestial body's surface according to Einstein's formula [1] can be calculated as:

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

therefore:

$$H_{universe} = \frac{\nu - \nu_0}{\nu_0} \cdot \frac{c^2}{g} \cdot \frac{2 \cdot \pi}{\alpha}, \quad (4)$$

and:

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

where $H_{universe}$ is the radius of the universe, $(\nu-\nu_o)/\nu_o$ 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 (3.141592), 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) and G is the gravitational constant ($6.673848 \cdot 10^{-11} m^3 \cdot kg^{-1} \cdot s^{-2}$) [3].

Numerically:

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

This can be demonstrated geometrically (Fig.3):

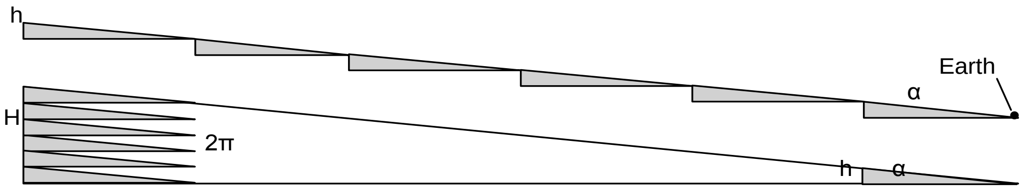

Fig.3 The trigonometric relationship is between the short (h) and long (H) evolving distances. H = n·h = (2π/α)·h. There is a substantial increase in length from the short evolving distance (h) to the radius of the universe (H). This may represent a quasi-flat universe (Ω≈1) bent by g (9,80665$m \cdot s^{-2}$), when Euclidean geometry is employed. *

The 'long evolving distance' (H) can be used to calculate 'evolving time' (T) 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 $12.994509779 \cdot 10^{25}$ m, which in time (T=H/c) is $4.3345010 \cdot 10^{17}$s. Since one year is $3.1556926 \cdot 10^7$s [4], this equates to 13.7355010 billion years, which is also the age of the universe according to our present knowledge [5].

3. Calculation of the size of the Earth

The 'short evolving distance' (h) can be given (h_h) by the ratio of the deviating angle (α) of a light beam passing near the Earth's surface as a result of the gravitational field (g) and of the entire plane angle (2π): $h_h/\alpha = h/2\pi$, therefore $h_h = h \cdot \alpha/2\pi$. With this ratio, a previously unknown length can be calculated which falls in the range of the radius of the Earth.

The deviation angle (α) of a light beam which passes near a celestial body's surface according to Einstein's formula is: $\alpha = 2\cdot G\cdot M\cdot c^{-2}\cdot R^{-1}$. Therefore:

$$h_{h(Earth)} = \frac{\nu-\nu_0}{\nu_0}\cdot\frac{c^2}{g_{Earth,s\tan d}}\cdot\frac{2\cdot G\cdot M_{Earth}}{c^2\cdot R_{Earth,mean}}\cdot\frac{1}{2\pi} = \frac{\nu-\nu_0}{\nu_0}\cdot\frac{G\cdot M_{Earth}}{g_{Earth,s\tan d}\cdot R_{Earth,mean}\cdot\pi}, \qquad (1)$$

where $h_{h(Earth)}$ is the radius of the Earth, $(\nu-\nu_o)/\nu_o$ is the ratio of redshift of the Milky Way (including the Earth), c is the speed of light ($2.99792458\cdot10^8 m\cdot s^{-1}$), G is the gravitational constant ($6.673848\cdot10^{-11} m^3\cdot kg^{-1}\cdot s^{-2}$), M is the mass of the Earth ($5.97219\cdot10^{24}$ kg), g is the standard gravity of Earth ($9.80665 m\cdot s^{-2}$), π is 3.141592 and R is the volumetric mean radius of the Earth ($6.371005\cdot10^6$ m) [6].

When this method is extended to such a large redshift of 3.141592, which can be measured at the farthest stars, substituting the values into the formula, the equatorial radius of the Earth can be calculated:

$$h_{h(Earth)} = 3.141592\cdot\frac{6.673848\cdot10^{-11}m^3\cdot kg^{-1}\cdot s^{-2}\cdot 5.97219\cdot10^{24}kg}{9.80665m\cdot s^{-2}\cdot 6.371005\cdot10^6 m\cdot 3.141592} = 6379.42\,km\,. \qquad (2)$$

4. Determination of the size of the Sun and the planets

The 'short evolving distance' (h) may be given (h_h) by calculating the ratio of the deviating angle (α) of a light beam which passes near the Sun or the surface of one of the planets as a result of their gravitational fields (g) and of the entire plane angle (2π): $h_h/\alpha = h/2\pi$, therefore $h_h = h\cdot\alpha/2\pi$. The angle of deviation (α) of a light beam which passes near a celestial body's surface, in this case the Sun or one of the planets, according to Einstein's formula is: $\alpha = 2\cdot G\cdot M\cdot c^{-2}\cdot R^{-1}$. Therefore:

$$h_{h(Sun)} = \frac{\nu-\nu_0}{\nu_0}\cdot\frac{c^2}{g}\cdot\frac{2\cdot G\cdot M}{c^2\cdot R}\cdot\frac{1}{2\pi} = \frac{\nu-\nu_0}{\nu_0}\cdot\frac{G\cdot M}{g\cdot R\cdot\pi}. \qquad (1)$$

When the redshift is 3.141592, substituting the values into the equation allow the radius of the Sun to be determined:

$$h_{h(Sun)} = 3.141592\cdot\frac{6.673848\cdot10^{-11}m^3\cdot kg^{-1}\cdot s^{-2}\cdot 1.9885\cdot10^{30}kg}{274\ \ m\cdot s^{-2}\cdot 0.696\cdot10^9 m\cdot 3.141592} = 0.69589\cdot10^9\ m\,, \qquad (2)$$

where $h_{h(Sun)}$ is the radius of the Sun, $(\nu-\nu_o)/\nu_o$ is the ratio of the redshift of the Sun as a component of the high redshifted Milky Way, c is the speed of light ($2.99792458\cdot10^8\ m\cdot s^{-1}$), G is the gravitational constant ($6.673848\cdot10^{-11}\ m^3\cdot kg^{-1}\cdot s^{-2}$), M is the mass of the Sun ($1.9885\cdot10^{30}$ kg), g is the surface gravity of the Sun ($274\ m\cdot s^{-2}$) and R is the volumetric mean radius of the Sun ($0.696\cdot10^9$ m).

Considering a redshift of 3.141592, the radii of small celestial bodies such as Mercury, Mars and Venus, in order of their increasing masses can be calculated as follows:

$$h_{h(planet)} = \frac{\nu-\nu_0}{\nu_0}\cdot\frac{c^2}{g}\cdot\frac{2\cdot G\cdot M}{c^2\cdot R}\cdot\frac{1}{2\pi} = \frac{\nu-\nu_0}{\nu_0}\cdot\frac{G\cdot M}{g\cdot R\cdot\pi}, \qquad (3)$$

where $h_{h(planet)}$ is the radius of a planet, $(\nu-\nu_o)/\nu_o$ is the ratio of the redshift of a planet as a component of the Milky Way, c is the speed of light ($2.99792458\cdot10^8\ m\cdot s^{-1}$), G is the gravitational constant ($6.67\cdot10^{-11}\ m^3\cdot kg^{-1}\cdot s^{-2}$), M is the mass of the same planet, g is the surface gravity of the same planet, R is the equatorial radius of the same planet [7],

$$h_{h(Mercury)} = 3.141592\cdot\frac{6.673848\cdot10^{-11}m^3\cdot kg^{-1}\cdot s^{-2}\cdot 3.301\cdot10^{23}kg}{3.70m\cdot s^{-2}\cdot 2.4397\cdot10^6 m\cdot 3.141592} = 2440.52\,km \qquad (4)$$

$$h_{h(Mars)} = 3.141592\cdot\frac{6.673848\cdot10^{-11}m^3\cdot kg^{-1}\cdot s^{-2}\cdot 0.64174\cdot10^{24}kg}{3.71m\cdot s^{-2}\cdot 3.3962\cdot10^6 m\cdot 3.141592} = 3399.13km \qquad (5)$$

$$h_{h(Venus)} = 3.141592\cdot\frac{6.673848\cdot10^{-11}m^3\cdot kg^{-1}\cdot s^{-2}\cdot 4.8676\cdot10^{24}kg}{8.87m\cdot s^{-2}\cdot 6.0518\cdot10^6 m\cdot 3.141592} = 6051.77\,km. \qquad (6)$$

At a redshift of 3.141592, the radii of larger planets, such as Uranus, Neptune, Saturn and Jupiter, in order of their increasing mass can be calculated as:

$$h_{h(Uranus)} = 3.141592 \cdot \frac{6.673848 \cdot 10^{-11} m^3 \cdot kg^{-1} \cdot s^{-2} \cdot 8.6816 \cdot 10^{25} kg}{8.87 m \cdot s^{-2} \cdot 2.5559 \cdot 10^7 m \cdot 3.141592} = 25556.92\, km \quad (7)$$

$$h_{h(Neptune)} = 3.141592 \cdot \frac{6.673848 \cdot 10^{-11} m^3 \cdot kg^{-1} \cdot s^{-2} \cdot 1.0242 \cdot 10^{26} kg}{11.15 m \cdot s^{-2} \cdot 2.4764 \cdot 10^7 m \cdot 3.141592} = 24755.14\, km \quad (8)$$

$$h_{h(Saturn)} = 3.141592 \cdot \frac{6.673848 \cdot 10^{-11} m^3 \cdot kg^{-1} \cdot s^{-2} \cdot 5.6836 \cdot 10^{26} kg}{10.44 m \cdot s^{-2} \cdot 6.0268 \cdot 10^7 m \cdot 3.141592} = 60285.45\, km \quad (9)$$

$$h_{h(Jupiter)} = 3.141592 \cdot \frac{6.673848 \cdot 10^{-11} m^3 \cdot kg^{-1} \cdot s^{-2} \cdot 1.8983 \cdot 10^{27} kg}{24.79 m \cdot s^{-2} \cdot 7.1492 \cdot 10^7 m \cdot 3.141592} = 71483.72\, km. \quad (10)$$

By invoking Newton's Law of Gravity, according to equation (3.1) is simpler as $g = G \cdot M \cdot R^{-2}$:

$$h_{h(celestial\ body)} = \frac{\nu - \nu_0}{\nu_0} \cdot \frac{G \cdot M}{g \cdot R \cdot \pi} = \frac{\nu - \nu_0}{\nu_0} \cdot \frac{G \cdot M}{\frac{G \cdot M}{R^2} \cdot R \cdot \pi} = \frac{\nu - \nu_0}{\nu_0} \cdot \frac{R}{\pi}. \quad (11)$$

If the redshift is 3.141592 (which may be simplified by π) and h_h=R, the radius of the Sun or a planet/moon may be determined. There is a direct relationship between the redshift and the radius of a celestial body which reach their real radius at a redshift of 3.141592. At instances when the redshift is greater than this, its size increases.

5. Summary

When considering a value of 3.141592 redshift, these calculations are precise enough to determine symmetrically the radius and age of the universe as well as the size of the Sun and the planets. From the information provided, it can be assumed that the methods described herein falls within the range of the results of other distance determination methods. This theory complements the notion of an expanding universe and furthermore, may be extended to determine the relative motion and location of the Earth in the cosmos.

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* Figures in 1-3 are non proportionate.