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Four-Dimensional Mathematics Creates the Super Universe

Ahti Rahikainen

Merkkipuuntie 2 L 39, Vantaa, Finland
Email: ahti.rahikainen@kolumbus.fi

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Abstract

In the common theory of the Universe, the redshift of the light wavelength from distant stars indicates the speed of the star. In this study, the model of the Universe is the surface volume of the four-dimensional sphere, and the shape of the Universe results in the most of the redshift of light wavelength. Therefore, there is no dark energy accelerating the Universe. The surface of the four-dimensional sphere is a volume, and this volume is a good model for the Universe. The surface volume of the four-dimensional sphere has been explained by a model of four-dimensional cube, within which the forming of surface volume can be easily shown. The model of four-dimensional cube containing six side cubes is ingenious for explaining the structure of the four-dimensional Universe, but it is not enough because the four-dimensional cube has not six side cubes, but eight side cubes. Therefore, in this study a better method has been created to construct the four-dimensional cube. Our three-dimensional Universe is the surface of the four-dimensional sphere Universe. The volume of our three-dimensional Universe is finite, and beneath it is the infinite volume four-dimensional Super Universe. Two important basic formulae have been derived: The surface volume of the four-dimensional sphere is $\pi^3 R^3$ in which R is the radius of the sphere, and the fourth-power volume of the four-dimensional sphere is $1/4\ \pi^3 R^4$. The volume of the Universe has been calculated $\pi^3 R^3 = 62 \times 10^{30}$ ly^3. Time as the fourth dimension of the space takes effect only near the speed of light, and therefore it has been ignored in this study.

Keywords

Mathematics of the Four-Dimensional Space, Structure of the Universe, Dark Matter, Dark Energy, Expansion of the Universe, Big Bang, Four-Dimensional Sphere, Four-Dimensional Matter, Atom Theory

1. Introduction

The present study continues the study of the publication [1]. Ananthaswamy has written in publication [2] that it is calculated that 69% of the total mass energy of the Universe is the dark energy that accelerates the Universe. The common knowledge is that the ordinary mass is only about 5%, dark matter that rotates the galaxies comprises 27%, and dark energy that expands the Universe is 68%. This evaluation of the dark energy is calculated from the measurements of the wavelength of light emitted from distant galaxies. The measurements have indicated that the wavelengths have become longer. The wavelength of light has shifted towards red. It is inferred that the redshift is the result of the speed of increasing distances of the far-off galaxies. The final conclusion is that the whole Universe is expanding at an increased rate of acceleration.

In the publication [3] "Galaxy Rotation in the Space of Four Distance Dimensions" the dark matter mystery has been solved in the Universe of four distance dimensions. The publication [3] presented a new idea that dark matter is located at the fourth distance dimension above the center of the galaxy. In the same manner as a structure of three dimensions can be drawn in the cross-sections of two dimensions, a structure of four dimensions can also be drawn in the cross-sections of two or three dimensions. Therefore, the determination of the location of dark matter in the fourth dimension is no problem. The study in the publication [3] contains the solution to the dark matter mystery of spiral galaxies by using the space of four distance dimensions x,y,z,x', in which x' is the fourth distance dimension. The four-dimensional mass M, which generates the main gravitation field of the galaxy, is located in the fourth dimension at the distance $x' = X'$ and the other dimensions are zero $x = 0$, $y = 0$, $z = 0$. The rotational speed distributions curves of the galaxy NGC 3198 have been presented in publication [4]. The speed distribution curve of the galactic halo in the publication [4] corresponds to the speed distribution curve of the four-dimensional mass in the publication [3]. In order to find out how well is the function of the four-dimensional model, the speed distribution curve of the four-dimensional mass was fitted into the galactic halo curve in the publication [4]. The conclusion was that the calculated distribution curve of the four-dimensional mass is a good match for the halo curve in the publication [4]. The accuracy of fitting was not very good, but good enough for this conclusion. Furthermore, four rotational speed distribution curves were calculated by using different values of the distance X', and in this manner, the different galaxy models of the publication [5] were obtained. This was further evidence that this solution to the dark matter mystery was correct.

The publication [1] "The Solution to the Dark Energy Mystery in the Universe of Four Distance Dimensions", solves the mystery of dark energy by using the structure of the four-dimensional Universe. The model of the Universe is the surface volume of the four-dimensional spherical Universe. This type of structure of the Universe creates the same kind of an accelerating redshift increase which has been measured. The cause of the redshift in this model of the Un-

iverse is its structure, and therefore, there is no accelerating expansion of the Universe. In order to prove this theory, the model of the surface volume of the four-dimensional Universe was constructed. The surface volume of the four-dimensional sphere is hard to comprehend. In the publication [1], the surface volume of three-dimensional cube was produced by two three-dimensional cubes with different sets of dimensions. As model of four-dimensional cube that was good, simple an easy to understand. But it had one shortcoming: This model had only six side volumes, while in reality there are eight side volumes. Therefore, a more complicated model was needed, and that model is in this study. The formula of the surface volume for the four-dimensional sphere in the publication [1] was derived with an approximate integration of summation method, which with luck coincided to be the right formula. In the present study the accurate formula is derived, and furthermore the formula for the fourth-power volume of the four-dimensional sphere was derived. The equation of the redshift caused by the theoretical Universe was solved, and the equation was fitted into the measured redshift in the real Universe. The measured redshift in the real Universe was obtained from the model of the expanding Universe in the publication [6]. A similar model of the Universe has been constructed by NASA [7]. In the study of publication [1] the function of the redshift was not completely correct, but however it was a big step forward in the study of the Universe. In the present paper the study of the publication [1] continues, and this new study yielded the Universe that was found to have constant speed of expansion until this point of time, and a Big Bang that was not very big. The speed of expansion of this new study is much less than that which is derived by the common theory of the Universe.

The measurements of the James Webb Space Telescope have shown that the age of the Universe 13.8 billion years cannot be correct. In publication [8] Jonathan O'Callaghan writes: The most startling explanation is that the canonical LCDM cosmological model is wrong and requires revision. "These results are very surprising and hard to get in our standard model of cosmology," Boylan-Kolchin says. "And it's probably not a small change. We'd have to go back to the drawing board."

In publication [9] it has been proven that the dark matter which rotates the galaxies cannot be in our three-dimensional Universe. The dark matter that rotates the galaxies is the four-dimensional matter in the fourth distance dimension, and its form is a super massive blackhole.

The purpose of this study is to create the four-dimensional mathematics to the four-dimensional super Universe, and to test how the theory fits into redshift measurements.

2. The Universe in Four Distance Dimensions

In the following, a simple method has been presented to do calculations in the space of four distance dimensions. In **Figure 1**, a box is drawn in the three-dimensional space *x,y,z.* the same box is drawn in the two-dimensional space

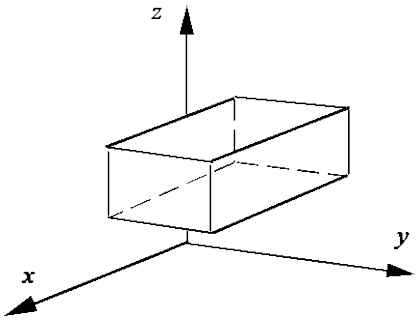

Figure 1. A box is drawn in a coordination system of the three dimensional space *x,y,z.*

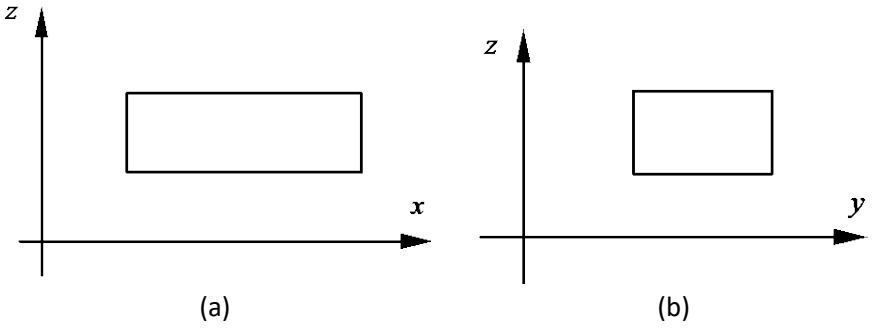

Figure 2. (a) The box is drawn in a coordination system *x,z;* and (b) The box is drawn in the coordination system *y,z.*

z,x (Figure 2(a)) and it is drawn in the two-dimensional space *z,y* (Figure 2(b)). Here, it is seen that a structure of three dimensions can be drawn in a two-dimensional coordination system. In the same manner, a structure of four dimensions can be drawn in coordination with the three dimensions *x,y,z, y,z.x′, x,z,x′, x,y,x′.* If the structure is simple, it is possible that only two-dimensional co-ordination is needed to determine the structure.

Figure 3 shows the technique of constructing the four-dimensional cube. In Figure 4(a), there is a three-dimensional *x,y,z* cube. By determining its position (for instance $x' = 0$) it is a section of the four-dimensional *x,y,z,x′* cube. In Figure 4(b), there is a *y,z,x′* cube, $x = 0$, which is also a section of the same four-dimensional *x,y,z,x′* cube. Both cubes have the same side on the *y,z* plane. Therefore, the volume between the two dark surface sides of the cube (Figure 4(b)) is in the cube (Figure 4(a)) in the area of the dark surface side on the *y,z* plane, and the whole *x'* axis is in the zero point of the coordinate axes. All six sides of the cube (Figure 4(a)) can be determined to have the same volume, and the total volume of the six sides of the cube is six times the volume of the cube. Except these six side cubes, the four-dimensional *x,y,z,x′* cube has two other side cubes, *x,y,z* cube, $x' = 0$ and $x' = 1$, and they are (Figure 4(b)) the two dark sides of the *y,z,x′* cube. The four other side cubes (Figure 4(b)) are the same as (Figure 4(a)), so that the four-dimensional cube has eight three-dimensional side cubes. The construction of the whole four-dimensional cube is done so that the three-dimensional *x,y,z* cube (Figure 4(a)) is determined to be $0 \le x' \le 1$. In the same manner, the

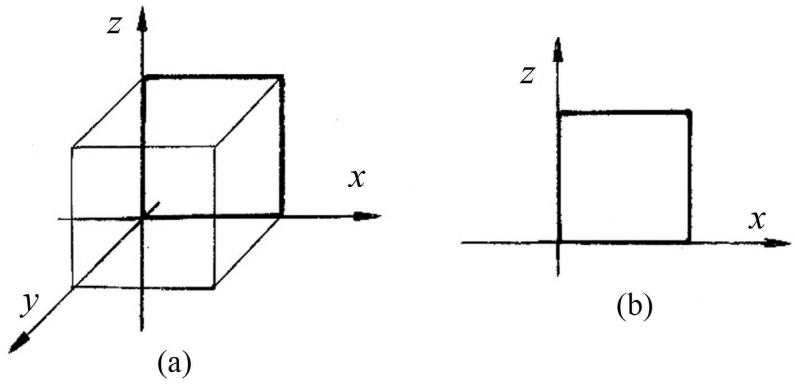

Figure 3. (a) There is a cube drawn in a coordination system of the three-dimensional space *x,y,z*, and (b) There is its cross-section on the *x,z* plane. The thick-lined square in the cube is the location of the cross-section. The cube on the figure (a) is located on the figure (b) in the square so that the volume of the cube is the area of the square on the figure (b), and the four sides of the cube, which are at a right angle to the cross-section square, are the four thick lines of the square on the figure (b). This technique is used in the following mathematics of the four-dimensional space.

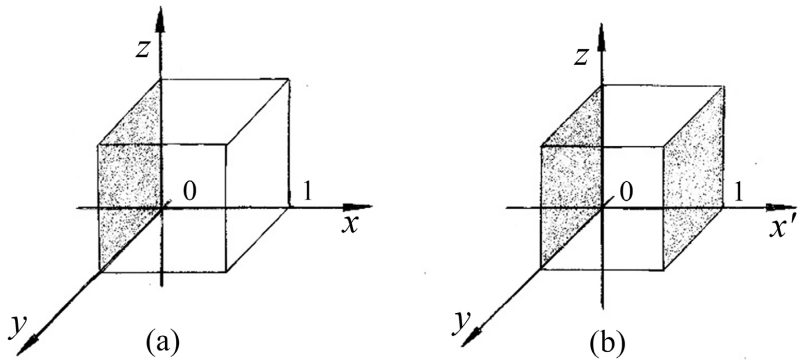

Figure 4. The four-dimensional cube is constructed by using the two three-dimensional cubes.

x,y,z section of the four-dimensional *x,y,z,x′* sphere has a surface area which is the three-dimensional volume. In this study, this type of surface area is a model of the Universe, and it produces a good fitting with the redshift measurements, proving it to be right.

Volume of the Universe:

1) In Figure 4 is presented the principle of the four-dimensional sphere Universe. In the same manner as in Figure 4 the four-dimensional *x,y,z,x′* cube has eight surface side volumes, the four-dimensional sphere has a similar surface volume, which in this study is a model of the Universe.

2) The *x-z* cross-sections are the same in the figures a and b in Figure 5.

3) The whole surface area of the three-dimensional sphere in Figure 5(a) is located at the circumference of the *x–z* cross-section of the four-dimensional sphere in Figure 5(b). This is by using the coordination system of two angles and the distance from the center *R*, and the technique of Figure 3. The thick circumference line indicated area.

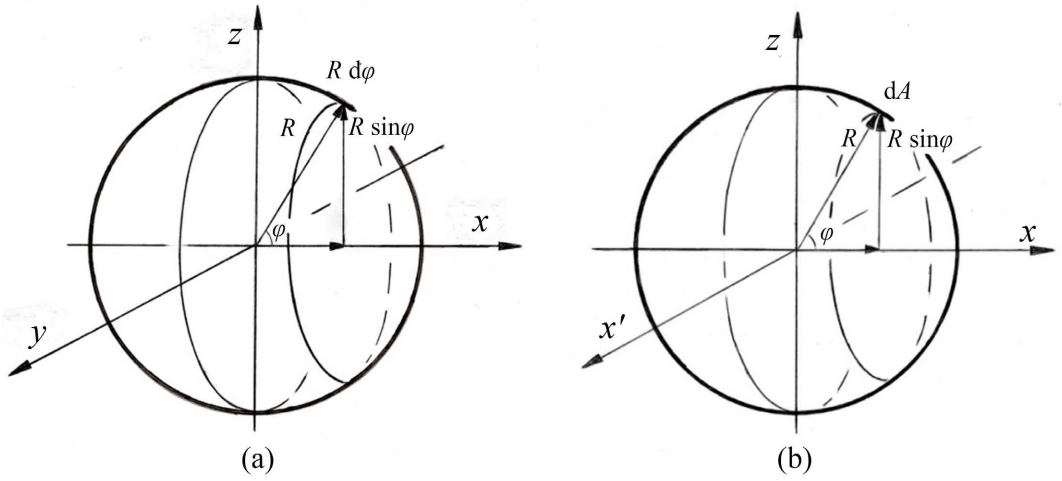

Figure 5. In the figure is two three-dimensional sections *y,z,x* and *x,z,x′* of the four-dimensional *x,y,z,x′* sphere. The surface of the four-dimensional sphere at the distance *R* from the center is the model of the Universe. (a) The whole surface area of the sphere is transformed into the thick circle line at the radius *R*. (b) The surface volume of the sphere is calculated by rotating the infinitesimal area d*A*, Equation (1), half a rotation along the solid circle line.

4) The area within the length of the circumference $R\mathrm{d}\varphi$ in **Figure 5(a)** is

$$\mathrm{d}A = 2\pi R\sin\varphi R\mathrm{d}\varphi = 2\pi R^2\sin\varphi\mathrm{d}\varphi \tag{1}$$

5) Half a rotation (solid line) of the area dA is the increment of the volume in **Figure 5(b)**

$$\mathrm{d}V = 2\pi R^2\sin\varphi\mathrm{d}\varphi\cdot\pi R\sin\varphi = 2\pi^2R^3\sin^2\varphi\mathrm{d}\varphi \tag{2}$$

6) The volume of the Universe

$$\frac{1}{2}\int_0^V \mathrm{d}V = \int_0^{\pi/2} 2\pi^2R^3\sin^2\varphi\mathrm{d}\varphi \tag{3}$$

$$V = 4\pi^2R^3\int_0^{\pi/2}\sin^2\varphi\mathrm{d}\varphi \tag{4}$$

$$V = 4\pi^2R^3\frac{1}{2}\int_0^{\pi/2}(1-\cos 2\varphi)\mathrm{d}\varphi \tag{5}$$

$$V = 4\pi^2R^3\frac{1}{2}\frac{\pi}{2} = \pi^3R^3 \tag{6}$$

The calculation of the four-power volume of the four-dimensional sphere is performed in this manner. The three-dimensional volume of the surface area of the four-dimensional sphere is Equation (6)

$$V = \pi^3R^3$$

The calculation of the four-power volume of the four-dimensional super Universe is presented in **Figure 6**. The outer circle is our three-dimensional Universe, the volume of which is finite, and it can be calculated with Equation (6). Beneath it is the four-dimensional Super Universe, the volume of which is infinite, and its fourth-power volume can be calculated with Equation (8).

$$\mathrm{d}W_2 = \pi^3R^3\mathrm{d}R \tag{7}$$

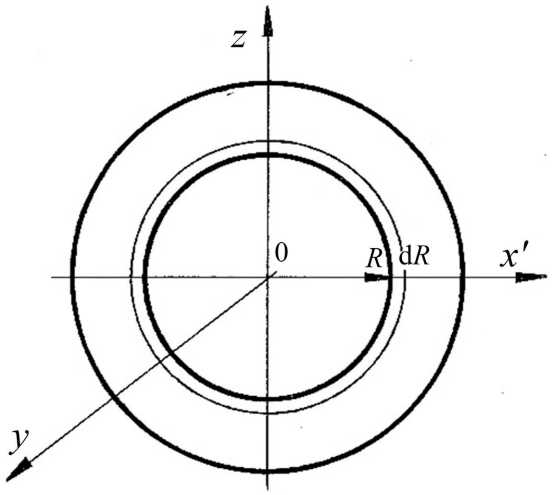

Figure 6. The outer circle, the surface volume of the four-dimensional sphere, is our three-dimensional Universe. Beneath is the four-dimensional Super Universe, and the calculation of its fourth-power volume is presented in the cross-section of the sphere. In the Super Universe there are massive four-dimensional Black Holes, the mass of which increases as the distance from the surface volume increases, publication [9].

and the whole four-power volume is the integral

$$W_2 = \int_0^R \pi^3 R^3 \mathrm{d}R = \frac{1}{4}\pi^3 R^4 \tag{8}$$

3. Red Shift Calculation

The demonstration that there is no dark energy expanding the Universe has been proven as follows: the redshift of light emitted from distant galaxies is the result of the structure of the Universe of four distance dimensions. **Figure 7** presents the four-dimensional x,y,z,x' sphere as its two dimensional cross-section x,z. The model of the Universe is the cover volume of the fourth-dimensional sphere at the distance R from the center. The photon of light has been emitted at point A, and it has been observed at point B. The angle between the points A and B is φ radians. At point A the photon's energy is E, and as the photon travels to point B, its Energy is $E\cos\varphi$. This is because all the three surface volume dimensions must be at a right angle to the radius vector R of the four-dimensional sphere. Therefore, it can be concluded that the photon, which has been emitted at point A, as it travels to point C, will completely disappear. This is a theory, but the next part of this chapter will demonstrate that the theory functions correct in the calculations of the redshift of light in the Universe.

The increase of the wavelength in the Universe was calculated from the decrease of the energy of the light photon. Basic equations of light are speed of light and energy of the light photon.

$$c = \lambda_0 \cdot f$$

$$\lambda_0 = hc/E$$

The equation of the wavelength of light in **Figure 7**

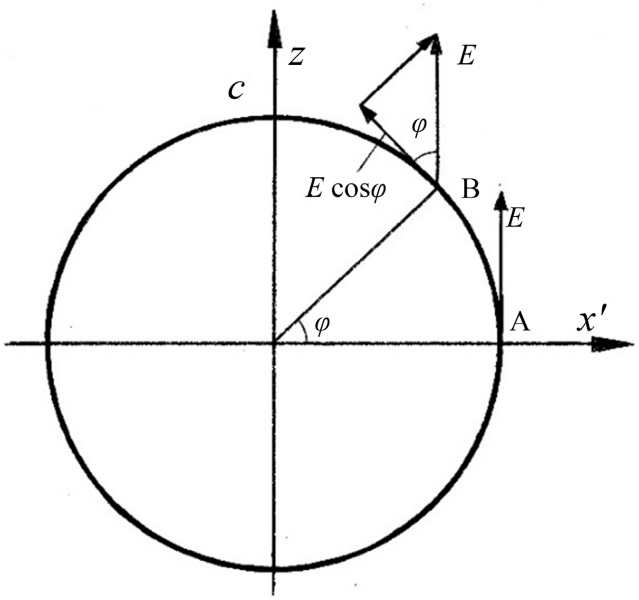

Figure 7. This figure is a two-dimensional x, z cross-section of the four-dimensional x,y,z,x' sphere. The model of the Universe is the three-dimensional volume surface of the four-dimensional sphere. The three-dimensional volume is presented as the circumference of the radius R. As the light photon travels from point A to point B, its energy decreases from E to $E\cos\varphi$.

$$\lambda = \frac{hc}{E\cos\varphi} \tag{9}$$

in which

h, Planck's constant.

c, Speed of light.

E, Photon's energy at point A in Figure 7.

$E\cos\varphi$, Photon's energy at point B.

λ_0, Original wavelength.

λ, Redshift wavelength.

The measured wavelengths of the light from distant stars have lengthen, and the common theory is that this fact indicates the expansion of the Universe. According to this theory, the lengthening of the wavelength is directly proportional to the change of the distance of the distant star, and therefore, the redshift curve indicates also the expansion curve of the Universe. In order to find out how well the theory that the redshift is the result of the shape of the Universe functions, the change of the wavelength in Equation (9) was fitted into the model of the Universe according to the redshift measurements. The measurements were published in scientific journals as well as in newspapers around the world, and here the model of the Universe was used in the publication [6]. This model of the Universe presents the increase of the theoretical radius of the Universe, which is directly proportional to the increase of the wavelength of the measured light from distance stars. The equation of the wavelength of light, Equation (9), fitted this model of the Universe, but was not good enough, and therefore, a compo-

nent of the expansion of the Universe was added to the equation, and then it did match.

In Figure 8, the wavelength at the zero point is A = $\lambda_0 = hc/E$, and in Figure 7 the corresponding zero point is A. Then the light travels 13.8 years, and in Figure 8 the wavelength is B, which in Figure 7 corresponds to the point B. If the wavelength of light at the zero point is for example 500 nm, then according to the scale of the wavelength axis, the wavelength A = 500 nm corresponds to the wavelength B = 1200 nm. The redshift in the Universe is the increase of wavelength according to the equation $\lambda - \lambda_0$. The redshift has two components: the first component is the effect of Equation (9) in Figure 7, and the second component is the effect of the approximate expansion speed of the Universe. In Figure 8 the equation of the approximate measured wavelength in the Universe is

$$\lambda = \frac{hc}{E\cos\varphi} + 0.0033\frac{hc}{E}\varphi \tag{10}$$

In Figure 9 the measured wavelength is λ_m, Equation (10), and the wavelength according to Equation (9) is λ, which is the effect of the turning of the Universe's dimensions. The first part of Equation (10) is the effect of the shape of the Universe on the red shift, and the most of redshift is the result of this turning effect of the Universe's dimensions, Figure 7. The second part of the Equation (10) is the effect of the expansion of the Universe, and this expansion is much less than that which is predicted by current theory of the Universe's expansion, and it has no acceleration at all. The matching of Equation (10) to the measured wavelength curve of publication [6] means that the theory of the Universe appears to be correct. The range of the wavelength measurements are so large that the fitting cannot be coincidental. A further analysis of the expansion speed of the

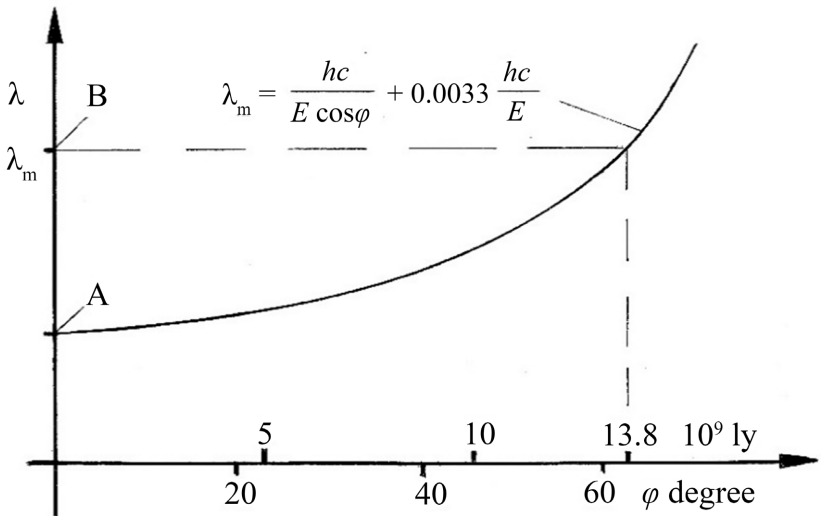

Figure 8. The vertical axis λ is the measured wavelength of the light photon emitted from distant star, beneath the horizontal axis is the angle of the Universe φ (Figure 7), and above the horizontal axis is the corresponding distance in light years. The curve λ_m is the fitting of Equation (9) into the measured wavelength of light. The fitting matches the measured wavelength with an additional term 0.0033 hc/E.

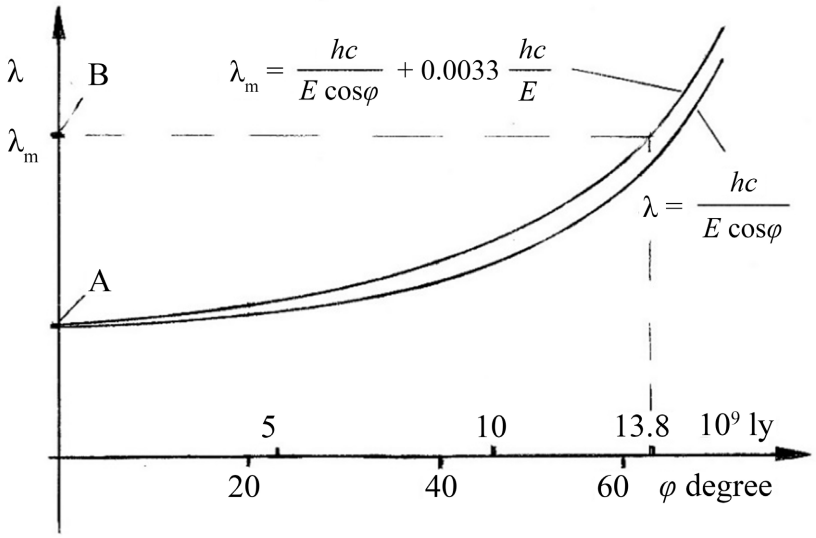

Figure 9. The measured wavelength is λ_m, Equation (10), and the wavelength of Equation (9) is λ, which is the effect of the turning of the Universe's dimensions (**Figure 7**). The difference of these wavelengths is directly proportional to the expansion speed of the Universe. The difference of the wavelengths $\lambda_m - \lambda$, the expansion speed, indicates that there has been at some point the Big Bang. The expansion speed has no acceleration, and it is much less than the expansion speed concluded by the current theories.

Universe is in **Figure 9**. The expansion speed of the Universe in publication [6] by The Swedish Academy of Science indicates that our time is 13.8×10^9 years after the Big Bang at which point in time, the speed is at a high rate of acceleration. This is because the mass of the whole Universe is in the point of the Big Bang, and therefore it cannot move, while our galaxy moves. The Universe of the four-dimensional sphere is different. Our galaxy and the galaxies of the Big Bang are both at the surface area of the sphere of the Universe, and they are both moving in opposite directions. Therefore, the galaxies of the Big Bang move and our galaxy also move. In **Figure 9** the zero point is our time.

The radius of the Universe R in **Figure 7** can be calculated based on **Figure 8**. The angle φ between points A and B in **Figure 7** is in **Figure 8** the angle φ beneath the horizontal axis, and its corresponding distance above the horizontal axis in **Figure 8** is the distance A – B in **Figure 7**. The maximum distance of measurement is 13.8×10^9 ly which corresponds to the angle $\varphi = 62.7^\circ$ in **Figure 8**, and the angle $\varphi = 360^\circ$ corresponds to the distance 79.2×10^9 ly which is the circumference of the four-dimensional sphere, and the radius of the Universe is $R = 79.2 \times 10^9$ ly$/2\pi = 12.6 \times 10^9$ ly. Calculation of the Universe using Equation (6)

$$V = \pi^3 R^3 = \pi^3 \times 12.6^3 \times 10^{27}\ \text{ly}^3 = 62 \times 10^{30}\ \text{ly}^3 \tag{11}$$

The volume of the center sphere of the Universe is

$$\frac{4}{3}\pi R^3 = \frac{4}{3}\pi \times 12.6^3 \times 10^{27}\ \text{ly}^3 = 8.38 \times 10^{30}\ \text{ly}^3 \tag{12}$$

The volume of the Universe divided by the volume of the center sphere of the

Universe is 62/8.38 = 7.4. This result can be compared with the corresponding value of the four-dimensional cube. If the center cube of the *x,y,z* space on the left side of **Figure 4** had a volume of 1 m^3, the six sides of the center cube would have a volume of 6 m^3. On the right side of **Figure 4** there are two three-dimensional side cubes (the two dark sides) and the four other sides of the cube at the right side are the same as the sides of the cube at the left side. Therefore, the volume of the three-dimensional side cubes around the four-dimensional cube is 8 m^3. The volume of the sides around the four-dimensional cube divided by the volume of the center cube is 8/1 = 8. The ratio for the Universe 7.4 appears to be correct.

4. Conclusions

The study of publication [1], "The Solution to the Dark Energy Mystery in the Universe of Four Distance Dimensions", had a deficiency, it did not properly prove that the four-dimensional sphere has eight side volumes. This problem has been solved in this study. In addition, two important formulae have been derived: the surface area of the four-dimensional sphere is $\pi^3 R^3$ in which R is the radius of the sphere, and the fourth-power volume of the four-dimensional sphere is $1/4\ \pi^3 R^4$. Furthermore, the redshift calculation has been revised. Therefore, the solution to the dark energy mystery has been competed in this study. The fact is that the wavelength of light from distant galaxies has shifted towards red, and thus it has been concluded in the common theory of the Universe that the Universe is expanding. The beginning of the Universe is at the point of the time where the red shift is so large that light disappears, and accordingly the age of the Universe seems to be 13.8×10^9 light years. The problems of this model of the Universe have been presented in publication [2]: "These twin tensions—between expectations and observations, between the early and late universe—may reflect some deep flaw in the Standard Model of Cosmology." The hard fact is that the age of the Universe must be more than 13.8×10^9 light years. Many calculations of the Universe have implied much longer age. In publication [5] it has been shown that a star (speed 150 km/s) rotates around the center of the galaxy ($R = 5 \times 10^{20}$ m) within the time of the age of the Universe 21.5 rotations, and within so few rotations the whole complex structure of the galaxy cannot be created by evolution. Therefore, it can be concluded that the redshift of the wavelength of light cannot be the result of the speed of expansion of the Universe, but it must be something else.

In the study of publication [1] the redshift is due to the shape of the Universe. This theory has been proved with the procedure of **Figure 10**, in which the progress of research and testing the hypothesis is presented in the same manner as it is in Karl Poppers's book [10]. The first step, the hypothesis, is that the redshift measurements from distant galaxies are due to the shape of the four-dimensional Universe, and also in some degree due to the expansion of the Universe. The second step is derivation of the equations. This phase of proceeding involves

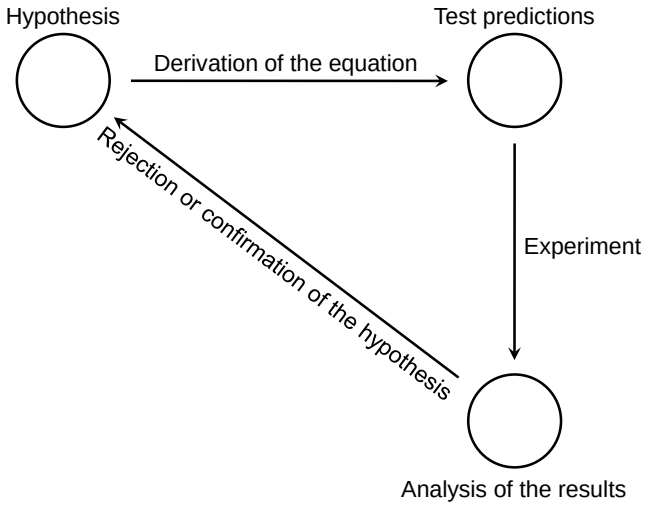

Figure 10. The testing of the four-dimensional sphere Universe. The hypothesis is that the measured redshift of the wavelength of the light is the result of the shape of the Universe. The diagram follows the method of Karl Popper [10].

the derivation of mathematics of the four-dimensional space. In the three-dimensional section of the four-dimensional space, area indicates volume and line indicated area. At this stage, the equation of the light photon travelling in the spherical surface volume of the four-dimensional Universe can be derived. The third step is the test prediction which is that the equation of the light photon travelling in the surface volume of the four-dimensional Universe is the same as the measured redshift values in the Universe. The fourth step is the measurements, which can be calculated based on the model of the Universe in publication [6]. In the theory of the Universe in this study, it is presumed that the redshift of the wavelength of light is directly proportional to the curve of the largeness of the Universe presented in publication [6]. Therefore, the measured wave length of light is directly proportional to the largeness of the Universe which is the model of the Universe in publication [6]. A perfect fitting to the model of the Universe in publication [6] was obtained. The fifth step is the analysis of the result. In the analysis, the measured wavelength with real red shift is compared to the wavelength with theoretical red shift which is due to the shape of the Universe. The fitting yielded the Universe of a constant expansion at this point of time. Therefore, it can be concluded that there has been Big Bang which is not very big. In this model of the Universe, dark energy, which is calculated, in the common studies of cosmology, to be 69% of the total mass energy of the Universe, does not exist.

The final step is the rejection or confirmation of the hypothesis, and it was found that the equation of the measured wavelength of light with real redshift fitted the theoretical wavelength of light with presumed red shift due to the shape of the Universe. The first round of the progress triangle is publication [3] "Galaxy Rotation in the Space of Four Dimensions", the second round is publication [1] "The Solution to the Dark Energy Mystery in the Universe of Four Distance

Dimensions", the third round is the publication [9] "Theory to the Mystery of the Super Massive Black Holes", and the fourth round is this study "Four-Dimensional Mathematics Creates the Super Universe".

This method of progress was used for the solution to the Hill's equation. The famous British Nobel laureate A. V. Hill invented this equation in 1938. Within five rounds that problem was solved, publications [11] [12] [13] [14] and [15]. The experiments of this study consist of forearm and whole arm rotations upwards and downwards at maximum force and power. The arm rotations were recorded a special motion camera system which shows the movement as a series of object images in one photograph. According to the theory the movement proceeds as follows: start of movement, movement proceeds at constant maximum force, movement proceeds at constant maximum power, stopping of motion. With the procedure of **Figure 10**, the theory was proved to be correct.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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List of Variables

Dimensions of ordinary space	x,y,z
Fourth distance dimension	x'
Four-dimensional mass	M
Distance of the four-dimensional mass from center of galaxy	X'
Speed distribution component of the four-dimensional mass	v_M
Radius of the four-dimensional spherical Universe	R
Coordination angle of the four-dimensional spherical Universe	φ
Distance, Light years	ly
Time, Years	t
Energy of light photon	E
Planck's constant	h
Speed of light	c
Volume of the four-dimensional spherical Universe	V
Area of the surface of the sphere Universe	A
Fourth power volume of the sphere Universe	W
Original wavelength	λ_0
Redshift wavelength	λ
Measured wavelength	λ_m