ANOTHER PATH TOWARDS THE TRUTH ABOUT HOW THE UNIVERSE WORKS?

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ABSTRACT

In the article titled “Each Point of Space in Expansion is the Preferred Reference Frame for Any Object Transiting to that Point”, published on March 30th, 2017, I presented a theory that demonstrates the existence of the Preferred Reference Frame and at which speed the Earth moves relative to it. I also stated that further theories about various phenomena of the Universe, may be derived from this theory and that therefore, opens a new path towards the truth about how the Universe works.

And now, with this article, I will try to begin to walk the above path, exposing some hypotheses explaining various phenomena of the Universe, in a way compatible with said theory.

Here are, in short, these hypotheses.

The Universe is exclusively composed of an infinity of space quanta, which tend to expand and thus cause it to expand, as a consequence.

Matter manifests on sets of space quanta, which are compressed and thus enable the neighbouring quanta, and later the quanta further apart, to expand further.

Gravity is the effect of the fact that each object tends to move towards the least compressed space quanta and, therefore, towards other objects.

Speed of light depends on the degree of compression of space quanta in the places (or points) in which it transits, meaning that the greater the compression, the higher the speed.

But since also clocks move more or less rapidly according to their degree of compression, speed of light results always the same at any place.

Therefore, in the past, when the degree of compression of space quanta was greater, speed of light was also greater.

Cosmological redshift is due to the speed of the place in which the celestial object receiving photons, is moving, compared to the place in which the celestial object emitting it, has moved, in a Universe in decelerating expansion. In support of this hypothesis, I present two tables that simulate the journey of the photons of a high-redshift galaxy and that of CMBR photons.

I also present a formula for calculating the apparent brightness of high-redshift celestial objects, which I believe being more compatible with the observations than that supported by the scientific community, and which allows it to be used as a factor to calculate the speed of the expansion of the Universe.
Keywords: Preferred Reference Frame, CMBR, Cosmic Microwave Background Radiation, space quanta, expansion of the universe, General Relativity, speed of light, redshift, photons, type Ia supernovae, dark energy, dark matter.

1. INTRODUCTION

In the article titled “Every Point of Space in Expansion is the Preferred Reference Frame for Any Object Transiting to that Point” (8) I published on March 30th, 2017, I presented a theory that demonstrates the existence of the Preferred Reference Frame and at which speed the Earth moves relative to it. I also stated that further theories about the various phenomena of the Universe, may derive from it and that, therefore, this theory opens a new path towards the truth about how the Universe works. Now, with this article, I intend to begin to walk that path. I will therefore expose some hypotheses explaining various phenomena of the Universe, such as its expansion, gravity, speed of light and cosmological redshift, in a way compatible with said theory.

I would also like to point out that I will in many cases speak in the present tense instead of the conditional, not in order to express any certainty, but for simplicity of exposure.

This is the second version of the article, that above all presents important changes on the theme of the apparent brightness of celestial object with high-redshift, compared to the first one (paragraphs 3.3 and 3.5).

2. A UNIVERSE OF SPACE QUANTA

2.1 Expansion of the Universe

The Universe may be imagined as an immense sphere composed exclusively of an infinity of tiny indivisible particles of an equal amount of space, which, from now on, I will call “space quanta”.

By “space” I mean a continuous substance, therefore not made up of particles (which means that the very small space quanta are not made up of even smaller particles) that tends to expand. In practice it is the only real substance composing the Universe and, therefore, it must be very different from the matter we are able to observe.

At the time of the so-called Big Bang, the quanta were extremely compressed. Therefore they immediately began to expand, causing the expansion of the Universe, which is still ongoing.

The speed of this expansion tends to be uniform in any place (from now on, I will use the word “place” instead of “point”, that I have used in the previous article) in the Universe.
This means that each place moves away from any other place at a speed that tends to depend on distance. The more distant they are, the faster they move away from each other.
So every place can be considered as a center of the Universe, from which all the other places move away.

As I have written, the speed of the space expansion tends to be the same and, therefore, it isn't literally the same in that space expansion between celestial objects is affected also by matter, which is not distributed in an exactly uniform way throughout the Universe, as I shall explain later.

2.2 Gravity

There is no vacuum among the space quanta. Therefore if one single quantum compresses and shrinks in size, the adjacent quanta can/must increase in size and thus expand.

Matter is made up of space quanta.

The elementary particles of the so-called standard model of quantum physics, are physical phenomena that, amongst other things, compress space quanta. Therefore a material object contains a huge number of sets of compressed space quanta, that increase the average compression of the space quanta composing it.
Consequently the quanta adjacent to the object, i.e. those situated in the front line (first liner), can/must expand further due to the reduction in size of the quanta of the object. However they are later partially recompressed, because the second-liner space quanta, which are now more compressed because they have not undergone any expansion, expand in turn towards the first-liner space quanta. Later also the quanta in the third line, yet compressed, expand towards those in the second line, and so on, until the quanta ever more distant from the object.
In other words, matter squeezes large amounts of space quanta and allows the neighbouring quanta, and then gradually those farther away from them, to expand more.
The result is an environment in which the space quanta situated in the vicinity of matter, are more expanded than those located far from it.
The quanta composing matter are more compressed than the external ones. However, for the sake of precision, we should say that the average compression of the quanta composing matter, is greater than the average compression of those outside of it. This is because atoms include numerous quanta that could even be more expanded than those outside of it, i.e. those between the nuclei and the electrons, in that they are located closer to the elementary particles.

The sets of quanta composing the atoms, tend to expand in the direction of the most expanded (or less compressed) quanta, as they encounter less resistance to their expansion. Therefore since material objects are made up of atoms, they expand in the direction of the most expanded quanta and thus in the direction of other objects. For this reason every object tends to move towards other objects.
To move an object in the opposite direction than the one in which it would tend to move, i.e. from a point where the quanta are more expanded (e.g. from ground level) to a point where they are less expanded (e.g. 1 m from the ground), a certain force must be applied to gradually increase the compression of the sets of quanta composing the atoms of the object, in order for them to oppose to the greater pressure of the quanta they encounter as they approach the higher level.

However, more precisely, we should not think of quanta as moving from one point to another, but of quanta compressions as moving from one point to another. Or, better yet, to physical manifestations occurring in different points in space.

Consequently an object of one meter in height, has its atoms situated in a higher position at a higher mean compression rate, compared to the lower atoms, as the quanta making up the higher atoms, encounter more resistance to their expansion, compared to the quanta in the lower atoms. Therefore, assuming that the object has the shape of a cube, it will have a larger lower surface area than the upper one, because the compression of the quanta situated near the lower surface, is smaller than that of the quanta closer to the upper surface. However, if measured, the two surfaces would still appear to be the same, as the atoms of the measuring instruments themselves, are subject to expansion of the neighbouring quanta.

All of this justifies gravity in a different but similar way to that hypothesized by General Relativity (GR), in that matter does not bend space-time, but increases the expansion of space quanta, and an object is not guided by space-time curvature, but it is guided by space quanta expansion.

In short, space-time curvature is thus replaced by space quanta expansion. Therefore the mathematics envisaged by GR, should also apply to this hypothesis.

Before concluding this topic, I would like to mention the issue of the combination of the native expansion of space quanta, causing celestial objects to displace apart, with the expansion due to the presence of matter, making them move close to each other.

### 2.3 Speed and frequency of photons, variables

It was experimentally observed that

1. **Gravity affects the flow of time and photon wave frequency and therefore their wavelength (2).**

However, based on this hypothesis,

2. **Gravity is caused by space expansion.**

Consequently, it can be stated that

3. **Space expansion affects the flow of time** (the more space expands, the more clocks slow down) **and photon wave frequency and therefore their wavelength.**

However, since it also results that

4. **Photon speed remains unvaried regardless of which place it is measure and, therefore, at any time flow speed,**
it results that

(5) also photon speed adapts to space expansion, and namely photons move either faster or slower depending on the level of space expansion.

Therefore, in the past,

(6) When space of the Universe was much less expanded, photons moved at a much higher speed than the present, although hypothetical clocks of the time would still measure it at 300,000 km/s (as they would measure time faster because space was less expanded).

In other words, as the Universe expanded, photon speed dropped, although hypothetical clocks would have slowed down and therefore still measured photon speed at 300,000 km/s.

As shown at point 3, space expansion affects photon wave frequency. More precisely it slows down wave frequency although hypothetical clocks would not be able to detect it, because expansion also slows them down proportionally.

If this were not the case, the frequency of the photons emitted by a given type of source (e.g. hydrogen) and measured by the same clock, would be higher on the top of a mountain (where space is less expanded) than at its foot (where space is more expanded).

Therefore, in the past, when space was less expanded, the frequency of the photons emitted by a given type of source (e.g. hydrogen), was much greater than now and later slowed down, as the Universe became expanded. However, hypothetical clocks would have not been able to detect any deceleration in frequency, as they too would have slowed down proportionally.

Essentially, those photons may themselves be seen as clocks.

In conclusion space expansion does not let them measure, at least directly, any deceleration in photon wave frequency and, consequently, not even the cosmological redshift.

3. MODEL OF THE UNIVERSE

The deceleration in photon wave frequency due to space expansion and the subsequent increase in their wavelength, is known by the Scientific Community (SC) as “cosmological redshift”.

However, in the previous paragraph, I argued that along with said deceleration in frequency, also a deceleration of clocks occurs proportionally and therefore no redshift is detected.

Hence, what could cause the high redshift value detected in photons coming from very distant celestial objects?

As I will demonstrate below, it is due to the recession speed of the place where the celestial object receiving the photon is moving, compared to the place where the celestial object emitting it, was moving.

Hence said, redshift is still due to space expansion, as the expansion stretches the distances between different places in the Universe, thus increasing the recession speed of places in the Universe, but only indirectly.
In support of this hypothesis, I am presenting two simulation tables:
- the first one, which simulates the journey of the photons of a high-redshift galaxy, also using the apparent brightness of high-redshift celestial objects;
- the second, which simulates the journey of the Cosmic Microwave Background Radiation (CMBR).

3.1 Exemplification of the model of the Universe

In order to better understand the two simulations mentioned above, I will introduce them with a simple exemplification.

Let us imagine the expanding Universe as a large rubber sphere constantly inflating, with numerous points marked on its surface (identifying places in the space).

Let us imagine a galaxy as a lorry moving on the surface of our sphere at a speed of 0.1 m/s, remaining in the vicinity of a point. Now let us imagine Earth as another lorry also moving near a point, at a speed of 0.1 m/s. Because of the expansion of the sphere, the two points above move apart from one another at a certain speed. Consequently the two lorries move away from one another at the same speed (more or less in function of the direction of their motion).

Now let us imagine photons as a set of cars moving on the surface of the sphere at constant speed, e.g. 1 m/s. We will now note that, due to the expansion of the sphere surface, the points move apart from one another. Therefore each car will move at a speed of 1 m/s relative to the point over which it passes, however at a different speed compared to the other points marked on the sphere surface. If a car starts from a point in the sphere (marking the place where the galaxy is moving) to reach another point (marking the place where Earth will move upon its arrival), at the start it will move at a speed of 1 m/s relative to the starting point, however lower relative to the arriving point, as it is moving apart from it, due to the sphere's surface expansion. However, during its journey, its speed relative to the arrival point, will increase due to the constant increase in distance between the point over which it passes (still at 1 m/s) and the starting point. Finally it will reach, at a speed of 1 m/s relative to the arrival point, which will move at a given speed relative to the starting point. Hence the car will move at a speed of more than 1 m/s, of said given speed, relative to the starting point.

3.2 Simulation of the journey of the photons of a high-redshift galaxy

As mentioned above, space expands tendentially at the same speed at any place in the Universe. Therefore any place moves away from any other place, at a speed that depends on distance.
In other words any place in the Universe may be considered as its centre in that any other place moves apart from it, but also because photons that move through it, have the same speed, i.e. 300,000 km/s, in all directions. However, if these photons move at a speed of 300,000 km/s relative to the place they are covering, and the places they progressively cover, move increasingly faster from their place of emission, even photons move increasingly faster relative to their place of emission.

For example the photons emitted by a galaxy and going towards the Earth, at the emission have a speed of 300,000 km/s relative to the galaxy’s place (more precisely, relative to the “place where the galaxy is moving”, as no celestial object is at rest relative to its place, but we will just call it “place” for the sake of brevity), but far smaller relative to the Earth’s place (more precisely, “the place where Earth will be at upon arrival”, but we will just call it “Earth’s place” for the sake of brevity), because it is moving apart from the galaxy’s place.

However as photons move towards the Earth’s place, through places that move increasingly faster relative to the galaxy’s place, photons move at an increasingly speed relative to the Earth’s place, reaching it at 300,000 km/s with respect to it.

Said speed increase, corresponds to the speed of the receiving place, relative to the emitting place. It is used as a factor for calculating the so-called cosmological redshift, indicated by the symbol “z”, whose value incremented by 1, corresponds to the ratio between the speed of light and the difference between it and the speed of the receiving place relative to the emitting one (formula 3.2.1)

$$1 + z = \frac{c}{(c - v_r)}$$

Where “$v_r$” represent the speed of the receiving place.

This is a formula of the Doppler shift which considers the receiver in motion and the source motionless. From this formula can be derived also the formula for calculating the speed of the receiving place, i.e. (formula 3.2.2)

$$v_r = c - \frac{c}{1 + z}$$

The formula used by the SC, instead, considers the receiver motionless and the source in motion, whereby the factor $z$ results from the ratio between the speed of source and that of the light. Consequently in order to calculate the speed of source knowing the factor $z$, this must be multiplied by the speed of light (formula 3.2.3).

speed of source = $z \times c$

But for the SC, the $z$ factor refers to space expansion and not to the recession speed between the various places of space (see "moving coordinates" on wikipedia).

For the sake of precision, I would like to point out that besides the cosmological redshift, there is also the ones caused by the motion of the emitting and receiv-
ing objects, relative to their respective places, which in this case is not particularly relevant, but is still comprised in the measured value on the Earth. For example, a redshift of 0.59 measured on the Earth, indicates that Earth moves apart from the galaxy at a speed of 111,321 km/s.

\[ v_r = 300,000 - \frac{300,000}{1 + 0.59} = 111,321 \]

And a redshift of 2.00 indicates that the Earth is moving away from the galaxy at 200,000 km/s, and not that the galaxy is moving away from the Earth to 600,000 km/s, i.e. twice the speed of light, as it would be if we apply the formula at SC (formula 3.2.3), for which, however, as I wrote above, the factor \( z \) refers to space expansion.

To better explain how this works, using the Excel application, I have drafted a simulation table of the journey towards Earth, of the photons of a high-redshift galaxy, which I am presenting here below. I drafted this table for the sole purpose of demonstrating the validity of this hypothesis so, even though I have tried to obtain realistic results, I may only present them as an example. Redshift values are based on an article by astronomer Vincenzo Zappalà (7).

**JOURNEY TO EARTH OF PHOTONS OF A HIGH-REDSHIFT GALAXY**

<table>
<thead>
<tr>
<th>Time</th>
<th>speed on start place</th>
<th>distance</th>
<th>progressive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prog.</td>
<td>transit photons + place</td>
<td>Redshift Earth photons + place</td>
<td>Earth diff.ce diff.ce photons + place</td>
</tr>
<tr>
<td>Start</td>
<td>1.590 275,000</td>
<td>0.000 5.040</td>
<td>-5.040 -5.040</td>
</tr>
<tr>
<td>1</td>
<td>18,217 318,217</td>
<td>1.450 224,095</td>
<td>1.061 0.747</td>
</tr>
<tr>
<td>2</td>
<td>35,201 335,201</td>
<td>1.340 185,427</td>
<td>1.117 0.618</td>
</tr>
<tr>
<td>3</td>
<td>51,321 351,321</td>
<td>1.250 156,548</td>
<td>1.171 0.522</td>
</tr>
<tr>
<td>4</td>
<td>66,640 366,640</td>
<td>1.175 135,745</td>
<td>1.222 0.452</td>
</tr>
<tr>
<td>5</td>
<td>81,591 381,591</td>
<td>1.110 121,795</td>
<td>1.272 0.406</td>
</tr>
<tr>
<td>6</td>
<td>96,492 396,492</td>
<td>1.052 113,866</td>
<td>1.322 0.380</td>
</tr>
<tr>
<td>7</td>
<td>111,321 411,321</td>
<td>1.000 111,321</td>
<td>1.371 0.371</td>
</tr>
</tbody>
</table>

Speed values are expressed in km/s.
Distance values are expressed in billion of light-years.
Time values are expressed in billions of years.

**POSTED VALUES:**

| Speed of Earth at Start | 275,000 |
| Initial distance of Earth’s place | 5.040 |

I am explaining below the methods by which I calculated the values shown in the table. This is only a general explanation because the entire method would be too complex to describe here (the Excel table I mentioned is available on request).
I would also like to point out that compared with the Excel worksheet based on which the table was drafted, I had to hide two columns, due to lack of horizontal space. The first one is marked as column B and lists photon speed relative to the places covered, i.e. always 300,000 km/s in each cell. The second one is marked as column G and lists the distance travelled by the photons relative to the different places, i.e. always 1 billion light-years in each cell.

First of all, based on the redshift, for each period I calculated the mean velocity at which the places progressively covered by the photons, move farther from the galaxy’s place, using the formulas in 3.2.2 and then entered it in the “speed -- transit place”- column (C). Then I added said speed value to that of the photons compared to the places covered (300,000 km/s) and entered the result in the cells of the “speed -- photons + place” column (D). At this point I calculated the distance travelled by the photons, by dividing the values shown in the “speed -- photons + place” column (D) by 300,000, and I entered the results in the “distance -- photons + place” column (H). Then I obtained and entered the progressive values in the “distance -- progressive -- photons + place” column (L). As can be seen, in the last cell of said column, it results the value of 8.536 billion light-years, which corresponds to the sum of the total distance travelled by the photons, with the recession distance of the place covered, sum that corresponds to the actual distance between the place of the galaxy and that of Earth. At this point through a formula for calculating apparent brightness (3.3.1) – see explanation in paragraph 3.3 (to better explain my formula, I needed the table, so I had to postpone the explanation) – I obtained the ratio between the actual distance and that of the time of photon emission, and I calculated its value of 5,040 billion light-years.

Then, using Excel functions, I have varied dichotomically the Earth’s speed at Start, until in the last cell of “distance -- progressive -- diff. ce” column (K) value 0 appears, and thus I obtained the mean speed of outdistance of the Earth’s place from that of the galaxy, which I calculated according to the redshifts of the various periods, which are displayed in the “speed -- Earth place” column (F). Finally, for each period, I calculated the recession distance of the Earth’s place compared to that of the galaxy, and I entered it into the “distance -- Earth place” column (I). I then entered its progressive value in the Excel cells of the “distance -- progressive -- Earth place” column (M).

The table shows that at the start of the journey, the Earth’s place is 5,040 billion light-years away from that of the galaxy, a place that due to space expansion between itself and that of the galaxy, is moving away at the speed of 275,000 km/s from the galaxy’s place, thus making the Earth also moving away from the galaxy. In the following periods the speed at which the Earth’s place move away from that of the galaxy, decreases, and, consequently, space expansion decelerates (this phenomenon is also described in paragraph 3.4).
Finally, when photons arrive at Earth, the Earth’s place is 8.536 billion light-years, compared to that of the galaxy, and its recession speed relative to that of the galaxy, is 111,321 km/s.

During their journey, again due to space expansion, photons also vary in speed with respect to the galaxy’s place, however increasing as they travel to places farther away compared to the galaxy’s place and therefore move away at an increasingly higher speed from the galaxy’s place. Finally photons arrive at the Earth’s place at a speed of 300,000 km/s relative to it, but at 411,321 km/s relative to the galaxy’s place.

### 3.3 Formula for calculating the apparent brightness of high-redshift celestial objects

Hereinafter, using the data of the table shown in the previous paragraph as an example, I am presenting a formula, that I believe is more consistent with the observations than that sustained by the SC, to obtain space expansion occurred during the journey of the photons of a high-redshift celestial object, using its apparent brightness.

I consider this important because, as stated by SC, according to the apparent brightness found in high-redshift type Ia supernovae, Universe expansion manifests in acceleration rather than in deceleration, while my hypothesis proves this wrong, by stating that the Universe expansion manifests in deceleration rather than acceleration.

Indeed this is what physicist Matteo Billi writes in his graduation thesis (5):

“SNe are used in cosmology as distance indicators. In 1998, two research teams – the Supernova Cosmology Project and the High-z Supernova Search Team – conducted studies on a sample of SNe in far galaxies at $z = 0.2 \div 0.9$. From this study emerged that apparent brightness was typically less than 25% compared to the expected values. This indicates that these objects are at a greater brightness distance than that provided by universe models dominated by matter. This is how the evolution of a universe in a state of accelerated expansion was first determined.”

For the formula given here, the factors by which absolute brightness (L) is divided in order to obtain apparent brightness ($\ell$) are the following:

1. Area of the sphere surface with a radius corresponding to the distance travelled by photons (P) relative to the places progressively covered (due to lack of horizontal space, this distance is not shown in the table, but corresponds to the speed of light, i.e. 7 billion light-years). This is because, as they move, photons are distributed on an ever-larger surface of the sphere, as its radius expands. However only the distance travelled by the photons, relative to the places crossed, should be considered, and not the distance to which the places move away from the galaxy’s place due to space expansion, as this movement does not imply photon distribution on a wider area.

2. The ratio between space expansion at the end of the journey ($e_f$) and space expansion at the start of the journey ($e_0$), raised to the cube. This ratio corresponds to space expansion occurred during the journey, which is tendentially
uniform in any place in the Universe and, therefore, even in the place where galaxy photons have transited – they are respectively the last and the first values, in the “distance -- progressive -- Earth place” column (M). The value of the ratio should be raised to the cube, as it is a volumetric expansion, which takes place on the three spatial dimensions.

Therefore, the formula is as follows (formula 3.3.1):

\[ l = \frac{L}{4\pi \cdot p^2 \cdot \left(\frac{e^4}{e^6}\right)^3} \]

Whereas the formula used by the SC, as I found online (6), is as follows:

\[ l = \frac{L}{4\pi \cdot D^2 \cdot (1 + z)^2} \]

Where “D” represents the current distance between the emitting and the receiving place.

Regarding the factor \((1 + z)\), based on what I found online, it should be squared for the following reasons:
- a factor is necessary to take into account the fact that every photon loses energy due to redshift;
- a second factor is due to the fact that also the arrival rhythm of the photons is lower than the emission rate again for the same factor.
Therefore the formula of SC considers the radius of the sphere as the current distance and not as the distance actually traveled by photons (without the one that is due to the "ta-pis roulant" of the expansion, which transports the photons, making them expand on three dimensions), as justified in the explanation of my formula. Moreover, at least for me incomprehensibly, the expansion factor sustained by the SC, is raise to the square (with questionable motivations, to say the very least, but which depend on expansion) rather than to the cube, as it should be done for an expansion volumetric.

I would like to point out that the values of cosmological redshift (0.59) and current distance between the transmitting and receiving place (8.68) were derived from the article by Zappalà (7) above and relate to the photons issued 7 billion years ago by a celestial object.

I chose a redshift of 0.59 (and therefore the photons issued 7 billion years ago by a galaxy) as it is the closest value to the average between the minimum and maximum redshift mentioned in Matteo Billi’s thesis (5), i.e. \((0.2 ÷ 0.9)\). Therefore also 25% less brightness, as mentioned in the thesis, should apply, because it should correspond to an average of reductions in brightness.

In order to compare the results of the two formulas, I believe we only need to compare the two denominators and exclude the \(4\pi\) factor, since it is there in both.
As for the SC’s formula, the factors are those contained in the expression $D^2 \cdot (1 + z)^2$ from which it results:

$$8.68^2 \cdot (1 + 0.59)^2 = 75.3424 \cdot 2.5281 = 190,473$$

According to what reported in the graduation thesis of Billi (3), since from the observations it appears that the observed apparent brightness is 25% lower than the calculated one, I calculate its value increasing the latter by 25%.

$$190,473 \cdot 1.25\% = 238,108$$

I use this value to calculate the ratio between the current distance and the distance at the start of the photons, between the Earth and the starting place of photons and, therefore, space expansion factor during the journey of the photons.

In the corresponding expression used by my formula, namely: $P^2 \cdot \left(\frac{e^{l}}{e^{0}}\right)^3$

I value the known data and I get:

$$7^2 \cdot \left(\frac{8,536}{e^{0}}\right)^3 = 238,108$$

Then I divide the two members by 49 ($7^2$) and I extract the cubic root of the member to the right:

$$\left(\frac{8,536}{e^{0}}\right)^3 = 4,859$$

$$\frac{8,536}{e^{0}} = 1,6937$$

Finally, with the last step

$$e^{0} = 5,040$$

I get the distance between the place of the Earth and that of the galaxy that emitted photons, at the beginning of the journey. Then I insert this distance into the table and thus I can complete the journey’s simulation of the galaxy’s photons, with the modality shown in the previous paragraph.

I point out that there is a slight difference between the current distance used by the SC’s formula, which is 8.68 billion light years derived from the article of Zappalà (7), and that used by my formula, which is 8.536 and was derived from the development of the simulation here presented.

For further clarity, I summarize the calculation method. First I use the redshifts of the various periods, to simulate the journey of photons until their arrival on Earth, obtaining the distance traveled by photons including that due to space expansion which, in practice, corresponds to the current distance between the galaxy and the Earth.
Then, applying formula 3.3.1, I use the apparent brightness observed to calculate the distance between the galaxy and the Earth, at the start of the photons. And finally I complete the simulation by changing dichotomically the speed in which the Earth was moving away from the galaxy, at the start of the photons. In short, I use the redshifts to calculate the current distance and then I use the apparent brightness to calculate space expansion.

3.4 Simulation of the journey of photons of the Cosmic Microwave Background Radiation (CMBR)

According to the Big Bang theory, about 380,000 years after its expansion began, the Universe became transparent to radiation, and therefore a huge amount of photons began to propagate freely in it \((3, 4)\).

Photons started from different places in the Universe and travelled in random directions. Therefore part of them travelled in the direction of the Earth’s place.

Since then said photons – known as CMBR – have continued to arrive at Earth, starting with those coming from the nearest places, gradually followed by the farther ones. During their journey, photons crossed places which, due to space expansion, moved increasingly faster away from their starting places and therefore increased their speed relative to said places, until they reached the Earth’s place at a speed of 300,000 km/s, however far greater than their starting places. And increasing speed also increased the redshift.

During this time, space has continued to expand and, consequently, the recession speed of the Earth’s place from the starting place of CMBR photons, has increased.

Hence, also redshift has progressively increased to reach its present values of around \(1,100\).

Therefore by applying the formula 3.2.2 shown in paragraph 3.2, the speed of the Earth’s place relative to the starting places of CMBR photons, is approximately \(299,728\) km/s at the time of their arrival at Earth.

\[
v_r = 300,000 - \frac{300,000}{(1 + 1,100)} = 299,728
\]

Using this redshift and also those of the various periods, with similar methods to those used for the simulation related to the galaxy, I developed a table that simulates the journey of CMBR photons from their starting place to the arrival at Earth, foreseeing variations of speed of the photons (due to the motion of the places from them gradually crossed) and of the Earth’s place, compared to the starting places.

In short it appears that the Earth’s initial place has moved at a high speed and has outdistanced the photons, which later caught up the delay and reached it.
### JOURNEY OF THE CMBR PHOTONS TOWARDS THE EARTH

<table>
<thead>
<tr>
<th>Time (years)</th>
<th>Distance at Start (km)</th>
<th>Progressive (km/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1,100</td>
<td>0.010</td>
</tr>
<tr>
<td>0.5</td>
<td>1,100</td>
<td>0.010</td>
</tr>
<tr>
<td>1</td>
<td>1,100</td>
<td>0.010</td>
</tr>
<tr>
<td>2</td>
<td>1,100</td>
<td>0.010</td>
</tr>
<tr>
<td>3</td>
<td>1,100</td>
<td>0.010</td>
</tr>
<tr>
<td>4</td>
<td>1,100</td>
<td>0.010</td>
</tr>
<tr>
<td>5</td>
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<tr>
<td>7</td>
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<tr>
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<tr>
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<td>1,100</td>
<td>0.010</td>
</tr>
<tr>
<td>14</td>
<td>1,100</td>
<td>0.010</td>
</tr>
</tbody>
</table>

Speed values are expressed in km/s
Distance values are expressed in billions of light-years
Time values are expressed in billions of light-years

### POSTED VALUES:

- Speed of Earth at Start: 1929,200
- Initial dist. of Earth's loc.: 0.010

I point out that at the end of the journey, the Earth's place is far from the starting place of CMBR photons of about 22 billion light years (last value of column M). A value that corresponds to the so-called radius of the observable Universe.

I also point out that, just as in the simulation of the journey of the galaxy photons, according to the reduction of the velocity of movement of the Earth's place (F), it results that the expansion of the Universe is decelerating.

In order to make a comparison, I tried to simulate the journey of CMBR photons also on the basis of the Universe model of the SC, and it is resulted a Universe radius that is much higher than that of the Universe model presented here and, in any case, a expansion speed in a very strong deceleration.

The difference in the length of the observable Universe radius, between the two Universe models, is due to the fact that in the present model it is used a formula of the Doppler shift, which sees the source motionless and the receiver in motion; while in the model of the Universe of the SC, it is used a formula that sees the receiver motionless and the source in motion, with the consequence that we obtain much higher expansion values, even if the SC considers the redshift as a factor of space expansion (see paragraph 3.2).

I also tried to simulate the speed of space expansion in acceleration, but it was not possible to get the arrive of CMBR photons at the Earth, which is a very important factor in favour of the Universe model here presented.
I would like to give a final consideration on this simulation. Since, as I wrote in chapter 2, the time speed varies according to the density of space and, therefore, towards the past it was flowing more rapidly, if there had been a clock that had always measured the time at the current speed (we could imagine it as outside the Universe), the life of the Universe would have been less than 14 billion years. Naturally I made some simulations and it turned out that its life would have been less than 8 billion years.

### 3.5 Considerations on redshift and apparent brightness, considered by the Scientific Community

Based on the Universe model presented here, it turns out that the expansion speed of the Universe is decelerating, and not accelerating as currently supported by the SC, based on its Universe model. The SC states that the expansion of the Universe is accelerating, to justify the lower brightness observed, compared to those resulting from the application of its formula on apparent brightness (3.3.2). This would mean that the proper distance (i.e. that existing at the arrival of photons) of the celestial object that emitted photons would be higher than that resulting from the application of its formula, formula that uses the factor \((1 + z)\) to get the distance due to space expansion.

But if the proper distance were really higher, it would mean, naturally, that space expansion would have been greater than that resulting from the application of the factor \((1 + z)\) as, indeed, supports the SC. But in this case also the redshift of the photons, i.e. the factor \((1 + z)\), should have been greater than that considered, because the greater expansion of the space should have been reflected also on the wavelength of the photons and therefore right on the factor \((1 + z)\), based on the assumption by the SC that the cosmological redshift is directly caused by space expansion. In conclusion it would seem that there is a contradiction in terms, in the statement that since the apparent brightness is less than expected, it means that the Universe is expanding in acceleration.

### 4. CONCLUSIONS

With my article “Every Point of Space in Expansion is the Preferred Reference Frame for any Object Transiting to that Point” I hope I have opened a new path to the truth about the functioning of the Universe, and in this article I have presented some hypotheses on certain physical phenomena in line with said theory, that I am briefly summarising here below.

#### 4.1 Expansion of the Universe

The Universe is made up of an infinity of tiny particles of equal amount of space (a substance that has the tendency to expand), which I call “space quanta”. Space quanta tend to expand unceasingly, thus causing the expansion of the Universe.
4.2 Gravity

Matter is made up of dynamic sets of compressed space quanta, which allow for a greater expansion of the neighbouring quanta and then, progressively, of the more distant ones. Each material object tends to move to places where space quanta are more expanded, i.e. towards other material objects.

4.3 Variable speed of light

Speed of light depends on the expansion of space quanta of the places in which they transit. However since also clocks move in function of said expansion, if measured, both the speed and frequency of light results always the same. Therefore, in the past, when space expansion was smaller, speed of light was greater.

4.4 Cosmological redshift

Cosmological redshift is due to the speed of the place of the celestial object receiving the photon, relative to the place of the celestial object that emitted it. In support of this hypothesis, I have presented two tables that simulate the journey of the photons of a high-redshift galaxy and that of CMBR photons, and a formula for calculating the apparent brightness of a high-redshift celestial object, to derive space expansion occurred during the journey of the photons towards the Earth. All of this proves that the expansion speed of the Universe is decelerating, and not accelerating as currently supported by the SC, based on its model of the Universe.

4.5 A brief consideration on energy and matter, obscure

I would like to point out that for this model of the Universe, energy and dark matter may be not necessary. Dark energy would be not necessary because the expansion of the Universe could be justified by the expansion of the space quanta (paragraph 2.1). Dark matter may not be necessary, if not to a lesser extent, because certain motions of the outer arms of spiral galaxies could be justified, at least in part, by the combination of the native expansion of space quanta, which causes celestial objects to move away, and their major expansion due to the presence of matter, that makes them approach each other (paragraph 2.2).

However, these are topics to be explored and developed.

In conclusion I think I have shown that the model of the Universe presented here, is at least more compatible with the observations than that supported by the SC.
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