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Space is composed of the particles (virtual and real) that occupy it

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1. Space is composed of the particles that occupy it

The idea of this paper is simple. Space is composed of the particles (virtual and real) that occupy it. We will see later in the paper, references to support this idea.

To explain this concept better, let us sum it up in three concepts:

1.1. The distance between two bodies is the number of particles (virtual and real) that separates them. More precisely, it is the number and its size. This means, if more particles appear for whatever reason between the bodies or the size of these particles increase, the distance between them will increase. If the number of particles between them decreases (or the size of the particles decreases), the distance between the two bodies decreases also. Let's see some examples to illustrate this.

1.1.1 In a moving body, the increase of the wavelength of photons emitted by it, is exactly the same as the decrease of the length of the body. Reference [8]

$$\lambda = \frac{\lambda_0}{\sqrt{1 - \frac{v^2}{c^2}}} \quad (1)$$

$$l = l_0 \sqrt{1 - \frac{v^2}{c^2}} \quad (2)$$

being:

λ_0 the wavelength of a photon emitted by the body at rest.

λ the wavelength of a photon emitted by the body at velocity v .

l_0 the length of the body at rest

l the length of the body moving at velocity v .

v the velocity of the moving body.

c the speed of light.

We can see that the difference in both equations is that in (1) the factor $\sqrt{1-\dfrac{v^2}{c^2}}$ is dividing, and in (2) is multiplying. One is the inverse of the other one.

As the size of a photon is directly related to the wavelength of its wave, we can say that the increase in the size of the photon is exactly the same as the decrease in the size of the body (of its length). Is this by chance?

In this paper, we consider that the distance of this body to a second body is related to the number of particles (photons in this case) between them and the size of these particles. So, when the size of these particles increase (as in this example), the distance between the two bodies increases also. Or what it is exactly the same, the length of the body, decreases with respect to the distance.

The distance is measured using the measurement devices that are in the body. We can consider that the measurement devices have been reduced (reduction of the length of the body), or we can consider that the distance has increased (increase of the size of the photons that separate the two bodies). Both views are valid and that is the reason that formulas (1) and (2) are exactly inverse.

To illustrate even more, please find attached the figures 1.a, 1.b and 1.c. For the target of visual simplicity we have considered a body which length at rest is the same as the wavelength of the photons emitted at rest (figure 1.a). But of course, it applies to whatever relation between length of the body and wavelength.

It can be seen in figures 1.b and 1.c, how the increase of wavelength with respect to the length of the body, is equivalent to the reduction of the length of the body with respect to the wavelength of the photons.

We can consider that a distance between the body to a second body has increased, because it has increased the size of the photons that are between them (1.b). Or it

can be considered that the distance has increased because the measurement devices (the length of the bodies and its instrument devices) have decreased in size (figure 1.c). And in both views, the decrease/increase is exactly in the same proportion. This leads to the conclusion that the photons (and its size) are affecting the relative size of the bodies or (what it is the same) the distances between them. According this paper, the way that this happens is because the photons themselves (plus other particles) compose space and define its corresponding distances.

Figure 1.a

Figure 1.b

$$\lambda = \frac{\lambda_0}{\sqrt{1-\frac{v^2}{c^2}}}$$

Figure 1.c

$$l = l_0 \sqrt{1-\frac{v^2}{c^2}}$$
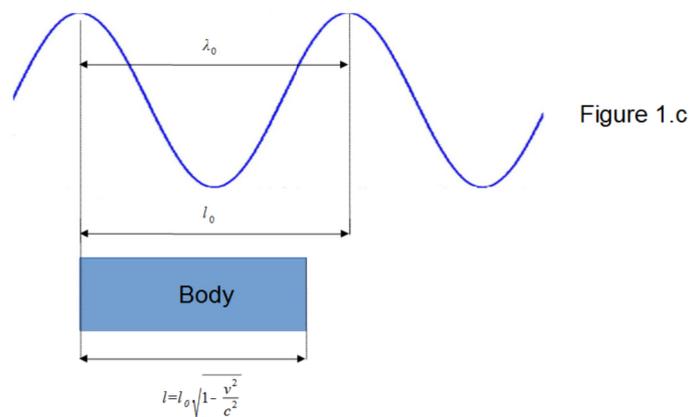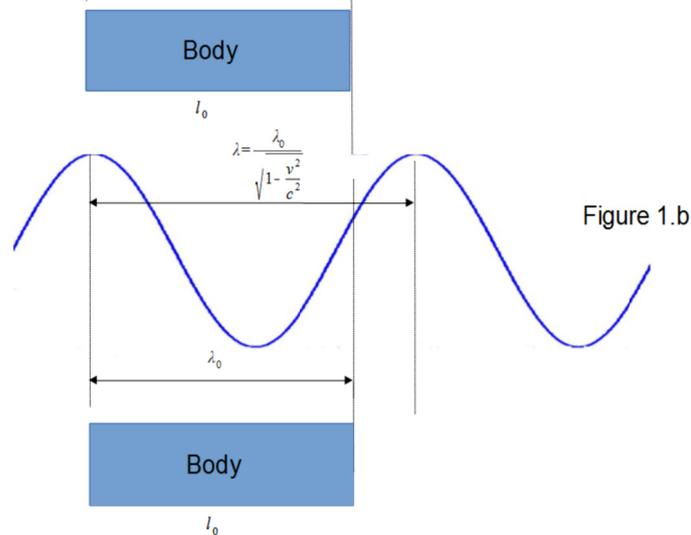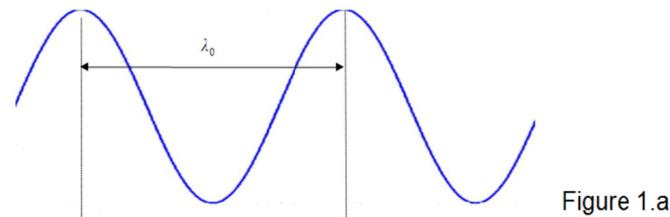
1.1.2 In a body near a gravitational field, the increase of the wavelength of photons emitted by it, is exactly the same as the decrease of the length of the body. Reference [8]

$$\lambda = \frac{\lambda_0}{\sqrt{1 - \frac{2GM}{rc^2}}} \quad (3)$$

$$l = l_0 \sqrt{1 - \frac{2GM}{rc^2}} \quad (4)$$

being:

λ_0 the wavelength of a photon emitted by the body in no gravitational field.

λ the wavelength of a photon emitted by the body in a gravitational field created by a mass M at a distance r.

l_0 the length of the body in no gravitational field.

l the length of the body in a gravitational field created by a mass M at a distance r.

M the mass creating a gravitational field affecting the body.

r the distance from the mass creating the gravitational field to the body.

c the speed of light.

We can see that the difference in both equations is that in (3) the factor $\sqrt{1 - \frac{2GM}{rc^2}}$ is dividing, and in (4) is multiplying. One is the inverse of the other one.

We see again that the reduction in size of a body due to a gravitational field is exactly equal to the increase of the size of the photons as we saw in point 1.1.1. Same conclusions apply.

We can consider that the measurement devices have been reduced (reduction of the length of the body), or we can consider that the distances have increased due to the increase of the size of the photons that define the distances in space. Again, the decrease of the body length and the increase of the size of the photons are exactly in the same proportion. By chance? Or conclusions in 1.1.1 apply again?

The figures 1.a, 1.b and 1.c apply exactly the same in this case with the substitution of $\sqrt{1-\dfrac{v^2}{c^2}}$ by $\sqrt{1-\dfrac{2GM}{rc^2}}$.

In this paper, I have tried to avoid the complicated maths to simplify the paper, but you can check similar conclusions to more general cases using Schwarzschild metric in the references [1][2].

1.2. The masses (the mass particles[1]) are continuously emitting particles[2].

This means, according 1.1, they are creating continuously space around them. They are emitting continuously particles and consequently creating space around them. We will check references supporting this concept. But, first let's see an example to illustrate this:

1.2.1 Definition of rotation

When a body is rotating, how do we know that the body is rotating, and not the rest of the universe? Or in another way, how does the rest of the universe affect the body so we know that it is rotating?

In a region of space that is very far from any mass, the space is considered euclidean. But anyhow, something is defining the rotation or even the acceleration, as when a body starts rotating forces appear. Something is defining what is a uniform movement, and what is accelerating or rotating.

This, as Mach and Einstein noticed, is the rest of the masses of the universe, even the very far ones (the far stars). If we consider that the space is composed by the particles emitted by the masses, this is an immediate conclusion. Why?

See figure 2.a and 2.b. The far masses (far stars for example) are continuously emitting particles (mainly photons). These photons are arriving to the body defining preferential directions. When a body rotates, it is rotating with respect to these preferential directions defined by the photons (of the far masses). These particles are the ones that define what an inertial state is and what a non rotating state is.

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[1] Through this paper when we talk about mass particles, we mean in general, fermions (half integer spin particles). And when we talk about particles in general, we mean all kind of particles (fermions and bosons –integer spin particles-).

[2] These emitted particles are bosons (mainly virtual photons created by the associated electric-magnetic field of the particle). But we will not enter in this issue. The important concept is that the mass particles are continuously emitting particles (creating space according 1.1.).
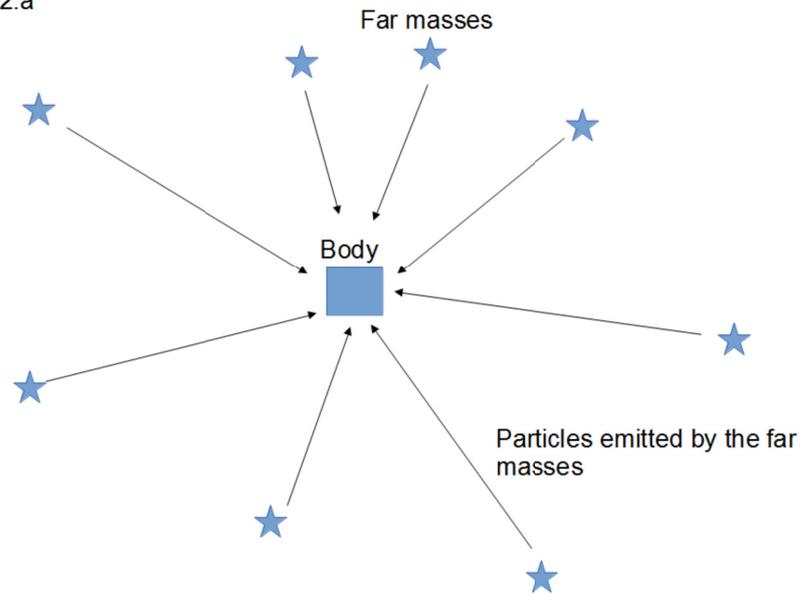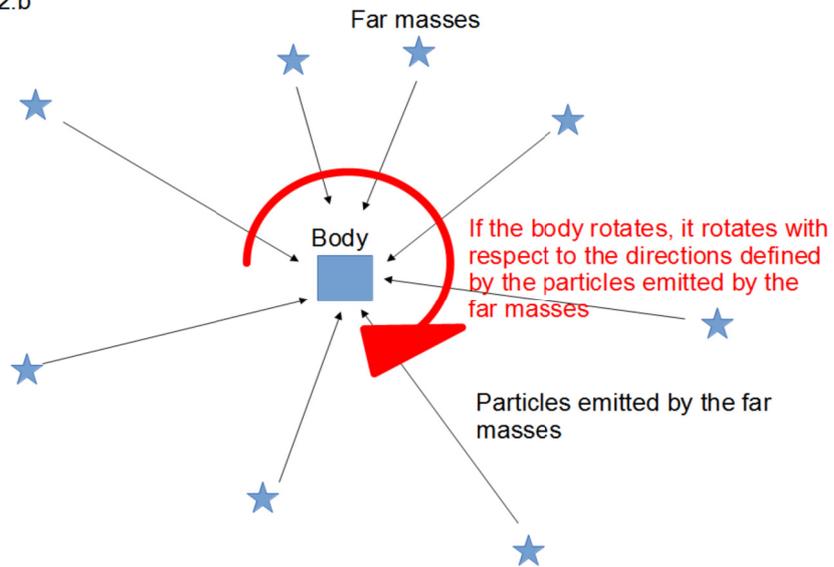
Figure 2.a

Far masses

Body

Particles emitted by the far masses

Figure 2.b

Far masses

Body

If the body rotates, it rotates with respect to the directions defined by the particles emitted by the far masses

Particles emitted by the far masses

Once again, it is not needed new type of particles (as gravitons) or add-on elements to define the different properties of space. If space is considered as composed by the particles that occupy it, all the properties of space can be explained. We will see more details in following points, with mathematical background in the corresponding references.

1.3. The trajectory followed by a particle is chaotic, because it has to go through the particles that compose space. The position of these particles is varying continuously so the real trajectory of a particle through them is unpredictable. We can consider our particle as jumping from one particle to another (more precisely, it is absorbing continuously the particles in space occupying its position, but we will not enter in this detail).

2. Observed effects

Ok, so what are the consequences of this? They are simple, and very well known by everybody.

2.1. In the large scale.

As commented in 1.2, the mass particles are continuously emitting particles (creating space). This means, in the large scale the total space of the universe will increase continuously, as observed. Even more, the ratio of increase of space has been calculated as exactly the space that all the masses of the universe have been calculated to be emitting. References [1] and [2].

2.2 In the medium scale.

The continuous emitting of particles (new space created) by the masses has a much known effect. Near the masses, this extra-space creates distortions in the existing space. This distortion warps the space in a way that causes the effect of the masses attracting each other. This is the gravity as understood by the general relativity (a warping of space by the masses).

It has been used the Schwarzschild metric approximation of general relativity to calculate the extra space that this metric is continuously creating. Getting to the conclusion that this extra-space appears to be created by the masses outwards, as if the mass itself created this space towards the universe. References [1] and [2].

This matches exactly with the view that the particles that are emitted by the mass, are the ones that compose these extra space created "outwards". This matches the concept commented in point 1.2.

2.3 In the small scale.

2.3.1. As commented in 1.3, the trajectory of a particle is unpredictable because we cannot know the current situation of space (which the exact situation of the particles that compose it, is). The trajectory of the particle will be defined by this unknown mare-magnum of particles (also known as space) in a completely unpredictable and chaotic way.

This means, we cannot know the trajectory of the particle because we do not have the complete information of the system (not because it is "conceptually unpredictable"). This agrees with the hidden variables interpretation of the quantum mechanics. That it seems will be the winner of the interpretations in the near future. [3]

Also, this mare-magnum of particles can be considered as a completely unknown random system (but real and unique, although unknown). In these regards, the best approximation to calculate the trajectory that a particle will follow in this unknown mare-magnum is to calculate the most probable in all the possible trajectories. This is exactly the concept of how to calculate these probabilities using the famous Feynman path integral [4].

2.3.2. Two mass particles that are continuously emitting space to each other will never be in the "same position". They can never "touch" as they are continuously creating space around each other. It does not matter how much near you want them to be, they will be continuously separating from each other due to the continuously space created around them. This effect is known as Pauli exclusion principle [5].

2.3.3. Going further, we could explain also the double slip experiment in these regards. The particle is continuously emitting other particles around it (let us call it the cloud of particles -the cloud of space- of the original particle). The interference in the double slit is done by this cloud of particles with itself. The output is an interference pattern of this cloud, which will define the position of the particles that have been emitted by the particle. This pattern is the possible "new spaces" where the original particle could be. So, even, if the possible positions of the particle suffer really an interference pattern, the final position of the original particle will be unique. A similar (but not exactly equal) interpretation can be found in [6].

3. References

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