

# The blue shift paradox

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## Abstract

Based on Einstein's equation  $E = mc^2$ , matter and anti-matter annihilate into photonic radiation energy. Photons have unique characteristics since they are massless and they travel at the speed of light in all the inertial reference frames. No other particle shares these unique characteristics. We claim that this unique behavior is due to the fact that photons do not apply gravitational effects on space-time, meaning, although photons will be forced to move in a curved line if space-time is curved they will not curve space time by themselves or apply gravity forces and time dilation .

In order to prove our claims we suggest a thought experiment that leads to a blue shift paradox which happens after annihilating 2 symmetrical in size and mass, matter and anti- matter (A&B) in the center of a hollow particles spherical shell . The only way to explain this paradox is to conclude that anti-matter imposes anti-gravity and therefore matter and anti-matter together impose zero gravity. Furthermore, this proves that the photonic energy from the annihilation phase has also zero gravity effect on space-time.

## The photonic gravitational paradox

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Key Words: matter; anti-matter; gravity; anti-gravity; photons

### 1. Introduction

A particle with mass will never reach the speed of light and it has a different velocity in different inertial reference frames. A particle of matter with mass applies a gravitational curve on space time which can be measured through gravitational force

and time dilation .Relativity dictates the equivalence of mass and energy, so based on the stress-energy tensor which is the source for the gravitational field via Einstein's field equations of general relativity ,energy and mass apply gravitational curvature to space-time .

On the other hand, Photons are energetic massless particles that travel, in open (free) space (meaning not trapped in black hole or trapped in a sealed mirrored box etc.), at the speed of light in all inertial reference frames .this unique characteristic of photons indicate a unique relationship between the photon and space-time. It is reasonable to ask whether a photon exerts a gravitational pull. Many scientists believe that according to general relativity, as a photon has energy it should bend space and hence create a gravitational pull although the mass of a photon is zero.

We claim that photons travelling at free space, without any interaction with matter (e.g. not applying photonic pressure), do not apply any gravitational curve to space-time. Although photons are influenced by curved space-time, they do not curve space-time by themselves. For example, we claim that two photons travelling in free space (no mass objects around) in parallel paths will not apply gravitational force on each other and they will keep moving forever in parallel paths .

In order to prove our claims we will assume for a moment that photons and anti-matter do exert gravitational force and will show that it leads to a paradox which we named as “The photonic gravitational paradox”.

## 2. The paradox

Let’s consider that two symmetrical objects, that have the same shape and mass, made of matter (A) and anti-matter (B) respectively, and are approaching each other towards annihilation into photonic radiation. Assuming they both impose gravity by curving space-time, a spherical shell of particles(C) is pulled by gravitational force towards A&B.

Configuration I (figure 1):

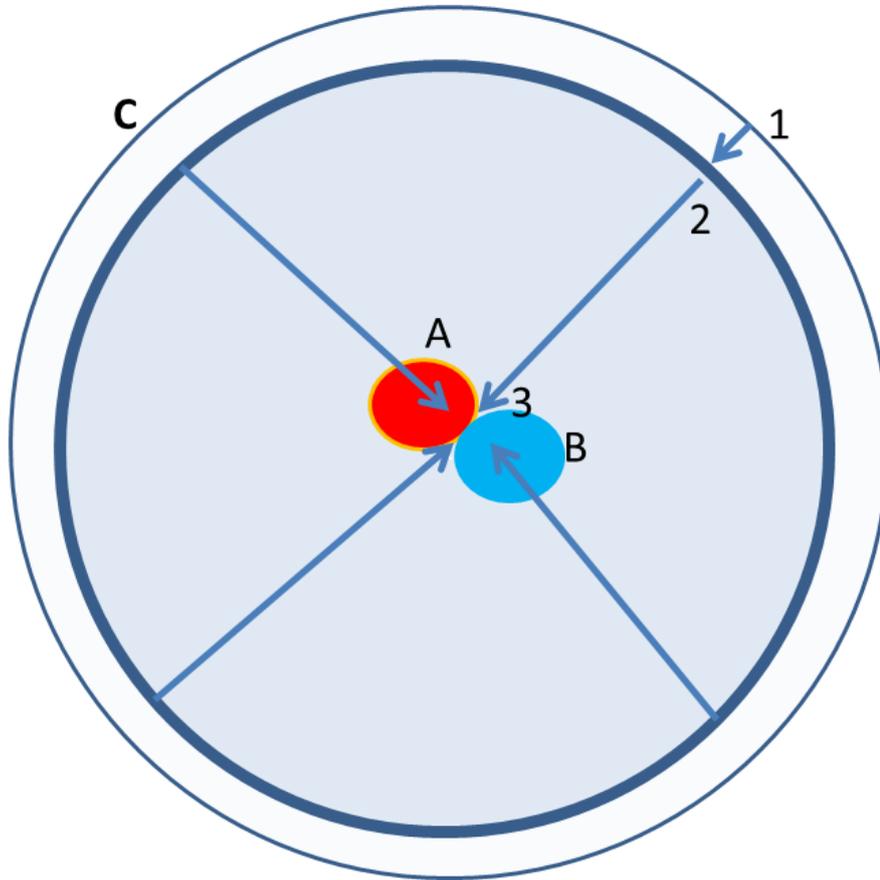


Figure 1: Configuration of 2 identical masses A(matter)& B(anti-matter) before annihilation in the center of a hollow spherical matter particles shell C. Because of gravitational forces each particle in the spherical shell C accelerates towards the center mass of A&B and based on Einstein's equivalence principle its mass increases and its gravitational pull on A&B increases. For example a particle from the spherical shell located at point 1 accelerates towards point 2 and by that increases its gravitational pull on A&B. Based on the assumption that the gravitational pull from all the spherical shell particles surrounding A&B cancel each other and sum up to zero, we expect that A&B will pull inwards the particles spherical shell C but will feel no gravitational pull outwards from the particles spherical shell C. The potential energy of the particles spherical shell C will transform to kinetic energy as the particles accelerate inwards towards A&B. The assumption is that the gravitational pull is transmitted through gravitons travelling at the speed of light. There is no increase in energy in configuration I.

### Configuration II (figure 2):

When matter and anti-matter collide they annihilate into pure energetic photons based on Einstein's equation  $E = mc^2$ . Let's assume from symmetrical considerations, that immediately after the annihilation the photons travel outwards at the speed of light in a radial direction from the center of mass in a shape of hollow spherical photonic shell where the photons are equally distributed on the thin surface of the spherical shell (Fig. 2).

Let's assume for a moment that the photons, after the annihilation, exert the same gravity as did the mass of A&B. The center of this hollow sphere is at the original center of mass A&B before annihilation.

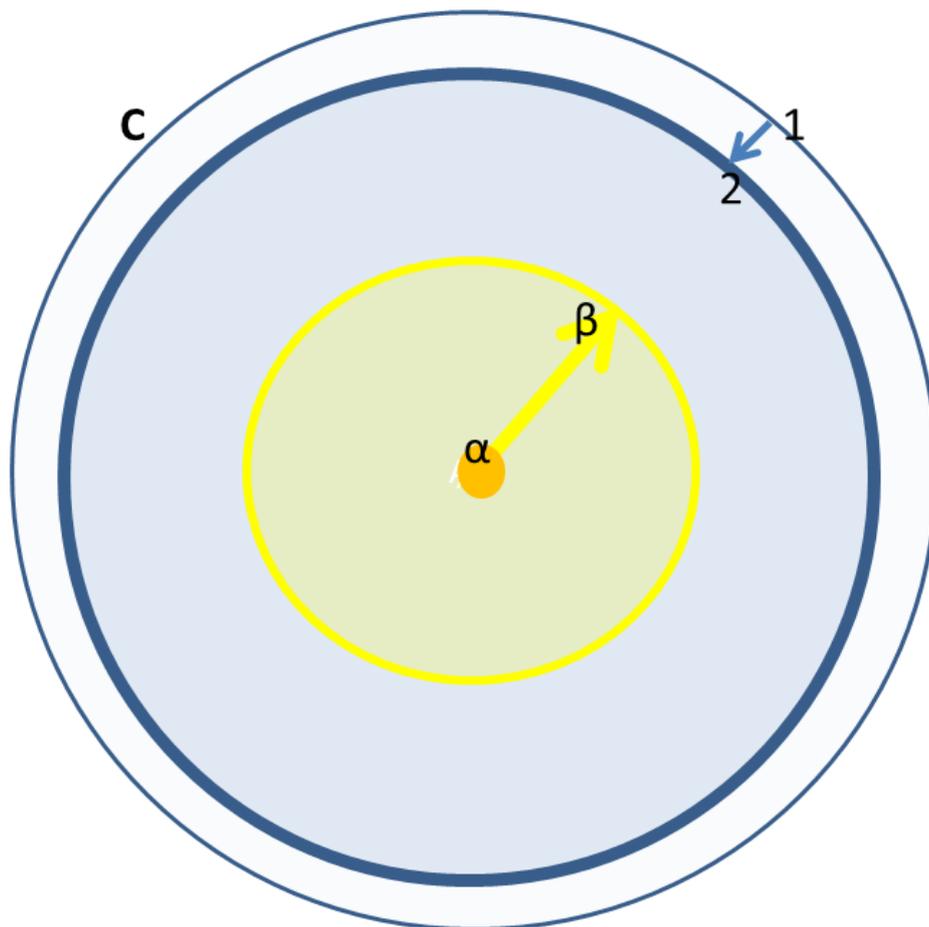


Figure 2: Configuration of masses A, B after annihilation ( $\alpha$ ) & spherical matter particles shell C. As the spherical shell accelerates towards the center because of

gravitational forces from point 1 to point 2 the photonic sphere accelerates to all directions at the speed of light from  $\alpha$  to  $\beta$ .

Now let's look at the gravitational pull of the spherical particles shell C on photon  $\beta$  in the spherical photonic shell (figure 3)

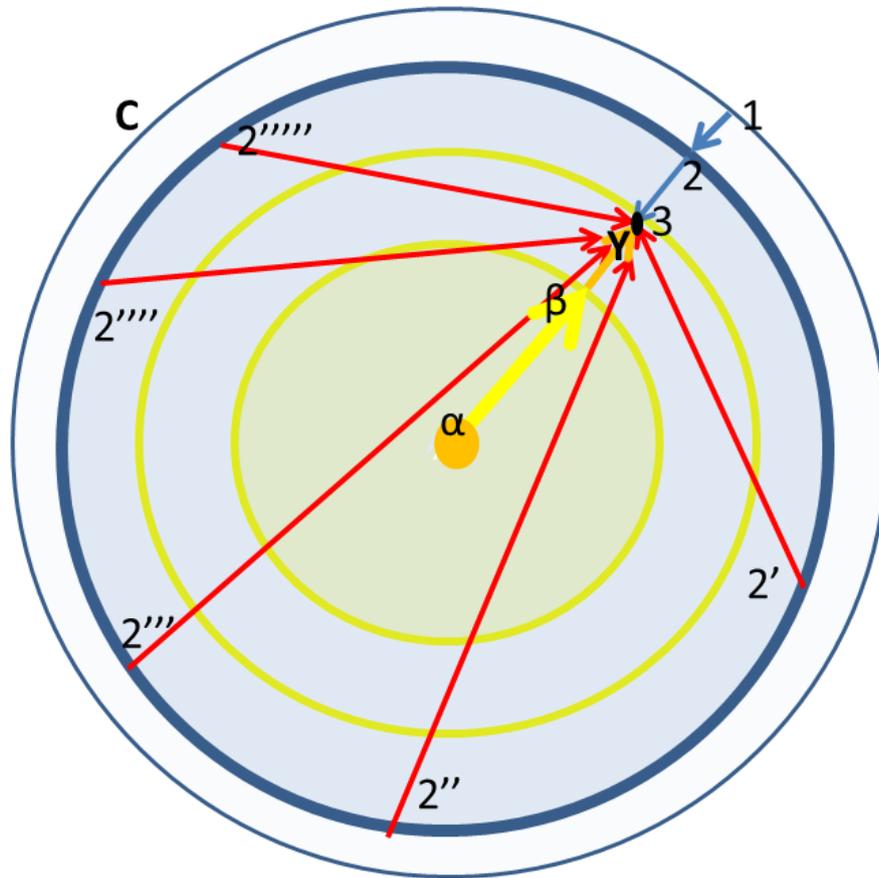


Figure 3: Configuration of the gravitons ( $2, 2', 2'', 2''', 2''''$ ) travelling towards photon  $\beta$  in order to reach it when it arrives at point 3 on the photonic spherical shell. We will rename this photon as  $Y$  instead of  $\beta$  when the photonic spherical shell arrives at point 3. only graviton 2 travelling the distance from point 2 to point 3 which is equivalent to the distance from point  $\beta$  to point  $Y$  will succeed in reaching it on time increasing its photonic energy through the blue shift effect on its wavelength.

As the spherical particles shell  $C$  accelerates from 1 to 2 its gravitational pull on  $\beta$  increases based on Einstein's equivalence principle. This increase in the gravitational pull is transferred to the photonic spherical shell through gravitons that travel at the speed of light. Let's assume that as the graviton travel the distance from 2 to 3, the photon at  $\beta$  travels the same distance to its new position at  $Y$  which is also point 3 (Fig. 3). This graviton (2) has a blue shift effect on photon  $Y$ . The rest of the gravitons from the particle sphere  $C$  (e.g.  $2', 2'', 2''', 2''''$ ) travel a larger distance in order to reach photon  $Y$  (point 3), and since both photon  $Y$  and these gravitons travel at the speed of light they can never reach it. these gravitons should have had a redshift effect

on photon Y but as explained they will never reach it. This means that photon Y will undergo only a blue shift effect (without the red shift neutralizing effect), meaning an increase in its photonic energy. From symmetrical considerations, photon Y is not unique and this increase in photonic energy (blue shift effect on photon Y) will take place in each and every photon on the spherical photonic shell. Since this extra energy takes place only in configuration II and not in configuration I, based on the energy conservation law, this is a paradox!

### 3. Conclusion

Even though that in both configurations (I and II) the setup energy was the same and the only difference was the annihilation of matter and anti-matter A & B (configuration II), the total energy wasn't the same and in configuration II the photonic spherical shell has undergone an increase in its energy in the form of photonic blue shift effect. This is a paradox!

The only way to explain this paradox is to assume that anti-matter imposes anti-gravity and therefore matter and anti-matter (A&B) together impose zero gravity on the particles spherical hollow shell (C). Based on that assumption the photonic energy from the annihilation phase has also zero gravity effect on space-time.

Matter and anti-matter were originally produced, based on the big bang theory, by gamma energetic photonic radiation. Since we claim that photonic radiation don't influence time and apply no gravity, we claim that matter and anti-matter must preserve two new conservation laws: 1. The "Conservation of gravity", 2. The "Conservation of time". The first new law of "conservation of gravity" states that if matter applies gravity, its partner anti-matter applies anti-gravity so that the total gravity of both particles sum up to zero as it was originally the zero gravity of the photon energy radiation that created them. The second new law of "conservation of time" states that if matter applies time dilation, its partner anti-matter applies time anti-dilation (time "runs" faster) so that the total time dilation of both particles sum up to zero as it was originally the zero time dilation of the photon energy radiation that created them [5],[6],[7],[8].

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## Figure legends:

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