The photonic gravitational 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 on one another.

In order to prove our claims we suggest a thought experiment that leads to a paradox. The only way to explain this paradox is to conclude that anti-matter impose 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.

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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 do exert gravitational force and will show that it leads to a paradox which we named as “The photonic gravitational paradox".

2. The paradox that lead to the conclusion that photons do not curve space-time

Let’s consider that two symmetrical objects, tangent at a point P, 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, an object (C) is pulled by gravitational force from the source (S) towards A&B with the center of gravity at point P (Fig. 1).

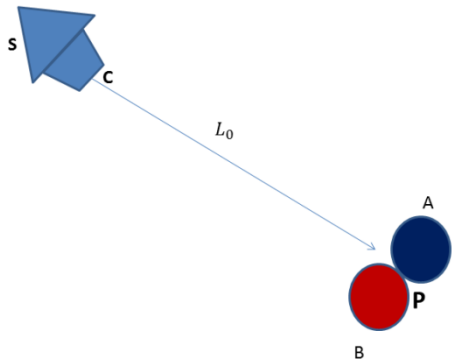

Figure 1: Configuration of masses A, B before annihilation & mass C attached to S, while S will stay fixed to its position in space relative to point P, during the whole time (setup mode).

When matter and anti-matter collide they annihilate into pure energetic photons. 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 at point P in a shape of hollow sphere 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 before annihilation. In order to determine the gravitational field inside and outside that spherical shell of photons we can assume that the above mentioned distribution of the photons is equivalent to a solid spherical shell (hollow sphere) made of matter, with radius R and with mass equal to the mass of A&B. That mass is uniformly distributed on the surface of the spherical shell. The center of this hollow sphere is at the original tangent location of mass A&B before annihilation (point P).

The only difference between these two models is that while in the case of the solid spherical shell, the radios R is fixed in time, in the case the spherical shell model of the photons the radios r (t) is increasing at the speed of light ($r(t) = c * t$). This is a unique characteristic of photons distribution that does not need any kind of internal or external energy.

The gravity field inside and outside a spherical shell is well known [4]. At points outside the spherical shell, the gravitational force is the same as though all the mass of the shell were concentrated at its center P. On the other hand, at points inside the shell the gravitational force is zero. Hence, the inner area within this photonic shell ("annihilation photonic ring") is free from gravitational effects and time dilation while the outer area has the same gravitational effect as before the annihilation of A&B (Fig: 2).

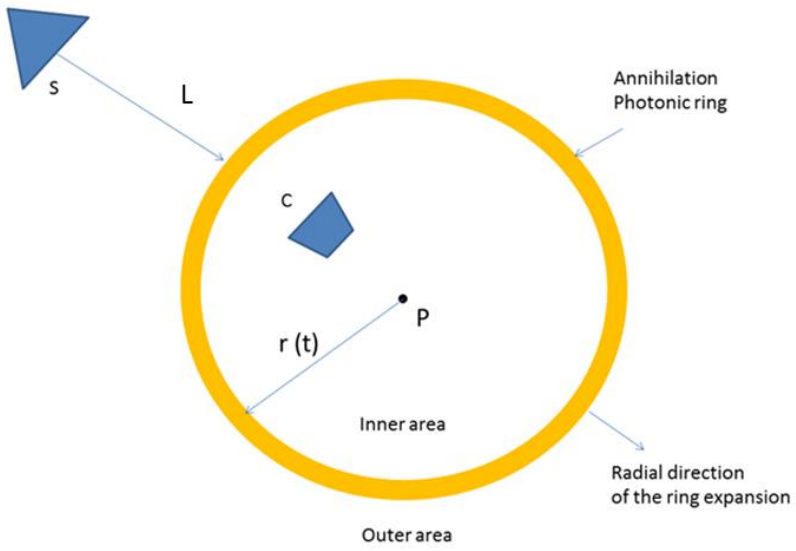

Figure 2: Configuration of the gravitational photonic spherical shell after annihilation of A & B, and mass C after penetrating the photonic spherical shell.

In order to demonstrate the paradox, consider the following thought experiment: assume that we have two identical experiment sets as drawn in (Fig. 1). Each set contains two symmetrical objects in the same shape and mass made of matter (A) and anti-matter (B) respectively that are approaching each other towards annihilation into photonic radiation. In both experiments, an object (C) is brought from point (P) to point (S) by applying the same potential energy and can be released from point S at any chosen moment. In both experimental setups the applied potential energy is equivalent just before the annihilation of A and B (setup mode). Once released, the mass (C) is pulled by gravitational force from the source (S) toward point (P). Assume that at time t_0 the matter A and the anti-matter B collide and annihilate into pure energetic photons.

In the first experiment (Fig. 3, left image), the mass (C) is released from point (S) at t_0 and pulled by the gravitational field toward the center of the photonic spherical shell (point P). Outside the photonic spherical shell, the mass (C) will accelerate and gain kinetic energy. After travelling the distance L1 and gaining the velocity V_1 it penetrates into the photonic spherical shell, where the gravitational field is zero, it will maintain its kinetic energy and continue to move toward point P with constant velocity V_1.

The second experiment (Fig. 3, right image) is almost similar to the first experiment except that mass (C) is released from point (S) at time $t_0+\Delta t$. As in the first experiment, the mass (C) is pulled by the same gravitational field as in the first experiment toward the center of the photonic spherical shell at point P. Outside the photonic spherical shell, the object C will accelerate and gain kinetic energy. Since the photonic spherical shell inflates in the speed of light ($r(t) = c * t$), the mass (C) will penetrate into the photonic spherical shell after a shorter distance L2, then in the first experiment and therefore its velocity V_2 and its kinetic energy will be less than in the first experiment (Fig. 3).

In both experiments, both the gravitational force and the potential energy are zero within the inner area of the photonic spherical shell. Since the photonic sphere propagates at the speed of light, once mass C entered into the photonic spherical shell it will stay forever within the inner area.

Since the gravitational force inside the spherical shell is zero, it has no potential energy and mass C has only kinetic energy. Since the two experiments were identical and shared the same potential energy during the setup phase, there is no way to explain the difference between the kinetic energy of mass (C) between the two experiments. Since no external or internal energy was inserted during the experiments, this result contradicts the energy conservation law and leads to a paradox (The photonic gravitational paradox).

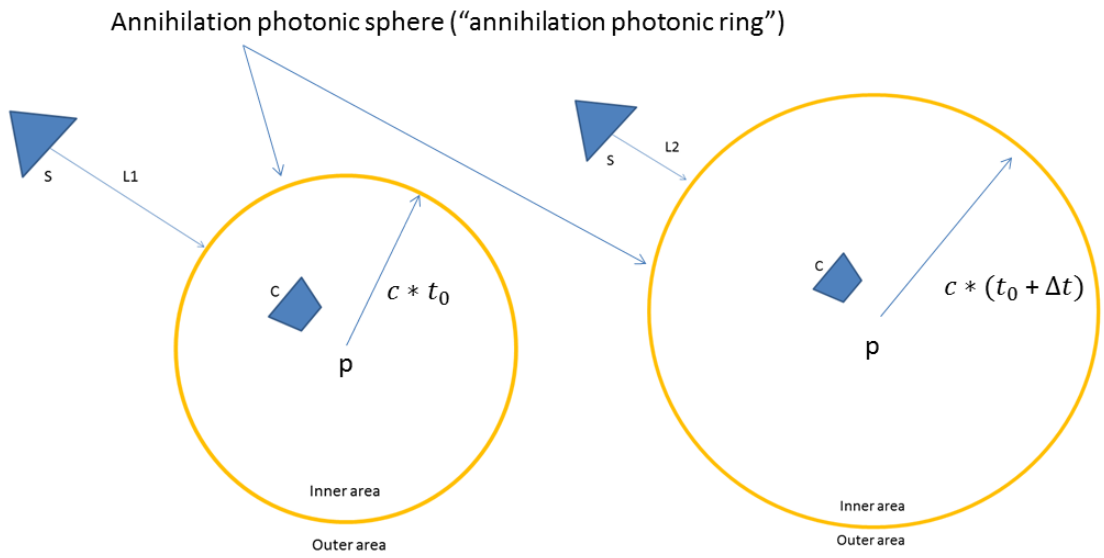

Figure 3: Configuration of experiments 1 and 2 after the annihilation phase.

3. Conclusion

Although in both experiments, before annihilation (setup mode), mass C had the same potential energy, we received different kinetic energies between the two experiments, after penetrating into the photonic spherical shell. Since there is no gravitational force inside the photonic sphere the kinetic energy is the total energy. Since we started both experiments with the same total energy and received at the end of the experiments a difference in the total energy between the two experiments we concluded that there is a paradox.

The only way to explain this paradox is to assume that anti-matter impose anti–gravity and therefore matter and anti-matter together impose zero gravity. 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:

Figure 1: Configuration of the masses A, B and C before annihilation (setup mode).

Figure 2: Configuration of the gravitational photonic spherical shell after annihilation of A&B and of mass C penetrating the spherical shell.

Figure 3: Configuration of experiments 1 and 2 after the annihilation phase.