Antimatter's gravity paradox

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Abstract

Assuming that during the “big bang” matter and anti-matter pair production and annihilation governed the first phase before the expansion and cool down of the universe, we would expect to find a universe consisting of both matter and anti-matter uniformly spread apart throughout space.

That is obviously not the case as we can observe today and we expect to find some new kind of anti-symmetry between matter and anti-matter.

In this paper we will show a paradox that leads to the conclusion that anti-matter must have "anti-gravity". Based on this conclusion we claim that matter and anti-matter preserve two new conservation laws: 1. Conservation of gravity, 2. Conservation of time.

Based on these new conservation laws we predict that anti-matter is uniformly spread, as anti-atoms or anti-elementary particles, throughout space and it’s one of the main reasons for space expansion.

We strongly believe that future tests on the influence of anti-matter on gravity and time will prove this theory.

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1. Introduction

Anti-matter is considered identical to normal matter in some respects but the exact opposite in others. For example, although the antiproton has the same mass as its counterpart the proton, it is negatively charged instead of positively charged.

Scientists have long wondered if antimatter responding the same way to gravity as ordinary matter. Physicists have generally assumed it does, but there are others that believe that antimatter will respond to gravity in a different way ("fall upwards") and they call it anti-gravity.

Ordinary matter atoms have the same mass as anti-matter atoms, but the opposite charge. Scientists wonder whether such a thing as anti-gravity exists. Direct evidence for whether or not anti-matter "falls upward", when pulled by gravity, remains difficult to experimentally gather since antimatter is rare and annihilates when it comes into contact with regular matter.

The combination of antimatter and gravity has never been experimentally tested before. So far, the experiment of letting a chunk of anti-matter drop and seeing what happens never been done. Recently, researchers have proposed a device that could help solve the mystery of whether antimatter falls up or down. [1], [2], [3]

2. The paradox that lead to the conclusion that anti-matter must impose anti-gravity

Let's consider that two symmetrical objects in the same shape and mass (M) made of matter and anti-matter respectively are approaching each other (assuming they both impose gravity), towards annihilation into pure energy in the form of energetic gamma rays (Fig. 1).

Phase 1 - just before annihilation: Let's consider that these two objects approach each other (just before annihilation) and their speed is much smaller than the speed of light (Newtonian physics for simplicity reasons). Let's consider a photonic source far away radiating a photon arriving at the two objects just before they collide and annihilate each other. Because of gravitational force, the photon undergoes a gravitational blue shift effect meaning its wave length shortens as it approaches the two objects.

$$E_{photon\ phase\ 1} = h\frac{c}{\lambda^*} \qquad (1)$$

Where $\lambda^* - wave\ length\ after\ gravitational\ blue\ shift\ effect$

Phase 2 - just after annihilation: the two objects annihilate each other into pure energy in the form of energetic gamma rays based on $Einstein's\ \ E = mc^2$ equation. Let's consider the same far away photonic source radiating another similar photon arriving at the location of the two objects long after they collide and annihilate each other. Because now there is no gravitational force, the photon does not undergo a gravitational blue shift effect, meaning its wave length does not change from the moment it left the photonic radiation source and its photonic energy does not change.

$$E_{photon\ phase\ 2} = h\frac{c}{\lambda} \qquad (2)$$

$Where\quad \lambda - the\ original\ wave\ length$

$Since\ \lambda > \lambda^*$ It is obvious that $h\frac{c}{\lambda} < h\frac{c}{\lambda^*}$

From Eq. (1) and Eq. (2) we get

$$E_{photon\ phase\ 2} < E_{photon\ phase\ 1} \qquad (3)$$

At phase 1 the total energy is $E1 = 2Mc^2 + h\frac{c}{\lambda^*}$

At phase 2 the total energy is $E2 = 2Mc^2 + h\frac{c}{\lambda}$

Therefor

$$E_2 < E_1 \qquad (4)$$

Since during the annihilation process the total energy should have been fully conserved, how can we explain the reduction in the total energy between the two phases? This is what we named as the "anti-matter's gravity paradox".

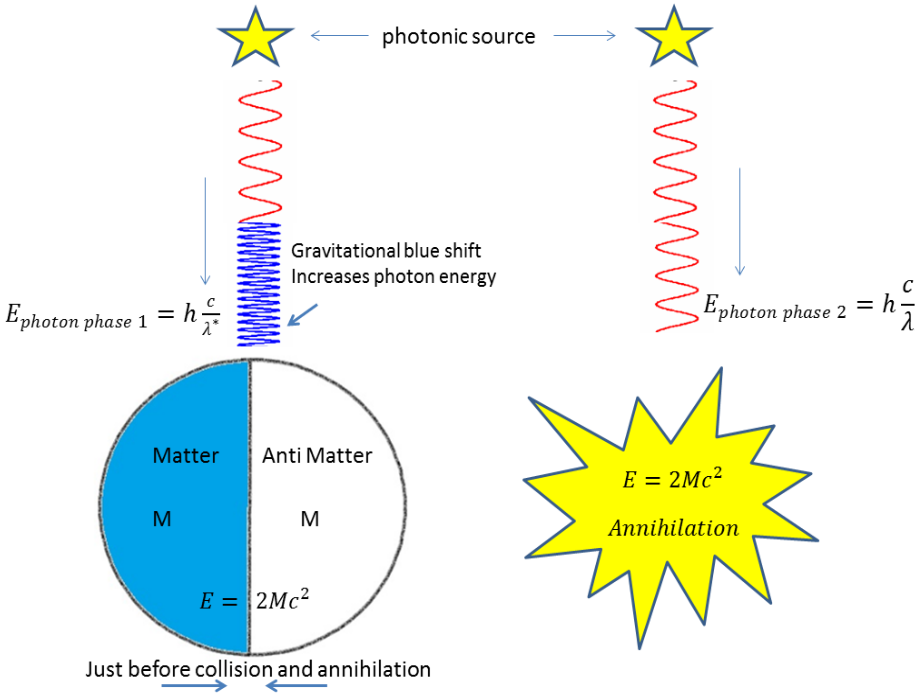

Figure 1. Photonic energy before annihilation at phase1 (on the left) is higher because of gravitational blue shift effect than at phase 2 (on the right) after annihilation. (The assumption is that the kinetic energy of the matter and anti-matter, just before collision, can be neglected compared to the mass energy).

This contradicts the energy conservation law. The only explanation that is able to solve this paradox is our claim that antimatter imposes anti-gravity instead of gravity.

This way, based on figure 1, if matter and anti-matter, each with mass M, collide, they do not apply any gravitational force (since gravity and anti-gravity yields zero gravity force) and the photon doesn't go through gravitational blue shift effect and there is energy conservation between phase 1 and phase 2 (based on figure 1) and there is no violation of the energy conservation law and therefor there is no paradox.

3. Gravity Conservation, Time Conservation

Matter and anti-matter were originally produced, based on the big bang theory, by gamma highly energetic radiation. Since photonic radiation doesn'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 impose gravitational time dilation(time “floats” slower), its partner anti-matter impose anti-gravitational time anti-dilation (time “floats” faster) so that the total effect on time sum up to zero as it was originally true for the photon energy radiation that produced originally those matter and anti-matter particles.

4. Where is the antimatter?

According to general relativity theory, the gravity of matter particles is caused by the curvature of space-time. The effect of this curving is expressed by accumulation of matter particles into chunks of mass that grows gradually up to the size of stars, galaxies, etc.

On the other hand, the anti-gravity tends to stretch space-time. The effect of this stretching is expressed by spreading the anti-matter particles in space far away from each other so that finally they are spread equally in space. This can explain as well why we could not expect to find stars made from pure anti-matter. Because the anti-matter particles have such small size and they are not accumulating into chunks, we are not able to detect them but still we strongly believe that they are there distributed probably equally in the huge empty space between galaxies.

5. Antimatter and the expansion of space

Hubble is known for showing that the recessional velocity of a galaxy increases with its distance from the earth, implying the universe is expanding. This recessional velocity was measured by detecting the redshift deviation of the photonic radiation of those stars.

We claim that the expansion of space is caused by the anti-gravity of the anti- matter particles that are distributed equally in space. As we claimed before, anti-gravity tend to stretch space-time (contrary to gravity that tend to curve space-time). Since anti-particles are spread equally all over the space each portion of space is stretched equally.

6. Conclusion

With the aid of the anti-matter gravitational paradox we concluded that there must be two extra new conservation laws: conservation of gravity and conservation of time. So, if matter tends to shape into stars and galaxies by applying gravity while curving space-time, anti-matter tends to spread by applying anti-gravity while stretching (expanding) space-time. We expect that because of the anti-gravity, the anti-matter will come in the most basic structures of positron, anti-proton, anti-atom or even small anti molecules, will spread uniformly in space influencing the space expansion as measured through red shift effects of the galaxies around us. That explains the missing anti-matter from the big bang, after the creation and annihilation of matter and anti-matter. We strongly believe that future tests on anti-matter atoms will prove that it has anti-gravitational effect and that time moves faster by the influence of anti-matter by expanding (stretching) the space-time fabric.

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Figure legends:

Figure 1. Photonic energy before annihilation at phase 1 (on the left) is higher because of gravitational blue shift effect than at phase 2(on the right) after annihilation. (The assumption is that the kinetic energy of the matter and anti-matter just before collision, can be neglected compared to the mass energy).