Non-quantum entanglement through time and gravity

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Abstract

In our previous paper [1] we 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.

In our previous paper [2] we show that based on the conservation of gravity and time, we expect that when a pair of matter and anti-matter particles is produced from pure energy (e.g. pair production from an energetic photon), they are entangled through gravity and time. This entanglement of time and gravity is not restricted to the quantum rules, and it will be referred as "non-quantum entanglement through time".

In this article, based on the non-quantum entanglement through time, we claim that we can exploit this non-quantum entanglement in order to communicate instantaneously through large distances.

Non-quantum entanglement through time

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Key Words: communication; time; entanglement; matter, antimatter

1. Introduction

Quantum entanglement is one of the central principles of quantum physics. Quantum entanglement means that pairs or groups of particles are generated or linked together in a way such that the measurement of one particle's quantum state determines the possible quantum states of the other particles.

Such phenomena were the subject of a 1935 paper by Albert Einstein, Boris Podolsky, and Nathan Rosen [3], describing what came to be known as the EPR paradox. Einstein, Schrödinger and others [4], [5] considered such behavior to be impossible, as it violated the local realist view of causality (Einstein referring to it as "spooky action at a distance") and argued that the accepted formulation of quantum mechanics must therefore be incomplete. Later, experiments have been performed involving measuring the polarization or spin of entangled particles in different directions, which, by producing violations of Bell's inequality [6] demonstrate statistically that the local realist view cannot be correct.

This has been shown to occur even when the distance between the sites of measurements was large enough so that the measurements are performed more quickly than even light speed could travel between the sites of measurements and influence the entangled particles. Recent experiments have measured entangled particles within less than one hundredth of a percent of the travel time of light between them [7]. According to the formalism of quantum theory, the effect of measurement happens instantly [8].

In quantum physics, we normally entangle individual particles like electrons or photons, where, for example, each electron can have a spin of either up or down in the direction of measurement. If you measure the spin of one of them, you instantaneously know the spin of the other, even if it's halfway across the Universe.

Many scientists wonder whether we could use this property of quantum entanglement to communicate instantaneously from, for example, a distant star system to earth.

The basic scenario for entanglement based communication looks like this: two people, traditionally named "Alice" and "Bob" share a pair of entangled particles that can each be measured in one of two quantum states, which we'll call "0″ or "1". These particles are prepared in an entangled state in which a measurement of the state of Alice's particle is correlated with the measured state of Bob's particle, no matter how far apart they are. That is, if Alice force her particle to be in state "1" she knows that

Bob will measure his particle at that moment to be in state"0" no matter where he is whether he is far away or even in a station on Mars.

It's seems to be a brilliant plan for instantaneous communication, but there's a problem: quantum entanglement works if you only measure the state. If you force an entangled particle into a particular state, you *break the entanglement*, and the measurement you make on Earth is completely independent of the measurement at the distant star.

In this article we present a different kind of entanglement named: *Non-quantum entanglement of matter and antimatter* that behaves in a different way than quantum entanglement and might be used for instantaneous communication.

2. Non-quantum entanglement of matter and anti-matter

Matter and anti-matter were originally produced, based on the "big bang" theory, by pure energy ($E = mc^2$). In our previous paper [1] we show a paradox that leads us to the conclusion that anti-matter must have "anti-gravity" and anti-dilation effect on time (time flows faster).

Since pure energy (e.g. energetic photons in free space) doesn't have mass, we expect that it will not influence time and apply no gravity. Based on that we claim that matter and anti-matter, produced from pure energy, must preserve two new conservation laws: 1. The "Conservation of gravity", 2. The "Conservation of time ".

In our previous paper [2], based on these new conservation laws [1], we claim that the number of all matter particles in the universe must be equal exactly to the number of all antimatter particles. Moreover, each matter particle must be entangled to a "partner" antimatter particle so all the universe is build up from matter and antimatter "entangled" pairs through gravity and time. Therefore, when a matter particle approaches a bulk of mass (e.g. star) that impose on the matter particle a gravitational time dilation, this information must be transferred instantaneously to its entangled "partner" anti-matter particle in order for it to impose anti-gravitational and time anti-dilation (time "floats" faster), so that the total effect on time will sum up to zero.

This is a new kind of entanglement, a "cosmological non-quantum entanglement" and it's not governed by the quantum entanglement rules. For example, in quantum physics, we normally entangle individual particles like electrons or photons. If you measure the spin of one of them, you instantaneously know the spin of the other, even if it's halfway across the Universe. But, if you force an entangled particle into a particular state you break the entanglement.

On the other hand, in the new kind of cosmological non-quantum entanglement, we entangle particles of matter with a particles of anti-matter (e.g. Electrons and Positron) where each electron impose a gravity and time dilation while its entangled partner, the positron, impose an anti-gravity and time anti-dilation so that the total effect on time and on gravity will sum up to zero.

Like in the case of regular quantum entanglement, if you measure, for example, the time dilation of a matter particle you can know the anti-dilation of the anti-matter entangled partner particle instantaneously and it doesn't matter what the distance is between those particles.

The big difference between these two kinds of entanglements is that in regular quantum entanglement if you force an entangled particle into a particular state, you break the entanglement, and the measurement you make on one side is completely independent of the measurement at the other side. On the other hand, in the case of the new kind of non-quantum entanglement, applying gravitational force (or acceleration force) on the matter particle for example, will not tear apart the entanglement. The gravitational or acceleration force applied on one side will change the time dilation on both sides instantaneously based on the time entanglement. This entangled phenomenon will happen instantaneously in all inertial reference frames. Also the causality will remain through all the possible inertial reference frames. This enables instantaneous communication without "breaking" any quantum rules. Measuring or influencing time dilation on one side (see Fig.1 and Fig. 2) will not influence the entangled state (as expected in regular quantum entanglement), since it is a non-quantum entanglement, and this will enable instantaneous information transfer.

3. Experiment to prove the concept of non-quantum entanglement through time for instantaneous communication through large distances

By using that unique property of this new non-quantum entanglement through time, we suggest a practical way to communicate instantaneously through large distances. Since all the required technologies are available today we suggest to test this approach in the laboratory.

Scientists at CERN have published the results of experiments in which they captured anti-hydrogen particles for 1,000 seconds before annihilation [9]. It is reasonable to assume that in the near future scientists will succeed to increase the lifetime of anti-matter for a much longer time.

Let us assume non-quantum entangled Anti matter (Alice) and matter (Bob) which are far away from each other. Increasing the gravitational force on Bob's side (e.g by decreasing the distance of the satellite from the star), will cause gravitational time dilation on Bob side and through the non-quantum time entanglement the anti-matter side (Alice) will measure an instantaneous anti-dilation in the flow of time (time moves faster), compared to a reference clock situated far enough from the anti-matter influence on time (Fig 1).

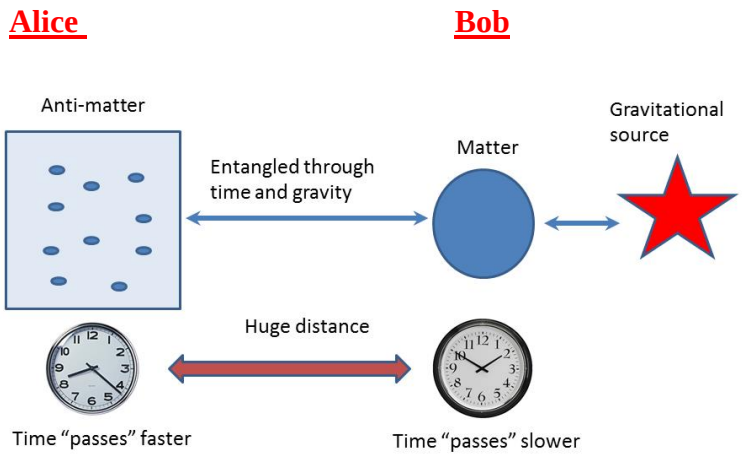

Figure 1: Applying instantaneous communication based on non-quantum time entanglement by applying gravitational force.

According to Einstein's general relativity theorem, acceleration and gravity force are equivalent and has the same effect on time dilation. Therefor Bob can cause gravitational time dilation by applying a change in the acceleration force applied on the matter on his side. This will cause a change in gravitational time dilation on Bob side and through the non-quantum time entanglement the anti-matter side (Alice) will measure an instantaneous change in the flow of time (time moves faster), compared to a reference clock situated far enough from the anti-matter influence on time (Fig. 2).

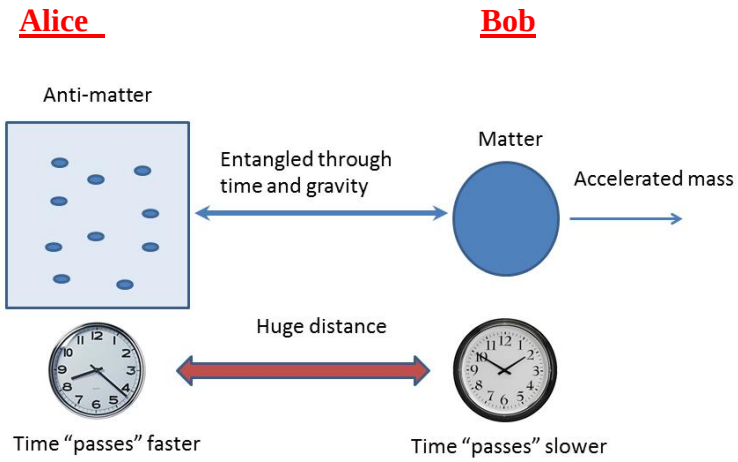

Figure2: Applying instantaneous communication based on non-quantum time entanglement by applying acceleration force.

The effect of time dilation is maximal at the location of the matter and anti-matter particles and gradually decreases as the distance from the particles grows. For example (Fig. 3), on Alice side (anti-matter), clock A is compared to a reference clock B located farther from the anti-matter (but still on Alice side). The farther the reference clock B is situated from the anti-matter the less it feels the anti-matters influence on its time flow.

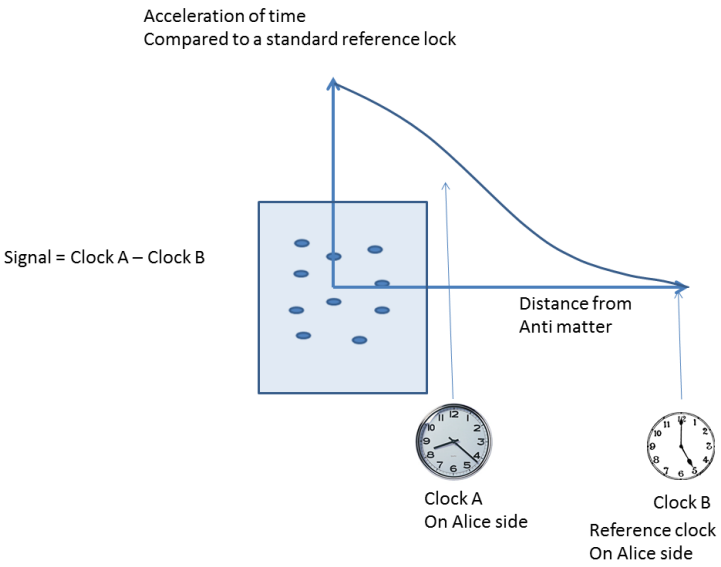

Figure3: an example of a setup designed to measure the time dilation signal on the anti-matter (Alice) side.

4. Conclusion

Based on time and gravity conservation consideration [1], matter and antimatter particles are entangled through time and gravity [2]. This is a non-quantum entanglement (compared for example to the quantum spin entanglement). Applying gravitational force (or acceleration force) on Bob side for example, will not tear apart the time entanglement. The gravitational or acceleration force applied on Bob's side will change the time dilation on both Alice and Bob sides instantaneously based on the time entanglement (see Fig. 1 and Fig. 2). This entangled phenomenon will happen instantaneously in any inertial reference frame that will observe Alice and Bob. The causality will remain through all the possible inertial reference frames.

If, for example, Bob apply a gravitational or acceleration force on his side and then Alice will measures a change in the time dilation on her side. This way Alice can know what Bob did on his side. This way, Bob can transmit instantaneously (e.g. through Mors code) information to Alice side. This might enable the future development of instantaneous communication systems.

By using that unique property of this new non-quantum entanglement through time, we suggested a practical way to communicate instantaneously through large distances. All mentioned above, regarding non-quantum entanglement through time, is true for non-quantum entanglement through gravity as well.

Since all the required technologies are available today we suggest to test this approach in the laboratory. If the results of such experiment will confirm our theory, then that will be a revolutionary breakthrough in the cosmological science.

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Figure legends:

Figure1: applying instantaneous communication based on non-quantum time entanglement by applying gravitational force.

Figure2: applying instantaneous communication based on non-quantum time entanglement by applying acceleration force.

Figure3: an example of a setup designed to measure the time dilation signal on the anti-matter (Alice) side.