

Energy relationship between photons and gravitons

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Abstract

Einstein's mass and energy relationship is reinterpreted to understand the energy flow within the universe. An energy relationship between photons and gravitons is identified. This relationship seems to be an important part of energy chain in our universe.

1. Introduction

Our universe is slowing down due to reasons which have not been clearly identified yet. This work reinterprets Einstein's mass and energy relationship to understand the energy flow within our universe. It has been observed that matter cannot exist without energy being supplied from an external energy source. This work suggests that slowing down of our universe is due to drop in this external energy supply. This work further suggests that our earth is adapting itself to compensate for drop in external energy supply for its survival. Remaining sections of this paper discuss these concepts in details. Section 2 reinterprets Einstein's energy and mass relationship. Section 3 describes the dependency of our universe on the supply of external energy. Energy relationship between photons and gravitons are described in section 4. Section 5 describes how drop in the external energy is affecting us. Section 6 details possible strategies the earth might be adopting to cope with the drop in supply of external energy.

2. Einstein's mass and energy relationship

Einstein proposed relationship between mass of an object and total energy it contains as:

$$E = mc^2 \quad (1)$$

Here,

m : Mass of the object O

c : Speed of light

E : Energy contained in object O with mass m

For the purpose of reinterpretation, let's assume that object O with mass m is an aircraft. Engines of this aircraft use fuel which is stored in the aircraft's fuel tank. Maximum energy that can be generated by fuel in the fuel tank of the aircraft is defined as mc^2 . Let's assume that the engine of the aircraft has 100% energy efficiency and is capable of converting all its fuel into mechanical energy. Furthermore, the engine is a super engine which can move within range of 0 meter to 3×10^8 meters in one second. The fuel consumption of this aircraft is directly proportional to the distance aircraft traveled and can be described as:

$$Q_{\text{Fuel}} \propto d_{\text{Travel}} \quad (2)$$

Here,

Q_{Fuel} : Quantity of fuel used.

d_{Travel} : Distance traveled.

In the above case, the fuel consumed by aircraft will be same if aircraft travels $3*10^8$ meters in one second or it travels $3*10^8$ meters in $3*10^8$ seconds. Thus, from fuel's consumption point of view, constant c (meter/sec) in Einstein's mass and energy relationship can be replaced with constant d (meter) which is equal to $3*10^8$ meters. Therefore, Einstein's mass and energy relationship can be rewritten as:

$$E = md^2 = m \sum d_i \text{ (i = 1 to } 3*10^8 \text{ where } d_i = d \text{) (3)}$$

Equation (3) means that object with mass m contains energy, which is equal to the energy consumed in moving mass m for $9*10^{16}$ meters.

3. External energy supply for survival of our universe

It is generally thought that gravity of sun is responsible for rotation of earth around sun. Earth is assumed to be 4.5 billion years old. Let's calculate the energy sun needs to be able to rotate our earth continuously for 4.5 billion years. For calculations following values are used:

Mass of earth $m_{\text{Earth}} = 6*10^{24}$ kg

Mass of sun $m_{\text{Sun}} = 2*10^{30}$ kg

Radius of earth $r_{\text{Earth}} = 6.4*10^6$ m

Mean radius of earth's orbit $R_{\text{Earth}} = 1.5*10^{11}$ m

Assuming that there is no other cosmological body rotating around sun except our earth, sun should be able to move earth to distance (meters) which is given by:

$$d_{\text{Sun,Earth}} = 9*10^{16} m_{\text{Sun}} / m_{\text{Earth}} = 3*10^{22} \text{ m}$$

The number of rotations the earth has made around the sun since the time of its birth 4.5 billion years ago is:

$$n_{\text{Earth}} = 4.5*10^9$$

The total distance traveled around the sun by the earth since its birthday is given by:

$$d_{\text{Earth}} = 2\pi R_{\text{Earth}} * 4.5*10^9 = 4.24*10^{21} \text{ m}$$

The calculations show that the sun has consumed significant part of its mass in rotating earth around its orbit for 4.5 billion years. From Equation (3), it is clear that earth can travel only $9*10^{16}$ meters by converting all its mass into energy. This distance is much less than the distance earth has already traveled.

The solar system consists of following nine planets. Now let's pay attention to Jupiter and see whether sun has enough energy to be able to rotate other planets like Jupiter. The distance sun can move Jupiter by converting its whole mass into energy is given as:

$$d_{\text{Sun,Jupiter}} = 9*10^{16} m_{\text{Sun}} / m_{\text{Jupiter}} = 9.47*10^{19} \text{ m}$$

Where,

m_{Jupiter} : 317.8 times of earths mass.

Assuming that Jupiter and Earth both came into being 4.5 billion years ago, the number of rotations Jupiter has made around the sun are given as:

$$n_{\text{Jupiter}} = 4.5 \times 10^9 / 11.86 = 3.79 \times 10^8$$

Assuming that the Jupiter is rotating in a circle, the total distance Jupiter has traveled since it came into existence 4.5 billion years ago is given by:

$$d_{\text{Jupiter}} = 2\pi R_{\text{Jupiter}} n_{\text{Jupiter}} = 1.85 \times 10^{21}$$

Where,

R_{Jupiter} : Orbital radius of the Jupiter which is 5.20 AU

1 Astronomical Unit (AU): 1.5×10^{11} m

From the above calculations, it is obvious that sun does not have enough energy to be able to rotate Jupiter around it for 4.5 billion years even when it converts all its mass into energy. Equation (3), it is clear that Jupiter can travel only 9×10^{16} meters by converting all its mass into energy. This distance is much less than the distance Jupiter already has traveled.

Now lets see whether, the earth has enough energy to be able to rotate moon around it. The distance the earth is capable of rotating moon around is given by:

$$d_{\text{Earth,Moon}} = 9 \times 10^{16} m_{\text{Earth}} / m_{\text{Moon}} = 7.7 \times 10^{18} \text{ m}$$

Where,

Mass of earth $m_{\text{Earth}} = 6 \times 10^{24}$ kg

Mass of moon $m_{\text{Moon}} = 7 \times 10^{22}$ kg

Let's assume that moon came into existence 4.5 billion years ago. The number of rotations moon has made around earth since its creation is given as:

$$n_{\text{Moon}} = 4.5 \times 10^9 \times 365 / 27 = 6.0 \times 10^{10}$$

The total distance traveled by moon since its existence 4.5 billion years ago is given as:

$$d_{\text{Moon}} = 2\pi R_{\text{Moon}} n_{\text{Moon}} = 1.5 \times 10^{20} \text{ m}$$

Where,

Radius of Moon's orbit around the earth $R_{\text{Moon}} = 4 \times 10^8$ m

It is obvious that even when earth converts its whole mass into energy, it is not possible for earth to have enough energy to be able to rotate moon around it for 4.5 billion years.

Falling photon experiment shows that photon has effective gravitational mass. As gravitational mass is always equal to inertial mass, photon can be treated like a particle with non-zero mass which can travel up to 9×10^{16} meters with energy it contains according to equation (3). It is believed that photons travel

more than $9 \cdot 10^{16}$ meters as we are able to detect photons from stars which are thought to exist at a distance larger than $9 \cdot 10^{16}$ meters. According to equation (3) photons need to energize themselves while traveling distance more than $9 \cdot 10^{16}$ meters. An energy source is required for photons to enable them to travel more than $9 \cdot 10^{16}$ meters.

Based on the above observations, it can be suggested that matter which forms cosmological bodies does not have enough energy to be able to exist without existence of external energy supply (EES) which periodically or continuously energizes it.

Let's assume, a cosmological body with mass m was filled with energy E_i at the time of universe creation and at event k it lost energy Δe_k which happened at any time between the moment of universe creation and the present time. According to Einstein:

$$mc^2 = E_i - \sum \Delta e_k \text{ where } k = i \text{ to } n \text{ (4)}$$

As $\sum \Delta e_k$ is a positive value, above relationship can be satisfied only if the cosmological body is refilling itself with ESS and the supply of ESS to mass m is equal to $\sum \Delta e_k$. The other possibility is that the speed of light decreases due to event k that happens at a cosmological body. It means that drop in speed of light is not a continuous phenomenon but something that happens at discrete events. If it is assumed that speed of light is same in all frame of references, change in speed of light at a discrete event at a specific point in the universe needs to be propagated to the whole universe in no time. As events due to which a cosmological body loses its energy, may happen at any of the cosmological body at any time, the whole universe will fall into chaos under this assumption.

It is not known where the source of EES exists and how energy from EES travels toward matter to energize it. However, based on our general observation of nature around us, we can imagine two types of flow of EES to matter in our universe:

- Our universe is a sea of EES and matter which exists in this universe acquires and uses energy from this sea of EES.
- Energy flows in different directions from source of EES like branches spreading out in different directions from a tree trunk. Each branch of flow of EES passes through different regions in the universe and energizes them.

4. Energy relationship between gravitons and photons

In 1965, American physicists Arno Penzias and Robert Wilson at Bell Telephone Laboratories in New Jersey discovered microwave that was same in whatever direction the microwave detector was pointed out. It was same through out the day and through out the year regardless of earth motion around the sun [1]. The detected microwave was assumed to be a glow from early universe. This work suggests some other possible explanations for existence of such microwave.

Earth has a special place in the universe

Let's assume a spherical space with very large radius which has our earth at its center. The boundary of this spherical space has large number of same kind of uniformly distributed stars. Photons emitted by these stars reach our earth. With this kind of universe's structure, microwave antenna should be able to detect microwaves regardless of the direction it is pointed out.

Our universe is enclosed in a container with mirror like inner surface

Let's assume a spherical container which has mirror like inner surface and contains our universe. Photons from cosmological bodies cannot escape this container as they always get reflected from mirror like inner surfaces of the container. This kind of structure can help universe function without photons being wasted in traveling infinite space where there is no matter which needs interaction with these photons. Earth in such container can receive photons from all directions. However, photons received on earth will not be same in all directions unless;

- Inner walls of the above spherical container act like photon energizer. Photons from different cosmological bodies that reach the inner wall of container are energized to a fixed level of frequency and then reflected back into the space within the container.
- Earth or our solar system exists at almost the center of this container.

Earth is traveling at a speed larger than c

Let's assume that the detected microwave is really a glow from early universe and creation of universe started from a specific space and time coordinate. If after Big Bang, both light and origin of matter forming our earth started travel in the same direction from this specific space and time coordinate, then

$$d_{\text{Earth}} = d_{\text{Glow}} = v_{\text{Earth}} t = v_{\text{Glow}} t \quad (5)$$

Here,

d_{Earth} : Distance traveled by earth since Big Bang

d_{Glow} : Distance traveled by glow since Big Bang

v_{Earth} : Velocity with which earth traveled since Big Bang

v_{Glow} : Velocity with which the early glow traveled since Big Bang

t : Time since Big Bang

As modern physics assumes that light's speed is constant, Equation (5) can be satisfied only in case when average speed of earth and glow (light) has been exactly same since the time of universe creation. If glow from early universe is arriving on the earth now, it means that earth and glow are in close race, where sometimes glow travels faster than the earth and sometimes earth travels faster than the glow. It also means that even now our earth is traveling toward a specific target with at least speed of light. Any such explanation negates following two important rules which form the basis of modern physics:

- Speed of light is constant
- Mass cannot travel faster than light

Cosmological bodies are energy hub

Cosmological body (earth) receives energy within a specific frequency range (microwave). It is also known that cosmological bodies (stars) have unique spectrum. Based on these two facts, It can be suggested that cosmological body is an energy transformer which changes received energy to new frequency and then distributes it to different points in the universe. It indicates the possibility that cosmological bodies in our universe play a specific energy transmission role while being part of a very huge energy distribution network.

Photons are dependent on matter for their survival

The possible mechanism, due to which we can detect glow from early universe on our earth now can be

due to existence of some kind of bond (relationship) between light and matter. Due to this bond light (glow) needed to remain in vicinity of matter (earth). In this scenario, glow from early universe and the origin of matter forming our earth started travel in the same direction at the same time. Earth traveled at a speed less than the speed of light while glow kept attached to the earth while traveling in vicinity of the earth at the speed of 3×10^8 meters. Microwave detector can detect microwave regardless of direction it is pointed out, as even now significant quantity of this glow is moving in vicinity of around this earth due to some kind of bond (relationship) between light and matter.

Let's further discuss the possibility of dependency of light on matter. Falling photon experiment shows that photon increases its energy (frequency) when it's distance to cosmological body (earth) decreases [3]. In other words, the cosmological body can act like energy recharger if photon deviate itself toward cosmological body or makes rotations around it. This re-energizing mechanism can help photon travel more than 9×10^{16} meters. Black holes and dark matter might be also acting like refueling stations for photons which need to travel long distances.

According to above observations, one of the energy chains in our universe is:

- EES energizes gravitons.
- Gravitons energize photons.
- Photons energize particles (such as electrons).
- Particles exchange energy with other particles

5. Drop in the supply of external energy

It is believed that the universe is slowing down. There are theories that claim that light is also slowing down since the Big Bang [2]. This section investigates the possible mechanism behind the slowing down of our universe.

In nature, same pattern can repeat. For example, earth rotates around sun in orbits and electrons rotate in orbits around nucleus. Let's extend Pauli Exclusion Rule to the cosmological bodies. If we observe our earth, some parts of the earth remain at low temperature while other parts of the earth are at higher temperature. Based on this observation, it can be said that energy requirements are different on different parts of the earth. For simplification purposes, let's assume that our earth is divided in two parts A and B as shown in Figure 1 according to its energy needs. Now let's assume that there are two earths E_1 and E_2 which are orbiting around sun in the same orbit. Pauli exclusion rule says that two electrons in the same orbit will have different spin directions. If Pauli exclusion rule is extended to our assumed case of two earths existing in the same orbit, earths E_1 and E_2 will need to spin in opposite directions. Let's assume EES is flowing from its source in the space where earths E_1 and E_2 are spinning around their own axis while orbiting around a larger object. In spin pattern 1 shown in Figure 1, spins of both earths are coordinated in such a way that the surfaces A of both earth face the same direction. Spin pattern 2 in Figure 2 shows a pattern where surface A of both earths are in opposite directions while spinning around their own axis. In spin pattern 1, the maximum surface area A that faces toward the flow of EES at any time is $2A$, while in spin pattern 2, the maximum surface area that faces toward the flow of EES at any time is A . Spin pattern 1 suits situations where there is enough energy to meet the demands of surface area $2A$ at any time. From energy utilization optimization point of view, spin pattern 2 can be beneficial in following specific case:

- The shape of the surface area of earth that faces the direction of EES acts like an antenna and

decides the amount of energy it can receive. The earth can change the reception of EES by adjusting the shape of its surface area that faces EES flow.

- There is not enough EES to meet the energy requirements of both earths E_1 and E_2 within a specific time period. Earths E_1 and E_2 need to coordinate their spin movements so that at any given time instance, maximum total area from both earths that faces the EES remains below A.

Earth is spinning around its own axis while rotating around the sun, sharing of limited supply of EES between two earths is feasible through different means such as:

- EES is a concentrated flow of energy which splits and follows the moving targets of earths.
- EES is spread throughout a space and earths E_1 and E_2 acquire their part of the share from this space.

From above arguments it can be said that:

- EES is different to gravity as gravitational force between two objects does not depend on shape of the surface area of the objects.
- Spin pattern 2 can be described as an evolution from spin pattern 1 beneficial in a scenario where there is a continuous drop in EES.

The matter in the universe is dependent on EES for its existence and the movement of matter in our universe is slowing down as is evident from evolution of Pauli exclusion rule and also by the drop in speed of light since Big Bang. This work suggests that drop in EES is responsible for slowing down of our universe and at a certain point in future; the matter in the universe won't be able to function anymore in the way it functions now if the drop in EES continues. As photons also use matter as refueling points, the photons will stop functioning too.

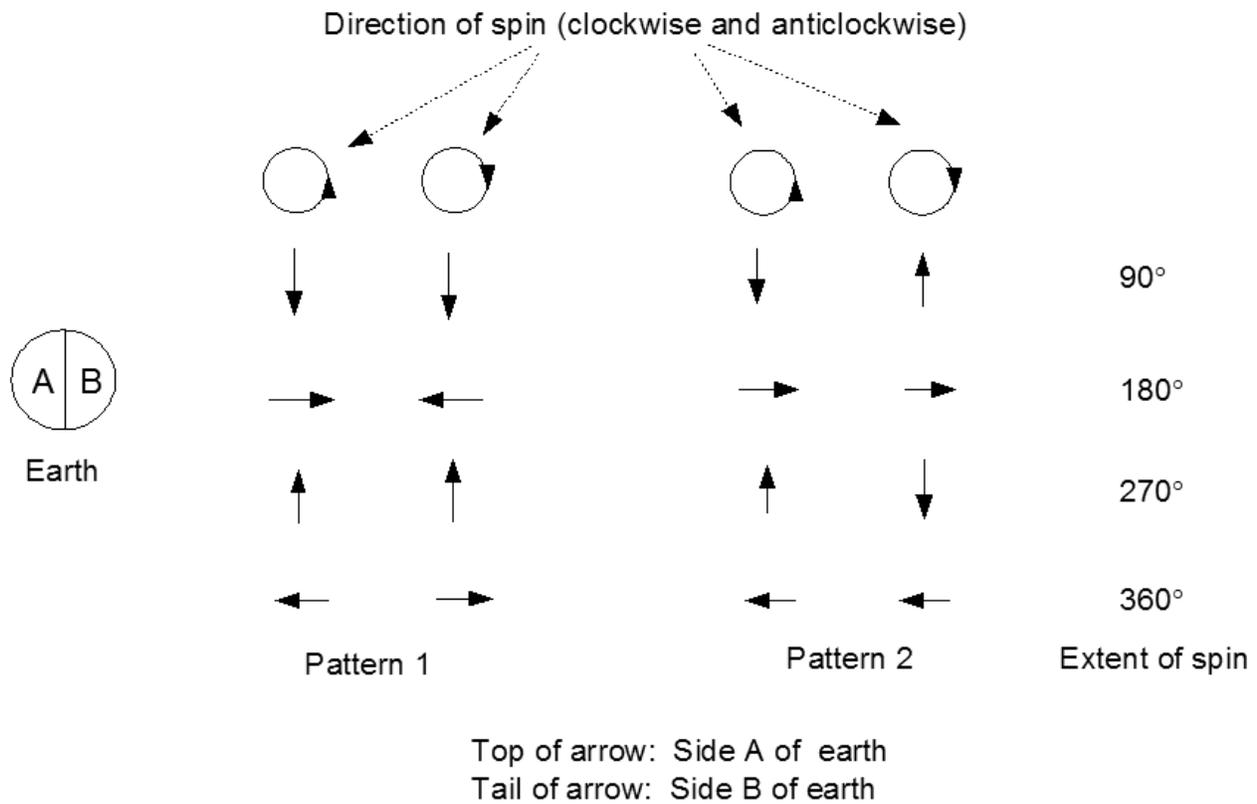


Figure 1: Spin patterns

6. Compensating for drop in external energy supply

Mass or collection of particles requires energy for different purposes. For example,

- Electron needs energy to be able to rotate in orbits around nucleus.
- Electron needs energy to move from low energy orbit to high energy orbit.
- Energy is required to restrict the movement of nucleus and molecules while they are bound to one another.
- Opposite charges need energy to move toward each other.
- Identical charges need energy to move away from each other.

For simplification purposes, Einstein's energy and mass relationship has been reinterpreted only for energy required for movement of mass. As supply of EES is dropping, the matter on earth needs to secure energy through different ways for its survival. For example:

- Changing the earth's surface to secure supply of EES including change in the area and shape of the earth's external surface.
- Securing supply of gravitons by changing the orbit's shape. The change in the earth's orbit can be permanent or temporary.
- Securing supply of gravitons by decreasing the distances to larger body at an increased rate. For example, earth and moon decrease their distance to sun at an increased rate.

- Securing supply of gravitons by reducing the spin rate around own axis. For example, increase in the length of day due to reduction in the rate of earth's spin.

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