

The Effect of Gravitation on the Electromagnetic Waves

In CPH Theory I tried explain withered the propagation of electromagnetic waves are influenced by gravitation.

I return to this theme because my previous presentation of the subject does not satisfy me, and, moreover, because I now see that one of the most important consequences of CPH Theory former treatment can be tested experimentally. It follows from the CPH Theory that electromagnetic waves passing close to the gravitational field are effecting by them. In CPH Theory the effect of gravitation on electromagnetic waves is different of Relativity.

As everyone know in General Relativity the frequency (and energy) of photons change in a gravitational field by following items;

1- Blue-shift- when a photon with frequency ν falls in a gravitational field, its frequency changes to ν' that gives by;

$\nu' = \nu(1 + \phi/c^2)$, that ϕ is the GM/R , G is gravitational constant, M is the mass of body and c is speed of light.

The above formula used for Blue-shift. And means gravitational field works on photon and energy (frequency) of photon increases.

2- Red-shift- when a photon with frequency ν is leaving a gravitational field, its frequency changes to ν' that gives by;

$$\nu' = \nu(1 - \phi/c^2)$$

The above formula used for Red-shift. It means the work of gravitational field on photon is negative and energy (frequency) of photon decreases.

The above relations are not really, because Relativity not considered to structure of photon and had looked on photon like other particles/objects. In fact photon is not same as other particles/objects. This difference comes up of photons properties and gravitons properties that I explained in CPH Theory.

The effect of gravitational field on photon in CPH Theory

For explaining the effect of gravitational field on photon, of the first we must consider to definition of structure of photon, gravitational field and relationship between photon and gravity field by according CPH theory. If you are similar with them, you can read section [Probably Function of Interaction Photon and Gravity](#).

I had believed any effort for finding a unified theory without considering conversion of the force and energy does not have any considerable success. In fact there is a unified force/particle in nature. In other words, Force, Energy and Mass had formed a unified fundamental particle that calls CPH in Theory of CPH. In Theory of CPH, Force and Energy are convertible. Also according to Relativity, mass and energy are equivalent.

So, Force, Energy and Mass are three manifests of a unified entity that is called CPH. And we should change our perception about force, energy and mass. Now I need define CPH.

Definition of CPH

Suppose there is a particle with mass of m that is moving with speed V_c in an inertial frame. And $V_c > c$ and c is the speed of light. So, its linear momentum gives mV_c . (Figure 1). It is Called CPH (Creation Particle Higgs).

$$\begin{array}{c}
 \text{CPH} \xrightarrow{\quad V_c} \\
 P = mV_c, V_c > c \\
 c \text{ speed of light}
 \end{array}$$

Figure 1

Principle of CPH

CPH is a particle with constant mass m and moves with constant speed V_c . CPH has the momentum of Inertia I . In any interaction between CPH and other particles/forces, the amount of V_c does not change, so;

$\text{grad}V_c = 0$ in all inertial frames and any space

Explain

According to figure 1, a CPH carries linear momentum of $P = mV_c$. So, CPH has inertia and also has Momentum Inertia I . When an external force is applied on a CPH, then a part of its Linear momentum ($P = mV_c$) converts to angular momentum and CPH takes Spin, so that the amount speed of CPH does not change in any case. When CPH has Spin, it is called GRAVITON. (Figure 2)

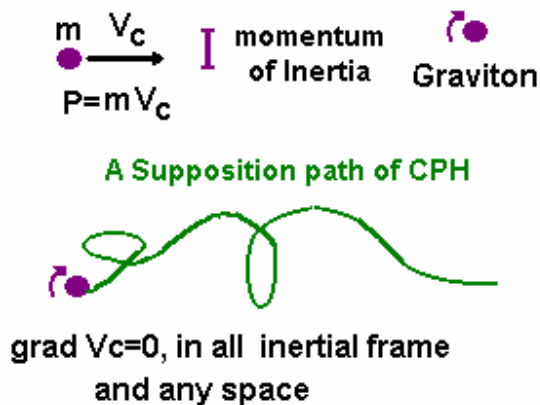


Figure 2

When a graviton works on an object/particle, graviton does disappear and converts to energy. Because it is not acceptable that force acts and produces energy; and force does not have any effect on itself while producing energy. All efforts for finding a unified field theory had no success, because physicists do not consider the conversion of force and energy. Also, a graviton acts on another graviton and produces energy. See Figure 3.

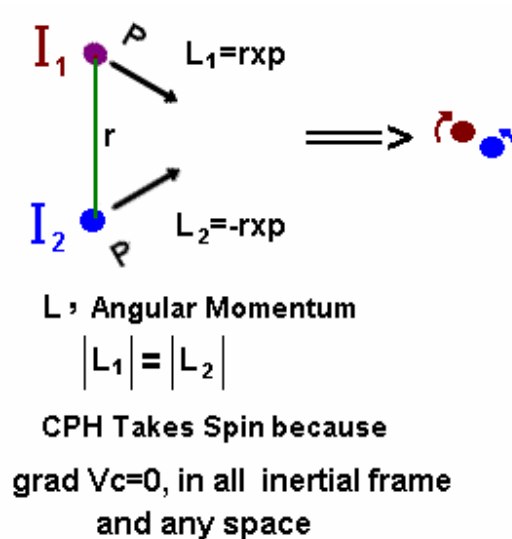


Figure 3

The picture above shows two gravitons with the mass of m , speed of V_c and linear momentum of $P=mV_c$, in distance of r feel each other. They absorb each other and “ r ” decreases. But CPH must move with the speed of V_c , so it loses a part of its linear speed and takes Spin. **When they contact with each other, then they repel each other and go far. But they absorb each other again. This interaction does continue until distance between them goes to near zero.**

A Photon is formed by a lot of CPH that they have spin and photon has spin too. So, when a photon is traveling with speed of c , CPH has linear speed of c and it has spin itself, and a speed equal to the speed of the photon (according to the structure of photon).

In a gravitational field, when a photon shifts to blue, gravitons convert to energy. And when the photon shifts to red, energy converts to graviton. And when energy decays, it produces Matter and Anti-Matter. See Figure 4. In fact ever thing formed of CPH.

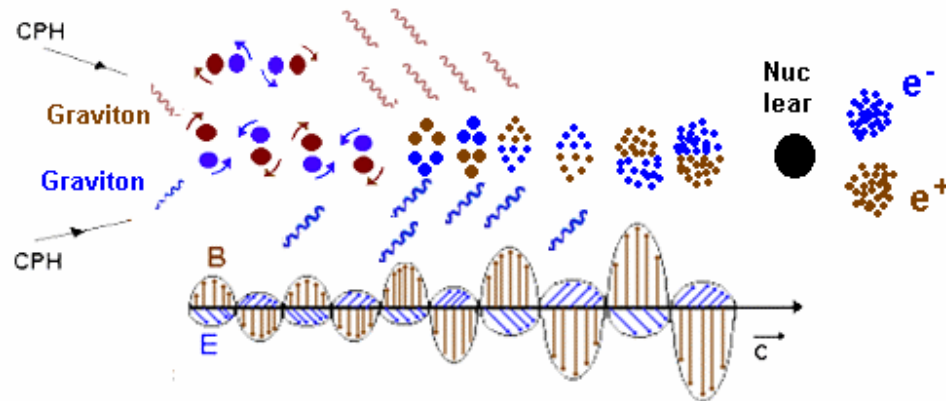


Figure 4

CPH is pure gravity force. CPH moves with speed of V_c in an inertial frame if no external force is applied on it. When an external force is applied on a CPH, it takes spin and is called graviton. So, V_c equals the speed of graviton (in an inertial frame), when it has no spin.

In fact a CPH is a sub-quantum of existence in nature. CPH has mass that is a manifest of matter; its movement is a manifest of energy. CPH has sub-quanta bounding gravity field around itself.

A CPH feels another CPH by this sub-quanta gravity field. Also, two CPH absorb each other by their sub-quanta fields. See Figure 5. **When they contact with each other, then they repel each other and go far. But they absorb each other again. This interaction does continue until distance between them goes to near zero.**

Photons (and all subatomic particles) are formed by many CPH that they have spin; and photon has spin too. So, when a photon is traveling with speed of c , CPH has a linear speed of c and it has itself spin and a speed equal to the speed of the photon (in the structure of photon or other subatomic particles).

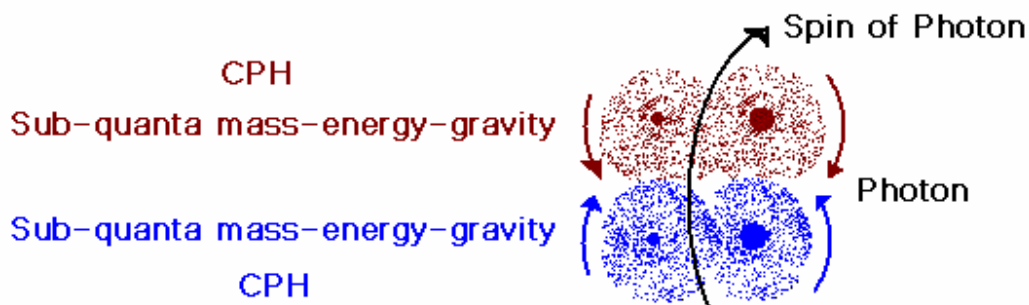


Figure 5

So, quantum energy is formed by a lot of CPH. Also, CPH (gravitons) work on CPH and produces energy. In the other words, force and energy are equivalent. Force converts to

energy and energy changes to force. For example; force converts to energy in blue-shift and energy converts to force in red-shift. Two objects/particles (like the moon and the earth, or an electron and a proton in an atom) transfer CPH continuously.

Photo Electric and Compton Effect by CPH

According to CPH theory a photon contains n number of CPH that they are moving with the speed of c in the structure of photons. The given mass of a CPH is m, so its momentum is $P=mc$ and the momentum of photon is $P=nmvc$, see Figure 6.

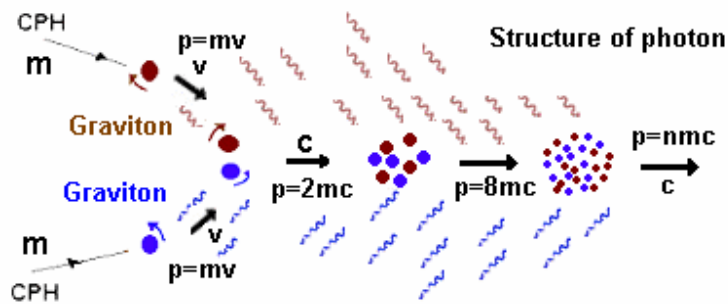


Figure 6

When a photon collides to an electron, a number of CPH that exist in the photon enter the electron. See Figure 7.

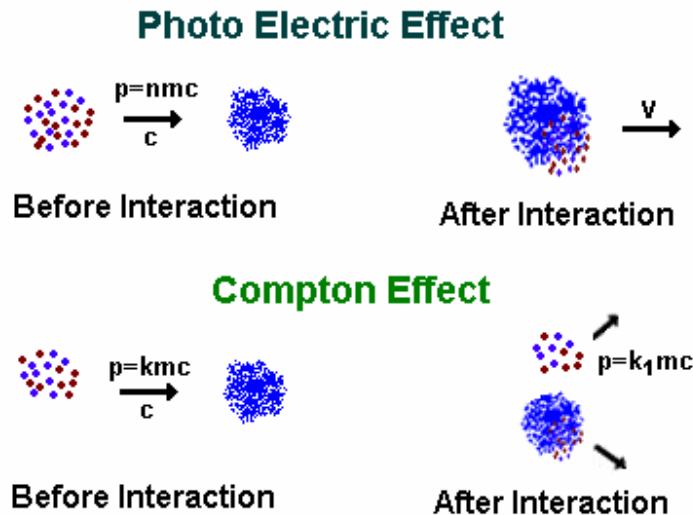


Figure 7

In photoelectric effect all CPHs of photon enter the structure of the Electron. Consider that it will happen if the amount of the energy of the photon is sufficient.

In Compton Effect some CPH enter the structure of the photon and other CPHs do not enter.

In the picture above, $k > k_1$ and $k_2 = k - k_1$ when CPH is joined with the electron.

Gravity

According TO CPH Theory, gravity is a currency among objects. For example consider the interaction between the earth and the moon:

Earth has a gravitational field. The gravitational field is formed by gravitons that are moving toward the earth and they are interacting with each other. Suppose the earth is alone and there are no interactions between earth and other bodies in universe. When gravitons reach the earth, the earth absorbs them. Then gravitons obey all forces around them. But the earth is not alone and it has interaction with other bodies. Take a look at earth and moon. There are two fields; one is around the earth and the other one is around the moon. When a graviton reaches the earth, the other one moves toward the moon and pushes the earth toward the moon. (Remember flow and ebb). Also when a graviton reaches the moon, the other one moves toward the earth and pushes the moon toward the earth. So earth (In fact every thing) is bombarded by gravitons continuously.

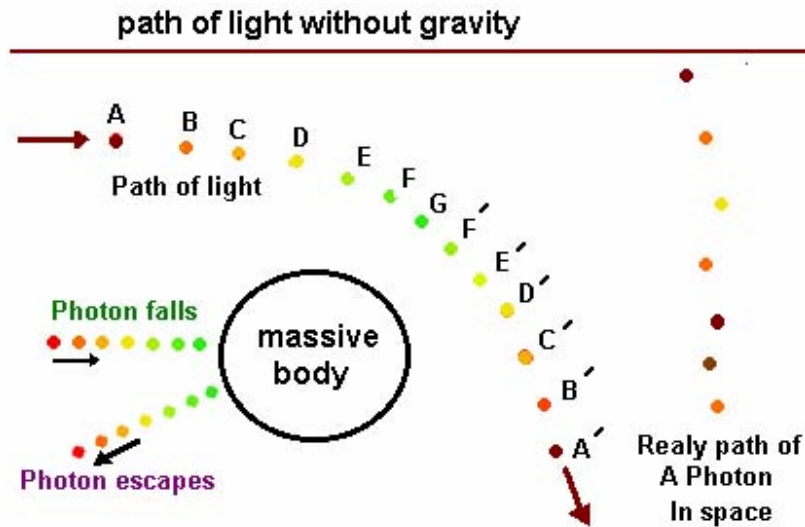


Figure 8

If movements in the space are without any gravitational effects, they move linearly with the speed of c (top of Figure 9). But space is full of gravity. So, photons' paths are like the right side of Figure 8.

Left side of Figure 9 shows that a photon is moving in a gravitational field of a massive body.

In point A, the photon has the speed of c , frequency of f and energy of E that reaches point A. Gravitational field acts on the photon, some gravitons enter the structure of the photon. Photons accelerate toward the massive body. Its frequency, energy and speed increase.

In point B, the photon has a frequency of f_1 , energy of E_1 and speed of c . During the time that photons are falling, the distance between the photon and body decreases, until it reaches the point G. In point G Frequency, speed and energy are maximum for that photon. When photon reaches point F', it is the same as point F, and so on. In point A' it is the same as point A.

The behavior of photons and gravitational fields is the same as spring and objects. On the left side of Figure 8, when a photon is falling, it shifts to blue and the gravity force converts into energy.

When photon is escaping from a massive body it shifts to red and energy converts to gravity force.

Theory of CPH – the ultimate explanation of the universe at its most microscopic level, a theory that does not rely on any deeper explanation - would provide the firmest foundation on which to build our understanding of the world.

Quantum of Work

Without a theory that combines Quantum Mechanics and Relativity, we cannot solve universal mysteries. In General Relativity space-time is continuous and it never combines with Quantum Mechanics. A theory that is able to combine General Relativity and Quantum Mechanics that results these two theories. This theory must be able explain the curvature of space and repulsive force. The solution is considering the relationship between force and energy. Theoretical physics and evidence show that energy is quantified. Now lets take a new look at a quantum energy and try to finding relationship between force and energy.

According to relations;

$$F=dp/dt, F=-dU/dx, w=fd=\Delta E, \Delta E=E_2-E_1$$

There is a questionable deduction of relationship between force and energy. It is not acceptable that energy was being quantified and work is being continuous. It is correct that energy is quantified. So, if energy is quantified and relation $fd=\Delta E$ is correct, work is quantized too. But d (distance) is continuous, so f (force) is equalized. Now we need to find (or define) a quantum of work, then find a quantum of force.

So, a quantum of work equals the production of the smallest quantum of energy. The new observations cast doubt on the existence of the Planck length (L_p). In theory, this is the smallest measurable unit of length. The weak force is gravity. So, a quantum of work equals gravity force works in a distance Planck length (L_p) and produces the smallest quantum of energy.

Suppose quantum of gravity force is F_g , so a quantum of work given by; **$W_q=F_g.L_p$**
And work W is n times of W_q that given by;

$$W=nF_g.L_p \text{ } n \text{ is an integer number.}$$

CPH bends space

We know the frequency of photon does change in gravitational field. When gravity force acts on a photon, the energy of the photon increases and its frequency increases too (or decreases). In red-shift work is negative (frequency decreases) and in blue-shift work is

positive (frequency increases). When photon is leaving gravitational field, it shifts to red and when photon is falling it shifts to blue. When light is moving in space that there is no gravitational effect, the path of light is linear (figure 10).

Now suppose light is moving in gravitational field of a massive body. Gravity works on it. When distance between photon and massive body goes to short, light shifts to blue like photon is falling. But when distance between photon and massive body goes to long, light shifts to red like photon escapes (Figure 9).

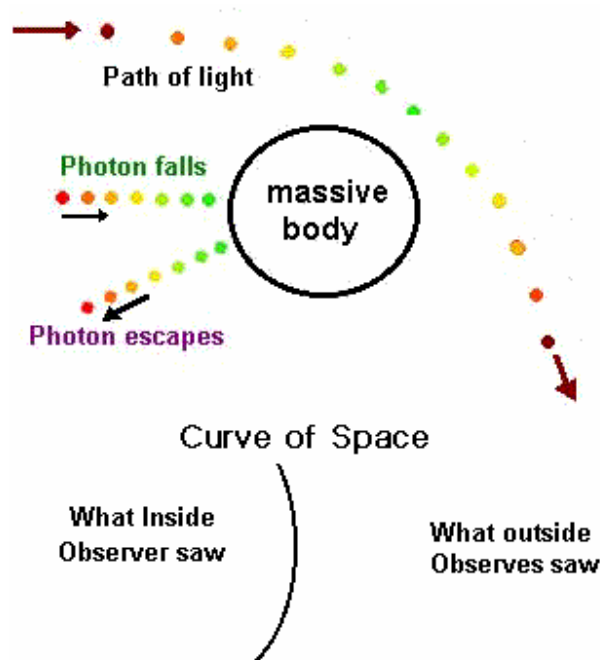


Figure 9

What the inside observer observes is the opposite of what the outside observer observes.

Zero Point Energy

Quantum energy is formed by a lot of CPH. Also, CPH (graviton) works on CPH and produces energy.

It happens when the density of the graviton is high. (Figure 10).

According to the size of a gamma photon and the number of CPH in it, we can calculate the density of CPH in the structure of the photon. The diameter of an electron is less than 10^{-18} m. A gamma photon (in pair production) produces an electron and a positron. Suppose the volume of a photon is 2 times bigger than the electron's volume.

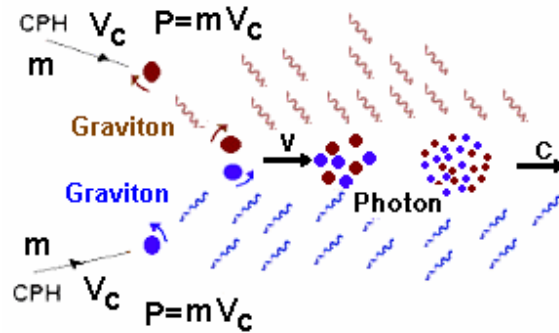


Figure 10

Suppose that the density of CPH in structure of photon is $D(cph)=n$ per m^3 , Space is full of gravitons. Gravitons have interaction among each other. They absorb each other and convert to electromagnetic wave. When they convert to energy, that density of CPH reaches to $D(cph)=n$ per m^3 .
 So, for space we have;
 Integral on volume of $D(cph)=0$ to $D(cph)=n$ per m^3 on $dD(cph) = E$, E is electromagnetic energy.

$$\int_0^{D(cph)=n \text{ per } m^3} dD(cph) = E$$

Integration of gravitons is a projection to production electromagnetic energy.

In the other word, force and energy are equivalent. Force converts to energy and energy changes to force.

Probably Function of Interaction Photon and Gravity.

But when a graviton reaches to a particle/object like an electron/stone, graviton enters to its structure. Suppose a stone with mass M is falling toward the earth, gravity field of the earth acts on it and the energy of stone increases (relativity mass-energy of stone increases). In fact when a graviton enters into stone, so the new mass of stone is $M+m$, that m is the mass of graviton. When n gravitons enter to stone, its new mass is $M+nm$.

Remember gravitons absorb each other and distance between them decreases. When they contact with each other, then they repel each other and go far. But they

absorb each other again. This interaction does continue until distance between them goes to near zero (see Figure 11).

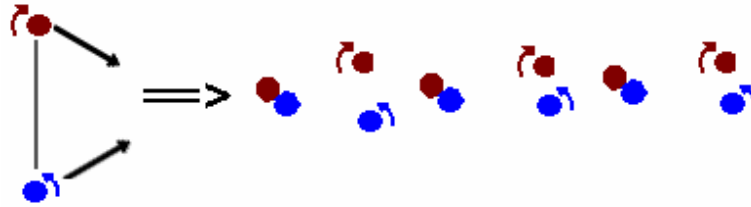


Figure 11

The above picture is showing an electromagnetic wave with energy less than $E=h2$.

Suppose a photon is falling in a gravitational field. A graviton enters into structure of photon. This graviton contacts with a graviton in structure and goes far. If the photon contains lots of gravitons other gravitons absorb it (Figure 12).

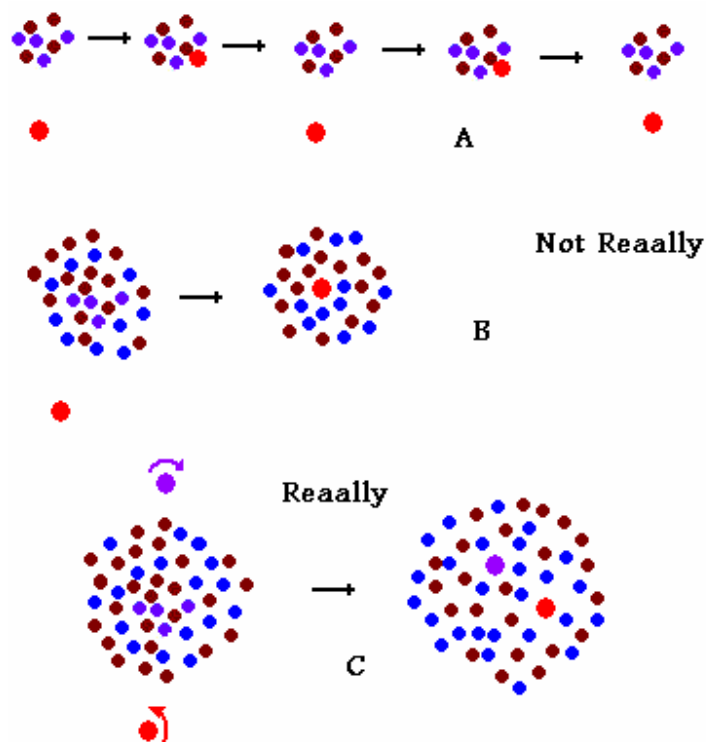


Figure 12

Look at the above picture carefully.

A. Photon is unable keep new graviton. Cause, there is density of graviton low in the structure of photon. So, new graviton leaves photon by contact with other gravitons.

B. Photon is able absorb new graviton, but cannot keep it. Density is enough but the sum of angular that photon takes is not equal zero. So, it is not a really interaction.

C. It is really, because density of graviton is enough in structure of photon. So, photon is able keep new gravitons. Also, two gravitons with right spin and left spin do balance the angular momentum.

Probability Function of work on photon

A photon with energy $E=mc^2$ has mass equal $m=E/c^2$, when it falls in a gravitational field with intensity g , force $F=mg$ works on it.

But photon can takes this work in following conditions:

1- Density of gravitons in structure of photon is an important condition. But it is not an absolute condition. It is a probably condition.

Pound and Rebka's experiment showed a gamma photon behaves like an object in a gravitational field. Given density of gravitons is $D(\text{gamma})$ in structure of gamma's photon. And density of gravitons is $D(\text{photon})$ in structure of an optional photon.

Then the probably of absorption by an optional photon gives by;

$$\mathbf{P(\text{absorption})=D(\text{photon})/D(\text{gamma})}$$

For gamma photon (and greater) it is equal one, and for other cases is less than one.

2- Probably of Spin is equal 1/2. Because if a graviton's Spin be right, other graviton's spin can be right or left. So,

$$\mathbf{P(\text{spin})=1/2}$$

So, total probably $[P(T)]$ gives with

$$P(T)= P(\text{spin}) \times P(\text{absorption})$$

So, the really work of gravitational field with intensity g , on a photon with energy $E=mc^2$ and mass $m=E/c^2$, when photon falls a distance equal y , gives with;

$$\mathbf{W(\text{really})=P(T)mgy}$$

Result;

The above equation is a common equation for any relationship between graviton and graviton, graviton and photon in any gravitational field.

Examples;

1- Suppose two gravitons absorb each other. Then $P(T)$ is less that 1 per 10^{20} for that two gravitons produce energy.

2- Compare frequency of radio electromagnetic waves with gamma's frequency. Then get result.

3- For a very strong gravitational field, gravitons convert to energy speedy. Cause there is density of gravitons very high.

According the CPH Theory we are able explain effect of gravitational field on photon so easy and simple.

Sincerely

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