

A new mechanism of Higgs bosons in producing charge particles

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Abstract

A new production method of elementary particles by Higgs bosons will be shown. But before that the structure of photon will be considered deeply, while a new definition of Higgs boson about color-charges and color-magnet will be given for the first time.

Keywords: Creative Particles of Higgs (CPH), Higgs boson, electron, positron, photon, graviton, color-charge, color-magnet

Introduction

While developing quantum chromo-dynamics, some new points of view of Higgs bosons have been introduced and also have been put into discussion about the other types and some specifications of Higgs bosons. [1] In the published articles in the recent years, most attractions have been noticed toward Higgs charges. Most of them have been paid attention to the Higgs bosons and electro-weak bosons but no any more relations between gravity and Higgs has been said or noticed, yet. [2][3] [4] [5] [6]

In this article, according to gravitational blue-shift it has been tried to investigate the Mössbauer effect and Pound-Rebka experiments and their interaction between gravity and photon from point of view Higgs field. [7] [8] Blue-shift and Mössbauer effect indicates clearly that three different Higgs bosons cause increasing photon mass while they have the electromagnetic specifications. These Higgs bosons are called positive and negative color-charges and color-magnet which will be explained very precisely in the following sections.

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A complete look into electromagnetic waves

A photon becomes energy-laden by revolving. It is quite obvious, because the electromagnetic fields around a "ray of light" are electromagnetic waves not static fields. Relativistically, the electromagnetic field generated by a photon is much stronger than the associated gravitational field. Further it is not clear at the present time whether the gravitational field of an energy-laden photon is static or oscillatory. It is unknown how the photon generates two sets of fields (electromagnetic and gravitational) with so different intensities. This is an enigma.

Let's take a new look at the behavior of electromagnetic wave in gravitational field; it can help us in resolving this enigma. As the general relativity theory had predicted before the frequency of photons changes in a gravitational field, this has been proved by experiment. [8]

When a photon falls in gravitational field, its energy (mass) increases. According to $W=Dmc^2$, the gravity force works on photon, so the mass (energy) of photon increases, too. But the energy of photon depends on its electrical field and magnetic field. So, a part of gravity work converts to electrical energy and the other part of gravity work converts to magnetic energy. How can it be explained by Higgs boson particles acquire mass? And also, according to Higgs boson what happens to blue-shift?

Higgs Mechanism

The Higgs mechanism is the mechanism that gives mass to all elementary particles in particle physics [9]. For an example of spontaneous symmetry-breaking, imagine a complex scalar field whose value at any point in space is;

$$H(x,y,z) \quad (1)$$

Consider giving the field a potential energy of the form;

$$V(x,y,z) = \left(|H(x,y,z)|^2 - v^2 \right)^2 \quad (2)$$

integrated over space. Here, $V(x, y, z)$ is a potential energy and $H(x, y, z)$ is Higgs field which is non-negative. There is a continuous manifold of minima at

$$|H|^2 = v^2 \quad (3)$$

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What this means in less technical terms is that the potential energy density, as a function of H looks like the bottom of a bottle: a hump in the middle and a circular valley around it. [11] According to relations (1) and (2), there is a Higgs particle in any small volume of space, which in this article is called Creative Particle Higgs or CPH.

Creative Particles of Higgs (CPH)

Definition: Suppose that there is a particle (smaller than a photon which can be located inside the photon) with constant mass (m) is moving with speed of V_{CPH} in any inertial reference frame and $V_{\text{CPH}} > c$ (c is the speed of light). So, the linear momentum of a CPH can be written by $p=m V_{\text{CPH}}$. A CPH can be shown with zero Higgs boson H^0 . When a CPH has spin, it is called a **graviton**. Now as space is full of gravitons, so it can be said that space is full of CPHs.

Principle of CPH

A CPH is a particle with constant mass (m) which moves with a constant magnitude of speed, which equals to V_{CPH} . The CPH has a momentum of inertia I . In any interaction between the CPH and the other existing particles, the magnitude of V_{CPH} is constant and it does not change. Therefore,

$$\text{grad } V_{\text{CPH}} = 0 \text{ in all inertial reference frames in any space}$$

Explanation

As $V_{\text{CPH}} = \text{constant}$, so, CPH takes spin, and in general case it has two movements; one is transfer motion and other one is spin. (Fig.1).

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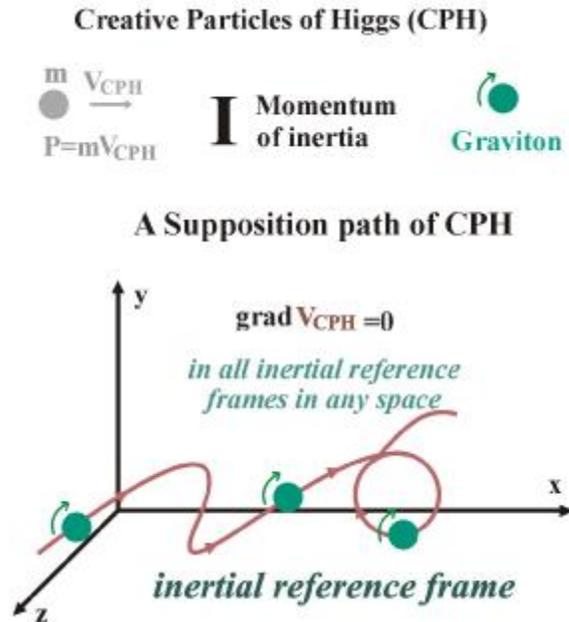


Fig. 1- CPH has two movements; transfer motion and spin motion

It shall be noticed that according to CPH principle the speed of CPH has been assumed to be in scalar form and not in vector form.

According to CPH principle, the CPH moves with constant amount of speed equal V_{CPH} .

V_{CPH} = speed of transfer motion + speed of spin.

$$V_{CPH} = V_s + V_t \quad (4)$$

Here V_s is speed of spin and V_t is speed of transfer motion (Fig. 2).

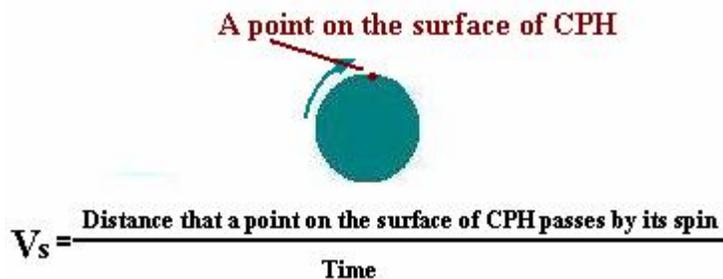


Fig. 2- Any point on the surface of a CPH always moves on a curve path with its displacement which is shown with V_s

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Generally, according to Fig.3, when transfer speed increases, spin decreases.

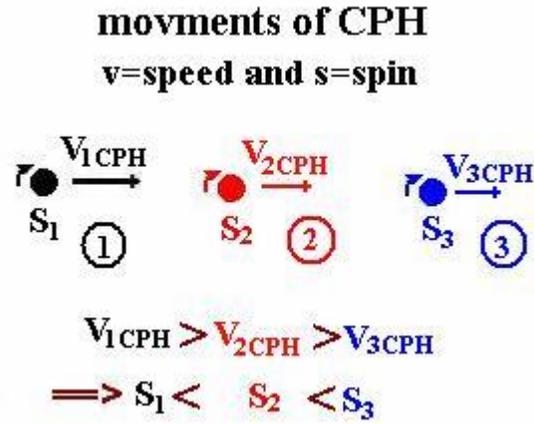


Fig. 3- Relation between transfer speed and spin of CPH in three different states

As it said in above, CPH including spin is graviton and graviton's spin is 2. Meanwhile the definition of the other particles spin (as electron that is quantized) is different of spin of CPH. One of the features of CPH is graviton. In the following sections, it will be discussed more precisely about CPH entity which can be resolved that everything is made of CPHs, and then it will be accepted that spin of CPH can not be a fixed figure.

Now, according to equation (4) the following equation can be driven;

$$\mathbf{a}_x + \mathbf{a}_y + \mathbf{a}_z + \mathbf{a}_s = \mathbf{0} \text{ in all inertial reference frames (5)}$$

Here, \mathbf{a}_x , \mathbf{a}_y , and \mathbf{a}_z are accelerations on x, y, and z axis, respectively and \mathbf{a}_s is acceleration of spin. The linear acceleration, \mathbf{a}_s has been replaced instead of angular acceleration, \mathbf{a}_ω in equation (5).

The later equation shows that transfer motion of the CPH changes to spin motion and vice versa. So, the energy of H^0 is constant, too. This is only spinning energy which changes to transferring energy and vice versa.

According CPH entity, can it be explained whether how photon acquires mass in gravitational field? This question can be answered in the following sections. But before that the below definitions shall be explained clearly.

Color-charges and color-magnet

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When a photon is falling and passing through the gravitational field, gravity works on the photon. Then the energy of the photon increases. But this energy of photon depends on two separate energies; electrical and magnetic field energies and these energies increase, too. Now, for more description the following equation about relativistic mass would be considered:

$$E^2 = c^2 p^2 + (m_0 c^2)^2 \quad (6)$$

The cp term in the equation (6) is positive when photon is falling down in gravitational field. The cp is equal Δmc^2 during this falling and the photon acquires a mass equal as Dm of Higgs field which exists in gravitational field. $E = Dmc^2$ is the energies that these two electrical field and magnetic field of photon acquire. But photon has electrical field around itself and it has not electrical effect. So, $E = Dmc^2$ separates into three parts; a part that behaves like magnetic field, another part that behaves like positive electrical field and the third part that behaves like negative field (See Fig.-4) which they annihilate each other in structure of photon..

Photon and Higgs bosons

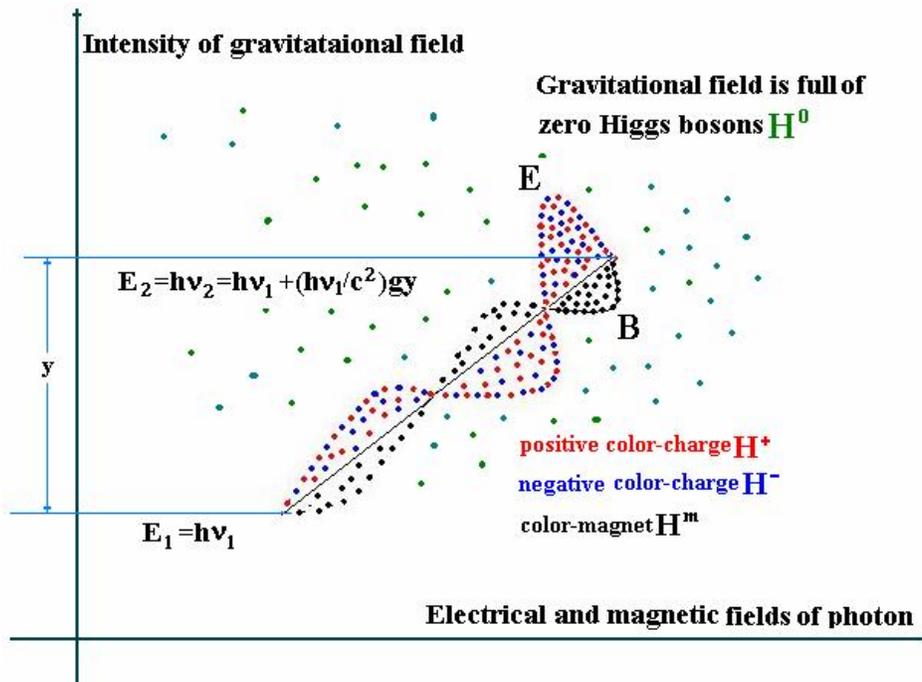


Fig. 4- increasing intensity of electrical field and magnetic field during photon fall in gravitational field due to increasing of photon energy [8]

According to Fig.-4, when a photon is falling in the gravitational field, in interaction between the photon and gravitons, here suppose three identified gravitons; one graviton

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behaves like positive electrical charge H^+ while another graviton behaves like negative electrical charge H^- which these two gravitons annihilate their electrical charges. The third graviton behaves like magnetic field H^m , then two vertical electrical and magnetic fields increase gradually and they become stronger and stronger. These are three different kind aspects of Higgs bosons which enter into structure of photon. This assumption is acceptable because when photon is falling in gravitational field, both its electrical field and magnetic field increase. But photon is neutral of electrical charge. So, there are two groups of particles which behave like charges and they make electrical field. These two groups annihilate the electrical effect of the others. In the structure of photon, there are color-charges (H^+ and H^-) and color-magnet (H^m) which all of them have spins. These particles are especial aspects of CPH which are spinning near each other like Fig.-5 (color-magnet inside the structure of photon has not been shown). Thus, a photon is made of lots of gravitons (especial form of CPH) that they have spins inside structure of photon while photon has spin by itself, too. Therefore, the gravitons have three motions inside of photon; one is self spin, the other is spin from photon spin and the last one is linear speed equal to (c) .

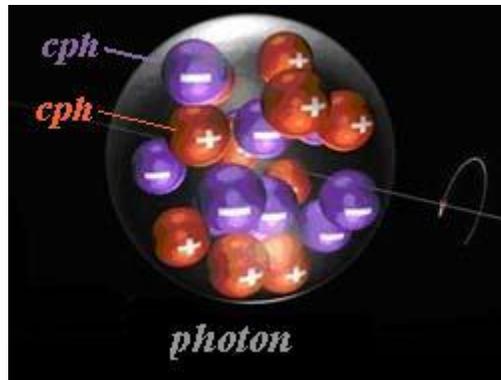


Fig. 5- Photon contain lots of CPHs, color-charges and color-magnet (color-magnet inside the structure of photon has not been shown)

As a photon is formed of lots of CPH, so the mass of CPH (m) is less than the photon's mass, so that;

$$m_{\text{CPH}} < hv/c^2, \text{ for any } v \quad (7)$$

Any CPH effects on the other CPH, sometimes, they attach and repel each other and the other time they are very close to each other (a distance like Plank Length that is equal to 1.6×10^{-35} m). In this case they combine with each other and then produce energy.

In a gravitational field, when a photon shifts to blue, gravitons convert to energy [8]. In fact color-charges and color-magnet enter into electrical and magnetic fields of photon. And when photon shifts to red, energy converts to gravitons, in this case color-charges and color-magnet leave photon's structure. And when energy decays (pair production), it

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converts into matter and anti-matter. So, every thing is formed of color-charges and color-magnet as it has been shown in Fig.-6.

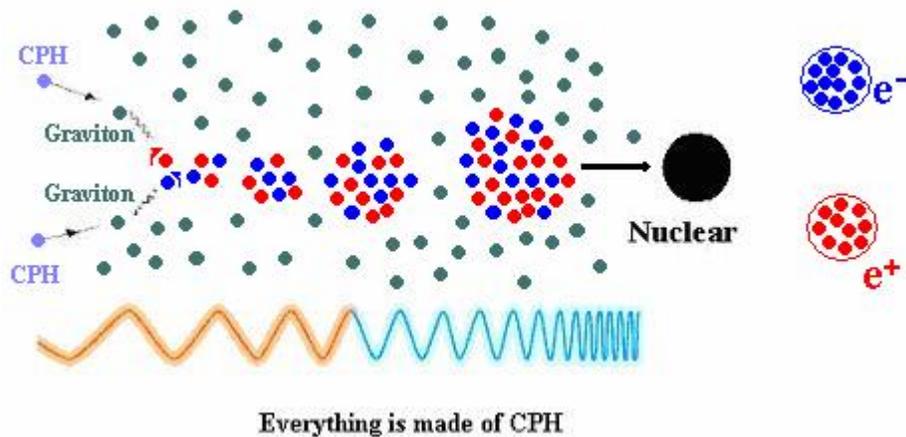


Fig. 6 Production procedures of matter and anti-matter by CPH

In fact a CPH is a sub-quantum of existence in universe.

Color-charges and color-magnet equations

According to the principle of CPH ($\text{grad} \mathbf{V}_{\text{CPH}} = 0$), any CPH, located inside a photon, has spin. By considering equation (5) when a photon is moving on x axis; its speed is constant ($a_x = 0$) which is equal to c (light speed) in inertial frames. Consequently, any CPH moves with $v_x = c$ inside the structure of the photon. So, CPH's speed changes only on y and z axis. As $\mathbf{a}_x = 0$ then $\mathbf{a}_y + \mathbf{a}_z + \mathbf{a}_s = 0$. When $\mathbf{a}_y = 0$ (here, CPH color-charge moves inside x & z plane, as it is shown in Fig. 7), then $\mathbf{a}_z + \mathbf{a}_s = 0$, so $V_z + V_s = \text{constant}$, relation (4). Therefore, exchanging of spin to transfer motion will be done on z axis. It means that when V_z goes to zero, spin goes to maximum in electromagnetic waves and vice versa.

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Two CPH inside the structure of photon

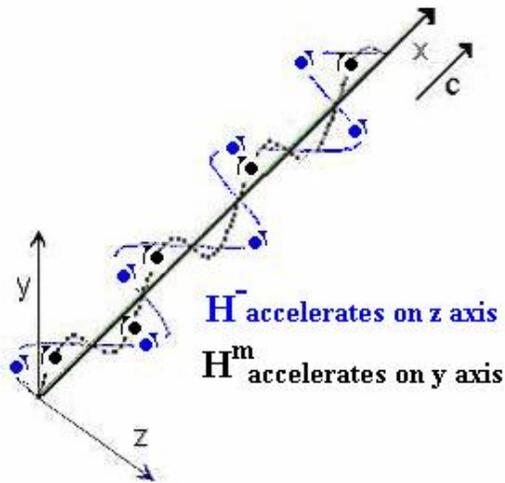


Fig. 7-a A negative color-charge is accelerating on z axis while a color-magnet accelerates on y axis

Two CPH inside the structure of photon

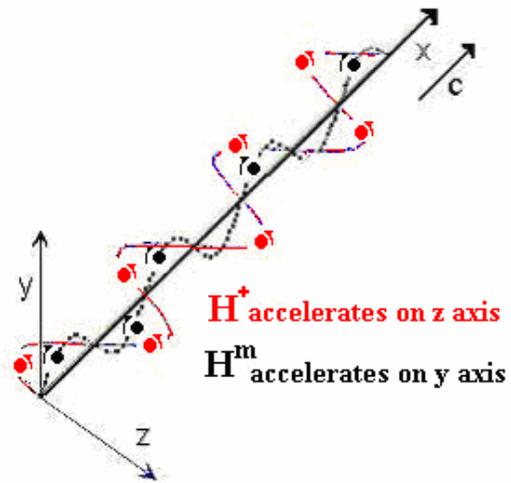


Fig. 7-b A positive color-charge is accelerating on z axis while a color-magnet accelerates on y axis

Three CPH inside the structure of photon

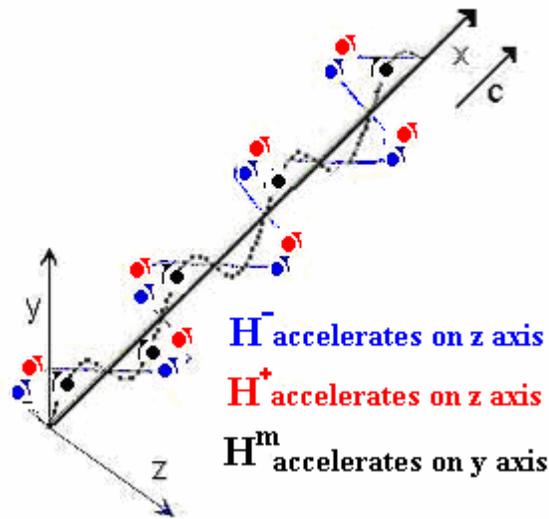


Fig. 7-c color-charges are accelerating on z axis while a color-magnet accelerates on y axis

Suppose that a color-charge CPH is accelerating on Z axis, its moving route is a function as;

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$$E_{\text{CPH},z} = E_{\text{CPHm}} \cos w(t-x/c), \quad (8)$$

$E_{\text{CPH},z}$ stands for color-charge and E_{CPHm} is its maximum magnitude of color-charge, w angular velocity of electrical field and x is displacement electrical wave. Remember $v_x=c$, $v_y=0$ and v_z changes as a sine function form. When spin of color-charge increases, v_z decreases and vice versa. For a negative color-charge, there is a positive color-charge that moves same as negative color-charge as it is shown in Fig 7-b. Therefore, the combination of these three CHPs make a photon according to Fig 7-c.

There is also a wave function for color-magnet as;

$$B_{\text{CPH},y} = B_{\text{CPHm}} \cos w(t-x/c), \quad (9)$$

Mostly similar to what said in above, $B_{\text{CPH},y}$ stands for color-magnet and B_{CPHm} is its maximum magnitude of color-magnet. There is a relationship between color-magnet spin and its speed on y axis. Remember color-magnet speed is $v_x=c$ and $v_z=0$ (in structure of photon), and v_y is only oscillating.

Notice; the effect of CPH color-charges and color-magnet are fixed and they do not change, but CPHs are oscillating around x axis, in other words electrical and magnetic fields are oscillating around x axis. So, $E_{\text{CPH},z}$ and $B_{\text{CPH},y}$ do change from view of the observer.

Color-charges and color-magnet in photon

The number of color-charges in a photon is even, because half of them are negative color-charges, and other half is positive color-charges. So, the following can be written;

$$E_{\text{photon}} = n E_{\text{CPHm}} \cos w(t-x/c) \quad (10)$$

$$B_{\text{photon}} = m B_{\text{CPHm}} \cos w(t-x/c) \quad (11)$$

Here, n is an even number in other word $n=m.c$.

When a photon is falling in a gravitational field, n increases. So, the magnitude of E_{photon} and B_{photon} increase too. It means a lot of CPH enter into structure of photon.

A new look at pair production

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It has been known before that a the production of a pair is a photon which has no charge effects. But after of a pair production there are two charge particles, electron with negative charge and positron with positive charge. Let's look at this phenomenon precisely, because investigation about this fact enables us to open a new way of understanding the essence and effective charges. Now look at the following procedure:

Electromagnetic energy => negative and positive charge particle

Matter and anti-matter can be produced as a pair. This production in nature or laboratory is a great experience that enables us to answer to many mysteries of the universe. A pair production and annihilation of a pair are empirical examples of equivalence relation between mass and energy.

In a pair production process, the γ ray (a gamma photon) is converted to an electron-positron pair as shown schematically in Fig.8.

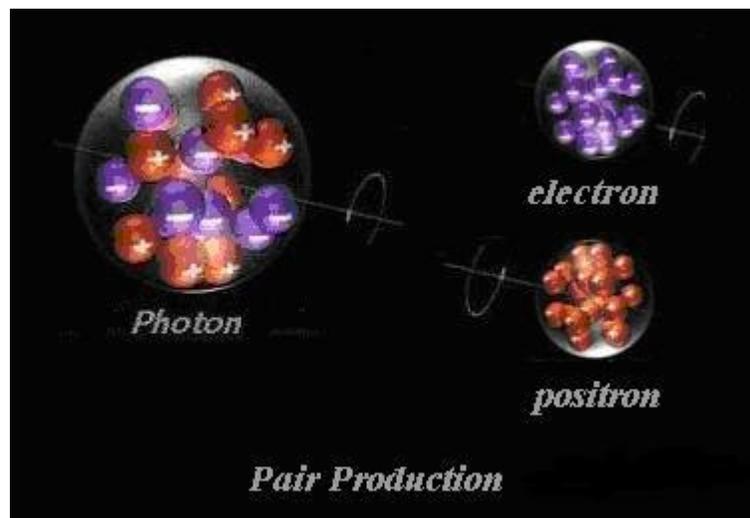


Fig. 8- Decay of a photon in production of a pair packages; negative color-charges make electron package and positive color-charges make positron package (here color-magnet is not shown)

As a positron and an electron absorb each other, further annihilation takes place, then it results the production of two photons as it is shown clearly in Fig. 9.

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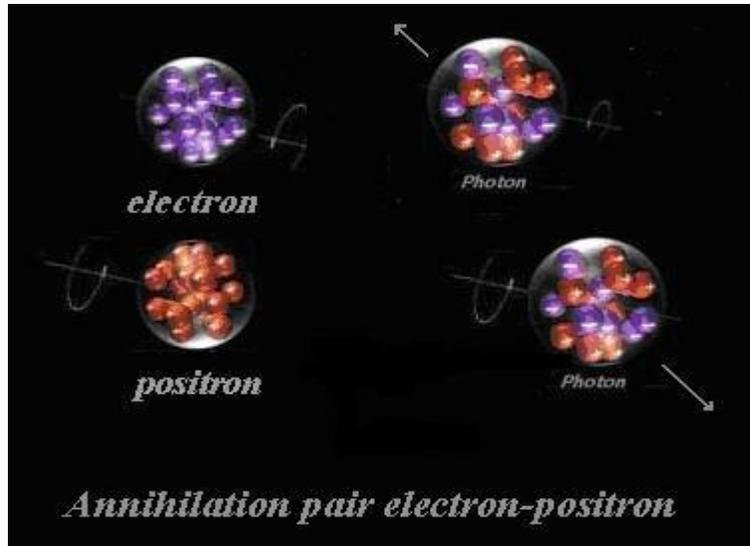


Fig. 9- Annihilation of a pair packages, the packages of negative and positive color-charges combine and produce two photons (here color-magnet is not shown)

Conclusions:

According to what have been said in above the following items can be resolved:

- 1- Gravitational field is formed of exchangeable particles that have electrical and magnetic effect (color-charge and color-magnet). Because, in gravitational field electromagnetic energy of photon increases.
- 2- Color-charges combine and produce charge particles.
- 3- Color-charges have two opposite signs, negative and positive that there are in the structure of photon Fig.-10.
- 4- In production of matter and anti-matter, negative color-charges combine with each other, and positive color-charges combine with each other, too. Then they do form positive and negative charge particles (see Fig.-11 and Fig.-12).

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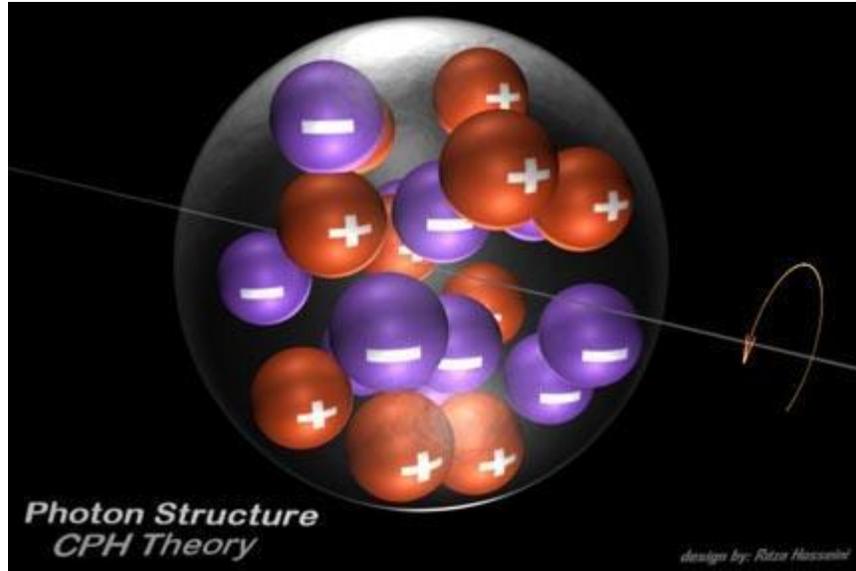


Fig. 10- A photon structure containing positive and negative color-charges before a pair production (here color-magnet is not shown)

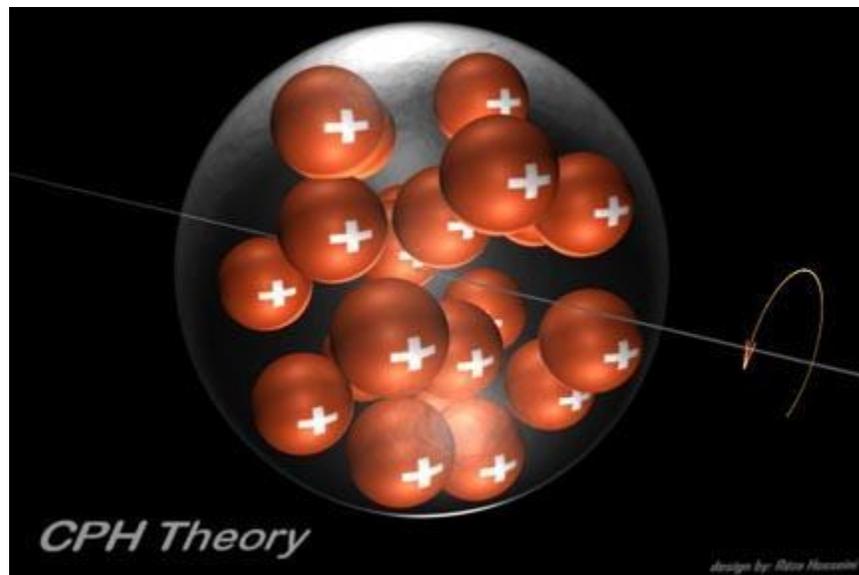


Fig. 11- A positive charge package containing positive color-charges (here color-magnet is not shown)

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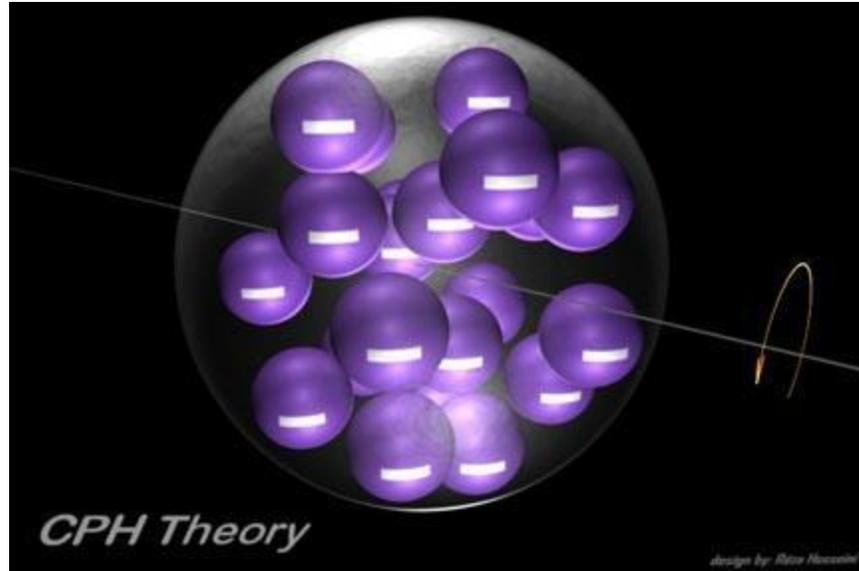


Fig. 12- A negative charge package containing negative color-charges (here color-magnet is not shown)

- 5- The reason that gravitons combine with each other is that they have color-charge effect. So, space-time is able to produce electromagnetic energy.
- 6- Every charge particle (also quarks) is formed of color-charges. This looking on charge particles enables us to explain why our visible universe is made of matter. Therefore, the number of negative color-charges shall be equal to the number of positive color-charge in any production of matter and anti-matter.
- 7- So far all of experiments about light and also the constancy of its speed in relativity theory domain have not been explained about the structure of light, but here by presenting CPH entity all of them would be explainable.

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