Precise theoretical calculation of the Higgs boson mass on the basis of Quantized space and time theory

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Abstract:

In this paper by applying the Quantized space and time theory, the speed limit of protons has been determined and consequently the Lorentz factor has been calculated with a high degree of accuracy. Eventually the mass equivalent to energy of Higgs boson which is created by collision of two proton beams (This experiment has been performed in LHC) has been calculated precisely to $124.77 Gev \pm 02 Gev$.

Key words: Higgs boson, speed limit, quantized space and time

1-Introduction:

By considering the speed limit under the rules of quantized space and time rules, Lorentz factor will be equal to 1722.9[1]

Exact determination of Higgs boson mass by using quantum relativity is difficult. According to the ultra-high voltage applied on each particle of protons (13Tev)in LHC[2], the Lorentz factor with current relativity rules and field of 13Tev is equal to: $\gamma = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}} = 6930$: Lorentz factor[2](1)

Regarding to relativity, if the speed of particles increase to speed of light then the energy of them should be infinitive, so the energy of Higgs boson in the produced radiation of collision two beams of proton to each other in LHC cannot be calculated precisely [3].

On the basis of the Quantized space and time theory, which has been defined by the author, all of the charged elementary particles have a speed limit equal to: V_{max}=299792407.5m/s [1].

Existing of speed limit, which makes the precise calculation of the Higgs boson mass possible, is a strong proof of the quantized baryonic universe.

Assuming the space and time quantized, help us to prevent of making infinitive amounts in special relativity and uncertainty of Heisenberg principle.

1-1: Why the speed is not quantized meanwhile the space and time are quantized?

This is the main question. This question is burst because of the time and space considered abstract, and then the movement add to them. The Mach principle says the geometry will be collapsed without the material [4]. This fundamental principle leads us to find out the elementary particles makes their own internal space, time and movement. The triangle of movement. Time and space creates the baryonic universe. In the following a relation will be presented which express the external speed of elementary particles.

1-2: by using two axioms in baryonic universe we will have the minimum possible length not separable to smaller lengths which still contains motion and it is equal to

$$l_0 : \text{Length quanta} = 1.409 \times 10^{-15} m \quad \text{(2) [1]}$$

The minimum possible time which there is no smaller time interval than it, is equal to,

$$\Delta T_0 : \text{Time quanta} = \frac{l_0}{c} = 0.47 \times 10^{-23} \quad \text{(3)} \quad \text{[1]}$$

Where c = 299,792,458 m/s is the speed of light

There are a lot of samples of these two amounts of quantas, in the baryonic universe. Such as the nuclear power range, the life time of vector mesons and...

1-3: There are some problems in assuming the time and space quantized with above mentioned axioms, the first one is; the Plank's length and time are much smaller than our axiom.

$$\ell_p = \sqrt{\frac{\hbar G}{c^3}} = 1.616252 \times 10^{-35} m \quad \text{(4) [1]}$$

$$t_p = \frac{l_p}{c} = 5.39124 \times 10^{-44} s \quad \text{(5) [1]}$$

And the second one is how beginning and the end of each length and time quanta can be separated from the next one?

The third problem is how the energy is limited in these quantas and wouldn’t radiated entirely?

2- Super dimension:

To solve the problems of previous section, another axiom is needed, that is a super dimension [1]. The super dimension is a compressed ladder string by the width of Plank’s length which doesn’t have any baryonic movement individually. It is illustrated in the Fig.1 as the black spiral and its vertical axis [1].

The figure 1 shows the creation of the frequent time and space sequences of electron on his own. The sequence of time and length quanta of an electron in super dimension is shown as $\overrightarrow{S_n}$. The electron has positive spin angular momentum with a relative velocity with respect to a local frame.

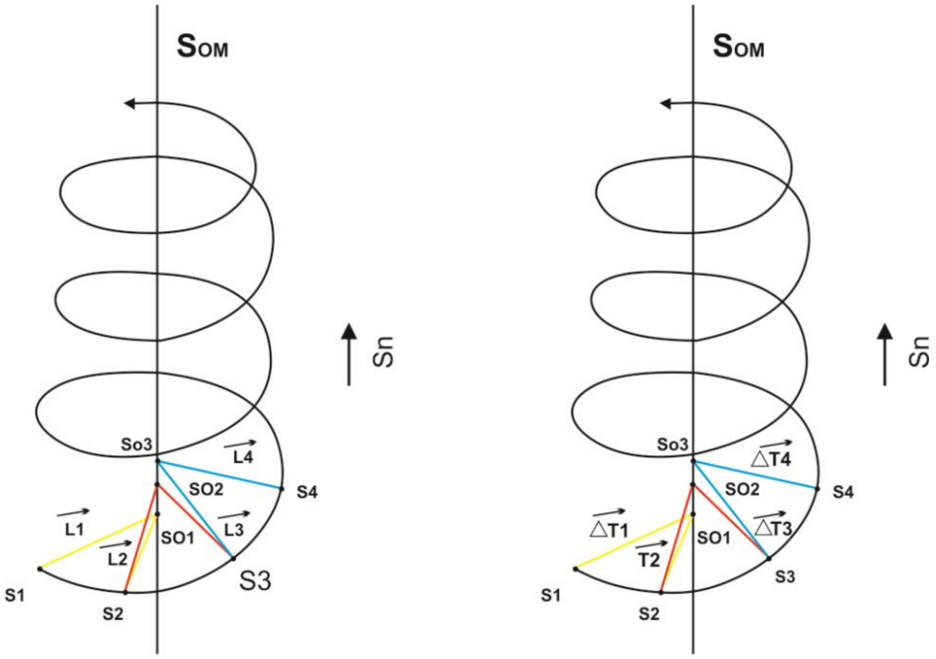


Fig (1) [1]

When the moton is purred in the string of super dimension due the time and length of colored lines in the figure 1 , it finds same measurable dimension

3- The relative velocity:

We can find the relative velocity of a particle with respect to a reference frame using Figures1 [1]

$$\vec{V}^{2} = \left(\frac{\vec{l}_{1(so1)}}{\Delta\vec{T}_{1(so1)}} \times \frac{\vec{l}_{2(so1)}}{\Delta\vec{T}_{2(so1)}}\right) - \left(\frac{\vec{l}_{2(so2)}}{\Delta\vec{T}_{2(so2)}} \times \frac{\vec{l}_{3(so3)}}{\Delta\vec{T}_{3(so3)}}\right), \qquad (6)\ [1]$$

$\vec{l}_0 = \vec{l}_1 = \vec{l}_2\ (s_{o1}) = 1.409\times10^{-15}$m, (7) [1]

$\Delta\vec{T}_0 = \Delta\vec{T}_{1\,=}\,\Delta T_2$ (s$_{o1)}$ =0.47×10^{-23}s, (8) [1]

$\vec{l}_3$ (s$_{o2)}$ $= \frac{\vec{l}_0}{\gamma}$, (10) [1]

$\Delta\vec{T}_3$ (s$_{o2)}$ $= \Delta\vec{T}_0\gamma$, (11) [1]

$V^2 = C^2 - \frac{C^2}{\gamma^2}$, (12) [1]

$\gamma = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}}$: Lorentz coefficient (13) [3]

$\vec{l} = \frac{\vec{l}_0}{\gamma}$, $\Delta T = \Delta\vec{T}_0\gamma$, (15)[3] (14)[3]

$|V| = \sqrt{c^2 - \frac{c^2}{\gamma^2}}$: Relative velocity of the particle (16)[1]

By using of the speed equation the internal movement of the elementary particles with external appearance, can be modeled and it can show that the movement in the outside of the elementary has a continuous graph.

This explains movement of particles by using the de Broglie wavelength relation ($\lambda = \frac{h}{p} = \frac{h}{mv}$) the following equation will be obtained.

$$p_{\max} = \frac{h\sqrt{1-\frac{{v_{\max}}^2}{c^2}}}{l_0\sqrt{1-\frac{v^2}{c^2}}}, \qquad (17)\ [1]$$

By using the equation (17) and knowing that quarks are divided to moton in the case of quantized space and time. [1] The limit momentum and maximum speed of protons can be calculated in LHC.

Maximum speed limit : regarding to quantized space and time theory there is a maximum speed limit for charge subatomic particles is equal to V_{max}=299792407.5m/s this speed express that the internal time and length quanta elementary particles have a limited capacity for transferring and momentum the extra energy applied to charged particles will be relatively radiated.[1]

4-Relativity charge formula

This formula shows that how the nuclear, electrical and magnetic field of charged subatomic particles bond to each other at speed limit.

We define charge as the energy radiated by a particle and we have:

$$E_{\max} = \frac{p_{\max} c^2}{v} \qquad (18) \qquad [1]$$

The amount of effect of the internal energy of particles on the surrounding space that is one length quanta or more, is defined as electric charge. We calculate the charge using the electromagnetic interaction of positive and negative charges which are at least one length quanta apart together, with using equation 18, we have:[1]

$$q = \sqrt{(8\pi\varepsilon_0 mc^2 l_0)}C \qquad (19)[1]$$

Here l_0 is the length quanta, q and m are the charge and active mass and $\varepsilon_0=8.854\times10^{-12}$ F/m is the vacuum permittivity. By applying the special relativity principles in Equation 19, we will get the following equation:

$$q = \frac{\sqrt{8\pi\varepsilon_0 m_0 c^2 l_0}}{4\sqrt{1-\frac{v^2}{c^2}}}C = \frac{1.602\times10^{-19}}{4\sqrt{1-\frac{v^2}{c^2}}}C \qquad (20)[1]$$

Where $m_0=9.109\times10^{-31}$ kg, m_0 is the initial active mass, and $l_0=1.409\times10^{-15}$ m, l_0 is length quanta around the particle.

In this formula the active mass protected by the energy momentum limit relation and as a result the absolute value of the basic charge of parting became equal of each other in low speeds and different masses.

5- Decay of protons in LHC accelerator

proton decay performed when two beams of protons radiate to each other in opposite direction at the speed limit .With calculating the Lorentz coefficient for speed limit we will have:

$$\gamma = \frac{1}{\sqrt{1 - \frac{299792407.5^2}{c^2}}} = 1722.9$$

$$\sqrt{\gamma} = \frac{1}{\sqrt[4]{1 - \frac{299792407^2}{c^2}}} = 41.51 \qquad (21)$$

And it considers The LHC as an electrical field (by relation (20))

$$E\frac{1}{q_0 \times \sqrt{\gamma}} = V \qquad (22)$$ [1]

$$Y = (x \times (m_p \times c^2) \times \frac{1723.9}{41.51} \times \frac{1}{1.602 \times 10^{-19}}) + (z \times Egluon \times \frac{1}{1.602 \times 10^{-19}}) - E2 = Yev \qquad (23)$$

Y: Energy equivalent mass of The Higgs boson

E2: energy of electromagnetic between protons.

$$E2 = x \times (\frac{8\pi\varepsilon_0 m_0 c^2 l_0}{4 \times 2\pi \times \varepsilon_0 \times L} \times \frac{1}{\sqrt[4]{1 - \frac{v^2}{c^2}}})$$

In relation (24) x is the number of protons which form a Higgs boson

To determine x the proton structure is applied

$$gluon_{1_1} + u_1 + gluon_{2_1} + d_1 + gluon_{3_1} + u_1 \xrightarrow{\overrightarrow{s_{p1}}}$$

$$gluon_{1_2} + u_2 + gluon_{2_2} + d_2 + gluon_{3_2} + u_2 \xrightarrow{\overrightarrow{s_{p2}}} \qquad (24)$$ [1]

As said before X is equal to sum of the integer numbers that indicating the number of protons which are sticked to each others with minimum electromagnetic force .These protons form a ultra hot layer of motons and super dimension. Neither the super dimension nor the time and space quanta can absorb or carry that energy.

According relation (24) we have:

The energy of proton is sum of the energy of three quarks and three gluons:

$$E_p = Egluon \times 3 + Eu + Eu + Ed \tag{25}$$

$$Egluon = E_{\max} = \frac{p_{\max} c^2}{v} = 0.88 Gev \quad (26)[1]$$

$$E_p = Egluon \times 3 + Eu + Eu + Ed = (3 \times 0.88 Gev) + (Mproton \times C^2) = 41.59 Gev$$
(27) [1]

6-Determinations of X:

After determination of the binding energy of the gluon which are produced in the collision of proton to each other and separation them from electromagnetic energy between protons the x will be obtained

$$x = 2 \rightarrow \quad Y = (2 \times E_p) + (z \times E_{p-p} gluon) - \left(\frac{8\pi\varepsilon_0 m_0 c^2 l_0}{4 \times 2\pi \times \varepsilon_0 \times L} \times \frac{1}{4\sqrt{1 - \frac{v^2}{c^2}}}\right)$$

$$= 83.18 Gev + (z \times 0 \bullet 88 Gev) - (0 \bullet 02 Gev \times \frac{l_0}{L}) \tag{28}$$

$$x=3 \rightarrow \quad Y=(3\times E_p)+(z\times E_{p-p}gluon)-(3\times(\frac{8\pi\varepsilon_0 m_0 c^2 l_0}{4\times 2\pi\times\varepsilon_0\times L}\times\frac{1}{4\sqrt{1-\frac{v^2}{c^2}}}))$$

$$=124.77Gev+(z\times 0\bullet 88Gev)-(3\times 0\bullet 02Gev\times\frac{l_0}{L})$$

(29)

$$x=4 \rightarrow \quad Y=(4\times E_p)+(z\times E_{p-p}gluon)-(6\times(\frac{8\pi\varepsilon_0 m_0 c^2 l_0}{4\times 2\pi\times\varepsilon_0\times L}\times\frac{1}{4\sqrt{1-\frac{v^2}{c^2}}}))$$

$$=166.36Gev+(z\times 0\bullet 88Gev)-(6\times 0\bullet 02Gev\times\frac{l_0}{L})$$

(30)

$$Y=xE_p+(\pm z)E_{p-p}gluon)-(x\times(\frac{8\pi\varepsilon_0 m_0 c^2 l_0}{4\times 2\pi\times\varepsilon_0}\times\frac{1}{L})\times\frac{1}{4\sqrt{1-\frac{v^2}{c^2}}})$$

(31)

L: the distance of active mass to gather protons which shows that length (space)quanta acs like a flexible spring and this is a very fundamental issue. Our function is too sensitive to length decrease and it has a continuous rate because of the continuity of the charge graph.

When x=2 then the resultant impulse of momentum of two protons is in the smallest end and the repulsive force of electromagnetism is the greatest so x=2 will be impossible

If x=4 it means that the square chord is equal to the sides of the square and it is impossible.

So x=4 and bigger amount are impossible because length is quantized.

In relation (31) we heave $3 \geq z \geq -3$ and $z \in Z$ that is the uncertainty of the production of gluon by the relation (26) following amounts are obtained and Statistical calculations must be:

$$E_p = Egluon \times 3 + Eu + Eu + Ed = (3 \times 0.88Gev) + (Mproton \times C^2) = 41.59Gev$$

$x = 3$ (31)

The amount of mass equivalent to energy of Higgs boson without considering the energy of gluons which contains some level of uncertainty, calculates equal to 124.77 Gev

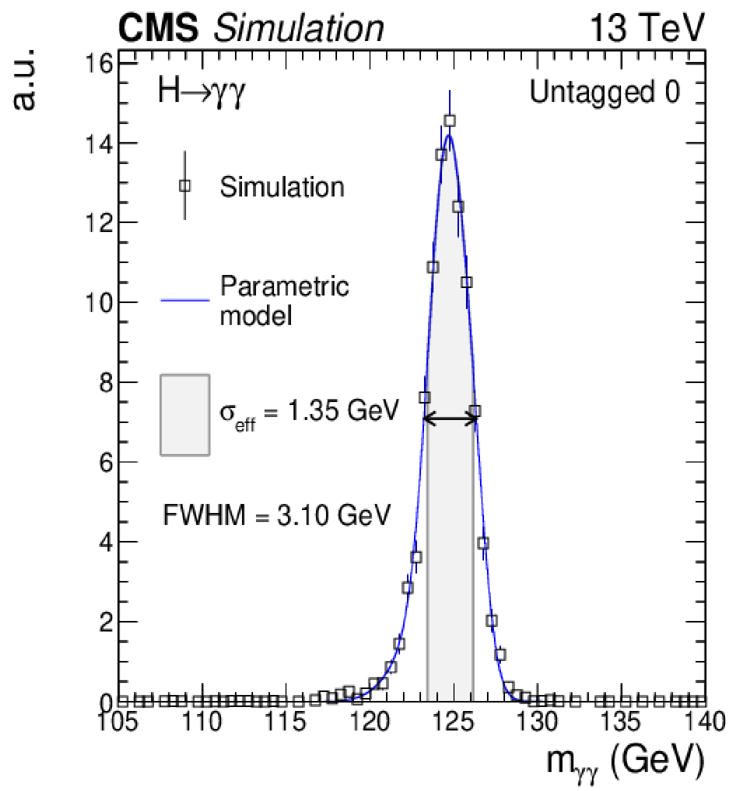
And when the gluons create. For X=3 will be as following:

Z= -1	Y=123.89Gev	z=1	Y=125.65Gev
Z= -2	Y=123.01Gev	z=2	Y=126.53Gev
Z= -3	Y=122.13Gev	z=3	Y=127.41Gev

The range of changes is equal to Equivalent to electromagnetic energy changes:

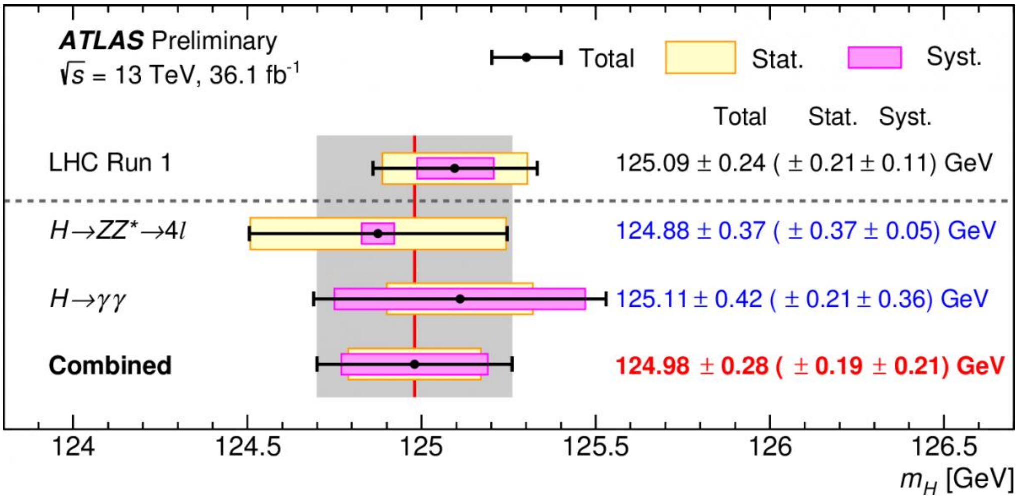
$\Delta Y = 0 \bullet 02Gev$ (32) $\sigma = 0.88Gev$ Standard deviation (33)

The frequency of dates can be found from testing in LHC (Cern) and the decay graph can be drowning. The result of the CMS detector in Cern is shown in



the graph 2. [5]

in the graph 2 the function(Y) of Higgs boson decay energy is calculated by Z measures. In this graph the produced force by gluon are shown as the weak interaction force between protons and the electromagnetice force as repulsive, respectively and.the diffrentiation between theses two, indicates the energy of the gamma readiation.



gragh3,

In the gragh 3 ,[6] the decay of Higgs boson to gamma radiation and ZZ^{*} particle has been shown in Gamma decay, the function is:

Z=1

$$Y = 3E_{p} + (1 \times E_{p-p} gluon) - ((\frac{8\pi\varepsilon_{0} m_{0} c^{2} l_{0}}{4 \times 2\pi \times \varepsilon_{0}} \times \frac{1}{L}) \times \frac{1}{4\sqrt{1-\frac{v^{2}}{c^{2}}}}) \quad (34)$$

$$Y = 124.77Gev + 0.88Gev - (3 \times 0.02Gev \frac{l_{0}}{L}) \quad (35)$$

In the equation (34), the electromagnetic force works until the gluon energy reaches to zero. The Gamma decay Energy range in the graph 3 is because of this issue

7-Conclusion:

By using the theory of quantized space and time the mass if Higgs boson calculated precisely to $124.77Gev \pm 02Gev$ Due to the ability of determination of maximum speed of charged particeles in accelator LHC by considering the time and space quantized the caculated amont is completey being consistent to experimental data gaddering for determinating the mass of Higgs boson in LHC .This being consistent can be considered as a proof of the grate potentials of the theory of quantized space and time to explains, predict and calculate the more various physical phenomena.

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https://atlas.web.cern.ch/Atlas/GROUPS/PHYSICS/CONFNOTES/ATLAS-CONF-2017-046/