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

By Hamid Reza Karimi

Electrical Engineering Department Islamic Azad University, South Tehran Branch

Tehran, 17776-13651, Iran

email:hr.karimy@gmail.com

Abstract:

In this study by appling the theory of quantized space and time [1], the mass of Higgs boson has been calculated precisely. the experimental effort for determination the mass of Higgs boson has performed in LHC of CERN accelerator in which two proton has collusion together in the opposite side and by registering the resultant gamma radiation the mass of the Higgs boson has been determined .the amount of the theoretical calculation is equal to 124.45Gev.

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

1-Introduction:

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 facto[2](1),

But by considering the speed limit under the rules of quantized space and time rules, Lorentz factor will be equal to 1714.

With regard to relativity, if the speed of particles increases to speed of light then the energy of them should be infinitive, so the energy of Higgs boson in the produced radiation of 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}=299792407m/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 : Length quanta $= 1.409 \times 10^{-15} m$. (2) [1]

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

ΔT_0 : Time quanta $= \frac{l_0}{c} = 0.47 \times 10^{-23}$ (3) [1]

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

There is 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 is 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.

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

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

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 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.

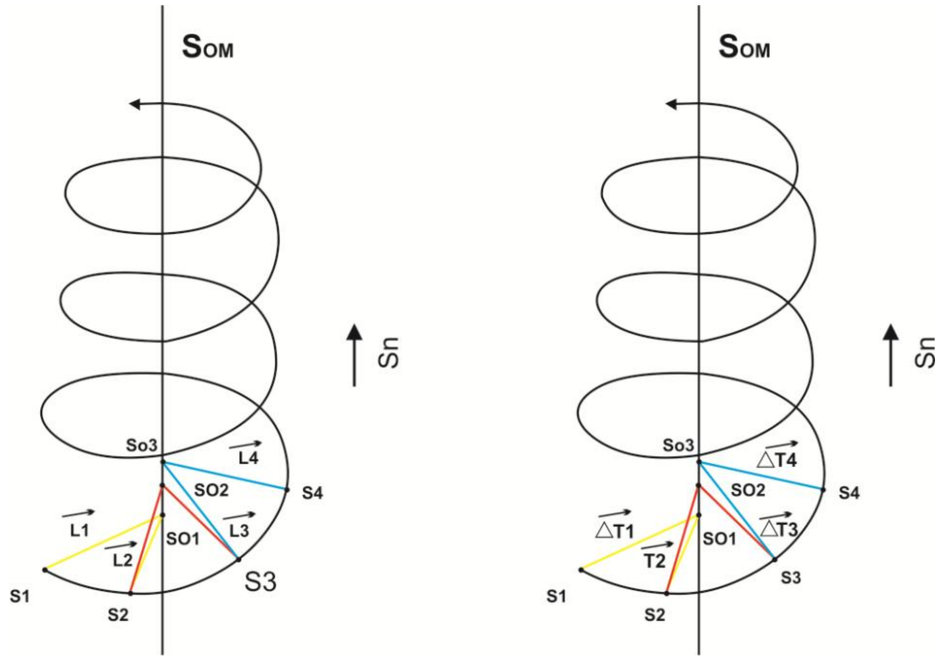


Fig (1) [1]

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

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

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

$$\Delta\vec{\mathrm{T}}_0 = \Delta\vec{\mathrm{T}}_{1\,=}\, \Delta\mathrm{T}_2\ (\mathrm{s}_{o1}) = 0.47\times10^{-23}\mathrm{s}, \qquad (8)\ [1]$$

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

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

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

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

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

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

By using of the speed equation the internal movement of the elementary particles with external appearance ,can be modeled and it can showed 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.

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

The equation (17) help us to find a limit for momentum of proton 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}=299792407m/s this speed express that the internal time and light 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:

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

The amount of effect of the internal energy of particles on the surrounding space that is one length quanta or more away from the particle 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:

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

Here l_0 is the length quanta, q and m are the charge and active mass and ε_0=8.854×10^{-12} F/m is the vacuum permittivity. By applying the special relativity principles in Equation 19, we will get the following equation:

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

Where m_0 =9.109×10^{-31} kg, m_0 is the initial active mass, and l_0=1.409×10^{-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 .whit calculating the Lorentz coefficient for speed limit then we have:

$$\gamma = \frac{1}{\sqrt{1-\frac{299792407^2}{c^2}}} = 1714 \qquad \sqrt{\gamma} = \frac{1}{4\sqrt{(1-\frac{299792407^2}{c^2}}} = 41.4$$

(21)

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

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

$$E_1 = \frac{xm_p c^2}{\sqrt[2]{1-\frac{v^2}{c^2}}} + 3xEgluon = (x \times m_p \times c^2 \times 1714) + 3XEgluon$$
$$= (x \times (m_p \times c^2) \times \frac{1714}{41.4} \times \frac{1}{1.602 \times 10^{-19}})$$
$$+ (3 \times X \times Egluon \times \frac{1}{1.602 \times 10^{-19}}) = Yev \qquad (23)$$

E1: Energy equivalent mass of The Higgs boson

In relation (24) x is the number of protons which from a higgs boson

7- 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 selected together whit 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:

$$E_p = Egluon \times 3 + Eu + Eu + Ed \qquad (25)$$

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

$$E_p = Egluon \times 3 + Eu + Eu + Ed = (3 \times 0.88Gev) + (Mproton \times C^2) = 41 \bullet 49Gev \qquad (27)\ [1]$$

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

$$x = 2 \rightarrow \begin{aligned} E1 &= (2 \times E_p) + E_{p-p} gluon - \left(\frac{8\pi\varepsilon_0 m_0 c^2 l_0}{4 \times 2\pi \times \varepsilon_0 \times L} \times \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}\right) \\ &= 82.98Gev + 0 \bullet 88Gev - (0 \bullet 02Gev \times \frac{l_0}{L}) \end{aligned} \qquad (28)$$

$$x = 3 \rightarrow \begin{aligned} E1 &= (3 \times E_p) + (3 \times E_{p-p} gluon) - \left(3 \times \left(\frac{8\pi\varepsilon_0 m_0 c^2 l_0}{4 \times 2\pi \times \varepsilon_0 \times L} \times \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}\right)\right) \\ &= 124.47Gev + (3 \times 0 \bullet 88Gev) - (3 \times 0 \bullet 02Gev \times \frac{l_0}{L}) \end{aligned} \qquad (29)$$

$$x=4 \rightarrow \quad E1=(4\times E_p)+(4\times E_{p-p}gluon)-(6\times(\frac{8\pi\varepsilon_0 m_0 c^2 l_0}{4\times 2\pi\times\varepsilon_0\times L}\times\frac{1}{\sqrt{1-\frac{v^2}{c^2}}}))$$

$$=165.96Gev+(4\times 0\bullet 88Gev)-(6\times 0\bullet 02Gev\times\frac{l_0}{L})$$

(30)

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

(31)

L: the distance of active mass to gather protons

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 the smallest end and the repulsive force of electromagnetism is 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 (30) we heave $3 \geq z \geq -3$ and $z \in Z$ that is the uncertainty of the production of gluon By the relation (26) fallowing amounts are obtained and Statistical calculations must be:

$$E_p = Egluon \times 3 + Eu + Eu + Ed = (3 \times 0.88Gev) + (Mproton \times C^2) = 41 \bullet 49Gev$$

$x = 3$ (31)

Average it is: Regardless of the energy of the gluon between the proton and the proton $E1 = 124.45Gev$

Z=1 E1=123.54Gev z=-1 E1=125.31Gev

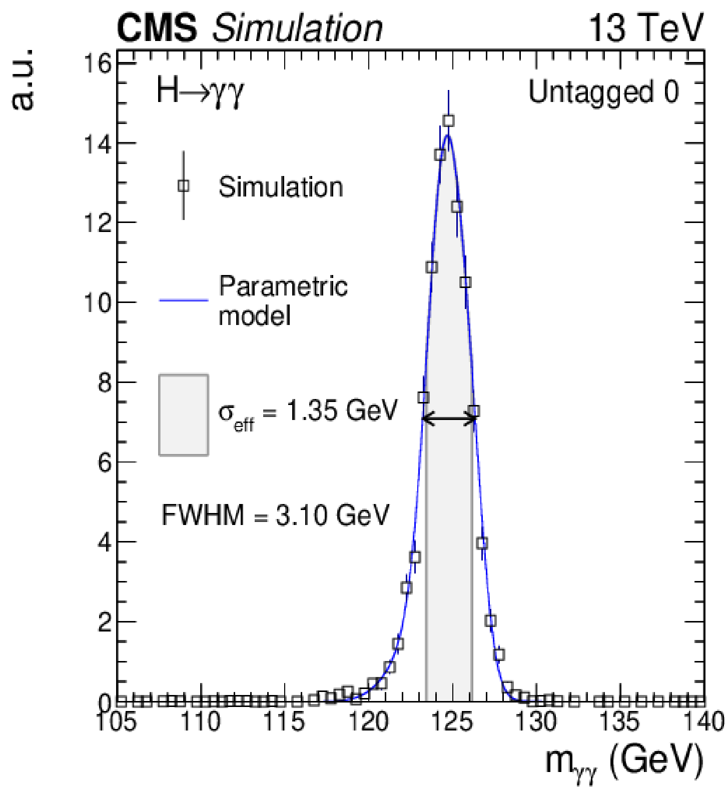
Z=2 E1=122.66Gev z=-2 E=126.18Gev

Z=3 E1=121.78Gev z=-3 E1=127.06Gev

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

$\Delta E = 0 \bullet 02Gev$ (32) $\sigma = 0.88Gev$ (33)

The frequency of dates can be found at from testing in LHC (cern) and the decay graph can be drowning. The result of the CMS detector in cern show in



the graph 2. [5]

7-Conclusion:

By using the theory of quantized space and time the mass if higgs boson calculated precisely $124.45Gev \pm 0.06Gev$. 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 quantizzd space and time to explains, predict and calculate the more varius physical ohenomenon.

References

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[1]Hadronic journal volume 33, Number3, June 2010 Quantized space a- Time and internal structure of elementary particles: A new model 249 Hamid Reza Karimi Electrical engineering Department Azadof south of Tehran 17776-13651, Iran hr.karimy@gmail.com.

[2].study of the simulation of the ATLAS fast Tracker system –LH accelerator (pag13).by Aristoole university of Thessaloniki Faculty of Scinces School of physics

[3] . Robert Resnick, Introduction to Special Relativity, Wiley Fastern Private Limited, 1972.

[4]The Fermi Solution: Essays on Science,Hans Christian Von Baeyer Courier Corporation, Dey 12, 1379 AP - Science - 172 pages

[5].A measurement of the Higss boson mass in the diphoton decay channel the CMS collaboration .contact:cms-pag-convenesrs-higgs@cern.ch /2019/09/30