QUANTUM STABILITY OF THE MUON, TAU, ELECTRON LEPTONS IN RELATION TO PLANCK MAGNITUDES AND VACUUM

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From the study of the spatial magnitude capacity as a sufficient form in its relation with the Planck magnitudes in the formation and development of observable and real processes such as electrical charge and rest mass, the close existing relationships among Tau, Muon and Electron leptonic particles are detailed as well as the definition for Tau and Muon particles as symmetrical components of an orderly *mathematical framework* defined by spatial relationships, which only permits the formation of some structures by an only and reproducible way.

The values obtained from the developed *theoretical equations* for muon and tau leptons rest mass equivalent are: $m_\mu{\cdot}c^2$=105,65763 62(83) [Mev] ; $m_\tau{\cdot}c^2$=1778,578 255(140) [Mev].
Taking the reference of experimental muon rest mass value[(1)] due to accuracy in mass measurement, the relative error is e_r^{μ} = 0,0000068.

1. Quantization of electric charge.
1.1. Quantization of electric charge. Supplementary conditions.
2. Theoretical support and relation with electron mass.
3. Tau, Muon relationships. Rest mass values calculation and conclusions.

[(1)] Fundamental Physical constants source: Peter J. Mohr and Barry N. Taylor, CODATA Recommended Values of the Fundamental Physical Constants: *Journal of Physical and Chemical Reference Data*, Vol. 28, No. 6, 1999 and *Reviews of Modern Physics*, Vol. 72, No. 2, 2000.

1. QUANTIZATION OF ELECTRIC CHARGE.

According to previous hypothesis in which the value of strength c^4/G was indicated as a referring precursor for rest mass property, and keeping in mind the value of the associated space related to vacuum dielectric constant and magnetic permeability "***s=(Gεμ)·m***" / $x=s$, we can suppose that such a strength/tension, in its action upon the medium, is also implied in the appearance of the property called electric charge.

In this way, by applying the value of the above mentioned precursor force to the medium of length "coupling space": x_c (≡ *Planck space*) and by equalizing it to the Coulomb´s Law in order to observe the electric charge values related to the same one so that it could only possess quantized charge values: charge=$q\cdot(\eta+1/3)$ [cb], we will observe the capacity that the medium of defined length offers to acquire the above mentioned property for the action of the force which was already related to the capacity of the medium in order to acquire the property resting mass "m_o":

$$\frac{c^4}{G} = \frac{1}{4\pi\varepsilon_o}\frac{q^2\left(\eta+\frac{1}{3}\right)^2}{r^2} \qquad q = \frac{\sqrt{4\pi G\varepsilon_o}}{\left(\eta+\frac{1}{3}\right)}\cdot m_c \quad ; \quad m_c = \sqrt{\frac{ch}{G}} \equiv m_{Planck}$$

$$r = x_c = \sqrt{\frac{Gh}{c^3}} \equiv x_{Planck} \qquad q = \frac{\sqrt{F\cdot(4\pi\cdot x_c^2)\varepsilon_o}}{\left(\eta+\frac{1}{3}\right)} = \frac{\sqrt{\varepsilon_o(F\cdot S_c)}}{\left(\eta+\frac{1}{3}\right)}$$

Where a spherical surface value with radius xc is named: $S_c = 4\pi\cdot x_c{}^2$.

$$m_c = \sqrt{\frac{ch}{G}} \quad ; \quad c = \frac{1}{\sqrt{\varepsilon_o\mu_o}} \quad \Rightarrow \quad ; \quad q = \sqrt{\left(4\pi\sqrt{\frac{\varepsilon_o}{\mu_o}}\right)\cdot h \Big/ \left(\eta+\frac{1}{3}\right)} \quad [1.1]$$

$$\sqrt{\frac{\varepsilon_o}{\mu_o}} = \frac{1}{\Omega_o} \quad ; \quad q = \sqrt{4\pi\left(\frac{h}{\Omega_o}\right)}\Big/\left(\eta+\frac{1}{3}\right) = \frac{Q}{(\eta+{}^1/_3)} ; (\Omega_o = 376'7303135\ [Ohm]\ , vacuum\ impedance).$$

1.1. QUANTIZATION OF ELECTRIC CHARGE. SUPPLEMENTARY CONDITIONS.

Experimentally there are evidences of the existence of fractions for the considered elementary charge "e" which at first do not turn out to be deduced in the equation [1.1]. It is for it that the next deduction is followed in order to consider the existence or not of the above mentioned relation:

- By taking values of "η": η=0,1, 2..., it is observed the capacity of rationalization of the equation [1.1] for every value of eta (though later it will be developed for other values of "η", we start from the value "η=1" for its representative deduction):

$$n=1 \quad ; \quad q = \frac{\sqrt{4\pi h\sqrt{\varepsilon_o/\mu_o}}}{\left(\eta+\frac{1}{3}\right)} = \frac{1}{3}\cdot\frac{\sqrt{4\pi h\sqrt{\varepsilon_o/\mu_o}}}{\left(1+\frac{1}{3}\right)} \quad ; \quad q = \frac{1}{3}\frac{Q}{\left(1+\frac{1}{3}\right)} \quad ; \quad \eta = \frac{9+3-1}{3}$$

$$n=2. \quad ; \quad q = \frac{2}{3}\cdot\frac{Q}{\left(1+\frac{1}{3}\right)} \quad ; \quad \eta = \frac{9+3-2}{6}$$

$$n=3. \quad ; \quad q = \frac{3}{3}\cdot\frac{Q}{\left(1+\frac{1}{3}\right)} \quad ; \quad \eta = \frac{9+3-3}{9}$$

$$For\ any\ value\ of\ \text{n}: \quad n = 1,2,3,\ldots \quad \eta = \frac{12-n}{3\cdot n} ; \quad \eta = \frac{4}{n}-\frac{1}{3}$$

In this way, for any value of "n" foreseen and considering values of η=0, 1, 2, ..., a supplementary quantization possibility can be observed for the electrical charge:

$$\eta = 0 \quad \Rightarrow \quad \eta = \frac{3-n}{3\cdot n} \quad ; \quad \eta = \frac{1}{n}-\frac{1}{3} \quad ; \quad q = n\cdot\sqrt{4\pi h\sqrt{\frac{\varepsilon_o}{\mu_o}}}$$

$$\eta = 1 \quad \Rightarrow \quad \eta = \frac{9+3-n}{3\cdot n} \quad ; \quad \eta = \frac{4}{n}-\frac{1}{3} \quad ; \quad q = \left(\frac{n}{4}\right)\cdot Q$$

$$\eta = 2 \quad \Rightarrow \quad \eta = \frac{18+3-n}{3\cdot n} \quad ; \quad \eta = \frac{7}{n}-\frac{1}{3} \quad ; \quad q = \left(\frac{n}{7}\right)\cdot Q$$

$$\eta = 3 \quad \Rightarrow \quad \eta = \frac{27+3-n}{3\cdot n} \quad ; \quad \eta = \frac{10}{n}-\frac{1}{3} \quad ; \quad q = \left(\frac{n}{10}\right)\cdot Q$$

$$\ldots \quad \ldots \quad \ldots \quad \ldots$$

$$\eta = 29 \quad \Rightarrow \quad \eta = \frac{261+3-n}{3\cdot n} \quad ; \quad \eta = \frac{88}{n}-\frac{1}{3} \quad ; \quad q = \left(\frac{n}{88}\right)\cdot Q$$

$$\forall\, n = 1,2,3,\ldots;\ \eta = 0,1,2,\ldots\ ;\ q = \frac{n}{(3\eta+1)}\sqrt{4\pi h\sqrt{\frac{\varepsilon_0}{\mu_0}}} \quad \textbf{[1.2]}$$

$$Values\ (\eta, n):\ (29,1) \Rightarrow q = \frac{1}{3}e \quad ; \quad (29,2) \Rightarrow q = \frac{2}{3}e \quad ; \quad (29,3) \Rightarrow q = e$$

So that from the consideration of the existence of a supplementary quantization condition finally expressed according to the equation [1.2], the rationalization experimentally observed in the above mentioned charge appears.

By assigning natural numbers "η=0…29", we have the following values for electrical charge magnitude:

$$(Q) = \sqrt{4\pi h\sqrt{\varepsilon_o/\mu_o}} = 4.701296\,235(185) \cdot 10^{-18}\ [\text{cb}]$$

Theoretical values	experimental values	relative error
$q(n=1,\eta=29) = 5.342382\,087(210)\cdot 10^{-20} cb$;	$^1/_3\, e = 5.340588\,207(210)\cdot 10^{-20} cb$;	$e_r = 0.000335896$
$q(n=2,\eta=29) = 1.0684764\,17(42)\cdot 10^{-19} cb$;	$^2/_3\, e = 1.0681176\,41(42)\cdot 10^{-19} cb$;	$e_r = 0.000335896$
$q(n=3,\eta=29) = 1.6027146\,26(63)\cdot 10^{-19} cb$;	$e = 1.6021764\,62(63)\cdot 10^{-19} cb$;	$e_r = 0.000335896$

In the theoretical calculation of "$q=f(n,\eta)$" value, the existing standard uncertainty in the experimental value for Planck constant "h" has been dragged along(1).

(h=6´626068 76(52)·10^{-34} [J·s]; c=299792458 [m·s^{-1}] ; μ_o=4π·10^{-7} [N·A])

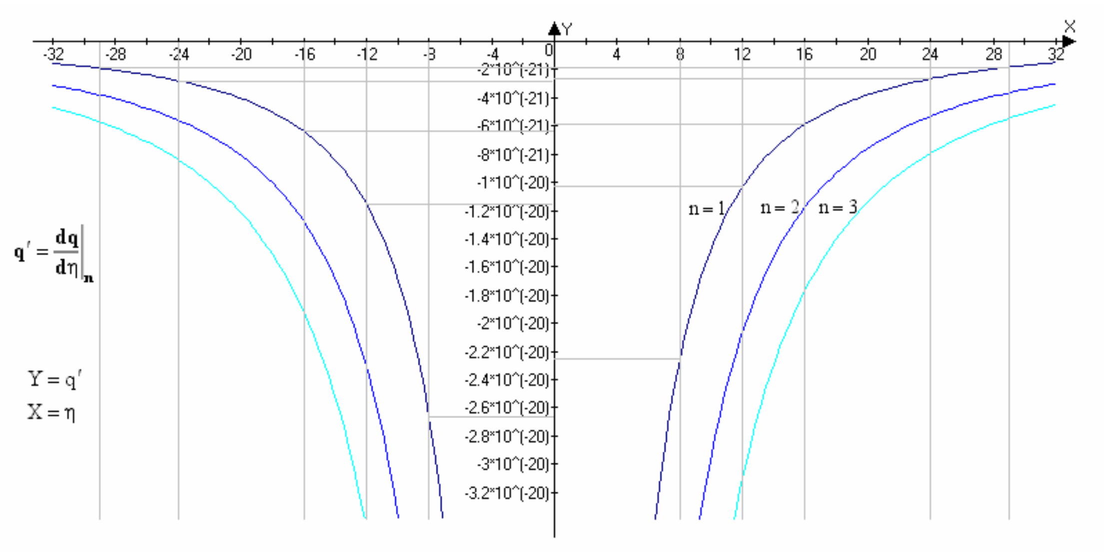

FIGURE 1. Study of symmetry in the function "$q=f(\eta)$" from its first derivative "$q'=dq/d\eta$" to observe the possible relation between the allowed electrical charge symmetry and η stability.

2. THEORETICAL SUPPORT AND RELATION WITH ELECTRON MASS.

In relation to the equation "$s=x=f(m)=(G\varepsilon\mu)\cdot m$" from which the spatial magnitude is identified across the form "$x=f(m)$" which possesses associated characteristics with the electrical charge "q", by applying the same principle developed in section 8.4.[4]:

$$\frac{1}{4\pi\varepsilon_o}\cdot\frac{q^2}{r^2} = m\cdot\frac{c^2}{r} \quad ; \quad r = \frac{q^2}{4\pi\varepsilon_o\cdot m\cdot c^2}$$

[2.1] ; Identical equation to the *classical electron radius* with only the replacement of the charge "q" for the electron charge "e" and its corresponding mass.

By renaming "$r' = x$" due to the correspondence in this case with a spherical property, three spatial variables appear depending on the mass:

$r = \frac{q^2}{4\pi\varepsilon_o \cdot mc^2}$; $r' = x = \frac{m \cdot G}{c^2}$; $\lambda = \frac{h}{m \cdot c}$ *(Compton wavelength "λ" for a mass "m").*

x: Associated space to mass. (See section 8.4. [4]: "*Being a photon that is found trapped in the curvature produced by a mass "m" so that it rotates around it to a distance " r′ " permitting a situation of equilibrium when it transforms the system defined by photon into an inertial system with constant velocity "c"… The photon would remain trapped by the central punctual mass, only to a distance whose value will be the associated space to "m": $r'=x=m \cdot G/c^2$, which is independent of the photon mass.*").

The following conclusions are observed in case of coincidence "couplings" among the previous magnitudes:

- $\lambda = r' \;\Rightarrow\; m_1 = \sqrt{\frac{ch}{G}} = m_c$ (See section 8.4. [4]).
- $r = r' \;\Rightarrow\; m_2 = \frac{q}{\sqrt{4\pi\varepsilon_o G}}$ / $q/m = \sqrt{4\pi\varepsilon_o G} \neq |e/m_e|^{(1)} = 1.7588201\,74(71) \cdot 10^{11}[\text{cb} \cdot \text{kg}^{-1}]$
- $\lambda = r = r' \;\Rightarrow\; m_2 = m_c \;\Rightarrow q = Q = q_U = \sqrt{4\pi h \sqrt{\frac{\varepsilon_0}{\mu_0}}}$ [2.2]

q_U , *unified electrical charge,* where $\lambda = r$ *coupling is sufficient.*

It is called "*unified electrical charge*": "q_U", to the value of the resultant charge for the three spatial relations equality and the equality of mass with the so called *coupling mass*: "m_c" (coincident with Planck mass). This value of electrical charge is the one which appears in the reasoning of the point **1**. That concludes with the equation [1.2], identical to [2.2] except for the quantization. As it was seen in point **1**., in the value of "q_U" is involved likewise the electrical force value coincidental with "c^4/G" as well as the one of the spherical surface value, "$4\pi x_c^2$" ("x_c" coincident with Planck space). To observe the quantizable factor, it is substituted the Compton wavelength for mass magnitude, appearing a non unity spatial relation term:

$$\left.\begin{array}{l} \frac{1}{4\pi\varepsilon_o} \cdot \frac{q^2}{r^2} = m \cdot \frac{c^2}{r} \\ \lambda = \frac{h}{m \cdot c} \end{array}\right\} \quad q = \sqrt{4\pi h \sqrt{\frac{\varepsilon_0}{\mu_o}}} \cdot \sqrt{\frac{r}{\lambda}} \quad ; \quad q = q_U \sqrt{\frac{r}{\lambda}} \qquad \textbf{[2.3]}$$

If [1.2] coincides with [2.3] then $\sqrt{\frac{r}{\lambda}} = \left(\frac{n}{3\eta+1}\right)$ that implies a quantized electrical charge values *depending of a spatial parameters relation and its coupling result* "q_U".

In this way three spatial relations appears in relation with elemental properties like mass and electrical charge:

$$\sqrt{\lambda \cdot r'} = x_c \quad (See\ sec. 9.1. [4]) \quad ; \quad \sqrt{\frac{r}{\lambda}} = \left(\frac{n}{3\eta + 1}\right) \quad [2.4] \quad ; \quad \sqrt{r \cdot r'} = \left(\frac{n}{3\eta + 1}\right) x_c$$

$x_c = \sqrt{\frac{Gh}{c^3}}$, coupling space. Coincident with Planck magnitude.

Studying now the combined relations λ,r for the electron in order to relate its electrical charge:

$$(\lambda \cdot r)_e = \frac{e^2}{4\pi\varepsilon_o \cdot m_e c^2} \frac{h}{m_e c} \quad ; \quad m_e = \sqrt{\left(\frac{1}{4\pi\varepsilon_0} \frac{e^2}{\lambda \cdot r}\right) \frac{G}{c^4}} \cdot m_c \qquad [2.5]$$

Likewise, for any resting mass it is fulfilled: $m_o = \sqrt{\left(\frac{1}{4\pi\varepsilon_0} \frac{q_U{}^2}{\lambda^2}\right) \frac{G}{c^4}} \cdot m_c$ **[2.6]**

By combining [2.5] with the most general 2.6: $e = q_U\sqrt{\frac{r}{\lambda}}$ ≡ [2.3] / ⇔ $\lambda=r \Rightarrow e=q_U$.

$$/ \quad F_{el} = \frac{1}{4\pi\varepsilon_o}\frac{{q_U}^2}{\lambda^2}$$

$$m_c = \sqrt{\frac{ch}{G}}; \quad F_U = \frac{c^4}{G}$$

$$\boxed{m_o = \sqrt{\frac{F_{el}}{F_U}}\cdot m_c} \quad \textbf{[2.7]} = [2.6]$$

By remembering the equations (E.6.3. [4], $\frac{m_c}{m_o} = \frac{\lambda}{x_c} = \frac{x_c}{x}$ $(E.9.1.STSE)$), in order to relate them to [2.7]:

$$m = \sqrt{\frac{c\,h}{G}}\sqrt{\frac{t}{T}}$$

$$m = \sqrt{\frac{F_{el}}{F_U}}\cdot m_c$$

$$x_c = \sqrt{\frac{G\cdot h}{c^3}} \quad ; \quad \sqrt{\frac{t}{T}} = \sqrt{\frac{r'}{\lambda}}$$

$$\boxed{\lambda = \frac{F_U}{F_{el}}\cdot r' = \frac{F_U}{F_{el}}\cdot x}$$

$$/ \quad \lambda\cdot x = \lambda\cdot r' = x_c$$

$$\boxed{\lambda = \sqrt{\frac{F_U}{F_{el}}}\cdot x_c \qquad r' = \sqrt{\frac{F_{el}}{F_U}}\cdot x_c} \quad [2.8]$$

According to the equation [2.7], the rest mass property appears like an accommodation whose origin is the Planck force and an electrical force "*f*(q_U,*λ*)" interaction, both of them inherent to the vacuum (" $T=c^4/G$ ": Tension of a string with linear density "$\mu=m/L$", on which a wave with speed v=c is transmitted ⇔ "$L=x=m\cdot G/c^2$"), that affects to the Planck mass value in order to acquire known values associated to particles; these values do not take any quantity as well as it occurs with the electric charge in Nature reality. If we want to obtain the electron rest mass value from the equation [2.7] by applicating quantized values, this value appears with a quantization of the type:

$$m_o = \sqrt{\frac{F_{el}}{F_U}}\cdot m_c = \sqrt{\left(\frac{1}{\kappa + {}^3/_5}\right)\left(\frac{1}{F_U}\right)}\cdot m_c \quad / \kappa = 0,1,2,\ldots \quad [2.9]$$

That is to say, by quantizing the electrical force in a similar way to the established in electrical charge. In this way, as well as it occurs with "η" value for which the electric charge acquires the rationalization experimentally observed with respect to electron charge, *the rest mass value that coincides with the mentioned particle mass is obtained for the value "$\kappa = \eta = 29$ ".*

[2.9]:$m_o(\kappa = \eta = 29) = 9'114882\,179(358)\cdot 10^{-31}Kg$; and by equivalence with the equation [1.2]

$$m_o = \sqrt{\left(\frac{n}{3\eta + {}^9/_5}\right)\left(\frac{1}{F_U}\right)}\cdot m_c \qquad \textbf{[2.10]} \qquad n = 3\,;\,\eta = 29 \Rightarrow m_o = m_{oe}\ (for\ electron).$$

"F_{el}", an *electrical force form* appears quantized.

The standard uncertainty existing in experimental Planck constant value "*h*" (1) has been taken into account for electron rest mass theoretical value resolved in kilograms. Note that estimated relative errors for the electron charge and mass present similar values in order to $3\cdot 10^{-4}$. (h=6´626068 76(52)·10-34 [J·s]; e=1.6021764 62(63)·10-19 [cb]) (1)

m_oc^2=0.5111357 58(40) [Mev] ; m_ec^2=0.5109989 02(21) [Mev](1) ; e_r=0.000267 821(119)

With the theoretical values obtained for electron/positron electrical charge and rest mass, the ratio "$|e^{+/-}/m|$" acquires the following values:

$$|{}^q/_m|_{n=3,\eta=29} = 1.758349\,252(138)\cdot 10^{11}[cb\ kg^{-1}]\ ;\ |{}^e/_m| = 1.7588201\,74(71)\cdot 10^{11}[cb\ kg^{-1}]\ (1)$$

3. TAU, MUON RELATIONSHIPS. REST MASS VALUES CALCULATION AND CONCLUSIONS.

We consider the masses of two particles "*i,j*" where the designation "*i*" coincides with electron/positron, assigning to "*i*" the spatial magnitude defined by [2.1] equation and to "*j*" the Compton wavelength which characterizes "m_j" that is related itself with "q_U" at the same time.

$$\left.\begin{aligned} r_i &= \frac{e^2}{4\pi\varepsilon_o m_i c^2} \\ \lambda_j &= \frac{h}{m_j c} = \frac{q_U{}^2}{4\pi\varepsilon_o m_j c^2} \end{aligned}\right\} \qquad m_j = \left(\frac{q_U}{e}\right)^2 \cdot \left(\frac{r_i}{\lambda_j}\right) \cdot m_i \quad / \Leftrightarrow i = j \Rightarrow m_i = m_j \qquad \boxed{\left(\frac{r_i}{\lambda_j}\right) = \left(\frac{e}{q_U}\right)^2 \cdot \left(\frac{m_j}{m_i}\right)} \qquad \textbf{[3.1]}$$

joined to [2.3] for the values in which electric charge coincides with the electron charge and its antiparticle:

$$\boxed{\left(\frac{r_i}{\lambda_j}\right) = \left(\frac{n}{3\eta+1}\right)^2 \cdot \left(\frac{m_j}{m_i}\right)} \qquad \textbf{[3.2]}$$

According to the equation [3.1], the existing relation among the mass of two particles is associated to other two relations, a spatial one is referred to a single particle as it was already seen in [2.4], and another one between observable electric charge and electric charge associated to Planck magnitudes. *Likewise, the equations [3.1] and [3.2] are transformed into [2.3] (for q=e) and [2.4] respectively if the spatial relation* "*r, λ*" *refers to a single particle.*

According to [3.2], ratio "r_i/λ_j" is a raised to square function of "*n, η*" parameter, so "m_j/m_i" would be able to be function of "*n, η*" so that the spatial relation be a global function. *Muon and tau* leptons have been chosen as particles "*j*" in this study so that including the electron, they form an initially related trio as members of this group and with *identical electrostatic charge* possession.

In fact, just as we had anticipated, two symmetrical relations exist that define the tau-electron and muon-electron relations with respect to mass making a global relation "r_i/λ_j". As well as that *factor "n, η" assigned to "e/q_U"*, these expressions are raised to square, and they are affected by some definite parameters which are underlined for its monitoring in subsequent relations. These expressions are the following ones:

$$\boxed{\left(\frac{m_\tau}{m_e}\right) = \left[\left(2 + \left(\frac{n}{3\eta+1}\right) \cdot \frac{1}{\underline{1}}\right) \cdot \eta\right]^2} \qquad \textbf{[3.3]} \qquad \boxed{\left(\frac{m_\mu}{m_e}\right) = \left[\frac{\eta}{2 + \left(\frac{n}{3\eta+1}\right) \cdot \frac{1}{\underline{2}}}\right]^2} \qquad \textbf{[3.4]}$$

So the expression that relates the masses of the three particles represents a symmetrical relation:

$$\boxed{\sqrt{\frac{m_\tau m_\mu}{m_e{}^2}} = \eta^2 \frac{\left(\underline{1} \cdot 2 \cdot (3\eta+1) + n\right) \cdot \underline{2}}{\left(\underline{2} \cdot 2 \cdot (3\eta+1) + n\right) \cdot \underline{1}}} \qquad \textbf{[3.5]} \qquad N_{r,\lambda} = \left(\frac{n}{3\eta+1}\right)_e \Rightarrow \boxed{\sqrt{\frac{m_\tau m_\mu}{m_e{}^2}} = \eta^2 \left(\frac{1 + N_{r,\lambda} \frac{1}{\underline{1} \cdot 2}}{1 + N_{r,\lambda} \frac{1}{\underline{2} \cdot 2}}\right)}$$

And the masses of tau and muon particles appear clearly connected:

$$\sqrt{\frac{m_\tau}{m_\mu}} = \left(\frac{n_3}{3\eta+1}\right)^2 \frac{1}{n_1 n_2} + \left(\frac{n_3}{3\eta+1}\right)\frac{2}{n_1} + \left(\frac{n_3}{3\eta+1}\right)\frac{2}{n_2} + 2^2 \quad \Leftrightarrow \quad n_1 = 1\ ;\ n_2 = 2\ ;\ n_3 = 3\ ;\ \eta = 29. \qquad \textbf{[3.6]}$$

$$\sqrt{\frac{m_\tau}{m_\mu}} = \left(\frac{\underline{3}}{3\eta+1}\right)^2 \frac{1}{\underline{1}\cdot \underline{2}} + \left(\frac{\underline{3}}{3\eta+1}\right)\frac{2}{\underline{1}} + \left(\frac{\underline{3}}{3\eta+1}\right)\frac{2}{\underline{2}} + 2^2 \qquad \textbf{[3.7]}$$

The coefficients that were performed for monitoring have been distributed with the denominations "n_1" and "n_2" as well as "n_3" to the coefficient "n=3" so that when they are substituted for values that determine the ratio between the tau and muon masses according to the equation [3.7], they display the existing symmetry in such equation and the intimate relation among the two particles as symmetrical components from a well arranged *mathematical framework* defined by spatial relations, parallel to "**D.N.A.**" instructions, that only permits the formation of certain structures in an unique and reproducible way.

The values obtained from the previous equations [3.3]; [3.4] and [3.7] are:

$m_\mu.c^2$	$m_\tau.c^2$	m_τ / m_μ	Used equations & values
105.65763 62(83) Mev	*1778.578 255(140)	16.83340 948(264)	[3.3][3.4],$m_e(n,\eta)$[kg],q_e
		16.83340 948(264)	[3.7]
105.65835 68(52) Mev (1)	1777.05(29) Mev (1)	16.81 88(27) (1)	Codata(1)

* In accordance with CLEO[2] 1997 collaboration (1778.7±1.6±1.2 Mev). The CLEO[1][2] combined result is: (1778.2±1.4 Mev); DELPHI collaboration: (1778.7±3.1±1.3 Mev) and neutrinoless τ decay results [3].

From [3.2], [3.3] and [3.4], by obtaining the equations $(r_e/\lambda_\mu)^{1/2}$; $(r_e/\lambda\tau)^{1/2}$, it can be verified that the equation [3.7] has a great importance because it describes likewise the spatial relation between Compton wavelengths or wavelengths for any velocity (whenever v_μ=$v\tau$), for the two masses:

$$\sqrt{\frac{\lambda_\mu}{\lambda_\tau}} = \left(\frac{\underline{3}}{3\eta_e+1}\right)^2 \frac{1}{\underline{1}\cdot\underline{2}} + \left(\frac{\underline{3}}{3\eta_e+1}\right)\frac{2}{\underline{1}} + \left(\frac{\underline{3}}{3\eta_e+1}\right)\frac{2}{\underline{2}} + 2^2 = \sqrt{\frac{m_\tau}{m_\mu}}$$

$$\sqrt{\frac{\lambda_\mu}{\lambda_\tau}} = N_{r,\lambda}^2 \frac{1}{\underline{\mathbf{1}}\cdot\underline{\mathbf{2}}} + 2N_{r,\lambda}\left(\frac{1}{\underline{\mathbf{1}}} + \frac{1}{\underline{\mathbf{2}}}\right) + 2^2 = \sqrt{\frac{m_\tau}{m_\mu}} = \left(N_{r,\lambda}^2 \frac{0+1}{1\cdot 2} + 2^2\frac{0+2}{1\cdot 2} + 2\cdot N_{r,\lambda}\cdot\frac{1+2}{1\cdot 2}\right)$$

$$\sqrt{\frac{\lambda_\mu}{\lambda_\tau}} = N_{r,\lambda}^2 \frac{1}{\underline{\mathbf{1}}\cdot\underline{\mathbf{2}}} + N_{r,\lambda}\frac{2}{\underline{\mathbf{1}}} + N_{r,\lambda}\frac{2}{\underline{\mathbf{2}}} + 2^2 = \sqrt{\frac{m_\tau}{m_\mu}} \qquad \textbf{[3.8]}=[3.7]$$

We can introduce and study a non dimensional modulator factor that we will name "symmetry factor: S" in order to represent a spatial symmetry with respect to authorized Compton wavelength "λ" values between "±λ" quantities.

$$S = \sqrt{1 - \frac{r}{\lambda}} = \sqrt{1 - \left(\frac{n}{3 \cdot \eta + 1}\right)^2} \quad ; \quad S_- = S_{n=3,\eta=-29} = 0.999391377 \quad ; \quad S_+ = S_{n=3,\eta=+29} = 0.999418736$$

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