Elementary Particles Rest Mass Formula and the Weak Interaction2

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A single formula for every non-neutrino fermion rest mass is determined based on the E/B triplet electromagnetic-nuclear-weak field-strengths and the Weak Interaction is simply explained based on these field-strengths also determining the W and Z masses.

Particle rest masses may be calculated from the **E**/**B** triplets.

Given:

$e^- = e(1) = \overline{(E^1,E^2,E^3)_1}$	$\mu^- = e(2) = \overline{(E^1,E^2,E^3)_2}$	$\tau^- = e(3) = \overline{(E^1,E^2,E^3)_3}$
$\nu_e = \nu(1) = \left(B^1_{\Updownarrow},B^2_{\Updownarrow},B^3_{\Updownarrow}\right)_1$	$\nu_\mu = \nu(2) = \left(B^1_{\Updownarrow},B^2_{\Updownarrow},B^3_{\Updownarrow}\right)_2$	$\nu_\tau = \nu(3) = \left(B^1_{\Updownarrow},B^2_{\Updownarrow},B^3_{\Updownarrow}\right)_3$
$u_R = u_1(1) = \left(B^1_{\Updownarrow},E^2,E^3\right)_1$	$c_R = u_1(2) = \left(B^1_{\Updownarrow},E^2,E^3\right)_2$	$t_R = u_1(3) = \left(B^1_{\Updownarrow},E^2,E^3\right)_3$
$u_G = u_2(1) = \left(E^1,B^2_{\Updownarrow},E^3\right)_1$	$c_G = u_2(2) = \left(E^1,B^2_{\Updownarrow},E^3\right)_2$	$t_G = u_2(3) = \left(E^1,B^2_{\Updownarrow},E^3\right)_3$
$u_B = u_3(1) = \left(E^1,E^2,B^3_{\Updownarrow}\right)_1$	$c_B = u_3(2) = \left(E^1,E^2,B^3_{\Updownarrow}\right)_2$	$t_B = u_3(3) = \left(E^1,E^2,B^3_{\Updownarrow}\right)_3$
$d_R = d_1(1) = \overline{\left(E^1,B^2_{\Updownarrow},B^3_{\Updownarrow}\right)_1}$	$s_R = d_1(2) = \overline{\left(E^1,B^2_{\Updownarrow},B^3_{\Updownarrow}\right)_2}$	$b_R = d_1(3) = \overline{(E^1,B^2,B^3)_3}$
$d_G = d_2(1) = \overline{\left(B^1_{\Updownarrow},E^2,B^3_{\Updownarrow}\right)_1}$	$s_G = d_2(2) = \overline{\left(B^1_{\Updownarrow},E^2,B^3\right)_2}$	$b_G = d_2(3) = \overline{\left(E^1,B^2_{\Updownarrow},B^3_{\Updownarrow}\right)_3}$
$d_B = d_3(1) = \overline{\left(B^1_{\Updownarrow},B^2_{\Updownarrow},E^3\right)_1}$	$s_B = d_3(2) = \overline{\left(B^1_{\Updownarrow},B^2_{\Updownarrow},E^3\right)_2}$	$b_B = d_3(3) = \overline{\left(B^1_{\Updownarrow},B^2_{\Updownarrow},E^3\right)_3}$

and:

$f(0) = 1$	$m_{\nu_e} = m(0,1) = m(0,1)f(0) = m(0,1)$
$f(1) = 2$	$m_d = m(1,1) = m(2,1)f(1) = 2m(2,1)$
$f(2) = 5$	$m_u = m(2,1) = m(3,1)f(2) = 5m(3,1)$
$f(3) = 5 \cdot 10^6$	$m_e = m(3,1) = m(0,1)f(3) = 5 \cdot 10^6 \cdot m(0,1)$

$\Rightarrow$

$m(0,1) = \frac{1}{5 \cdot 10^6} m(3,1)$	$m(0,i) = \frac{1}{5 \cdot 10^6} m(3,1) g(3,i)$
$m(1,1) = m(3,1) \cdot 2 \cdot 5$	$m(1,i) = m(3,1) \cdot 5 \cdot g(1,i) \quad , \ (i \neq 1)$
$m(2,1) = m(3,1) \cdot 5$	$m(2,i) = m(3,1) \cdot 2 \cdot 5 \cdot g(2,i) \ , \ (i \neq 1)$
$m(3,1) = m(3,1)$	$m(3,i) = m(3,1) \cdot g(3,i)$

(It is rather remarkable how simple the relationships are.)

$\frac{m(0,2)}{m(0,1)} = 1$	$\frac{m(0,3)}{m(0,1)} = 1$
$\frac{m(1,2)}{m(2,1)} = \left(\frac{23}{25}\right) \cdot (k)$	$\frac{m(1,3)}{m(2,1)} = \left(\frac{23}{25}\right)^{\frac{1}{2}} \cdot (k)^2$
$\frac{m(2,2)}{m(1,1)} = 1 \cdot (6k)$	$\frac{m(2,3)}{m(1,1)} = 1 \cdot \left[\left(\frac{3}{1004}\right)(6k)^2\right]^2$
$\frac{m(3,2)}{m(3,1)} = 1 \cdot (5k)$	$\frac{m(3,3)}{m(3,1)} = 1 \cdot \left[\left(\frac{2}{1450}\right)(5k)^2\right]^2$

$\frac{m(1,1)}{m(3,1)} = 5 \cdot 2$	$\frac{m(1,2)}{m(3,1)} = \left(\frac{23}{25}\right) \cdot (k) \cdot 1 \cdot 5$	$\frac{m(1,3)}{m(3,1)} = \left(\frac{23}{25}\right)^{\frac{1}{2}} \cdot (k)^2 \cdot 5$
$\frac{m(2,1)}{m(3,1)} = 5$	$\frac{m(2,2)}{m(3,1)} = 1 \cdot (6k) \cdot 5 \cdot 2$	$\frac{m(2,3)}{m(3,1)} = 1 \cdot \left[\left(\frac{3}{1004}\right)(6k)^2\right]^2 \cdot 5 \cdot 2$
$\frac{m(3,1)}{m(3,1)} = 1$	$\frac{m(3,2)}{m(3,1)} = 1 \cdot (5k)$	$\frac{m(3,3)}{m(3,1)} = \left[\left(\frac{2}{1450}\right)(5k)^2\right]^2$

$\Downarrow$

(h = the number of E's of the fermion / g = the generation)

$*$	h/g	1	2	3
$d_{R/G/B}$	1	$\left(\frac{1}{k}\right)^0 \frac{m(1,1)}{m(3,1)} = 10$	$\left(\frac{1}{k}\right)^1 \frac{m(1,2)}{m(3,1)} = \frac{23}{5}$	$\left(\frac{1}{k}\right)^2 \frac{m(1,3)}{m(3,1)} = \sqrt{23}$
$u_{R/G/B}$	2	$\left(\frac{1}{k}\right)^0 \frac{m(2,1)}{m(3,1)} = 5$	$\left(\frac{1}{6k}\right)^1 \frac{m(2,2)}{m(3,1)} = 10$	$\left(\frac{1}{6k}\right)^4 \frac{m(2,3)}{m(3,1)} = \left(\frac{3}{1004}\right)^2 \cdot 10$
$e/\mu/\tau$	3	$\left(\frac{1}{k}\right)^0 \frac{m(3,1)}{m(3,1)} = 1$	$\left(\frac{1}{5k}\right)^1 \frac{m(3,2)}{m(3,1)} = 5$	$\left(\frac{1}{5k}\right)^4 \frac{m(3,3)}{m(3,1)} = \left(\frac{2}{1450}\right)^2$

$m_e = m(3,1) = \frac{1}{10}\left[\frac{15}{8} + \frac{1}{4000}\left(\frac{486}{25}\right)\right]e = 0.51099892780470207761443900058 97$

$k = 4\pi^2 + \frac{15}{8} + \frac{1}{4000}\sum_{k=0}^{\infty}\left(-\frac{1}{20}\right)^k = 4\pi^2 + \frac{15}{8} + \frac{1}{4000}\left(\frac{20}{21}\right) = 41.353655699595529713433202094743$

(notice the fairly simple factors across the generations)

and for:

$m_W = m_\mu - 25 + \left(\frac{1}{10}\right)^3\left(\frac{3}{2}\right)^3$
$m_Z = 100k(m_\mu - m_W - 25)$

$f \to f + Z^0 \Leftrightarrow Z^0 = f + \bar{f}$

$f^\pm \to \overline{\eta(f^\pm)} + W^\pm \Leftrightarrow W^\pm = f^\pm + \overline{\eta(f^\pm)}$

where:

$$\eta(R_k^h) \equiv \begin{cases} E_k^h \;,\; R_k^h = B_k^h \\ B_k^h \;,\; R_k^h = E_k^h \end{cases} \quad,\; \eta(R_k^1, R_k^2, R_k^3) = (\eta(R_k^1), \eta(R_k^2), \eta(R_k^3))$$

simply describes the weak force/interaction as part of the electromagnetic-nuclear-weak fieldThe table (Cleary, W/Z are energy states required for the interaction.)

The above table makes plain the generation $(k, 6k, 5k)$ factors.

In fact, generation factors may be expressed commonly as: $\left(\left((h+3)+(-1)^h\right)^{T_0(h)} \cdot k\right)^{(g-1)^{1+T_0(h)}}$

(h = the number of E's of the fermion / g = the generation)

$*$	h/g	1
$d_{R/G/B}$	1	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)} \cdot k}\right)^{(g-1)^{1+T_0(h)}} \cdot \frac{m(1,1)}{m(3,1)} = 10$
$u_{R/G/B}$	2	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)} \cdot k}\right)^{(g-1)^{1+T_0(h)}} \cdot \frac{m(2,1)}{m(3,1)} = 5$
$e/\mu/\tau$	3	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)} \cdot k}\right)^{(g-1)^{1+T_0(h)}} \cdot \frac{m(3,1)}{m(3,1)} = 1$

$*$	h/g	2
$d_{R/G/B}$	1	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)} \cdot k}\right)^{(g-1)^{1+T_0(h)}} \cdot \frac{m(1,2)}{m(3,1)} = \frac{23}{25} \cdot 5$
$u_{R/G/B}$	2	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)} \cdot k}\right)^{(g-1)^{1+T_0(h)}} \cdot \frac{m(2,2)}{m(3,1)} = 10$
$e/\mu/\tau$	3	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)} \cdot k}\right)^{(g-1)^{1+T_0(h)}} \cdot \frac{m(3,2)}{m(3,1)} = 5$

$*$	h/g	3
$d_{R/G/B}$	1	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)} \cdot k}\right)^{(g-1)^{1+T_0(h)}} \cdot \frac{m(1,3)}{m(3,1)} = \sqrt{\frac{23}{25}} \cdot 5$
$u_{R/G/B}$	2	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)} \cdot k}\right)^{(g-1)^{1+T_0(h)}} \cdot \frac{m(2,3)}{m(3,1)} = \left(\frac{3}{1004}\right)^2 \cdot 10$
$e/\mu/\tau$	3	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)} \cdot k}\right)^{(g-1)^{1+T_0(h)}} \cdot \frac{m(3,3)}{m(3,1)} = \left(\frac{2}{1450}\right)^2 \cdot 1$

$*$	h/g	1	2	3
$d_{R/G/B}$	1	10	5	5
$u_{R/G/B}$	2	5	10	10
$e/\mu/\tau$	3	1	5	1

$\Leftrightarrow$

$*$	h/g	1	2	3
$d_{R/G/B}$	1	$2^1 \cdot 5^1$	$2^0 \cdot 5^1$	$2^0 \cdot 5^1$
$u_{R/G/B}$	2	$2^0 \cdot 5^1$	$2^1 \cdot 5^1$	$2^1 \cdot 5^1$
$e/\mu/\tau$	3	$2^0 \cdot 5^0$	$2^0 \cdot 5^1$	$2^0 \cdot 5^0$

$$: \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 0 \end{pmatrix} \begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 0 & 1 & 0 \end{pmatrix}$$

$$\Rightarrow \Gamma \equiv \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 0 \end{pmatrix} \quad ; \quad \Delta \equiv \begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 0 & 1 & 0 \end{pmatrix}$$

$\Rightarrow$

$*$	h/g	1	2	3
$d_{R/G/B}$	1	$2^{\Gamma_{hg}} \cdot 5^{\Delta_{hg}}$	$2^0 \cdot 5^1$	$2^0 \cdot 5^1$
$u_{R/G/B}$	2	$2^0 \cdot 5^1$	$2^1 \cdot 5^1$	$2^1 \cdot 5^1$
$e/\mu/\tau$	3	$2^0 \cdot 5^0$	$2^0 \cdot 5^1$	$2^0 \cdot 5^0$

$\Downarrow$

$*$	h/g	1
$d_{R/G/B}$	1	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)}\cdot k}\right)^{(g-1)^{1+T_0(h)}}\cdot\frac{m(1,1)}{m(3,1)}=2^{\Gamma_{hg}}\cdot 5^{\Delta_{hg}}$
$u_{R/G/B}$	2	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)}\cdot k}\right)^{(g-1)^{1+T_0(h)}}\cdot\frac{m(2,1)}{m(3,1)}=2^{\Gamma_{hg}}\cdot 5^{\Delta_{hg}}$
$e/\mu/\tau$	3	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)}\cdot k}\right)^{(g-1)^{1+T_0(h)}}\cdot\frac{m(3,1)}{m(3,1)}=2^{\Gamma_{hg}}\cdot 5^{\Delta_{hg}}$

$*$	h/g	2
$d_{R/G/B}$	1	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)}\cdot k}\right)^{(g-1)^{1+T_0(h)}}\cdot\frac{m(1,2)}{m(3,1)}=\frac{23}{25}\cdot 2^{\Gamma_{hg}}\cdot 5^{\Delta_{hg}}$
$u_{R/G/B}$	2	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)}\cdot k}\right)^{(g-1)^{1+T_0(h)}}\cdot\frac{m(2,2)}{m(3,1)}=2^{\Gamma_{hg}}\cdot 5^{\Delta_{hg}}$
$e/\mu/\tau$	3	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)}\cdot k}\right)^{(g-1)^{1+T_0(h)}}\cdot\frac{m(3,2)}{m(3,1)}=2^{\Gamma_{hg}}\cdot 5^{\Delta_{hg}}$

$*$	h/g	3
$d_{R/G/B}$	1	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)}\cdot k}\right)^{(g-1)^{1+T_0(h)}}\cdot\frac{m(1,3)}{m(3,1)}=\sqrt{\frac{23}{25}}\cdot 2^{\Gamma_{hg}}\cdot 5^{\Delta_{hg}}$
$u_{R/G/B}$	2	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)}\cdot k}\right)^{(g-1)^{1+T_0(h)}}\cdot\frac{m(2,3)}{m(3,1)}=\left(\frac{3}{1004}\right)^2\cdot 2^{\Gamma_{hg}}\cdot 5^{\Delta_{hg}}$
$e/\mu/\tau$	3	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)}\cdot k}\right)^{(g-1)^{1+T_0(h)}}\cdot\frac{m(3,3)}{m(3,1)}=\left(\frac{2}{1450}\right)^2\cdot 2^{\Gamma_{hg}}\cdot 5^{\Delta_{hg}}$

And:

h/g	3	3
1	$\frac{23}{25}=\left(\frac{(g+2)2^{(g+2)}+(-1)^g}{(g+2)2^{(g+2)}+(-1)^{g+1}}\right)^{\frac{1}{g-h}}$	$\sqrt{\frac{23}{25}}=\left(\frac{(g+2)2^{(g+2)}+(-1)^g}{(g+2)2^{(g+2)}+(-1)^{g+1}}\right)^{\frac{1}{g-h}}$

h/g	3
2	$\left(\frac{3}{1004}\right)^2=\left(\frac{h+(-1)^h}{h\left(h+2+(-1)^h\right)^{g-1}+h(h+1)-2}\right)^{g-1}$
3	$\left(\frac{2}{1450}\right)^2=\left(\frac{h+(-1)^h}{h\left(h+2+(-1)^h\right)^{g-1}+h(h+1)-2}\right)^{g-1}$

So:

$*$	h/g	1
$d_{R/G/B}$	1	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)}\cdot k}\right)^{(g-1)^{1+T_0(h)}}\cdot\frac{m(1,1)}{m(3,1)}=2^{\Gamma_{hg}}\cdot 5^{\Delta_{hg}}$
$u_{R/G/B}$	2	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)}\cdot k}\right)^{(g-1)^{1+T_0(h)}}\cdot\frac{m(2,1)}{m(3,1)}=2^{\Gamma_{hg}}\cdot 5^{\Delta_{hg}}$
$e/\mu/\tau$	3	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)}\cdot k}\right)^{(g-1)^{1+T_0(h)}}\cdot\frac{m(3,1)}{m(3,1)}=2^{\Gamma_{hg}}\cdot 5^{\Delta_{hg}}$

$*$	h/g	2
$d_{R/G/B}$	1	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)}\cdot k}\right)^{(g-1)^{1+T_0(h)}}\cdot\frac{m(1,2)}{m(3,1)}=\left(\frac{(g+2)2^{(g+2)}+(-1)^g}{(g+2)2^{(g+2)}+(-1)^{g+1}}\right)^{\frac{1}{g-h}}\cdot 2^{\Gamma_{hg}}\cdot 5^{\Delta_{hg}}$
$u_{R/G/B}$	2	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)}\cdot k}\right)^{(g-1)^{1+T_0(h)}}\cdot\frac{m(2,2)}{m(3,1)}=2^{\Gamma_{hg}}\cdot 5^{\Delta_{hg}}$
$e/\mu/\tau$	3	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)}\cdot k}\right)^{(g-1)^{1+T_0(h)}}\cdot\frac{m(3,2)}{m(3,1)}=2^{\Gamma_{hg}}\cdot 5^{\Delta_{hg}}$

$*$	h/g	3
$d_{R/G/B}$	1	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)} \cdot k}\right)^{(g-1)^{1+T_0(h)}} \cdot \frac{m(1,3)}{m(3,1)} = \left(\frac{(g+2)2^{(g+2)}+(-1)^g}{(g+2)2^{(g+2)}+(-1)^{g+1}}\right)^{\frac{1}{g-h}} \cdot 2^{\Gamma_{hg}} \cdot 5^{\Delta_{hg}}$
$u_{R/G/B}$	2	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)} \cdot k}\right)^{(g-1)^{1+T_0(h)}} \cdot \frac{m(2,3)}{m(3,1)} = \left(\frac{h+(-1)^h}{10 \cdot \left[h(h+2+(-1))^h\right]^2 + h(h+1)-2}\right)^{g-1} \cdot 2^{\Gamma_{hg}} \cdot 5^{\Delta_{hg}}$
$e/\mu/\tau$	3	$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)} \cdot k}\right)^{(g-1)^{1+T_0(h)}} \cdot \frac{m(3,3)}{m(3,1)} = \left(\frac{h+(-1)^h}{10 \cdot \left[h(h+2+(-1))^h\right]^2 + h(h+1)-2}\right)^{g-1} \cdot 2^{\Gamma_{hg}} \cdot 5^{\Delta_{hg}}$

Now, noting that wherever $\left(\frac{(g+2)2^{(g+2)}+(-1)^g}{(g+2)2^{(g+2)}+(-1)^{g+1}}\right)^{\frac{1}{g-h}}$ appears; $h = 1 < g \in \{2,3\} \Rightarrow g-h > 0$
Thusly, all the fermion masses may be reduced to this single formula:

$$\left(\frac{1}{\left((h+3)+(-1)^h\right)^{T_0(h)} \cdot k}\right)^{(g-1)^{1+T_0(h)}} \cdot \frac{m(h,g)}{m(3,1)} = \left(\frac{(g+2)2^{(g+2)}+(-1)^g}{(g+2)2^{(g+2)}+(-1)^{g+1}}\right)^{\left(\frac{1}{g-h}\right)\delta_1^h} \left(\frac{h+(-1)^h}{10 \cdot \left[h(h+2+(-1))^h\right]^2 + h(h+1)-2}\right)^{(g-1)\delta_3^g}$$

($h =$ the number of E's of the fermion / $g =$ the generation)

Note:

$$\Rightarrow \Gamma \equiv \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 0 \end{pmatrix} \Rightarrow \Gamma_{hg} = (1 - T_0(h))^{1-T_0(g)} \cdot \left[\tfrac{1}{2}\left(1 + (-1)^{T_0(h)}\right)\right]^{T_0(g)} \quad ;$$

$$\Delta \equiv \begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 0 & 1 & 0 \end{pmatrix} \Rightarrow \Delta_{hg} = \left[\tfrac{1}{2}\left(1 + (-1)^{T_0(h+1)}\right)\right]^{\frac{1}{2}(1-(-1)^g)}$$

$\Rightarrow$

h/g	1	2	3
1	$2^1 \cdot 5^1$	$2^0 \cdot 5^1$	$2^0 \cdot 5^1$
2	$2^0 \cdot 5^1$	$2^1 \cdot 5^1$	$2^1 \cdot 5^1$
3	$2^0 \cdot 5^0$	$2^0 \cdot 5^1$	$2^0 \cdot 5^0$

where: from previous:

$$T_0(h) \equiv ½\left(h - 1 + \delta^1_{(-1)^h}\right) \quad ; \quad T_n(h) \equiv T_0(T_{n-1}(h)) \,, \qquad (h \in \mathbb{N}, n \in \mathbb{N} \geq 1)$$

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