The Higgsless-Gluonless Fermion Mass Architecture and Quark Mass-Color Strong Force

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Mathematics is shown to be enough to produce the fermion mass architecture and quark mass-color strong force without resort to hypothetical-mythical unobservables, and mere accordance with an imaginative theory and barely in agreement with experiment.

As usual, from [1],[2]; the fermion architecture is as follows:

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

It's current electron mass measured value is:

$$m_e \approx .0.510998928(11) MeV/c^2 \approx \frac{1}{10}\left[\frac{15}{8} + \frac{1}{4000}\left(\frac{486}{25}\right)\right]e = 0.5109989278047020776144390005897$$

So, taking the mass of the electron as the basis, from the above analysis (in MeV/c^2):

$$\begin{cases} m_e = m(3,1) = 0.5109989278047020776144390005897 \\ m_u = m(2,1) = 5m(3,1) = 2.5549946390235103880721950029485 \\ m_d = m(1,1) = 2m(2,1) = 5.1099892780470207761443900005897 \end{cases}$$

and:

$\frac{m(0,2)}{m(0,1)} = \lambda_2$	$\frac{m(0,3)}{m(0,1)} = \lambda_3$
$\frac{m(1,2)}{m(2,1)} = \left(\frac{23}{25}\right) \cdot (k)$	$\frac{m(1,3)}{m(2,1)} = \left(\frac{23}{25}\right)^{\frac{1}{2}} \cdot (k)^2$
$\frac{m(2,2)}{m(1,1)} = 1 \cdot (6k)$	$\frac{m(2,3)}{m(1,1)} = 1 \cdot \left[\left(\frac{3}{1004}\right)(6k)^2\right]^2$
$\frac{m(3,2)}{m(3,1)} = 1 \cdot (5k)$	$\frac{m(3,3)}{m(3,1)} = 1 \cdot \left[\left(\frac{2}{1450}\right)(5k)^2\right]^2$

Yielding:

$$\begin{aligned} k &= \frac{m(1,2)}{m(2,1)}\left(\frac{25}{23}\right) = \frac{1}{6}\left[\frac{m(2,2)}{m(1,1)}\right] = \frac{1}{5}\left[\frac{m(3,2)}{m(3,1)}\right] \\ &= \sqrt{\frac{m(1,3)}{m(2,1)}\sqrt{\frac{25}{23}}} = \frac{1}{6}\sqrt{\frac{1004}{3}\sqrt{\frac{m(2,3)}{m(1,1)}}} = \frac{1}{5}\sqrt{\frac{1450}{2}\sqrt{\frac{m(3,3)}{m(3,1)}}} \\ &= 41.353655699595529713433202094743 \\ &= 4\pi^2 + \frac{15}{8} + \frac{1}{4000}\sum_{k=0}^{\infty}\left(-\frac{1}{20}\right)^k = 4\pi^2 + \frac{15}{8} + \frac{1}{4000}\left(\frac{20}{21}\right) \end{aligned}$$

So:

(in Mev/c^2) [3]:

Calculated	**Measured**
$m_d = m(1,1) = 5.1099892780470207761443900005897$	$m_d = m(1,1) \approx 5.0(0.5)$
$m_u = m(2,1) = 2.5549946390235103880721950029485$	$m_u = m(2,1) \approx 2.4(0.6)$
$m_e = m(3,1) = 0.5109989278047020776144390005897$	$m_e = m(3,1) \approx 0.510998928(11)$
$m_{\nu_e} = m(0,1) = 0.10219978556094041552288780011794 \times 10^{-6}$	$m_{\nu_e} = m(0,1) \approx 10^{-6} \times 0.107(27)$
$m_s = m(1,2) = 97.205699127171364309497389896187$	$m_s = m(1,2) \approx 95(5)$
$m_c = m(2,2) = 1267.9004233978873605586616073416$	$m_c = m(2,2) \approx 1275(25)$
$m_\mu = m(3,2) = 105.65836861649061337988846727846$	$m_\mu = m(3,2) \approx 105.6583715(35)$
$m_{\nu_{\mu e}} = m(0,2) = \lambda_2 m(0,1)$	$m_{\nu_{\mu e}} = m(0,2) = \lambda_2 m(0,1)$
$m_b = m(1,3) = 4190.9426907545271186849743851983$	$m_b = m(1,3) \approx 4180(30)$
$m_t = m(2,3) = 172924.17191486611744398343538627$	$m_t = m(2,3) \approx 172970(620)$
$m_\tau = m(3,3) = 1776.9680674108457768918379570944$	$m_\tau = m(3,3) \approx 1,776.82(16)$
$m_{\nu_\tau} = m(0,3) = \lambda_3 m(0,1)$	$m_{\nu_\tau} = m(0,3) = \lambda_3 m(0,1)$

That the electron/muon/tauon satisfy the Dirac equation - with a single mass constituent, yet the quarks are more complex, indicates one might affix:

$$\left(\Box - |m_{e/\mu/\tau}|^2\right) = 0 \Rightarrow |m_{e/\mu/\tau}|^2 = m_1^2 + m_2^2 + m_3^2 + m_0^2$$
$$\Rightarrow m_{e/\mu/\tau} = (m_1, m_2, m_3, m_0) = (0,0,0,m_0) \Rightarrow m_{e/\mu/\tau} = m_0$$

and:

$$\left(\Box - |m_q|^2\right) = 0 \Rightarrow |m_q|^2 = m_1^2 + m_2^2 + m_3^2 + m_0^2$$
$$\Rightarrow m_q = (m_1, m_2, m_3, m_0) = (m_1, m_2, m_3, 0)$$

which indicates the three quark mass constituents correspond to the **RGB** of the [9] color/strong force (since the electron constituent is an independent component/variable) and, since the sum: $m_1^2 + m_2^2 + m_3^2$ is order invariant, so is the **RGB** color/strong force (note that the neutrinos participate in color interactions yet are leptons like electrons. so have all four mass constituents - though small, are more complex) [4]

Now:

Legendre's three-square theorem [5], states that a natural number can be represented as the sum of three squares of integers: $n = x^2 + y^2 + z^2$ if and only if n is not of the form: $n = 4^m(8b+7)$ for integers: $a, b \geq 0$

Even though m_1, m_2, m_3 need not be restricted to integers, this theorem should be kept in mind.

and:

Lagrange's four-square theorem [6],states that every natural number can be represented as the sum of four integer squares. A parametrization of this as a pythagorean quadruple is [7]:

$$a = m^2 + n^2 - p^2 - q^2$$
$$b = 2(mq + np)$$
$$c = 2(nq - mp)$$
$$d = m^2 + n^2 + p^2 + q^2$$

via the identity:

$$[m^2 + n^2 + p^2 + q^2]^2 = [m^2 + n^2 - p^2 - q^2]^2 + [2(mq + np)]^2 + [2(nq - mp)]^2$$

Mesons may be of use determining quark pythagorean quadruples.

Since mesons are of the same type & color:

$$q(m_1, m_2, m_3, 0) : \bar{q}(m_1, m_2, m_3, 0)$$
$$\Rightarrow |m_{q:\bar{q}}| = \sqrt{(m_1^2 + m_2^2 + m_3^2) + (m_1^2 + m_2^2 + m_3^2)} = \sqrt{2(m_1^2 + m_2^2 + m_3^2)}$$
$$= \left(\sqrt{m_1^2 + m_2^2 + m_3^2}\right)\sqrt{2} = |m_q|\sqrt{2} \Rightarrow |m_q| = \frac{|m_{q:\bar{q}}|}{\sqrt{2}}$$
$$\Rightarrow \left(\frac{|m_{q:\bar{q}}|}{\sqrt{2}}\right)^2 = m_{q1}^2 + m_{q2}^2 + m_{q3}^2$$

Each of the quark mass constituents is non-zero and different (because the **RGB** colors are distinct), so if each quark mass constituent is a distinct integer times a common factor μ:

$$\Rightarrow \left(\frac{|m_{q:\bar{q}}|}{\mu\sqrt{2}}\right)^2 = m_{q10}^2 + m_{q20}^2 + m_{q30}^2$$

such that $\frac{|m_{q:\bar{q}}|}{\mu\sqrt{2}}$ is an integer, then the quark mass-color pythagorean quadruples may thusly be determined from a pythagorean quadruple table or the pythagorean quadruple formula (perhaps using the python algorithm [8])

Or, by using a following:

fermion mass table

$m_e = m_e$	$m_\mu = 5km_e$	$m_\tau = \left[\left(\frac{2}{1450}\right)(5k)^2\right]^2 m_e$
$m_u = 5m_e$	$m_c = 60km_e$	$m_b = \left(\frac{23}{25}\right)^{\frac{1}{2}} \cdot (5k)m_e$
$m_d = 10m_e$	$m_s = \left(\frac{23}{25}\right) \cdot (5k)m_e$	$m_t = 10\left[\left(\frac{3}{1004}\right)(6k)^2\right]^2 m_e$

may be reduced to - producing simper numbers to insert into the pythagorean quadruple parametrization formula :

$m_e \propto 1$	$m_\mu \propto 5k$	$m_\tau \propto \left[\left(\frac{2}{1450}\right)(5k)^2\right]^2$
$m_u \propto 5$	$m_c \propto 60k$	$m_b \propto \sqrt{23} \cdot k$
$m_d \propto 10$	$m_s \propto \left(\frac{23}{5}\right) \cdot k$	$m_t \propto 10\left[\left(\frac{3}{1004}\right)(6k)^2\right]^2$

(dropping the m_e's, which will divide out anyway)

carefully dropping out the k's could make it even simpler

a pythagorean quadruple table [9]:

(1, 2, 2, 3)	(1, 4, 8, 9)	(1, 6, 18, 19)	(1, 12, 12, 17)	(1, 8, 32, 33)
(1, 18, 30, 35)	(2, 3, 6, 7)	(2, 4, 4, 6)	(2, 6, 9, 11)	(2, 10, 11, 15)
(2, 8, 16, 18)	(2, 5, 14, 15)	(3, 4, 12, 13)	(3, 6, 6, 9)	(3, 6, 22, 23)
(3, 8, 36, 37)	(3, 12, 24, 27)	(4, 5, 20, 21)	(4, 8, 8, 12)	(4, 7, 32, 33)
(4, 8, 19, 21)	(4, 10, 28, 30)	(4, 13, 16, 21)	(4, 17, 28, 33)	(5, 6, 30, 31)

multiples of the m_q may be used with the mass table while dividing the others by that multiple, such as:

$$m_u \propto 5 \Rightarrow 5 \cdot 3 = 15 \Rightarrow |m_u|^2 \propto 5^2 = \left(\frac{15}{3}\right)^2 = \left(\frac{2}{3}\right)^2 + \left(\frac{5}{3}\right)^2 + \left(\frac{14}{3}\right)^2$$

so:

$$|m_u|^2 = (5m_e)^2 = \left(\frac{15}{3}m_e\right)^2 = \left(\frac{2}{3}m_e\right)^2 + \left(\frac{5}{3}m_e\right)^2 + \left(\frac{14}{3}m_e\right)^2$$

or:

$$|m_u|^2 = (5m_e)^2 = \left(\frac{30}{6}m_e\right)^2 = \left(\frac{4}{6}m_e\right)^2 + \left(\frac{10}{6}m_e\right)^2 + \left(\frac{28}{6}m_e\right)^2$$
$$|m_d|^2 = (10m_e)^2 = \left(\frac{30}{3}m_e\right)^2 = \left(\frac{4}{3}m_e\right)^2 + \left(\frac{10}{3}m_e\right)^2 + \left(\frac{28}{3}m_e\right)^2$$
$$|m_c|^2 = (60km_e)^2 = (30 \cdot 2km_e)^2 = (4 \cdot 2km_e)^2 + (10 \cdot 2km_e)^2 + (28 \cdot 2km_e)^2$$
$$|m_s|^2 = \left(\left(\frac{23}{5}\right) \cdot km_e\right)^2 = \left(30 \cdot \left(\frac{23}{30 \cdot 5}\right) \cdot km_e\right)^2 = \left(4 \cdot \left(\frac{23}{30 \cdot 5}\right) \cdot km_e\right)^2 + \left(10 \cdot \left(\frac{23}{30 \cdot 5}\right) \cdot km_e\right)^2 + \left(28 \cdot \left(\frac{23}{30 \cdot 5}\right) \cdot km_e\right)$$
$$|m_b|^2 = \left(\sqrt{23} \cdot km_e\right)^2 = \left(30 \cdot \frac{\sqrt{23}}{30} \cdot km_e\right)^2 = \left(4 \cdot \frac{\sqrt{23}}{30} \cdot km_e\right)^2 + \left(10 \cdot \frac{\sqrt{23}}{30} \cdot km_e\right)^2 + \left(28 \cdot \frac{\sqrt{23}}{30} \cdot km_e\right)^2$$

are a first case quark architecture:
(tabulated):

$m_u = (4, 10, 28)\frac{1}{6}m_e$	$m_c = (4, 10, 28)2km_e$	$m_b = (4, 10, 28)\frac{\sqrt{23}}{30} \cdot km_e$
$m_d = (4, 10, 28)\frac{1}{3}m_e$	$m_s = (4, 10, 28)\left(\frac{23}{30 \cdot 5}\right) \cdot km_e$	$m_t = (4, 10, 28)\frac{10}{30}\left[\left(\frac{3}{1004}\right)(6k)^2\right]^2 m_e$

Or, in general, from any pythagorean quadruple $(a_j, b_j, c_j, d_j) \Rightarrow a_j^2 + b_j^2 + c_j^2 = d_j^2 \propto |m_{q_j}|^2 = (\theta_j m_e)^2$:

$$\Rightarrow m_{q_j} = (a_j, b_j, c_j) \cdot \frac{\theta_j}{d_j} m_e$$

(tabulated):

$m_u = (a_j, b_j, c_j)\frac{5}{d_j}m_e$	$m_c = (a_j, b_j, c_j)\frac{60k}{d_j}m_e$	$m_b = (a_j, b_j, c_j)\frac{\sqrt{23}}{d_j} \cdot km_e$
$m_d = (a_j, b_j, c_j)\frac{10}{d_j}m_e$	$m_s = (a_j, b_j, c_j)\left(\frac{23}{25}\right) \cdot \left(\frac{5k}{d_j}\right)m_e$	$m_t = (a_j, b_j, c_j)\frac{10}{d_j}\left[\left(\frac{3}{1004}\right)(6k)^2\right]^2 m_e$

Experimental data determines each proper quark mass-color pythagorean quadruple (a_j, b_j, c_j, d_j).

Clearly now, the Higgs mechanism, extra dimension(s), and boson particle is superfluous and extraneous ...
- nothing but a myth.

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