Folding a pattern

Alejandro Rivero

February 1, 2013

Abstract

We propose a reorganisation of the standard model and their mesons in order to build supersymmetric multiplets. The presentation is open to improvements to choose the adequate candidates in each recombination.

I have told elsewhere how a chain of four Koide equations does a good work to predict SM mass. Gray cells are inputs All triplets in sequence meet Koide equation. For (bcs), sign of $\sqrt{m_x}$ is minus, so in the exact case it is orthogonal to $(e\mu\tau)$:

<table>
<thead>
<tr>
<th></th>
<th>pdg 2012</th>
<th>exact</th>
<th>rotated</th>
</tr>
</thead>
<tbody>
<tr>
<td>t</td>
<td>173.5 ± 1.0</td>
<td>174.10</td>
<td>173.26</td>
</tr>
<tr>
<td>b</td>
<td>4.18 ± 0.03</td>
<td>3.64</td>
<td>4.197</td>
</tr>
<tr>
<td>c</td>
<td>1.275 ± 0.025</td>
<td>1.698</td>
<td>1.359</td>
</tr>
<tr>
<td>\tau</td>
<td>1.77682(16)</td>
<td>1.698</td>
<td>1.776968</td>
</tr>
<tr>
<td>s</td>
<td>95 ± 5</td>
<td>121.95</td>
<td>92.275</td>
</tr>
<tr>
<td>\mu</td>
<td>105.65837</td>
<td>121.95</td>
<td>105.6584</td>
</tr>
<tr>
<td>d</td>
<td>\sim 4.8</td>
<td>8.75</td>
<td>5.32</td>
</tr>
<tr>
<td>u</td>
<td>\sim 2.3</td>
<td>0</td>
<td>0.3564</td>
</tr>
<tr>
<td>e</td>
<td>0.5109989</td>
<td>0</td>
<td>0.5109989</td>
</tr>
</tbody>
</table>

Lets exploit this identification of some levels to try to fold them into a susy-like configuration.

First step, the SM as it is. For each QCD string, consider its fundamental state.

$\nu_1, t_{rgb}$
$\nu_2, b_{rgb}$
$\tau, c_{rgb}$
$\mu, s_{rgb}$
$\nu_3, d_{rgb}$
$e, u_{rgb}$

$B^+, B_c^+ \quad bu, bc \quad bb, bs, bd \quad \eta_b, B^0, B_c^0, \bar{B}_c^0, \bar{B}_c^0$
$D^+, D_s^+ \quad sc, dc \quad \eta_c, D^0, \bar{D}_c^0$
$\pi^+, K^+ \quad su, du \quad ss, sd, dd \quad \eta_8, \pi^0, K^0, \bar{K}^0$

For charged particles, the antiparticle is in the same level. I omit the “+ antiparticle” remark.
Now, second step, we fold $t$ and $u$

\[\begin{array}{c}
c\bar{e}_{\nu_2, b_{\text{rgb}}, e, u_{\text{rgb}}} & B^+, B_c^+ \quad \nu_2, b_{\text{rgb}}, c, u_{\text{rgb}} & B^+, B_c^+ \quad b_u, b_c & \eta_b, B_0, B_c^0, B_0^0, \bar{B}_0^0, \bar{B}_c^0 \\
c\bar{e}_{c, \bar{c}} & \tau, c_{\text{rgb}} & D^+, D_s^+ \quad \nu_2, b_{\text{rgb}}, c, u_{\text{rgb}} & D^+, D_s^+ \quad s_c, d_c & \eta_c, D_0, \bar{D}_0^0 \\
c\bar{u} & \mu, s_{\text{rgb}}, \nu_1, t_{\text{rgb}} & \pi^+, K^+ \quad \nu_1, t_{\text{rgb}} \quad \pi^+, K^+ \quad s_d, d_d & \eta_8, \pi^0, K^0, \bar{K}^0 \\
\end{array}\]

Next steps are arbitrary, we could fold any combination of up-like quarks

\[\begin{array}{c}
c\bar{c}_{\nu_2, b_{\text{rgb}}, e, u_{\text{rgb}}} & B^+, B_c^+ \quad \nu_2, b_{\text{rgb}}, c, u_{\text{rgb}} & B^+, B_c^+ \quad b_u, b_c & \eta_b, B_0, B_c^0, B_0^0, \bar{B}_0^0, \bar{B}_c^0 \\
c\bar{c}_{\bar{c}, c} & \tau, c_{\text{rgb}}, \nu_3, d_{\text{rgb}} & D^+, D_s^+ \quad \nu_3, d_{\text{rgb}} \quad D^+, D_s^+ \quad s_c, d_c & \eta_b, \eta_c, D_0, \bar{D}_0^0 \\
\bar{c} & \mu, s_{\text{rgb}}, \nu_1, t_{\text{rgb}} & \pi^+, K^+ \quad \nu_1, t_{\text{rgb}} \quad \pi^+, K^+ \quad s_d, d_d & \eta_8, \pi^0, K^0, \bar{K}^0 \\
\end{array}\]

And last, and even more arbitrary, is to decide which neutral meson to fold into the intermediate level. Just choose one

\[\begin{array}{c}
c\bar{c}_{\nu_2, b_{\text{rgb}}, e, u_{\text{rgb}}} & B^+, B_c^+ \quad \nu_2, b_{\text{rgb}}, c, u_{\text{rgb}} & B^+, B_c^+ \quad b_u, b_c & \eta_b, B_0, B_c^0, B_0^0, \bar{B}_0^0, \bar{B}_c^0 \\
c\bar{c}_{\bar{c}, c} & \tau, c_{\text{rgb}}, \nu_3, d_{\text{rgb}} & D^+, D_s^+ \quad \nu_3, d_{\text{rgb}} \quad D^+, D_s^+ \quad s_c, d_c & \eta_b, \eta_c, D_0, \bar{D}_0^0 \\
\bar{c} & \mu, s_{\text{rgb}}, \nu_1, t_{\text{rgb}} & \pi^+, K^+ \quad \nu_1, t_{\text{rgb}} \quad \pi^+, K^+ \quad s_d, d_d & \eta_8, \pi^0, K^0, \bar{K}^0 \\
\end{array}\]

The $\pm 4/3$ diquarks, at last, I guess they are related to electroweak symmetry breaking via some condensation. They could stay as there are, or perhaps the charm should be at an upper level

\[\begin{array}{c}
c\bar{c}_{\nu_2, b_{\text{rgb}}, e, u_{\text{rgb}}} & B^+, B_c^+ \quad \nu_2, b_{\text{rgb}}, c, u_{\text{rgb}} & B^+, B_c^+ \quad b_u, b_c & \eta_b, B_0, B_c^0, B_0^0, \bar{B}_0^0, \bar{B}_c^0 \\
c\bar{c}_{\bar{c}, c} & \tau, c_{\text{rgb}}, \nu_3, d_{\text{rgb}} & D^+, D_s^+ \quad \nu_3, d_{\text{rgb}} \quad D^+, D_s^+ \quad s_c, d_c & \eta_b, \eta_c, D_0, \bar{D}_0^0 \\
\bar{c} & \mu, s_{\text{rgb}}, \nu_1, t_{\text{rgb}} & \pi^+, K^+ \quad \nu_1, t_{\text{rgb}} \quad \pi^+, K^+ \quad s_d, d_d & \eta_8, \pi^0, K^0, \bar{K}^0 \\
\end{array}\]

It could be. Probably all the ambiguities in the above folding, including this last one, are related.

Final, let me prettify it by adding the antiparticles. Note that we have the required quantity of bosons for three generations of the SM, but that the not-SM charged bosons (the uu etc) can not be arranged in a pattern of three generations of Dirac particles; it is because of it that we can guess they have a different role that being a plain sfermion.

\[\begin{array}{c|c|c|c|c|c|c|c|c}
\bar{c} & \bar{c} & \nu_2, b_{\text{rgb}}, e, u_{\text{rgb}} & B^+, B_c^+ & b_u, b_c & \eta_b, B_0, B_c^0, B_0^0, \bar{B}_0^0, \bar{B}_c^0 \\
\bar{c} & \bar{c} & \nu_2, b_{\text{rgb}}, e, u_{\text{rgb}} & B^+, B_c^+ & b_u, b_c & \eta_b, B_0, B_c^0, B_0^0, \bar{B}_0^0, \bar{B}_c^0 \\
\bar{c} & \bar{c} & \nu_2, b_{\text{rgb}}, e, u_{\text{rgb}} & B^+, B_c^+ & b_u, b_c & \eta_b, B_0, B_c^0, B_0^0, \bar{B}_0^0, \bar{B}_c^0 \\
\end{array}\]