

I think that it is possible to estimate the mass spectrum of an infinite generation in the standard model.

I try a simple law, inspired by the Balmer series:

$$M(n) = \alpha + \beta n^\gamma$$

where  $\gamma$  is a half-integer, or integer, value.

The three series (quarks and leptons) have not exact values (this happen only if the  $\gamma$  are real values, and there are three parameter and three data).

I obtain the three series:

$$\begin{aligned} M_{uct\dots}(n) &= 1.881193077062768892 + 0.3188052300646115587 n^{12} \text{ MeV} \\ M_{dsb\dots}(n) &= 4.575648907331948613 + 0.1243536139173471342 n^{9.5} \text{ MeV} \\ M_{e\mu\tau\dots}(n) &= -0.3091114985400389044 + 0.8201674163860093688 n^7 \text{ MeV} \end{aligned}$$

minimizing the error (using the method of least square, and gradient descent):

$$E = \frac{1}{2} \sum_n [\beta + \gamma \ln(n) - \ln(M_n - \alpha)]^2$$

the masses in this serie are:

| $M_{uct\dots}$ | $M_{dsb\dots}$ | $M_{e\mu\tau\dots}$ |
|----------------|----------------|---------------------|
| 2.199998 MeV   | 4.700746 MeV   | 0.5140149 MeV       |
| 1.307707 GeV   | 95.15529 MeV   | 105.0511 MeV        |
| 169.4281 GeV   | 4.269364 GeV   | 1.799868 GeV        |
| 5.348666 TeV   | 65.59124 GeV   | 13.48579 GeV        |
| 77.83331 TeV   | 546.3416 GeV   | 64.30644 GeV        |
| 693.9696 TeV   | 3.088042 TeV   | 230.4224 GeV        |

with errors:  $E_{uct\dots} = 9.197 \cdot 10^{-4}$ ,  $E_{dsb\dots} = 4.639 \cdot 10^{-4}$  and  $E_{e\mu\tau\dots} = 1.741 \cdot 10^{-4}$

If there is no constraint on the exponent, the three series are;

$$\begin{aligned} M_{uct\dots}(n) &= 1.910036412573556550 + 0.2899635874264434505 n^{12.10583002618315881} \text{ MeV} \\ M_{dsb\dots}(n) &= 4.566954224039138876 + 0.1330457759608611239 n^{9.424649161550640029} \text{ MeV} \\ M_{e\mu\tau\dots}(n) &= -0.3444624327064040175 + 0.8554624327064040175 n^{6.953204782631492837} \text{ MeV} \end{aligned}$$

and the masses of the model are:

| $M_{uct\dots}$ | $M_{dsb\dots}$ | $M_{e\mu\tau\dots}$ |
|----------------|----------------|---------------------|
| 2.200000 MeV   | 4.700000       | 0.5110000 MeV       |
| 1.280000 GeV   | 96.00000 MeV   | 105.6600 MeV        |
| 173.1000 GeV   | 4.180000 GeV   | 1.776800 GeV        |
| 5.633516 TeV   | 62.84010 GeV   | 13.13518 GeV        |
| 83.93741 TeV   | 514.6974 GeV   | 61.98407 GeV        |
| 762.9749 TeV   | 2.869487 TeV   | 220.2142 GeV        |