# The Mass of the Neutron Reviewed: The Role of Two New Quarks Rather Than One

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Abstract: Reviewing my quite recent work concerning the mass of the neutron, it is becoming evident that both the up and the down quark of the neutron have been revised: both have been slightly altered in mass to accurately produce the observed mass of the neutron. This means that 8 quark types exist instead of 6, as expected for E8 symmetry.

To fully understand my most recent flow diagram[1], I carefully reviewed how the accurate[2] mass of the neutron was calculated. This mass was 939.57 MeV, and after dividing by **1.0000055** to get 939.56483 it is accurate to within 1.0000006 to the neutron's measured mc^2 of **939.56541 MeV**.

The calculation (amazingly!) starts with the mass of the Z(4430) tetraquark. The 4430 MeV tetraquark mc^2 is first divided by the ratio (age of the universe now/age of the universe at the end of the last cycle)^2 (*signal that holography is involved)* = 4430 /(13.799/13.5)^2 = 4430/1.0447865 = 4240.1007 MeV. This corrected value of mass is then divided by the mc^2 mass of the tau neutrino (15.5 MeV) to find one of **nature's** most useful dimensionless ratios; 273.55488. *The number 27 signals the 10^27 galaxies of our universe and can be ignored for this work.*

*Taking the remaining signal 3.55488*, *we split off 3.55, which is a signal of the existence of one or several new quarks.* The remaining 0.00488 we use (XMeV) to either increase or decrease the mc^2 of the up quark $\mathbf{u_n}$ or the down quark $\mathbf{d_n}$ for

the neutron. We first try **4.8** + 0.00488 = $\mathbf{u_n}$ and **2.3** +0.00488 = $\mathbf{d_n}$ : the sum of one up quark and two down quarks = 4.80488 + 2 x 2.30488 = 4.80488 + 4.60976 = 9.41464 (too large).
We next try 4.80488 + 2 x 2.29512 = 4.80488 + 4.59024 = 9.39512 = **9.395** *correct to 4 digits for the mc^2 of the neutron.*
We next try 4.79512 + 2 x 2.30488 = 4.79512 + 4.60976 = 9.40488 (too large).
We finally try 4.79512 + 2 x 2.29512 = 4.79512 + 4.59024 = 9.38536 (too small).

We next alter the hypothetical mass 939.57 Mev slightly to 939.56. Now we *mutiply rather than divide by 1.0000055 to get 939.56516* and now **939.56541**/939.56516 = 1.0000002 (extremely close agreement). Next we set up the equation 9.3956 = 4.8+0.00Y+(2x2.3)-0.002Y and solve for Y. We get Y = 440 and the dimensionless number becomes 273.55440.

We note also that the accurate[3] calculation of the mass of the proton uses the same dimensionless multiplier **1.0000055** as the neutron. This may be a signal of new physics or just another signal (together with the often-used dimensionless constant **1.0000155)** for the holographically important **1/3** ~ **1.0000055/1.0000155.**

This review has revealed several mistakes in the neutron story which I have now attempted to correct.

1. George R. Briggs, "An MHCE8S flow diagram emphazising peculiar Z-boson phenomena and the existence of one new quark", ViXra 1902, (2019)
2. George R. Briggs, "Calculating the mass of the neutron in a better way with HCE8S theory", ViXra 1808.0168, (2018)
3. George R. Briggs, "Calculating the mass of the proton in a better way with with HCE8S theory", ViXra 1808.0626, (2018)