Evidence for the Existence of Superluminal Waves in the Creation of Matter & Energy
A Physical, as well as Mathematical Explanation

Part IV: The Interactive Behavior of the Constants of Nature

If matter is perfectly described mathematically by ultrawave equations, what can be learned about the constants and their changing values?

Answering this question requires a simple plan of action. Looking at the ultrawave equations as a set allows for checking the NIST accepted values and associated deviations. The equations used are the SM ones with changes based on the ultrawave theory construction.

$\alpha = c \cdot e^2/(m_e \cdot C^* \cdot R_{ei})$ $\qquad$ $R_\infty = \alpha^2 \cdot c \cdot m_e/(4pi \cdot L)$

$\mu_{ei} = pi \cdot r_{ei}{}^2 \cdot I$ $\qquad$ $A_T = 4pi^2 \cdot r_{ei} \cdot R_{ei}$

where μ_{ei} is equivalent to the Bohr magneton, μ_B. L = mvr is numerically equal to *h-bar*, and A_T = torus surface area (formerly Planck's constant). I is the standard electrical symbol for current, which is $\omega \cdot e/2pi$ with $\omega = C^*/r_{ei}$. C^* = 8.93591486159363E+16m/s, but varies with changing electron mass, or by changing the constant A_T. This is an expected value based on NIST 2014 CODATA and an adjusted electron mass of 9.1093835583kg.

Using these and a few other equations provide a simple check on the NIST values. Besides m_e, *c*, and *h* (for convenience A_T will not be used), the main constants that can be verified are the magnetic moments of all the fermions, the fine structure constant (alpha), and the Rydberg constant.

Because the UT equations precisely match the NIST data, altering any one of the constants, m_e, *e*, *h* or *C**, produces a different outcome. For a fixed m_e, altering *e* affects the magnetic moment, whereas *h* does not. Altering *h* affects the Rydberg constant much more so than does *e*. Altering C* keeps the ratio of the electron's two radii, r and R at a constant 1E-7 to allow the magnetic constant to remain fixed for electrons. The existence of *C** is the only significant deviation from the SM equations.

Are there historical precedents that support the assumption that the constants of nature are interrelated in some fashion?

Yes, there certainly seems to be. The NIST accepted values change every four years and the last update for 2014 was published at the end of June 2015. When looking back at the previous NIST listings and comparing them with the 2014 data an interesting pattern emerges. The sets of values noticeably change either up or down together, but not separately in both directions at once. This cannot be coincidence.

Not all of the constants are examined, only the ones that are critical for determining the size, shape, and electro-magnetic behavior of matter particles. Besides the mass and magnetic moment of the electron the other constants are the electron-Volt (e), what is currently referred to as Planck's constant (h), and the fine structure constant alpha (α).

These are the three latest sets of values from NIST. The same trend can be seen in the earlier versions, as NIST retains lists in 4-year steps back to 1998.

2006: m_e = 9.10938215±45E-31

μ_B = 9.27400915±23E-24 (ideal)

e = 1.602176487±40E-19

h = 6.62606896±33E-34

α = 7.2973525376±50E-3

2010: m_e = 9.10938291±40E-31

μ_B = 9.27400968±20E-24

e = 1.602176565±35E-19

h = 6.62606957±29E-34

α = 7.2973525698±24E-3

2014: m_e = 9.10938356±11E-31

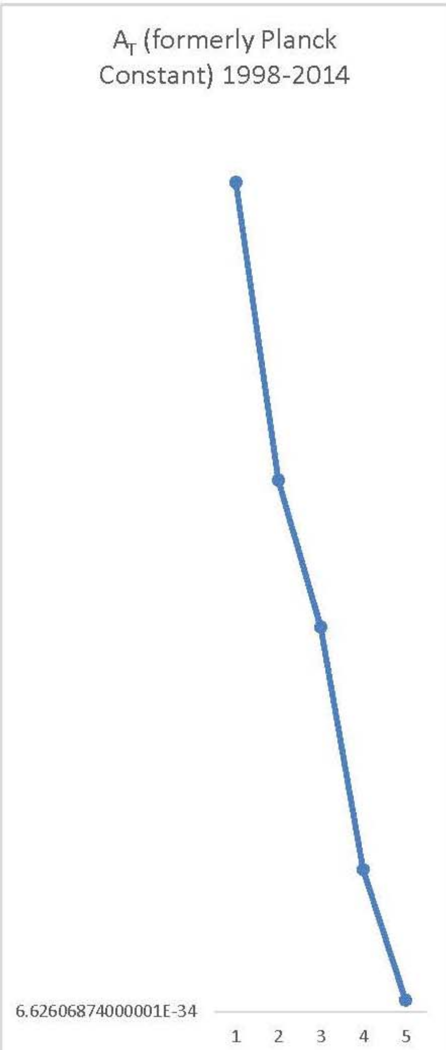
μ_B = 9.274009994±57E-24

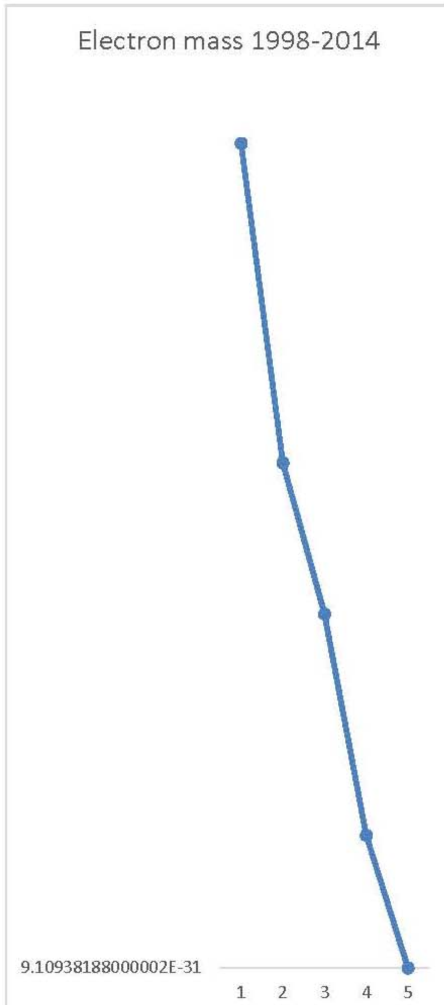
e = 1.6021766208±98E-19

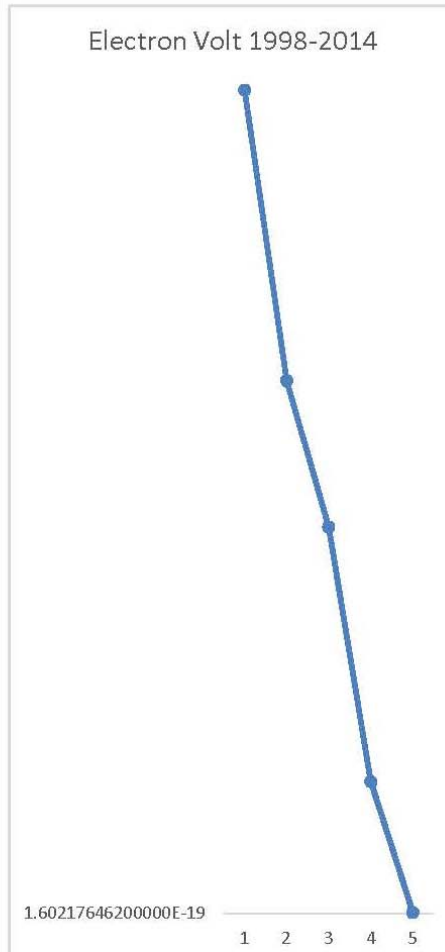
h = 6.626070040±81E-34

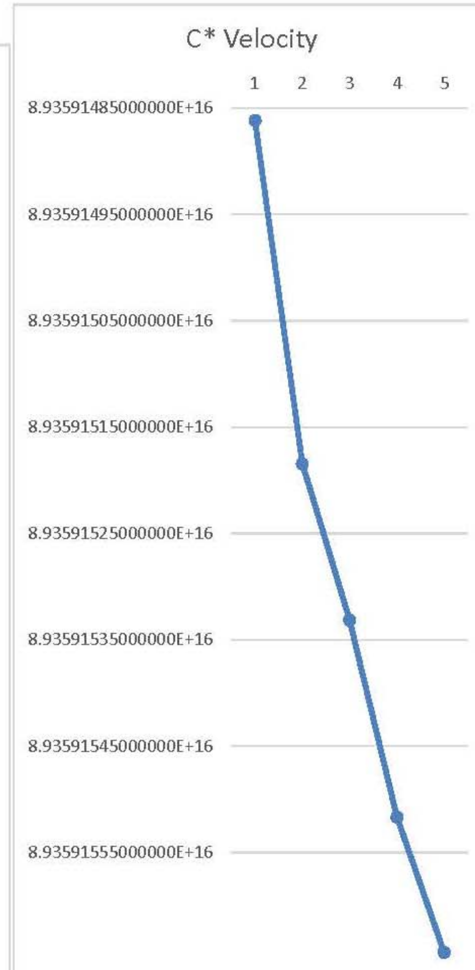
α = 7.2973525664±17E-3

Graphing the constants data from 1998 to 2014 allows visualization of the relationships. (The 2006 and 2002 data are in reverse order to keep the data linear.)









	m_e	Multiplied total
2014	9.10938356E-31	8.8884127448E-67
2010	9.10938291E-31	8.8884111362E-67
2002	9.10938260E-31	8.8884103288E-67
2006	9.10938215E-31	8.8884094664E-67
1998	9.10938188E-31	8.8884088282E-67

Because *e* and *h* have an inverse behavior in the UT equations—*e* goes down as *h* goes up and vice-versa—there is a small chance for a discrepancy in the true versus NIST posted values, but it is fairly small. It was barely enough to make alpha come out smaller as the electron mass increased from 2010 to 2014. When m_e, *e*, and *h* are multiplied together the discrepancy disappears and what we are left with is the indisputable evidence shown above.

Doesn’t this mean that ratios of the constants to the electron mass can provide values for the constants at any electron mass value desired?

Absolutely!

Unfortunately, since there is a range of values for each constant, there is not a single ratio of m_e to any of the other constants that can be known with certainty based on the NIST data. We can; however, narrow down the possibilities by correlating the data since these are constants and the equations are fixed. The existing correlations between the constants using the last five NIST data point years from 1998 to 2014 seem higher than expected. The correlation values are all very close to ±1, within three nines:

Electron mass to e = .99870

Electron mass to h = .99939

Electron mass to C* = -.99923 (reverse relationship)

e to h = .99987

Because of the high initial correlations, the data was adjusted through interpolation one digit at a time to a value of 1 to within thirteen nines. The deviations from nominal were extremely small. At both the high and low values for all items being correlated, the deviations were also extremely small.

The complete set of nominal adjusted values with 2006 & 2002 reversed and including C* are;

6.62607006131672E-34, 9.1093835600E-31, 1.60217662337165E-19, 8.93591487429986E+16

6.62606956468111E-34, 9.1093829100E-31, 1.60217656166239E-19, 8.93591517704075E+16

6.62606932782397E-34, 9.1093826000E-31, 1.60217653223182E-19, 8.93591532142477E+16

6.62606898399921E-34, 9.1093821500E-31, 1.60217648951002E-19, 8.93591553101457E+16

6.62606877770441E-34, 9.1093818800E-31, 1.60217646387693E-19, 8.93591565676850E+16

Being a physical theory, the inclusion of C* is necessary in ultrawave theory. Other than its obvious purpose, it provides a stabilizing effect on the calculations such that the ratio of magnetic to electric force remains constant at 1E-7 for the electron. This limits the constants to single values when calculating nominal values for the magnetic moment, the fine structure constant, and the Rydberg constant.

By using C* in this manner, it is possible to find exact values for all of the constants simultaneously. This limits the range of error allowed that still provides a close fit with the nominal data given by NIST. Because the data correlates so nicely, it does not seem reasonable that the constants can drift up or down in value if that produces discord in the correlations.

One small detail that is significant to finding the answer to the question of how to determine the values of the constants lies is an unexploited feature of the Rydberg constant, and to a lesser extent alpha. Both of these constants have values that tend toward a much smaller range than the electron mass, *e*, and *h*. The Rydberg constant especially seems rooted at the value 1.0973731568537E+7. This value does not occur as a result in the calculations for the nominal, high, or low data sets from the last five NIST data points. It always falls outside the range. Fortunately, it can be set as the final answer and the data adjusted to match that value. When this is done, the data still falls well within the error bars, so there is no reason not to believe that this is a reasonable course of action.

- A further refinement to the constants can be made because of the nature of the constants *e* and *h* and their effect or non-effect on the Rydberg constant. By setting a single value for the ratio of m_e to *h* and letting *e* float, a best fit value can be determined. The best ratio, which was biased toward the 2010 and 2014 data years rather than the earlier data years, is 1.3747792435E+3.
- It is then possible to find a ratio adjustment of *e* to m_e. Using the 2014 data point as the baseline value, the ratio of *e* to m_e can be adjusted by the number 1.00000054888465 for each digit in the last decimal place for lower electron mass values, and its inverse for higher electron mass values. For example, reducing the electron mass from 9.10938356E-31kg to 9.10938355E-31kg, the *e* ratio is multiplied by the above number.

The goal for applying UT equations describing a physical construction for matter and energy was to find a simple way to predict the values of the other basic constants of nature for any given mass value of the electron. That goal has been achieved. The accompanying Excel file contains a set of calculations that allows the mass of the electron to be altered, which then gives the values of the constants for that particular electron mass. This is easily tested by changing the mass from the 2014 values to that of any other data year and seeing how closely it matches the CODATA provided by NIST.

While this is by no means the exact values for the constants, it should be close enough that an eventual set of values can be determined through first principles using the relationships shown by the UT equations.