ADDENDUM 3

A FORMULA FOR THE FINE STRUCTURE CONSTANT

Let:

1) P = any prime;
2) n = the ordinal number of a prime;
3) P_n = the nth prime;
4) $P_n!!$ = the product of the first n primes or primorial P_n;
5) Let (Pn – 1)!! = the product of the first n primes with each prime reduced by , or: (2 – 1)(3 – 1)(5 – 1)(7 - 1)(11 – 1))13 – 1)(17 – 1)(19 – 1)(23 – 1)(29 – 1)….(P_n – 1). This is the expression for the number of integers from zero through $P_n!!$, called prims, which do not have any of the prime factors of P_n as a factor. (Note that P_{10} = 29.);
6) α^{-1} = 137.0359990710(96), the reciprocal of the fine structure constant;
7) $B_n \equiv [(P_3!!^2 - P_n!!)(P_{10} - 1)!!] \div P_{10}!! = [(2.3.5)^2 - 2.3.5] \times (2 -1)(3-1)(5 - 1)(7 -1)(11-1)(13 - 1)(17 -1)(19 -1)(23 - 1)(29 - 1) \div$ 2x3x5x7x11x13x17x19x23x29;
8) $B_n = 870 \times [(P_{10} - 1)!! \div P_{10}!!] = 870 \times .1594722310194…$;
9) B_n =137.41490343241359…, rational number;
10) m_p =1836.152627161…, the rest mass of the proton, as measured. with a statistical uncertainty of .0000085;
11) m_n = 1838.68366598 the rest mass of the neutron, as measured, with a statistical uncertainty of .000013
12) $(m_p / m_n)^2$ = .99772488033641.,

13) $B_n(m_p / m_n)^2 = 137.036145129\ldots$;

14) $B_n(m_p / m_n)^2$minus α^{-1} is (137.036145129 – 137..035999070(96) = .0000261…. or approximately 1.8 parts in 10 million, whereas the measured value is for α^{-1} is said to be accurate within .7 parts per billion provided by the formulaic value;

15) $B_n(m_p /m_n)^2 \approx \alpha^{-1.}$

16) The statistical uncertainties for the measured values of m_n and m_p are .0000085 and .00085 respectively, so that the formula "$B_n(m_p / m_n)^2$" is an equality through five significant figures and a possible equality thereafter.

The plausibility of the above formula is suggested by the following:

1) It seems to spring naturally from an attempt to prove the Twin Prime Theorem using the prim system of numbers inspired by the use of Euler's Totient;

2) At least two number theorists have found the prime"29" of use in constructing possible numerical representations of the fine structure constant;

3) A recent measurement of the Fine Structure Constant involving 891 four loop Feynman Diagrams suggests a slight association with the number "870" in the formula;

4) "30" is an important number as it is the largest primorial number for which all of the prims, except "1, are prime";

5) The prim and nonprim sets for a primorial numbers are roughly analogous to the bandings of various spectra of light;

6) The prominence of the number $2(2.3.5)^2$ suggests: $m_p \approx 2(2.3.5)^2 + (2.3)^2 =$ 1836.

7) The fact that the formulaic value for α^{-1}, differs from the measured value by only about 1,8 parts in ten million, which is within the allowable statistical uncertainty for m_p, suggests that more may be at work in this matter than mere coincidence.

ADDENDUM 4

$m_p/m_n \approx (\alpha^{-1}/B_n)^{1/2}$, AND $m_p \approx (1/\alpha B_n)^{1/2} m_n$.

The above formulae are derived by rearranging formulae in Addendum 3, and indicate the relationships among the rest masses of the proton, the neutron, the electron, given as "1", the Fine Structure Constant, and B_n.

By inserting the numbers for some of the respective letters in the above formula for m_p, we obtain: $\mathbf{m_p \approx [((\alpha^{-1})(29!!)) / (29 + 1)(29)(29-1)!!]^{1/2} \times m_n}$, a remarkable result.