Quintessence-momentum as link between mass and charge

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A mathematical description of the natural constants, $G, h, e, \mu_0, m_e, R_\infty$, is presented in terms of momentum Q, $alpha$ (Sommerfeld fine structure constant) and c. This momentum is referred to as Quintessence-momentum and is the square root of Planck momentum. The formulas describe geometrical forms, the units are consistent with corresponding SI units and the numerical values, including the Rydberg constant and the vacuum permeability, are consistent with CODATA 2006.

1 Introduction

Some things never change. Physicists call them the constants of nature. Such quantities as the velocity of light, c, Newton's constant of gravitation, G, and the mass of the electron, me, are assumed to be the same at all places and times in the universe. They form the scaffolding around which the theories of physics are erected, and they define the fabric of our universe. Physics has progressed by making ever more accurate measurements of their values. And yet, remarkably, no one has ever successfully predicted or explained any of the constants. Physicists have no idea why they take the special numerical values that they do. In SI units, c is 299,792,458; G is 6.673e-11; and me is 9.10938188e-31 -numbers that follow no discernible pattern. The only thread running through the values is that if many of them were even slightly different, complex atomic structures such as living beings would not be possible. The desire to explain the constants has been one of the driving forces behind efforts to develop a complete unified description of nature, or "theory of everything." Physicists have hoped that such a theory would show that each of the constants of nature could have only one logically possible value. It would reveal an underlying order to the seeming arbitrariness of nature. [1]

Listed below are the natural units as mathematical formulas (geometrical shapes) in terms of a 'quantity of momentum' Q (the square root of Planck momentum), c and $alpha$. A geometrical formula for the electron is proposed as a dimensionless magnetic monopole. The formulas and units are cross referenced with each other to confirm continuity and the numerical solutions are consistent with CODATA 2006.

Quintessence momentum Q is related to Planck momentum.

$$Q = 1.019\ 113\ 41...\ units = \sqrt{\frac{kg.m}{s}}$$

$$Planck\ momentum = 2.\pi.Q^2\ ,\ units = \frac{kg.m}{s}$$

2 Initial formulas:

$G, h, e, m_P, A, \mu_0, \epsilon_0, k_e$ in terms of $Q,\ l_p,\ \alpha,\ c,\ 2^n$.

$$m_P = \frac{2.\pi.Q^2}{c},\ units = kg \tag{1}$$

$$G = \frac{l_p.c^3}{2.\pi.Q^2},\ units = \frac{m^3}{kg.s^2} \tag{2}$$

$$h = 2.\pi.Q^2.2.\pi.l_p,\ units = \frac{kg.m^2}{s} \tag{3}$$

$$\hbar = 2.\pi.Q^2.l_p \tag{4}$$

$$e = \frac{16.l_p.c^2}{\alpha.Q^3},\ units = \frac{m^2}{kg.s.\sqrt{(kg.m/s)}} \tag{5}$$

$$A = \frac{8.c^3}{\pi.\alpha.Q^3},\ units = \frac{m^2}{kg.s^2.\sqrt{(kg.m/s)}} \tag{6}$$

$$\mu_0 = \frac{\pi^2.\alpha.Q^8}{32.l_p.c^5} \tag{7}$$

$$\epsilon_0 = \frac{32.l_p.c^3}{\pi^2.\alpha.Q^8} \tag{8}$$

$$k_e = \frac{\pi.\alpha.Q^8}{128.l_p.c^3} \tag{9}$$

3 Planck length l_p:

l_p in terms of $Q,\ \alpha,\ c$. The magnetic constant μ_0 has a fixed value. From eqn.7

$$l_p = \frac{\pi^2.\alpha.Q^8}{2^7.\mu_0.c^5} \tag{10}$$

$$\mu_0 = 4.\pi.10^{-7}\ N/A^2$$

$$l_p = \frac{5^7.\pi.\alpha.Q^8}{c^5} \tag{11}$$

4 Reference formulas:

The above formulas are linked by 3 principle (SI) units; $Q = sqrt(kg.m/s)$, $l_p = m$ and $c = m/s$. Here the formulas and their units are cross referenced with common physics equations.

$$\alpha = \frac{2.h}{\mu_0.e^2.c}$$

$$2\ 2.\pi.Q^2.2.\pi.l_p\ \frac{32.l_p.c^5}{\pi^2.\alpha.Q^8}\ \frac{\alpha^2.Q^6}{256.l_p^2.c^4}\ \frac{1}{c}$$

$$\alpha = \alpha \tag{12}$$

$$c = \frac{1}{\sqrt{\mu_0.\epsilon_0}}$$

$$\mu_0.\epsilon_0 = \frac{\pi^2.\alpha.Q^8}{32.l_p.c^5}\ \frac{32.l_p.c^3}{\pi^2.\alpha.Q^8} = \frac{1}{c^2}$$

$$c = c \tag{13}$$

$$R_\infty = \frac{m_e.e^4.\mu_0^2.c^3}{8.h^3}$$

$$m_e\ \frac{65536.l_p^4.c^8}{\alpha^4.Q^{12}}\ \frac{\pi^4.\alpha^2.Q^{16}}{1024.l_p^2.c^{10}}\ c^3\ \frac{1}{8}\ \frac{1}{8.\pi^3.Q^6.8.\pi^3.l_p^3}$$

$$R_\infty = \frac{m_e}{4.\pi.l_p.\alpha^2.m_P} \tag{14}$$

$$E_n = -\frac{2.\pi^2.k_e^2.m_e.e^4}{h^2.n^2}$$

$$2.\pi^2\ \frac{\pi^2.\alpha^2.Q^{16}}{16384.l_p^2.c^6}\ m_e\ \frac{65536.l_p^4.c^8}{\alpha^4.Q^{12}}\ \frac{1}{4.\pi^2.Q^4.4.\pi^2.l_p^2}$$

$$E_n = -\frac{m_e.c^2}{2.\alpha^2.n^2} \tag{15}$$

$$q_p = \sqrt{4.\pi.\epsilon_0.\hbar.c}$$

$$q_p = \sqrt{4.\pi\ \frac{32.l_p.c^3}{\pi^2.\alpha.Q^8}\ 2.\pi.Q^2.l_p\ c} = \sqrt{\alpha}.e \tag{16}$$

$$r_e = \frac{e^2}{4.\pi.\epsilon_0.m_e.c^2}$$

$$r_e = \frac{256.l_p^2.c^4}{\alpha^2.Q^6}\ \frac{1}{4.\pi}\ \frac{\pi^2.\alpha.Q^8}{32.l_p.c^3}\ \frac{1}{m_e.c^2} = \frac{l_p.m_P}{\alpha.m_e} \tag{17}$$

$$m_e = \frac{B^2.r^2.e}{2.V}$$

$$V_p = \frac{E_p}{e}$$

$$\frac{B^2.r^2.e^2}{E_p} = \frac{\pi^2.\alpha^2.Q^{10}}{64.l_p^4.c^4}\ l_p^2\ \frac{256.l_p^2.c^4}{\alpha^2.Q^6}\ \frac{1}{2.\pi.Q^2.c}$$

$$\frac{B^2.r^2.e^2}{E_p} = m_P \tag{18}$$

5 Electron as magnetic monopole:

m_e in terms of $m_P,\ t_p,\ \alpha,\ e,\ c$.

The ampere-meter is the SI unit for pole strength (the product of charge and velocity) in a magnet (A.m = e.c). A magnetic monopole [2] is a hypothetical particle that is a magnet with only 1 pole. Proposed is a dimensionless geometrical formula for the electron constructed from magnetic monopoles M_{pole}. Planck mass = m_P, electron mass = m_e.

$$m_e = 2.m_P.t_x.M_{pole}^3 \tag{19}$$

where...

$$M_{pole} = \frac{2.\pi^2}{3.\alpha^2.e_x.c_x} \tag{20}$$

the conversion of Planck time t_p, elementary charge e and speed of light c to $1s, 1C, 1m/s$ requires dimensionless frequencies whose numerical values are equivalent (t_x, e_x, c_x).

$$\frac{t_p}{t_x} = \frac{5.3912...e^{-44}s}{5.3912...e^{-44}} = 1s$$

$$\frac{e}{e_x} = \frac{1.6021764...e^{-19}C}{1.6021764...e^{-19}} = 1C$$

$$\frac{c}{c_x} = \frac{299792458m/s}{299792458} = 1m/s$$

6 Numerical reference

α in terms of Q.

The accepted standard (experimental) values for the physical constants may be referenced from the CODATA website. The CODATA 2006 values:

R_∞ = 10 973 731.568 527(73) [3]
h = 6.626 068 96(33) $e - 34$ [4]
α = 137.035 999 679(94) [5]
l_p = 1.616 252(81) $e - 35$ [6]
e = 1.602 176 487(40) $e - 19$ [7]
m_e = 9.109 382 15(45) $e - 31$ [8]

$\mu_0 = 4.\pi.10^{-7}$ (fixed) [9]
$G = 6.674\ 28(67)\ e - 11$ [10]

The Rydberg constant R, which incoprorates the other constants, is the most accurately measured fundamental physical constant and so may be used to cross-check the results.

$$R_\infty = \frac{m_e.e^4.\mu_0^2.c^3}{8.h^3}$$

Using CODATA 2006 precision as a data filter, alpha and Q as the variables and by replacing Planck length l_p with eqn.11, the range of possible solutions for alpha and Q may be determined.

$for\ \alpha = 137.0359...\ to\ 137.0361...$
$for\ Q = 1.0191133...\ to\ 1.0191135...$
$h = 2^2 * 5^7 * \pi^3 * \alpha * Q^{10}/c^5$
$if\ (h > 6.62606863e - 34\ and\ h < 6.62606929e - 34)$
$then\ R = \pi^2 * c^5/(2^{10} * 3^3 * 5^{21} * \alpha^8 * Q^{15})$
$if\ (R > 10973731.568454\ and\ R < 10973731.568600)$
$then\ e = 16 * 5^7 * \pi * Q^5/c^3$
$if\ (e > 1.602176447e - 19\ and\ e < 1.602176527e - 19)$
$then\ m_e = (2 * \pi * Q^2/c) * (\pi^4/(2^8 * 3^3 * 5^{14} * \alpha^5 * Q^7))$
$if\ (m_e > 9.1093817e - 31\ and\ m_e < 9.1093826e - 31)$
$then\ print...$

$$\alpha = 137.035\ 999\ 918(1285)$$

$$Q = 1.019\ 113\ 407\ 898(5090)$$

Therefore, if we know alpha, we can calculate Q (or vice-versa).

If $\alpha = 137.035\ 999\ 084$ [11]
$Q = 1.019\ 113\ 411\ 20735$
$R_\infty = 10\ 973\ 731.568\ 527$
$h = 6.626\ 069\ 145\ 645\ e - 34$
$e = 1.602\ 176\ 513\ 011\ e - 19$
$l_p = 1.616\ 036\ 603\ 073\ e - 35$
$m_e = 9.109\ 382\ 321\ 096\ e - 31$
$\mu_0 = 4.\pi.10^{-7}$ (fixed)
$G = 6.672\ 497\ 198\ 179\ e - 11$

R, h, e, m_e, μ_0 are consistent with CODATA 2006.
$G\ (l_p)$ is consistent with CODATA 2002.

7 Magnetic (electric) constant

$$\mu_0 = 4.\pi.10^{-7}\ N/A^2$$

Therefore, in a vacuum, the force per meter of length between the two infinite straight parallel conductors carrying a current of 1 A and spaced apart by 1 m, is exactly $2.10^{-7} N/m$

Planck force F_p;

$$F_p = \frac{E_p}{l_p} = \frac{2.\pi.Q^2.c}{l_p} \tag{21}$$

The electric force is weaker than the strong force by a factor of alpha.

$$F_{electric} = \frac{F_p}{\alpha} \tag{22}$$

A (Planck) Amperes force law and from eqn.6

$$\mu_e = \frac{F_{electric}}{A^2} \tag{23}$$

$$\mu_e = \pi.\mu_0 = 4.\pi^2.10^{-7} \tag{24}$$

8 Conclusion

The above would seem to suggest a Planck unit theory with the Planck units as geometrical shapes or forms constructed from momentum and velocity. We may therefore normalize (Planck) momentum = (Planck) velocity ($2.\pi.Q^2 = c$). The structure of the dimensionless electron formula implies that role of particles is to dictate the frequency of these (integer or discrete) Planck events. Particles become the universe 'database'.

References

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