

The Grand Unified Theory and its Embodiment in The Fundamental Equation of the Universe

Part I - Fundamentals

1. The matter of the universe is made up of the following fundamental particles which have rest mass and have long, perhaps infinite, lifetimes [no other “particles” satisfy those two conditions].

- a. protons and electrons
- b. anti-protons and anti-electrons [positrons]

That universe could come into existence from absolute nothing only in a $\pm[1 - \text{cosine}]^a$ form.

[The alphabetic superscripts refer to the References at the end of this paper, the references being to the portions of the book *The Origin and Its Meaning*, that elaborate the item superscripted.]

The fundamental equation is the following pair of equations.

2. The four particles, per ¶ 1a and 1b above, are each a center of spherical oscillation propagating spherical waves outward, exponentially decaying as a result, and of the form^b

$$u_c(t) = \pm U_c \cdot [1 - \cos(2\pi \cdot f \cdot t)] \cdot e^{-t/\tau}$$

U_c = the original amplitude of the oscillation at time $t = 0$,

f = the particular particle’s oscillation frequency,

τ = the exponential decay time constant,

e = the Naperian base.

3. The propagating spherical waves are of the form

$$u_w(t, d) = \pm U_w \cdot [1 - \cos(2\pi \cdot f \cdot t - d/\lambda)] \cdot \delta / 4\pi d^2$$

$U_w = U_c \cdot e^{-t/\tau}$ for t at the moment of propagation of each cyclic pulse,

d = distance out from the center of oscillation,

λ = the wavelength of the propagated wave,

δ = the radius of the central core of the source of propagation which core contains the exponentially decaying supply of that propagated.

Part II - Details

4. The fundamental mechanical dimensions of the universe are mass $[M]$, length $[L]$, and time $[T]$. Time cannot decay, it is the independent variable. Mass is proportional to frequency $[m \cdot c^2 = h \cdot f]$ which like its inverse, time, cannot decay nor anti-decay. The exponential decay is of the length $[L]$ dimension of all components of material reality.^c

5. The spherical waves propagate outward at the speed of light.^d

$$c = \frac{1}{\sqrt{\mu_0 \cdot \varepsilon_0}}$$

Because the speed of light is dimensionally L/T , it is a decaying quantity its $[L]$ dimension decaying. [Of its speed-determining μ and ε , μ is dimensionless and ε is T^2/L^2].

6. The initial propagation was into empty space, absolute nothing, which could not contain nor provide μ and ε . They were and are contained in and provided by the propagating wave itself, U_w , which obtains them from $U_c \cdot e^{-t/\tau}$ as above.^e

7. The constants in the foregoing are [as exponentially decayed to their values of $t = \text{now}$ from their initial, $t = 0$, values] [in MKS units: $m \equiv \text{meters}$, $kg \equiv \text{kilograms}$, $s \equiv \text{seconds}$]:

$$\mu_0 = 4 \cdot \pi \cdot 10^{-7} = 12.566,370,614... \cdot 10^{-7} \text{ [dimensionless]}$$

$$\epsilon_0 = 8.854,187,817... \cdot 10^{-12} \text{ s}^2/\text{m}^2$$

$$\tau = 3.57532 \cdot 10^{17} \text{ s}$$

$$\delta = 4.05134 \cdot 10^{-35} \text{ m}$$

frequency and wavelength per the following table.^f

<u>Proton and Anti-Proton</u>	<u>Electron and Positron</u>
m = mass = $1.672,624,777 \cdot 10^{-27} \text{ kg}$	m = mass = $9.109,382,910 \cdot 10^{-31} \text{ kg}$
f = $[m \cdot c^2/h] = 2.268,731,6 \cdot 10^{23} \text{ Hz} = 1/\text{s}$	f = $[m \cdot c^2/h] = 1.235,589,8 \cdot 10^{20} \text{ Hz} = 1/\text{s}$
$\lambda = c/f = [h/m \cdot c] = 1.321,410,0 \cdot 10^{-15} \text{ m}$	$\lambda = c/f = [h/m \cdot c] = 2.426,310,6 \cdot 10^{-12} \text{ m}$

$$c = 2.997,924,58 \cdot 10^8 \text{ m/s}$$

$$h = 6.626,069,57 \cdot 10^{-34} \text{ kg} \cdot \text{m}^2/\text{s}$$

8. Neutrons are a combination of a proton and an electron and anti-neutrons are a combination of an anti-proton and a positron. Their being such combination particles is evidenced by that each decays with a mean lifetime of 881.5 s into the indicated components when not secure in an atomic nucleus.^g

9. The energy of the universe is present in three forms:

- The kinetic and potential energy of matter particles, for example atomic orbital electrons,^h
- The energy equivalent of matter's mass $[E = m \cdot c^2]^i$ which conversion occurs naturally occasionally as part of radioactive decay and as the result of matter – antimatter mutual annihilations and of fusion reactions in suns, the source of solar energy,
- Photons, which can result from changes in either of the above two forms of energy, and which are a half cycle of sinusoidal electro-magnetic wave propagating at c and whose frequency is given by

$$f = W/h$$

W = the energy change producing the photon.^j

Photons produced by atomic orbital electrons losing energy [and of necessity also losing angular momentum] receive angular momentum and can deliver that and their energy to another orbital electron.

Photons resulting from energy changes not involving angular momentum lack angular momentum and can only rarely interact with atoms. Those photons are called neutrinos.^k

Part III – Atoms and Other “Particles”

10. Atomic nuclei are complex centers of spherical oscillations that are a combination of the simple spherical oscillations of the protons and electrons [some combined as neutrons] making up the nuclei.^l

$$\begin{aligned} z_{\text{Symbol}}^A &= \frac{[A \text{ protons}]}{U_c \cdot [A - \text{Cos}[2\pi \cdot A \cdot f_p \cdot t]]} + \frac{[[N = A-Z] \text{ electrons}]}{-U_c \cdot [N - \text{Cos}[2\pi \cdot N \cdot f_e \cdot t]]} \\ &= U_c \cdot [Z - \text{Cos}[2\pi \cdot A \cdot f_p \cdot t]] + \text{Cos}[2\pi \cdot N \cdot f_e \cdot t] \end{aligned}$$

Z = element atomic number for the neutron $Z = 0, A = 1, N = 1$

A = element atomic mass number N = number of neutrons in nucleus

f_p = proton frequency f_e = electron frequency

[Not shown in the above is that U_c decays in the same manner as in the fundamental particles at $\cdot e^{-t/\tau}$.]

11. All other contended “particles” are fragments of the above naturally occurring particles. The fragments are produced by smashing natural particles into pieces by means of collisions at immense energies relative to the particles being smashed. The resulting fragments are extremely unstable and rapidly decay having extremely short half lives.

12. From the foregoing all of physics can be derived as in the following sections of the book *The Origin and Its Meaning*:

- Electric Field and Charge	Section 11
- Coulomb’s Law	Section 12
- Motion and Relativity	Section 13
- Magnetic and Electromagnetic Field	Section 14
- Quanta and the Atom	Section 15
- Newton’s Laws	Section 16
- The Atomic Nucleus	Section 17
- Radioactivity	Section 18
- Gravitation	Section 19
- The “Cosmic Egg”	Section 20
- The Probable End	Section 21

Part IV – References

Caution: The entire work is an ordered presentation with an integrated development and logic related to that order. Skipping over parts or addressing parts out of context or out of order can lead to confusion and misunderstanding.

- a. Section 6
Section 10, Detail Notes 2, pages 57-61
- b. Section 10, figure 10-1, equation 10-2
Detail Notes 2, pages 57-61
Section 21, pages 414-425
- c. Section 21, pages 425-429
- d. Section 16, pages 255-259
- e. Section 16, pages 255-259
- f. Section 12, pages 84-85
- g. Section 16, pages 234-238
Section 18, pages 331-332
- h. Section 15, pages 162-182
- i. Section 16, pages 237-238
- j. Section 15 pages 182-187
- k. Section 18, page 332, 338-340
- l. Section 17