

Photo-Electric Conversions

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Photo-Electric Conversions:

Part 1: Ether Model, One Force – Equal Energies

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Calculations using the equations of Einstein, Coulomb, and Newton at an atomic scale reveal an astonishing equal joules outcome for the rest mass of an electron, the charge, and a *photon body*. The key to a single energy, or force, is the velocity parameter. The gravitational energy of a photon body at a speed, v , equals the energy calculated using Einstein's mass-energy equivalence for the rest mass of an electron at the speed of light, c . This photon body turns out to consist of a relatively small radius whose source lies in the Boltzmann Constant. Moreover, it is revealed that the classically measured 'electron rest mass' is being synthesized out of this latent photon body. The energy of the classical electron rest mass at c^2 turns out to equal precisely the energy of a universal mass, or ether, calculated within the electron classical radius at a velocity squared, v^2 . If the energy described above is an artificial result due to experimental conditions, then there exists *in situ* a two mass body, namely, a photon body of $1.859222909 \times 10^{-9}$ kg plus an etheric mass of $1.859222909 \times 10^{-9}$ kg contained within a mean volumetric radius whose source lies in the Boltzmann Constant.

Synopsis of 3 Parts

Part 1: One Force - Equal Energies builds the initial argument for a particle that unifies gravitational and electromagnetic energies. Based on experimentally derived CODATA, the quantum equivalent of $2.04099771 \times 10^{21}$ electrons is seen to form this photon mass: a cloud about the atom. This new paradigm is to be distinguished from the one electron system portrayed by the Heisenberg uncertainty principle. The radius of this particle perfectly matches the Boltzmann Constant: it is this photon body of a radius of $1.380668031 \times 10^{-36}$ and mass of $1.859222909 \times 10^{-9}$ kg that affords us an elegant solution to the deep problem of a unified gravitational and electric force. The physical quantities of mass and charge are herein reconciled. The proof of a unified force is evinced in an *equal joules value* of $8.187104787 \times 10^{-14}$ J for both an electron produced as rest mass by an external electromagnetic field and for that of an innate photon pulsating *in situ* about an atom. In an atom, a composite photon two-mass body pulsates at a radius equal to the Boltzmann Constant. The electron shells are now revealed to be a result of external electromagnetic stress.

Part 2: Pair Production substantiates the absence of an electron in a nascent hydrogen atom. An electron-positron rest mass is revealed to be the result of a fusion of an extant photon mass of the hydrogen atom shell with a *photon mass equivalent* of 13.6 eV supplied ionization energy. The Rydberg Constant had all along indicated the presence of this photon. Yes, an electron does emerge when ionization energy is applied to hydrogen atoms in a gaseous state; however, this does not automatically mean that the electron is there in the first place.

The analysis continues with Part 3: The Fine Structure Constant. Mathematical evidence allows one to describe a photon couple pulsating by a volumetric factor of 137.036 cubed.

The dilation and contraction limits are set by the radii of the fusing photons and emanating electron-positron pair for a hydrogen atom. Thus the described particles pulsate and this implies a rippling effect. The wavelength of light is clearly due to the pulsating wave-maker called a photon or electron.

Deriving from readily available CODATA the assembled jigsaw puzzle reveals a startling new commonsense picture of the nascent hydrogen atom. Most significantly, this obviates the presence of an electron *in situ* and thus indicates a redefining of atomic structure and a redefining of the term, ionization energy for a hydrogen atom.

Introduction to Part 1

In ancient Greek, the *aether* represents a creative shining light. In the solid elastic theory of early modern science, an ether was argued to be a homogenous medium responsible for everything from gravity and the transmission of light to heat and electric charge. In the nineteenth and twentieth centuries several apparently futile attempts were made to measure *ether drag*, the hypothetical medium's effect upon the then known speed of light; as a result of these experiments judgment on the presence or absence of ether was suspended. In its place a sort of four-dimensional trampoline space-time was portrayed: a universe where the collection of heavenly bodies and all visible matter is declared to be the *determinant* of space-time, light, and gravity, and, it was suggested, *without such entities* all is emptiness and void.

However, despite innumerable demonstrations (of say, light traveling in a vacuum), one seeks in vain to find a scientist who has the audacity to dismiss absolutely the possibility of a discrete universal medium like ether. Instead, other nomenclatures have been put forward, like 'Dirac Sea', 'dark matter/dark energy', and so forth.

But the older simpler idea of an all encompassing medium convinced me that some indicators of this must exist, leading to a creative search for workable formulae and data for just such an 'un-measurable' fabric of our world. I knew the material would have to be so dense that *far from inhibiting anything* it would be the very conductor of light, and a thus *a priori* to the visible world. Hence, the *ether* I conceived of is a pre-existent medium *out of which* space-time's heavenly bodies are engendered, *basic to* light as electro-magnetism, to the atom, and so, basic to the gravitational forces in which bodies float suspended and in which we all exist in its dense etheric sea; thus the material world at any scale would have to be *less dense* than the etheric.

The first practical breakthrough in this understanding came when, *pace* Newton, I observed that the universal gravitational constant, G , can be factored into the ratio, $G = R c^2 / M$ to produce an ether constant ratio, R / M . The ether constant ratio (2) opened the gates on new correspondences and unities within the measurable physical world.

Results and Discussions

Ether Constants

Let us calculate for an homogenous medium using the universal gravitational constant, G , in relation to two bodies of mass, M, m , for the outcome for force, F . If a mass spins at a tangential spin velocity of the speed of light, c , then,

$$F = GMm / R^2 = m c^2 / R, \quad G = R c^2 / M \quad (1)$$

Since the universal gravitational constant, G , and the speed of light, c , are each constant, the radial distance, R , apportioned by one kilogram of mass yields a constant. The value of this constant is of the order of 10^{-28} meter per kilogram; this magnitude (un-measurable by experimental observation) can be safely construed to be a radius-to-mass R / M ratio of a universal mass or ether.

$$G / c^2 = R / M = 7.42604894 \times 10^{-28} \text{ m/kg} = \text{ether constant.} \quad (2)$$

Utilizing this equation derived by breaking down the universal gravitational constant, G , into its components, one is consequently able to equate relate electromagnetic and gravitational forces.

Thus one kilogram of this homogenous mass, or ether, is found to be contained within an infinitesimal mean volumetric radius of 10^{-28} meter.

Now from the inverse perspective, when contained over the mean volumetric radius, R , of one meter, the mass of ether is of the huge order of 10^{27} kilograms.

$$c^2 / G = M / R = 1.346611109 \times 10^{27} \text{ kg/m} \quad (3)$$

Now, if we wish to determine the amount of ether contained in, say, an electron, we simply substitute the classical electron radius, R_e , for the radius, R , in the ether constant ratio. The mass of ether embedded in an electron is

$$M_{\text{ether}} = \frac{2.817940325 \times 10^{-15}}{7.42604894 \times 10^{-28}} \text{ kg} = 3.7946697 \times 10^{12} \text{ kg} \quad (4)$$

Meaning of Electric Charge

Electric charge, measured in coulombs, is said to be an intrinsic property of a photon or electron and is responsible for electrical phenomena. A photon is said to have no net charge, whereas an electron carries an assigned negative charge while a positron is assigned a positive charge.

Exam question: Distinguish between a charge and an electron.

Answer: An electron is a fundamental carrier of charge. The SI unit is coulomb and the unit is C.

Furthermore, the law of charges states that like charges repel and unlike attract.

A surplus of electrons is negative and a deficiency positive charge.

Now the student is clear in concept. She gets an A, and all is well.

The Ether Model on the other hand starts to resolve the difference in the very concepts of charge and electron.

I will spell it out now, in advance, so that the math will be easy to follow in terms of converting algebraic equations to text.

Just as energy is an effect of a force through a distance, so is charge squared an effect of the mass of a photon pulsating through a distance up-to a limit of the classical electron radius. $q^2 = M \times R \times 10^7$.

One could think of an electron as the limit of a pulsating photon in terms of its mean volumetric radius and mass.

One has to envisage a dynamic model, like a bubble, a photon bubble, whose limits of expansion or contraction are set by the mass and radial parameters of an electron.

In this dynamic model the photon or electron mass is exchanged with the etheric mass contained within the boundaries of the bubble.

The ultimate velocity of the electron mass is determined to be the speed of light, c , as shown in the math that follows.

Suffice to say, charge is a result of a dynamic pulsation of a photon, or electron which is an extreme case of a photon.

In Situ Two-Mass Body at Velocity, v

A charge is obtained only from an electron or photon mass. A photon or electron mass obeys the equation, $q^2 = M \times R \times 10^7$, whereas etheric mass obeys the equation, $M / R = 1.346611109 \times 10^{27} \text{ kg/m}$. The formation of a charge *in situ* is

due, therefore, to a two mass body of a photon of $1.859222909 \times 10^{-9} \text{ kg}$ and ether of $1.859222909 \times 10^{-9} \text{ kg}$.

$$M / R = 1.346611109 \times 10^{27} \text{ kg/m} \quad (3)$$

$$R_e = \frac{3.794669746 \times 10^{12}}{1.346611109 \times 10^{27}} = 2.817940325 \times 10^{-15} \text{ m} \quad (4)$$

$$G = (R / M_{\text{ether}}) \times c^2 = (R / M_{0 \text{ rest mass electron}}) \times v^2$$

$$M_0 \times c^2 = M_{\text{ether}} \times v^2 \quad (5)$$

The above equation expresses the relationship between slowed tangential velocity, v , and velocity of light, c , of etheric and electron rest masses. By introducing values [in Eq. (5)] we arrive at

$$9.1093826 \times 10^{-31} \times (2.99792458 \times 10^8)^2 = 3.794669746 \times 10^{12} \times v^2$$

$$v^2 = 21.5752762 \times 10^{-27} \text{ m/s}^2 \text{ And } v^2 / c^2 = 2.400573227 \times 10^{-43} \quad (6)$$

Solving further, the tangential spin velocity

$$v = 1.468852484 \times 10^{-13} \text{ m/s} \quad (7)$$

The solution in Part 3 for the fine structure constant, α , addresses another relationship between the wavelength, λ , and radius, R , of the classically described electron. For the classical electron: $\alpha = 2\pi R / \lambda = 2\pi \times 2.817940325 \times 10^{-15} / \lambda$, so that the wavelength of the electron,

$$\lambda = 2.42631022 \times 10^{-12} \text{ m} \quad (8)$$

Using De Broglie's equation, $M \times v \times \lambda = h$, and substituting values from (7, 8) we arrive at the mass of a photon body, M ,

$$M \times 1.468852484 \times 10^{-13} \times 2.42631022 \times 10^{-12} = 6.6260693 \times 10^{-34}$$

$$M = 1.859222909 \times 10^{-9} \text{ kg}.$$

At a tangential speed, $v = 1.468852484 \times 10^{-13} \text{ m/s}$ the photon body consists of a mass, $M = 1.859222909 \times 10^{-9} \text{ kg}$ with a radius of $1.380668031 \times 10^{-36}$. These are the three parameters, velocity, mass, and radius which define an elementary charge couple.

A Dynamic Relationship between the Two-Mass Body In Situ and the Two-Mass Electron Body Under Electro-magnetic Stress.

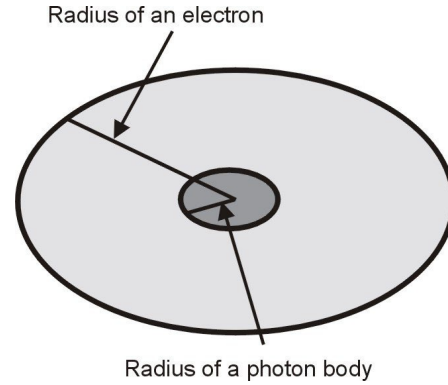
When an atom is subjected to electromagnetic energy its extant photon body forms into an electron-positron pair. Though radius and mass of the cloud around the atom are altered, importantly, charge is conserved. Moreover, in this pulsation activity, energy is conserved.

The evolving story in the subsequent text is of a change in tangential velocity from a slower speed, v , of the two-mass body to the speed of light, c , for the electron body.

The meaning of tangential velocity will be dealt with in depth in a subsequent Paper, *Particles, Waves and Fields*.

Note: While calculations represent an emerging picture of the atom, the shapes and patterns illustrated below are meant as visualizing indicators only.

Dynamic Model of Photo-electric Conversions



Illustrated at "Radius of an electron": the peripheral two-mass body: an electron of $9.1093826 \times 10^{-31} \text{ kg}$ and ether of $3.79466974 \times 10^{12} \text{ kg}$ contained in the classical radius, R_e , of the electron of $2.817940325 \times 10^{-15} \text{ m}$.

Illustrated at "Radius of a photon": a central two-mass body: a photon of $1.859222909 \times 10^{-9} \text{ kg}$ and ether of $1.859222909 \times 10^{-9} \text{ kg}$ contained in the radius of $1.380668031 \times 10^{-36}$.

The parameters of mass and radius of this central two-mass body are obtained by two equations, namely, the equation for conservation of electric charge and the etheric mass-over-radius constant M / R .

$$q^2 = M \times R \times 10^7 \text{ and } M / R = 1.346611109 \times 10^{27} \text{ kg/m}$$

$$(1.602176537 \times 10^{-19})^2 =$$

$$1.859222909 \times 10^{-9} \times 1.380668031 \times 10^{-36} \times 10^7$$

$$\text{and } \frac{M}{R} = \frac{1.859222909 \times 10^{-9}}{1.380668038 \times 10^{-36}} = 1.346611109 \times 10^{27} \text{ kg/m}$$

In a subsequent Paper, *Absolute Temperature and Zero Volume*, the value of this radius of $1.380668038 \times 10^{-36} \text{ m}$ is shown to be the source of the Boltzmann Constant.

Entailed here is a picture of a nascent atom presenting a two-mass body with a radius of $1.380668031 \times 10^{-36} \text{ m}$.

The Quantum Relationship

The rest mass of an electron, $M_0 = 9.1093826 \times 10^{-31} \text{ kg}$. A quantum equivalent of $2.040997717 \times 10^{21}$ electrons forms the photon body. The mass of ether embedded in each electron is $3.79466974 \times 10^{12} \text{ kg}$. There is a first quantum jump from electron to photon as follows,

$$\begin{aligned} \text{Photon mass} &= \\ 9.1093826 \times 10^{-31} \text{ kg} \times 2.040997717 \times 10^{21} \text{ electrons} \\ &= 1.859222909 \times 10^{-9} \text{ kg} \end{aligned}$$

A second quantum jump yields the value of ether over the classically defined radius of an electron as follows {see(4)}:

$$\begin{aligned} 1.859222909 \times 10^{-9} \text{ kg} \times 2.040997717 \times 10^{21} \text{ particles} \\ = 3.794669713 \times 10^{21} \text{ kg} \end{aligned}$$

The *in situ* two-mass body, each of $1.859222909 \times 10^{-9} \text{ kg}$, consists of an etheric mass associated with a photon mass obtained from the first quantum jump. From the second quantum jump, the mass of $3.794669713 \times 10^{21} \text{ kg}$ is ether associated with the electron generated by supplied energy.

Evidence Unifying Electrical and Gravitational Energies

The physical quantities of electron rest mass, charge, and the two-mass body photon-plus-etheric mass are reconciled. The confirmation of this arrives in the outcome of an *equal joules value* of $8.187104787 \times 10^{-14} \text{ J}$.

Rest mass of an electron	M_0	$9.1093826 \times 10^{-31} \text{ kg}$
Speed of light squared	c^2	$8.987551787 \times 10^{16} \text{ m}^2/\text{s}^2$
Dielectric constant	k	$8.987551787 \times 10^9 \text{ Nm}^2/\text{C}^2$

Einstein's equation: $E = M_0 \times c^2$

$$E = 9.1093826 \times 10^{-31} \times 8.987551787 \times 10^{16} = 8.187104787 \times 10^{-14} \text{ J}$$

Coulomb's equation: $E = k \times q_1 \times q_2 / R$

$$\begin{aligned} E &= \\ \frac{8.987551787 \times 10^9 \times (1.60217653 \times 10^{-19})^2}{2.817940325 \times 10^{15}} &= 8.187104787 \times 10^{-14} \text{ J} \end{aligned}$$

Newton's equation: $E = G \times M_1 \times M_2 / R$

$$\begin{aligned} E &= \frac{(6.674199942)10^{-11} \times (1.859222909 \times 10^{-9})^2}{(2.817940325)10^{-15}} \\ &= 8.187104787 \times 10^{-14} \text{ J} \end{aligned}$$

The $1.859222909 \times 10^{-9} \text{ kg}$ of a two-mass body is squared for etheric mass, M_1 , and photon mass, M_2 , as derived from CODATA under 'Meaning of Electric Charge'.

Conservation of gravitational energy and electrical energy is herein summarized.

The Force in Couplets

If the electric charge and gravitational mass evinces an equal energy outcome, then the force, F , within a charge couplet is constant.

$$\text{Force} = \frac{\text{Energy}}{\text{Radius}} = \frac{8.187104787 \times 10^{-14}}{2.817940325 \times 10^{-15}} = 29.05350661 \text{ N}$$

Thus a newly derived value for the force, F , within a charge couplet is determined to be 29.05350661 N .

It was this force constant that enabled me to calculate the Rydberg Photon body taken to be an electron. [Paper 3].

Newton's equation holds up perfectly on the atomic scale even as it does on the galactic. All along, science has substituted an incorrect electron rest mass into Newton's equation rather than the *in situ* two-mass body at velocity, v . The Ether Model affords a solution for a unification of electromagnetic and gravitational force.

Conclusions

$E = M_0 \times c^2$ is the energy equivalent of different forms of matter whether measured as rest mass of an electron, charge, or as the two-mass photon body.

The physical quantities of gravitational mass and charge are reconciled. The confirmation of this arrives in the outcome of an *equal joules value* of $8.187104787 \times 10^{-14} \text{ J}$ for a charge couple by employing the equations of Einstein, Coulomb, and Newton.

Utilizing the ether constant by breaking down the universal gravitational constant, G , into its components as, $G/c^2 = R/M = 7.42604894 \times 10^{-28} \text{ m/kg}$, one is able to equate electrical and gravitational forces.

A description of a *two mass body* unifies the gravitational and electro-magnetic energies. This photon body is formed at a reduced tangential spin velocity and yet its wavelength is the same as that of an electron. The radius of this photon mass-containing-ether corresponds to the Boltzmann Constant.

The Ether Model equations demonstrate that with just one length parameter, and with ether as a common denominator, one can compute acceleration due to gravity, the wavelength of light, charge, force, and energy of a body.

The meaning of charge aptly describes a dynamic photon-to-electron reversible conversion. The math describes a pulsation rather than the old orbital motion of an electron.

The relationship between slowed tangential velocity, v , and velocity of light, c , with etheric and material masses is clearly derived.

One can thus safely hypothesize that, as etheric mass slows from the speed of light, c , to rest, v , its mass value decreases;

and as etheric mass-velocity decreases, the result is the formation of visible matter. The material is changing because of change in spin velocity. Creation of matter and annihilation into ether has been mathematically expressed.

Photo-Electric Conversions:

Part 2: Pair Production in the Hydrogen Atom

Electron-Positron Formation in the Hydrogen Atom Explained

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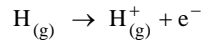
Calculations reveal that electron-positron rest mass results from a fusion of photons. The mass of the hydrogen atom shell reacts with the *photon mass equivalent* of 13.6 electron volts supplied ionization energy. Ionization is causing pair production. This picture indicates that the electron-positron rest mass of $9.1093826 \times 10^{-31}$ kg is created under specific parameters of a type of experimentation. In other words, by exposing the hydrogen atom to ionization energy equal to or greater than 13.6 electron volts an artificial production of an electron-positron is being brought about. The calculations based on CODATA demonstrate in quite elementary terms what is really going on in electron-positron pair production in a nascent hydrogen atom.

Results and Discussions

The Source of an Electron in the Hydrogen Atom

It is said that a hydrogen atom contains only one orbital electron. Evidence for a single orbital electron comes from experiments where the hydrogen atom in its ground state is ionized by 13.6056923 eV energy.

The hydrogen atom ionization equation is represented as:



The difficulty with this experimentally defined equation is that the value of the classical electron radius $2.817940325 \times 10^{-15}$ m is, in fact, inconsistent with the value of the Bohr Radius (0.529×10^{-10} m) for the hydrogen atom electron. Seeing this discrepancy of 10^5 m between the classical electron radius and the Bohr Radius leads to the query, *What could be the factors contributing to this difference in magnitude?*

The ultimate response to this question is found in the depiction of a hydrogen atom containing a photon instead of an orbital electron.

It appears to be that one photon is cocooning the nucleus.

Calculations

The Rydberg Constant for a hydrogen atom caused me to investigate the possibility of an associated mass. This research led to the unraveling of a photon body, referred to here as the Rydberg Photon.

The Rydberg Photon

Calculated as follows, the mass of $2.425434789 \times 10^{-35}$ kg represents the extant photon shell of the nascent hydrogen atom, while its radius is precisely twice the Bohr Radius, $R = 1.058354422 \times 10^{-10}$ m.

Applying De Broglie equation, $M \times c \times \lambda = h$,

$$2.425434789 \times 10^{-35} \times 2.99792458 \times 10^8 \times \lambda = 6.6260693 \times 10^{-34}$$

$$\lambda = 9.11267052 \times 10^{-8} \text{ m} \quad (1)$$

The inverse of λ is the wave number defined by the Rydberg Constant, $R_\infty = 1.097373155 \times 10^7$. The origin of the Rydberg Constant is thus clearly identified as the wave number generated by the Rydberg Photon mass of $2.425434789 \times 10^{-35}$ kg.

The Relationship between the Bohr Radius and the Rydberg Constant.

The following calculation uses the fine structure formula to calculate wavelength, lambda, λ .

$$\lambda = 2\pi \times R \times 137.036, \text{ where } R \text{ is twice the Bohr Radius.}$$

$$\lambda = 2\pi \times 1.058354422 \times 10^{-10} \times 137.036$$

$$\lambda = 9.11267052 \times 10^{-8} \text{ m} \quad [\text{The inverse of } \lambda \text{ is the Rydberg Constant for a hydrogen atom; see (1)}].$$

Conservation of Charge for the Electron and Rydberg Photon

We can now discuss the equivalence of charge squared with mass and radius whose defining formula is expressed as

$$q^2 = M \times R \times 10^7$$

If we assume that the electrical force due to charge and the centripetal force are equal, then,

$$F = k \times q \times q / R^2 = Mc^2 / R$$

And then, $q^2 = \text{mass of a particle} \times \text{radius of a particle} \times 10^7$. This equation holds for a photon and an electron.

Application of $q^2 = M \times R \times 10^7$

The charge of the rest mass of an electron squared, q^2 , equals the electron rest mass, M_0 , multiplied times the classical radius of an electron R_e

$$(1.602176537 \times 10^{-19})^2 = 9.1093826 \times 10^{-31} \text{ kg} \times 2.817940325 \times 10^{-15} \times 10^7 \text{ m}$$

The radius of the Rydberg Photon is derived using the equation, $q^2 = M \times R \times 10^7$. Charge squared is always conserved.

$$(1.60217653 \times 10^{-19})^2 = 2.425434789 \times 10^{-35} \times R \times 10^7$$

$R = 1.058354422 \times 10^{-10} \text{ m}$. This radius value is twice the Bohr Radius value of $5.291772108 \times 10^{-11} \text{ m}$.

For the hydrogen atom in its ground state, the Rydberg Photon mass of $2.425434789 \times 10^{-35} \text{ kg}$ with a radius of $R = 1.058354422 \times 10^{-10} \text{ m}$ reacts with $M = 3.421277314 \times 10^{-26} \text{ kg}$ generated by $E = 13.6056923 \text{ eV}$ to produce an electron-positron pair.

Photon Mass Equivalent of $E = 13.6056923 \text{ eV}$ Ionization Energy

Ionization is causing pair production. This is seen in the following calculations where it becomes clear that 'ionization energy' does not signify a removal of an electron from the first shell of a hydrogen atom. Rather, ionization energy is proven to be the cause for the introduction of photon mass generating or manufacturing the observed ionized atom and electron.

The photon mass of $M = 3.421277314 \times 10^{-26} \text{ kg}$, generated by $E = 13.6056923 \text{ eV}$ is derived using the ether constant equation $q^2 = M \times R \times 10^7$.

Energy $E = 13.6056923 \text{ eV}$ [energy required to ionize the hydrogen atom]. This electron volt energy is now converted to joules.

$$E = 13.6056923 \times 1.60217653 \times 10^{-19}$$

$$E = 2.179872088 \times 10^{-18} \text{ J}$$

$E = F \times R$, where F is the force constant between two charges. [see "Force in Couplets", Part 1]

$$2.179872088 \times 10^{-18} = 29.05350661 \times R$$

$$R = 0.7502956931 \times 10^{-19} \text{ m} \text{ where } R \text{ is the photon radius.}$$

$$q^2 = M \times R \times 10^7$$

$$M = \frac{(1.60217653 \times 10^{-19})^2}{0.7502956931 \times 10^{-19} \times 10^7} = 3.421277314 \times 10^{-26} \text{ kg}$$

A mass of $M = 3.421277314 \times 10^{-26} \text{ kg}$ and radius $R = 0.7502956931 \times 10^{-19} \text{ m}$ interacts with the hydrogen atom in its ground state.

A Theory-of-Knowledge Question

Once the hydrogen atom is ionized, how does the electron mass show up as $9.1093826 \times 10^{-31} \text{ kg}$? The answer is that during ionization the hydrogen atom with a shell photon mass of $2.425434789 \times 10^{-35} \text{ kg}$ picks up the photon mass fired at it due to 13.6 eV and thus undergoes a mass increase of up to $9.1093826 \times 10^{-31} \text{ kg}$.

The hydrogen atom until now has been perceived to contain one shell electron mass; however, this new understanding redefines the nature of the cloud around the nucleus. $E = 13.6056923 \text{ eV}$ ionization energy is a mass equivalent of $M = 3.421277314 \times 10^{-26} \text{ kg}$. The increase in mass is caused by the reaction of $2.425434789 \times 10^{-35} \text{ kg}$ with the mass value of $M = 3.421277314 \times 10^{-26} \text{ kg}$.

The appearance of a squared electron-positron rest mass $(9.1093826 \times 10^{-31} \text{ kg})^2$ equals

$$M^2 = 3.421277314 \times 10^{-26} \text{ kg} \times 2.425434789 \times 10^{-35} \text{ kg}$$

Thus, the electron-positron is artificially produced by an applied energy source of $E = 13.6056923 \text{ eV}$.

A Summary of Electron-Positron Rest Mass Creation from Two Photons

As shown below, a simple method is now available to calculate the mass of a particle: in the present case, an electron-positron pair created from the fusion of two photons.

Solution for the Electron-Positron Rest Mass Formation

$$q^2 = \text{mass of photon} \times \text{radius of photon} \times 10^7$$

$$q^2 = 2.425434789 \times 10^{-35} \times 1.058354422 \times 10^{-10} \times 10^7$$

[for hydrogen]

$$q^2 = 3.421277314 \times 10^{-26} \times 0.7502956931 \times 10^{-19} \times 10^7$$

[for 13.6 eV]

$$q^4 = 2.425434789 \times 10^{-35} \times 1.058354422 \times 10^{-10} \times 10^7 \times$$
$$3.421277314 \times 10^{-26} \times 0.7502956931 \times 10^{-19} \times 10^7$$

$$q^2 = \pm [9.1093826 \times 10^{-31} \times 2.81794029 \times 10^{-15} \times 10^7]$$

Clearly, an electron-positron mass of $9.1093826 \times 10^{-31} \text{ kg}$ and of radius $2.817940325 \times 10^{-15} \text{ m}$ is created artificially by a union of two photon masses $M = 3.421277314 \times 10^{-26} \text{ kg}$ and $2.425434789 \times 10^{-35} \text{ kg}$. Charge squared has two outcomes of $\pm 1.60217653 \times 10^{-19} \text{ C}$.

This invalidates the presence of an orbital electron in the ground state hydrogen atom even while the atom is still the arena for electron-positron pair creation by fusion of two photons under $E = 13.6056923 \text{ eV}$ stress.

Conclusion

The classical electron is described as a result of ionization studies. This paper shows that it is unknowingly manufactured by the introduction of $E = 13.6056923 \text{ eV}$ to the nascent atom's photon mass which is the true origin of the cloud around the hydrogen nucleus.

A useful outcome of this research is the mathematical capability of quantifying a new entity like an electron-positron pair from the union of two photons, by the formula, $q^2 = \text{mass of a particle} \times \text{radius of a particle} \times 10^7$.

The question dogging science, that of the electron falling (losing energy) while in dynamic motion in the first energy level, need no longer arise since it is evident that *the electron was never there*. In fact, the Rydberg Constant has all along described the presence of a photon in the ground state level for the hydrogen atom. Moreover, this photon corresponds to twice the Bohr Radius further substantiating its presence in the hydrogen atom. Furthermore, it is only due to electron mass formation that the cocoon shrinks to the classical electron radius.

The original aim of this research was to elucidate photoelectric conversions, but the results led the researcher to a fresh perspective on the internal photon nature of the hydrogen atom.

In fine, the results of this research invalidate the presence of an orbital electron in the ground state nascent hydrogen atom. The findings are that the atom is an arena for electron-positron creation by fusion of two photon energies.

Photo-Electric Conversions:

Part 3: Solution to the Fine Structure Constant

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The Fine Structure Constant α is approximately the inverse of 137, a dimensionless number associated with the electromagnetic force. Mathematically, the value of alpha is expressed in equation form as, $\alpha = \mu_0 \times c \times e^2 / 2h$. By applying the formula for charge, $q^2 = e^2 = M \times R \times 10^7$, I am able to simplify the terms in alpha to $\alpha = 2\pi R / \lambda$ so that it becomes evident that alpha is the circumference of a photon or an electron particle divided by its wavelength. This equation can be contextualized as: the wavelength, lambda, of an electro-magnetic wave being attributable to an increase in the circumference of a photon or electron by a factor of 137.036. The ultimate solution for the existence of number 137.036 is as follows: the volumetric contraction or expansion factor of 137.036 cubed arises as a consequence of photo-electric conversions. An electron-positron pair is produced when an extant photon in the nascent hydrogen atom fuses with a photon mass of 13.6 eV equivalent ionization energy.

The Fusion of Photons

The photo-electric conversion derivations prove pair formation: two photon masses make surface contact where the one photon of the hydrogen atom *shrinks from twice the Bohr Radius* to that of the electron classical radius. Similarly, the *E = 13.6056923 eV generated photon dilates* to the dimension of the electron classical radius. There is a concomitant exchange of mass and an electron-positron pair is produced. Shrinkage and dilation occurs by a factor of 137.036 *cubed* for each photon respectively.

Introduction

The fine structure constant, alpha (approx. 1/137) was first identified and named in 1916 by Arnold Sommerfeld, Heisenberg's teacher, who was studying fine patterns in spectral lines. Alpha, a dimensionless number appearing repeatedly in various physical observations, is central to Quantum Electrodynamics. It is known as "the coupling constant for the electromagnetic force," but its ultimate value is unexplained. Richard P. Feynman speculates that this dimensionless number has to do with *pi*, π , and refers to it as written by the *hand of God*. Feynman made the famous remark that every physicist will have alpha tacked onto the wall as a worry, as a reminder, that is, to try to understand what it is all about. James G. Gilson relates alpha to circular or cyclic motions of coupled objects. Surely his assessment is correct in this connection that "a smokescreen of deep complicated and little understood theoretical structures obscure the obvious."

This unsolved though experimentally observed number, 1/137, is simplified in this paper to a function $2\pi R / \lambda$ where a fundamental particle such as a photon or an electron can be mathematically identified by a circumference-to-wavelength ratio. By applying the formula for charge,

q^2 or $e^2 = M \times R \times 10^7 C^2$, we are able to simplify the terms in the fine structure constant.

Mathematical Derivation

Listed below are the physical constants to be brought into use for the data processing involved in the solution of alpha, the fine structure constant.

Planck's constant, $h = M \times c \times \lambda = 6.6260693 \times 10^{-34} \text{ J s}$

Squared charge of an electron, q^2 or $e^2 = M \times R \times 10^7 C^2$

Magnetic permeability, $\mu_0 = 4\pi \times 10^{-7}$

Fine structure constant $\alpha = \mu_0 \times c \times e^2 / 2h$

Introducing values for μ_0 , h , and e^2 , the fine structure constant

$$\alpha = 4\pi \times 10^{-7} \times c \times M \times R \times 10^7 / 2(M \times c \times \lambda) = 2\pi R / \lambda$$

Data Processing

If we assume the electrical force due to charge and centripetal force to be equal, then force,

$$F = k \times q \times q / R^2 = M c^2 / R$$

Canceling and rearranging terms yields, $q^2 = M \times R \times 10^7$.

This equation holds true for photons and electrons alike as calculated below.

Example 1: Squared charge of the rest mass of an electron.

$$(1.602176537 \times 10^{-19})^2 = 9.1093826 \times 10^{-31} \text{ kg} \times 2.817940325 \times 10^{-15} \times 10^7 \text{ m}$$

Example 2: Charge of $1.602176537 \times 10^{-19} \text{ C}$ for photon mass extant in nascent atoms. [see equation (8) in paper 1]

$$(1.602176537 \times 10^{-19})^2 = 1.859222909 \times 10^{-9} \text{ kg} \times 1.380668031 \times 10^{-36} \times 10^7 \text{ m}$$

The above two examples are a proof of how charge is conserved by a redistribution of photon mass about a mean volumetric radius. In other words: if the extant photon mass increases, its mean volumetric radius decreases, and vice versa (see below, Conclusion). Thus photon mass and photon radius are in an inverse relationship. It must be recalled at this point that an electron is in dynamic equilibrium with a photon body and, moreover, is itself a type of photon.

Application of the Fine Structure Constant in determining the Electron Rest Mass

In order to elucidate photo-electric conversions, it is important to connect the terms such as electron rest mass, wavelength, and the 137.036 circumference extension factor involved in the dynamic event of the photo-electric conversions.

For an electron: $\alpha = 2\pi R / \lambda = 2\pi \times 2.817940325 \times 10^{-15} / \lambda$

$$\lambda = 2.42631022 \times 10^{-12} \text{ m} \\ = 137.036 \times \text{the circumference of an electron}$$

Applying De Broglie's equation, $M_0 \times c \times \lambda = h$, and rearranging terms

$$M_0 = \frac{h}{c \times \lambda} = \frac{6.6260693 \times 10^{-34}}{2.99792458 \times 10^8 \times 2.42631022 \times 10^{-12}} \\ M_0 = 9.1093826 \times 10^{-31} \text{ kg}, \text{ which is the electron rest mass.}$$

Mass Distributed within a Time-Period for One Cycle

In order to describe how the photo-electric conversion comes about, we mathematically formulate relationships between various parameters such as mass and time period.

Derivation for the wavelength of yellow light,

$$\lambda = 5.9 \times 10^{-7} \text{ m}$$

$$\text{Frequency: } f = \frac{c}{\lambda} = \frac{2.99792458 \times 10^8}{5.9 \times 10^{-7}}$$

$$f = 0.50812281 \times 10^{15} \text{ s}^{-1}$$

$$\text{Energy: } E = h \times f = 6.6260693 \times 10^{-34} \times 0.50812281 \times 10^{15} \text{ J}$$

Photon mass is

$$\frac{E}{c^2} = \frac{3.366856953 \times 10^{-19}}{8.987551787 \times 10^{16}} = 3.746133578 \times 10^{-36} \text{ kg} \quad (2)$$

Here, yellow light has a photon mass of $3.746133578 \times 10^{-36} \text{ kg}$.

Applying values for the mass of light [from Eq. (2)] and inverse of frequency (time-period) [from Eq. (1)] we arrive at

$$\begin{aligned} \text{Photon mass} \times \text{time period} \\ &= 3.746133578 \times 10^{-36} \times 1.968028162 \times 10^{-14} \\ &= 0.7372496364 \times 10^{-50} \text{ kg} \times \text{s} \end{aligned} \quad (3)$$

This relationship turns out to be useful in understanding how the mass of a photon is redistributed in a wave with respect to time-period. It is erroneous to think of time and mass as redistributed. It is *mass* distributed within a *time-period* for one cycle.

For a photon:

$$\text{Mass} \times \text{time period} = 0.7372496364 \times 10^{-50} \text{ kg} \times \text{s} \quad [\text{see (3)}]$$

For an electron: Time-period is inverse of frequency and calculated as follows,

$$c = \lambda \times f, \quad f = \frac{2.99792458 \times 10^8}{2\pi R_e \times 137.036}, \quad f = 0.169320307 \times 10^{22} \text{ s}^{-1}$$

$$\text{Or time-period } T = 5.905966129 \times 10^{-22} \text{ s}$$

The Mass \times time period for an electron is

$$\begin{aligned} 9.1093826 \times 10^{-31} \times 5.905966129 \times 10^{-22} \times 137.036 \\ = 0.7372496364 \times 10^{-50} \text{ kg} \times \text{s} \end{aligned} \quad [\text{see (3)}]$$

This is evidence for the tangential spin of an electron pulsating at the speed of light c .

Calculations & Deriving Meaning out of 137

Radius, R , is twice the Bohr Radius of the Rydberg Photon mass of $2.425434789 \times 10^{-35} \text{ kg}$ extant in the nascent hydrogen atom. (See Part 2)

$$R = 1.058354422 \times 10^{-10} \text{ m}$$

Wavelength of a photon using the inverse of the Fine Structure Constant

Applying the formula for the fine structure and rearranging to solve for lambda,

$$\lambda = 137.036 \times 2\pi R = 137.036 \times 2\pi \times 1.058354422 \times 10^{-10}$$

$\lambda = 9.11267052 \times 10^{-8} \text{ m}$ (Inverse of λ is the Rydberg Constant for the hydrogen atom)

$$\lambda_{\text{photon of H-atom}} = \frac{3.366856953 \times 10^{-19}}{137.036 \times 4\pi R_{\text{electron}}} =$$

$$137.036^3 \times 4\pi \times 2.81794029 \times 10^{-15} \text{ m}$$

$\lambda = 9.11267052 \times 10^{-8} \text{ m}$ (Inverse of λ is the Rydberg Constant for the hydrogen atom)

It is evident that the surface of the electron has expanded by a factor of 137.036^3 to form the photon mass of $2.425434789 \times 10^{-35} \text{ kg}$ extant in the nascent hydrogen atom. Reversibly, the photon shrinks from twice the Bohr Radius to the classical electron radius.

Similarly, the photon mass of $M = 3.421277314 \times 10^{-26} \text{ kg}$ produced by $E = 13.6056923 \text{ eV}$ stress expands or dilates from a radius of $R = 0.7502956931 \times 10^{-19} \text{ m}$ to the classical electron radius. (See above, Part 2)

Wavelength of an Electron derived from 13.6 eV stress

Applying the formula for the fine structure and rearranging to solve for lambda,

$$\begin{aligned}\lambda_{\text{electron}} &= 137.036^3 \times 4\pi R_{\text{photon}} \\ &= 137.036^3 \times 4\pi \times 0.750295677 \times 10^{-19} \text{ m}\end{aligned}$$

$$\lambda_{\text{electron}} = 2.42631022 \times 10^{-12} \text{ m}$$

Applying De Broglie's equation $M_0 \times c \times \lambda = h$

$$M_0 = \frac{6.6260693 \times 10^{-34}}{2.426310224 \times 10^{-12} \times 2.99792458 \times 10^8}$$

$M_0 = 9.1093826 \times 10^{-31} \text{ kg}$, the rest mass of an electron.

Thus the rest mass of an electron is derived by use of the fine structure constant and results from a dynamic photo-electric conversion.

Conclusion

As per the first derivation, the fine structure constant reveals itself as the circumference of a photon or electron particle multiplied by the value of its wave number, $2\pi R / \lambda$. In other words, the product of the circumference of a photon particle and 137.036 yields its wavelength.

This is further evidence for the existence of photo-electric conversions and it enhances our understanding of Richard P. Feynman's grand expression of *the hand of God* as the author of the fine structure constant.

The photon generated by 13.6 eV stress is the photon that dilates by a factor of 137.036 cubed. This dilated photon now attains the classical electron radius and electron rest mass.

The photon extant in the nascent hydrogen atom depicted by the Rydberg Constant is the photon that contracts by a factor of 137.036 cubed. The contracted photon now attains the classical electron radius and electron rest mass.

These two interacting photons pulsate by a volumetric factor of 137.036 cubed respectively.

Shrinkage and dilation occur by a factor of 137.036 cubed for each photon respectively.

I hypothesize that the shrinkage of the extant photon in the hydrogen atom leads to positron formation, while the dilation of the 13.6 eV generated photon leads to electron formation.

Mathematical calculations prove the mechanism of electron-positron formation by fusion of two photons in the hydrogen atom; this further substantiates the absence of an electron in the nascent hydrogen atom.

Feynman's conjecture is that the fine structure constant has to do with pi , π ; he also proposed that the underlying photon-electron interaction is responsible for this dimensionless constant.

The mathematical proofs in this present research at hand only serve to recapitulate and give backing to Feynman's thoughts on alpha.

The image of a pulsating photon body emerges from the equations above. The electron is a type of pulsating photon. This picture has huge implications as it resolves wave-particle duality. The particle of photon or electron has mass, a radius, and a mathematically defined charge as depicted by the equation,

$$q^2 = \text{mass of a particle} \times \text{radius of a particle} \times 10^7$$

The photon (or electron) mass pulsates by a volumetric factor of 137.036 cubed in the hydrogen atom. This ripple results in wavelength, λ .

One can only make the inference that an electron or a photon body pulsates up to a wavelength of lambda. This paves the way to a resolution of wave-particle duality. Particles make waves. The photon or electron pulsations act as wave makers.

Summary of the Findings in the Three Papers

The two most important "Theory of Knowledge" questions that a scientist must ask are:

1. What is the evidence for the knowledge I have received or encountered?
2. Why must I believe or accept this information as true?

The Ether Model has addressed these two questions and the answers it gives have far reaching implications.

1. Newton's equations are proven to work at the atomic scale.
2. Gravitational and Electro-magnetic forces are unified.
3. Mathematical proof for an extant photon (taken to be an electron) in a nascent hydrogen atom.
4. Charge squared is photon mass pulsating about a mean volumetric radius.
5. An electron is shown to be a type of photon.
6. A two-mass body is at the heart of an atom, with a radius that corresponds to the Boltzmann Constant.
7. The Heisenberg uncertainty principle is challenged.
8. Photo-electric conversions occur by a factor of 137.036 cubed.

9. Photons do have mass. A mass-less photon particle is a contradiction in terms.
10. Mathematical proof for the existence of ether under newly derived constants listed below.
11. Redefining of ionization energy as pair production

S.I. Values CODATA Recommended

Parentheses indicate uncertainty in the last digits of the value.

Descriptor, Symbol	Value, Units
First ionization energy	13.6056923(12) eV
Bohr radius, a_0	$5.291772108 \times 10^{-11}$ m
Rydberg constant, R_∞	1.097373155×10^7 m ⁻¹
Rest Mass of an Electron, M_0	$9.1093826(16) \times 10^{-31}$ kg
Planck's constant, h	$6.6260693 \times 10^{-34}$ J s
Speed of light in vacuum, c	2.99792458×10^8 m/s
Elementary charge, q_e	$1.602176537 \times 10^{-19}$ C
Classical electron radius, R_e	$2.817940325 \times 10^{-15}$ m
Alpha, α	$7.2973525504 \times 10^{-3}$
Universal Gravitational constant, G	$6.6742(10) \times 10^{-11}$ m ³ / kg s ²
Dielectric constant in a vacuum, k	8.987551787×10^9 Nm ² /C ²

Newly Derived Constants and Ratios

Descriptor, Symbol	Value, Units
Mass of ether spread over one meter length,	
	M / R $1.346611109 \times 10^{27}$ kg
q^2 = mass of a photon \times radius $\times 10^7$	q , Infinite values C

Mass spread over $1.380668031 \times 10^{-36}$ m	Mq
	$1.859222909 \times 10^{-9}$ kg
A quantum of electrons number	$2.04099771 \times 10^{21}$ electrons
Force between a charge couple	29.05350661 N
Mass \times time-period	$0.7372496364 \times 10^{-50}$ kg \times s
Hydrogen photon mass taken to be an electron	
	$2.425434789 \times 10^{-35}$ kg
Photon mass generated by 13.6 eV	$3.421277314 \times 10^{-26}$ kg

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✽

Every solution is derived from available CODATA values of fundamental constants and I have created a colligation that passes the dimensional test for units.

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Photo-Electric Conversions:

Part 4: The Bohr Model, A Fresh Perspective

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A fresh understanding of the Bohr model of the Hydrogen atom describes its atomic shell as one *Rydberg photon*. This photon absorbs or emits discrete wavelengths of light. Absorption spectra arise when the Rydberg photon absorbs radiant energy and moves to a higher energy state with a shrinkage in size. Applying the equation for charge squared, I am able to prove that quantized states are being manufactured by the introduction of electron volt energy. One Rydberg photon on account of introduced electromagnetic energy is converted to electron-positron masses creating the observed Hydrogen atom absorption or emission spectra. Mathematical proof is provided herein for shell # 1 to contain a one electron-positron mass, shell # 2 a mass equal to two electron-positron pairs, and shell # 3 a mass equal to three electron-positron pairs, and so forth, all under experimental conditions of electromagnetic supplied energy. Furthermore, pair production takes place as a result of photon fusion where electron-positron mass generation is quantized as whole number multiples. Higher energy levels are shown here to be due to higher introduced electron volt energy and converge closer to the nucleus; this is in stark contrast to the Bohr model where higher energy levels are depicted as being located further away from the nucleus.

Bohr's Model of the Atom

Niels Bohr (1885-1962), Danish Nobel laureate in Physics (1922) put forward a model of the atom which was an advance over the nuclear model of Ernest Rutherford. Bohr in 1913 proposed that an electron moves around the nucleus in a well defined circular path. His two main postulates explain the stability of, particularly, the Hydrogen atom. Bohr's first postulate is that an electron particle has a definite circular path around the atomic nucleus with specific energy values. This circular path he called "orbit" or "energy level". His second postulate maintained that an electron may "jump" to the next higher energy level (or orbit) when given a definite amount of energy or "fall" to a lower level (or orbit) by losing radiant energy.

If E_2 is the energy of an electron in a higher energy level and E_1 is the energy of an electron in a lower energy level then energy released, ΔE , will be expressed as,

$$\Delta E = E_2 - E_1$$

Bohr also maintained in his atomic model that there were "stationary orbits" or "stationary states" of the electron where it neither absorbed nor released energy.

And so, according to Bohr's atomic model, electrons orbit the nucleus within specific energy levels. In Bohr's model, electrons possessing the least energy were said to be found in the "lowest" levels closest to the nucleus. Electrons with more energy were said to be located in progressively "higher" or more distant levels from the nucleus.

When an electron released its newly acquired energy it would fall back to its initial orbital position or "ground state". It was

also said that when excited electrons acquire sufficient energy they may make several energy level transitions. Moreover the model showed that when these electrons returned to the ground state several distinct energy emissions occurred; the energy that an electron emitted when returning to the ground state was called electromagnetic radiation.

Thus Bohr's model explained the experimentally observed EM spectrum for one-electron atom systems in terms of orbital electrons.

Bohr's derivation stems from three assumptions [Ref 1]:

1) The total energy of an electron in orbit is the sum of its kinetic and potential energies:

$$E = E_{\text{kinetic}} + E_{\text{potential}} \\ = \frac{1}{2} m_e v^2 - \frac{kq_e^2}{r} \quad (1)$$

2) The angular momentum of the electron can only have certain discrete values:

$$L = m_e v r = n \frac{h}{2\pi} \quad (2)$$

where the principal quantum number $n = 1, 2, 3, \dots$ and h is Planck's constant.

3) The electron is held in orbit by the Coulomb force. That is, the Coulomb force is equal to the centripetal force:

$$\frac{kq_e^2}{r^2} = \frac{m_e v^2}{r} \quad (3)$$

Simplifying Eq (3),

$$\frac{kq_e^2}{r} = m_e v^2 \quad (4)$$

The left hand side term in Eq (4) is potential energy.

$$E = \frac{1}{2} m_e v^2 - \frac{kq_e^2}{r} = -\frac{1}{2} m_e v^2 \quad (5)$$

To calculate for velocity, v , we utilize Eq (2) and solve for r ,

$$r = n \frac{h}{2\pi m_e v} \quad (6)$$

Substitute this value for r from Eq. (6) into Eq. (4),

$$kq_e^2 \frac{m_e v 2\pi}{nh} = m_e v^2 \quad (7)$$

Dividing both sides by $m_e \times v$,

$$\frac{kq_e^2 2\pi}{nh} = v \quad (8)$$

Substituting the value for v into the equation for energy, and the values for k and $\frac{h}{2\pi}$, we obtain the energy of the different levels of the Hydrogen atom.

$$E_n = -\frac{1}{2} m_e \left(\frac{kq_e^2 2\pi}{nh} \right)^2 \quad (9)$$

$$E_n = -\frac{m_e q_e^4}{8h^2 \epsilon_o^2} \times \frac{1}{n^2} \quad (10)$$

Substituting values for the constants in Eq. (10) listed under CODATA yields,

$$E_n = (-13.6 \text{ eV}) \frac{1}{n^2} \quad (11)$$

Thus, the energy, E_n , of a particular shell is worked out by substituting the value of the shell number, n .

A Fresh Understanding of the Bohr Model

Building on Niels Bohr's equations the derivation that follows develops an understanding of how photo-electric conversions occur.

$$E_n = -\frac{1}{2} m_e \left(\frac{kq_e^2 2\pi}{nh} \right)^2 \text{ [see Eq. (9)]}$$

Substituting values for k , q_e and h and canceling common terms,

$$E_n = -\frac{1}{2} m_e \left(\frac{c^2 \times 10^{-7} \times m \times r \times 10^7 2\pi}{n \times m \times c \times 2\pi \times r \times 137.036} \right)^2$$

yields,

$$E_n = -\frac{1}{2} m_e \left(\frac{c}{n \times 137.036} \right)^2 \quad (12)$$

Rearranging terms,

$$E_n = -\frac{1}{2} m_e \times c^2 \left(\frac{1}{n \times 137.036} \right)^2 \quad (13)$$

The Rydberg photon mass of $2.425434789 \times 10^{-35}$ kg yields,

$$E_n = m_{\text{Rydberg}} \times c^2 \text{ [see Eq. (13)]} \quad (14)$$

Thus E_n represents the energy of electromagnetic radiation equivalent to 13.6 eV.

The ratio of electron mass [see Eq. (13)] to the Rydberg photon mass [see Eq. (14)] yields a value that involves the fine structure constant.

$$\frac{m_{\text{electron}}}{m_{\text{Rydberg}}} = 2 \times n^2 \times 137.036^2 \quad (15)$$

The criticism Niels Bohr faced was that his model did not explain the fine structure patterns exhibited in the spectral charts obtained for the Hydrogen atom. The above equation [Eq. (15)] clearly indicates the true source of the fine structure pattern. The fine structure value exists on account of the inherent Rydberg photon *and its conversion into an electron*.

Another embarrassment Bohr faced was that his model depicted an electron in circular motion orbiting a central nucleus. And yet, a deeper examination of Bohr's derivation reveals that he was near to affirming the truth.

Let us examine the equation below.

$$E = \frac{1}{2} m_e v^2 - \frac{kq_e^2}{r} = -\frac{1}{2} m_e v^2 \text{ [see Bohr's Eq. (5)]}$$

Bohr's equation [Eq. (5)] may be rewritten as,

$$\frac{1}{2} m_e v^2 + \frac{1}{2} m_e v^2 = \frac{kq_e^2}{r}$$

$$m_e v^2 = \frac{kq_e^2}{r} \text{ [see Bohr's Eq. (4)]}$$

The left hand side term is the energy of an electron at velocity, v . The electron is in circular motion at a radial distance, r , which is Bohr's radius.

Replacing the radial distance, r , by $2r$ yields

$$\frac{1}{2}m_e v^2 = \frac{kq_e^2}{2r} \quad (16)$$

The key here is to distinguish between Bohr's radius and the classical electron radius.

The left hand side term in Eq. (16) is the kinetic energy of an electron in circular motion at velocity, v , and the right hand side term stands for the potential energy of the Rydberg photon body pulsating about twice Bohr's radius. In this fresh paradigm charge is conserved as shown below.

$$q^2 = 2.425434789 \times 10^{-35} \times 1.058354422 \times 10^{-10} \times 10^7$$

[Rydberg photon]

The factor taken to be the kinetic energy of an electron body by Niels Bohr is the Rydberg photon energy.

$$m_{\text{Ryd}} c^2 = \frac{kq_e^2}{2r} \quad (17)$$

A Summary of Equivalent Energies

$$E_n = m_{\text{Rydberg}} \times c^2 \text{ [see Eq. (17)]}$$

$$E_n = -\frac{1}{2}m_e \times c^2 \left(\frac{1}{n \times 137.036} \right)^2 \text{ [see Eq. (13)]}$$

$$E_n = \frac{1}{2}m_e v^2 = \frac{kq_e^2}{2r} \text{ [see Eq. (16)]}$$

Equations Eq (17) & Eq. (13) are extensions of the brilliant work of Niels Bohr. They depict photo-electric conversions and a subsequent electron mass energy equivalence of an electron body in pulsate motion [see electron photon ratio Eq. (15)].

Though mathematically correct, Niels Bohr's equation [Eq. (16)] lacks physical justification. In this equation the kinetic energy of the electron is in fact the potential energy of the Rydberg photon, where $2r$ is the descriptor of this photon body [see Eq. (17) & Eq. (18)].

Pair Production

Elucidated above are the energy levels understood to belong to a single electron system. This electron is thought to move from lower to higher levels and vice-versa resulting in absorption and emission spectra for a Hydrogen atom.

Now we are going to mathematically prove that the energy levels are in fact, the result of pair production.

Results and Discussions

The Rydberg Photon

Calculated as follows, the mass of $2.425434789 \times 10^{-35}$ kg represents the photon shell of the atom, while its radius, $R = 1.058354422 \times 10^{-10}$ m, is precisely twice Bohr's radius.

Applying de Broglie's equation, $m \times c \times \lambda = h$,

$$2.425434789 \times 10^{-35} \times 2.99792458 \times 10^8 \times \lambda = 6.6260693 \times 10^{-34}$$

$$\lambda = 9.11267052 \times 10^{-8} \text{ m}$$

The inverse of λ is the wave number defined by Rydberg's constant, 1.097373155×10^7 per meter. The origin of Rydberg's constant is thus clearly identified as the wave number generated by the photon mass of $2.425434789 \times 10^{-35}$ kg.

We can now discuss the equivalence of charge squared, q^2 , with photon mass and radius whose defining formula is expressed as

$$q^2 = m \times R \times 10^7$$

If we assume that the Coulomb force due to charge and the centripetal force are equal, then,

$$F = \frac{k \times q \times q}{R^2} = \frac{mc^2}{R} \quad .$$

And then, $q^2 = \text{mass of a particle} \times \text{radius of a particle} \times 10^7$.

This equation holds for a photon and an electron.

Application of $q^2 = m \times R \times 10^7$

The radius of the Rydberg photon is derived using the equation, $q^2 = m \times R \times 10^7$. Charge squared is always conserved.

$$(1.60217653 \times 10^{-19})^2 = 2.425434789 \times 10^{-35} \times R \times 10^7$$

$$R = 1.058354422 \times 10^{-10} \text{ m} \quad (18)$$

This radius value [Eq. (18)] is twice Bohr's radius value of $5.291772108 \times 10^{-11}$ m.

In the nascent Hydrogen atom the Rydberg photon of mass $2.425434789 \times 10^{-35}$ kg and radius $1.058354422 \times 10^{-10}$ meter reacts with a mass of $3.421277314 \times 10^{-26}$ kg generated by 13.6056923 eV to produce an electron-positron pair.

Photon Mass Equivalent of $E = 13.6056923 \text{ eV}$

The photon mass of $3.421277314 \times 10^{-26} \text{ kg}$, generated by 13.6056923 eV is derived using the equation, $q^2 = m \times R \times 10^7$.

Energy $E = 13.6056923 \text{ eV}$ [energy required to ionize the Hydrogen atom]. This electron volt energy is now converted to joules, J.

$$E = 13.6056923 \times 1.60217653 \times 10^{-19} \text{ J} \quad (19)$$

$$E = 2.179872088 \times 10^{-18} \text{ J} \quad (20)$$

$E = F \times R$, where F is the force constant between two charges.

[see *Photo-Electric Conversions*, Part 1, "Force In Couplets"]

$$2.179872088 \times 10^{-18} = 29.05350661 \times R \quad (21)$$

$$R = 0.7502956931 \times 10^{-19} \text{ m}, \text{ where } R \text{ is the photon radius.} \quad (22)$$

$$q^2 = m \times R \times 10^7$$

$$m = \frac{(1.60217653 \times 10^{-19})^2}{0.7502956931 \times 10^{-19} \times 10^7} = 3.421277314 \times 10^{-26} \text{ kg} \quad (23)$$

A mass of $3.421277314 \times 10^{-26} \text{ kg}$ and Rydberg radius $7.502956187 \times 10^{-20} \text{ meter}$ interacts with the Hydrogen atom in its ground state.

A Theory-of-Knowledge Question

Once the Hydrogen atom is ionized, how does the electron mass show up as $9.1093826 \times 10^{-31} \text{ kg}$? The answer is that during ionization the Hydrogen atom with a shell photon mass of $2.425434789 \times 10^{-35} \text{ kg}$ picks up the photon mass fired at it due to 13.6 eV and thus undergoes a mass increase up to $9.1093826 \times 10^{-31} \text{ kg}$.

The Hydrogen atom has always been perceived to contain one shell electron mass; however, this new understanding redefines the nature of the cloud around the nucleus.

A Summary of Electron-Positron Rest Mass Creation from Two Photons

A simple method is now available to calculate the mass of a particle, in this case an electron-positron pair, from the fusion of two photons.

SHELL #1

$$q^2 = \text{mass of photon} \times \text{radius of photon} \times 10^7$$

$$q^2 = 2.425434789 \times 10^{-35} \times 1.058354422 \times 10^{-10} \times 10^7$$

[Rydberg photon]

$$q^2 = 3.421277314 \times 10^{-26} \times 0.7502956931 \times 10^{-19} \times 10^7$$

[for 13.6 eV photon]

$$q^4 = 2.425434789 \times 10^{-35} \times 1.058354422 \times 10^{-10} \times 10^7 \times 3.421277314 \times 10^{-26} \times 0.7502956931 \times 10^{-19} \times 10^7$$

$$q^2 = \pm [9.1093826 \times 10^{-31} \times 2.81794029 \times 10^{-15} \times 10^7]$$

Clearly, an electron-positron mass of $9.1093826 \times 10^{-31} \text{ kg}$ and of radius $2.81794029 \times 10^{-15} \text{ meter}$ is created artificially by a union of two photon masses, the Rydberg photon of $2.425434789 \times 10^{-35} \text{ kg}$ and the 13.6 eV photon of $3.421277314 \times 10^{-26} \text{ kg}$. Charge squared has two outcomes of $\pm 1.60217653 \times 10^{-19} \text{ C}$.

This invalidates the presence of an orbital electron in the "ground state" Hydrogen atom even while the atom is acknowledged as the arena for electron-positron pair creation by fusion of two photons under $E = 13.6056923 \text{ eV}$

Further proof: the Bohr Energy Levels

Utilizing the experimentally determined energy states E_n , where n stands for the shell number I am able to prove that pair production occurs with the shrinkage of the shell cocooning the nucleus.

$$E_n = (-13.6 \text{ eV}) \frac{1}{n^2}$$

$$E_1 = 13.6056923 \text{ eV}$$

$$E_2 = 3.401423075 \text{ eV}$$

$$E_3 = 1.511743589 \text{ eV}$$

Fusion of photons

The Rydberg photon extant in the Hydrogen atom can react with introduced photon mass equivalents m_1, m_2 or m_3 .

The Rydberg photon mass is $2.425434789 \times 10^{-35} \text{ kg}$.

Let us consider shell # 2, and shell #3.

SHELL #2

Similarly,

$$E_2 = 3.401423075 \text{ eV} \times 1.60217653 \times 10^{-19} \text{ J} = 5.449680219 \times 10^{-19} \text{ J}$$

$$E = F \times R$$

$$5.449680219 \times 10^{-19} = 29.05350661 \times R_2$$

The radius, R_2 , of shell # 2,

$$R_2 = 0.187573923 \times 10^{-19} \text{ m}$$

Utilizing the formula for charge squared, q^2 ,

$$q^2 = \text{mass of photon} \times \text{radius of photon} \times 10^7$$

$$(1.60217653 \times 10^{-19})^2 = m_2 \times 0.187573923 \times 10^{-19} \times 10^7$$

$m_2 = 13.68510925 \times 10^{-26}$ kg, where m_2 is the photon mass introduced into shell # 2.

$$q^2 = 2.425434789 \times 10^{-35} \times 1.058354422 \times 10^{-10} \times 10^7$$

[Rydberg photon]

Fusion of photons is represented as,

$$q^4 = 2.425434789 \times 10^{-35} \times 1.058354422 \times 10^{-10} \\ \times 13.68510925 \times 10^{-26} \times 0.187573923 \times 10^{-19} \times 10^{14}$$

$$q^2 = \pm \left[(9.1093826 \times 10^{-31}) \times 2 \right] \times \left[(2.81794029 \times 10^{-15} \times 10^7) \times \frac{1}{2} \right]$$

The electron mass is doubled and the electron radius is halved, thus the energy of the shell increases as its volumetric size decreases.

SHELL #3

Consider the energy of shell # 3.

$$E_3 = 1.511743589 \text{ eV} \times 1.60217653 \times 10^{-19} \text{ J} \\ = 2.422080098 \times 10^{-19} \text{ J}$$

$$2.422080098 \times 10^{-19} = 29.05350661 \times R_3$$

The radius, R_3 , of shell # 3 is,

$$R_3 = 0.083366188 \times 10^{-19} \text{ m}$$

Utilizing the formula for charge squared, q^2

$$q^2 = \text{mass of photon} \times \text{radius of photon} \times 10^7$$

$$(1.60217653 \times 10^{-19})^2 = m_3 \times 0.083366188 \times 10^{-19}$$

$m_3 = 30.79149587 \times 10^{-26}$ kg, where m_3 is the photon mass introduced into shell # 3.

$$q^2 = 2.425434789 \times 10^{-35} \times 1.058354422 \times 10^{-10} \times 10^7$$

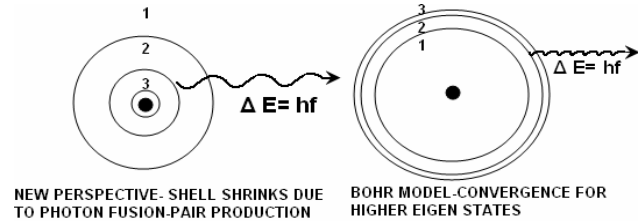
[Rydberg photon]

Fusion of photons is represented as,

$$q^4 = 2.425434789 \times 10^{-35} \times 1.058354422 \times 10^{-10} \\ \times 30.79149587 \times 10^{-26} \times 0.083366188 \times 10^{-19} \times 10^{14}$$

$$q^2 = \pm \left[(9.1093826 \times 10^{-31}) \times 3 \right] \times \left[(2.81794029 \times 10^{-15} \times 10^7) \times \frac{1}{3} \right]$$

The electron mass is tripled and the electron radius is reduced by one third, thus energy of the shell increases as its volumetric size decreases. Thus the calculations clearly indicate formation of a



two electron-positron equivalent mass in shell # 2 and a three electron-positron equivalent mass in shell # 3.

Photo-electric conversions take place as the ionization energies are applied to the Hydrogen gas. Pair production is thus established as the phenomenon where an electron-positron pair is being produced by fusing photons under experimental stress.

Conclusion

One Rydberg photon encapsulates the Hydrogen nucleus. Electron-positron masses are produced under conditions of induced ionization energy. The electron-positron mass in each shell is the product of the Principal quantum number and rest mass of an electron.

The energy levels for a Hydrogen atom are thought to be the result of a single electron as it makes transitions between stable orbits. However, the energy levels are now mathematically proven to be a creation of one electron-positron pair in the first energy level and two electron-positron pairs in the second level, and so on. The shell mass increase is by whole numbers caused by introduced energy applied to the Hydrogen atom. Because introduced ionization energy leads to shrinkage of the extant photon shell, shell # 3 is smallest in size and highest in mass-energy as compared to shell # 1 and # 2.

The absence of the classical electron in the nascent Hydrogen atom obviates the need for imposition of a quantized condition. Instead, the erstwhile definition of a "quantized state" can be seen to be a temporary state of electron-positron formation created by experimentally induced ionization energies. Moreover, it can be seen that once the electric switch is turned off, the absorption or emission spectra disappear!

The derivations successfully prove photon fusion and resulting pair production as the cause for the Bohr spectrum.

Niels Bohr had once stated that his model was not an affirmation of the truth. However, I have proved that an in-depth search within Bohr's model is an affirmation of the true nature of the Hydrogen atom. The conjecture of an orbiting electron did not stand up to the test of time. However, Bohr's model does point to an extant Rydberg photon appearing as an electron positron pair when subjected to external electron volt stress. And so, building on Bohr this research is a further development in our understanding of how photo-electric conversions occur. The fine

structure value exists on account of the inherent Rydberg photon and its conversion into an electron.

S.I. Values CODATA Recommended

Parentheses indicate uncertainty in the last digits of the value.

Descriptor, Symbol	Value, Units
First ionization energy	13.6056923(12) eV
Proton mass measured at introduced eV,	9.382723128 $\times 10^8$ eV
Bohr's radius, a_0	5.291772108 $\times 10^{-11}$ m
Rydberg's constant, R_∞	1.097373155 $\times 10^7$ m ⁻¹
Rest Mass of an Electron, m_0	9.1093826(16) $\times 10^{-31}$ kg
Planck's constant, h	6.6260693 $\times 10^{-34}$ J s
Speed of light in vacuum, c	2.99792458 $\times 10^8$ m \cdot s ⁻¹
Elementary charge, q_e or e	1.602176537 $\times 10^{-19}$ C
Classical electron radius, R_e	2.817940325 $\times 10^{-15}$ m
Alpha, α	7.2973525504 $\times 10^{-3}$
Gravitational constant, G	6.6742(10) $\times 10^{-11}$ m ³ \cdot kg ⁻¹ \cdot s ⁻²
Dielectric constant in vacuum, k	8.987551787 $\times 10^9$ Nm ² \cdot C ⁻²

Newly Derived Constants and Ratios

Descriptor, Symbol	Value, Units
$q^2 = \text{mass of a photon} \times \text{radius} \times 10^7, q^2$	Conserved value C ²

Two-mass Body, Mq	1.859222909 $\times 10^{-9}$ kg
Radius of the two-mass body	1.380668031 $\times 10^{-36}$ m
Force between a charge couple	29.05350661 N
Rydberg photon radius, R_{Rydberg}	7.502956187 $\times 10^{-20}$ m
Rydberg photon mass, m_{Rydberg}	2.425434789 $\times 10^{-35}$ kg
Photon mass generated by 13.6 eV	3.421277314 $\times 10^{-26}$ kg
Photon acceleration, in volts, a	5.856235535 $\times 10^{34}$ m \cdot s ⁻²
Mass[X] acceleration, in volts, a	1.737003498 $\times 10^{28}$ m \cdot s ⁻²
9.382723128 $\times 10^8$ eV photon, m	4.961123308 $\times 10^{-34}$ kg.
The slowed velocity, v	1.468852484 $\times 10^{-13}$ m \cdot s ⁻¹
References	

- [1.] Niels Bohr (1914). "The spectra of helium and hydrogen". Nature 92: 231-232.
- [2.] http://www.biocrawler.com/encyclopedia/Niels_Bohr.
- [3.] J.H. Hubbell, "Electron-positron pair production by photons: A historical overview." Radiation Physics and Chemistry 75 (6) 614-623 (June 2006).
- [4.] F.V. Fernandes, *Photo-Electric Conversions*, Parts 1, 2 & 3

Photo-Electric Conversions

Part 5: The Corpuscles in a H-Atom

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A mass [X] of $1.672622216 \times 10^{-27}$ kg fuses with the 9.382723128×10^8 eV introduced photon mass to produce an electron-positron pair. Similarly, the Rydberg photon fuses with the 13.6 eV introduced photon mass to produce an electron positron pair. The mass[X] is comprised of 6.896174754×10^7 Rydberg photons.

Introduction

In *Photo-Electric Conversions*, Part 3: Solution to the Fine Structure Constant, it is proven that photon fusion occurs leading to pair production in a nascent Hydrogen atom. Thus, the electron-positron pair is artificially produced by an applied energy source of $E = 13.6056923$ eV. Furthermore, pair production takes place when the Hydrogen atom is impinged upon by its conjugate photon generated from introduced electron volt energy. In Part 4: The Signal for Pair Production, precise introduced electron volt energy causes a mass [X] to form an electron-positron pair, in Solution 2. Thus, pair production is shown to be due to a precise value of electron volt energy: the introduced 9.382723128×10^8 eV energy corresponding to a photon body of mass $4.961123308 \times 10^{-34}$ kg.

Pair Production:

Two Solutions at Speed of Light, c

The beauty that lies in these two solutions is that they prove the corpuscular nature of the Hydrogen atom.

Solution 1 for the Electron-Positron Rest Mass Formation

In *Photo-Electric Conversions*, Part 2: Pair Production, electron-positron formation in the Hydrogen atom was explained. The summary of the same is given below.

Let us calculate for the mass of the electron-positron pair emanating from the fusion of the Rydberg photon and the experimentally introduced 13.6 eV equivalent photon at the speed of light, c.

$$q^2 = \text{mass of photon} \times \text{radius of photon} \times 10^7$$

$$q^2 = 2.425434789 \times 10^{-35} \times 1.058354422 \times 10^{-10} \times 10^7$$

[for Rydberg photon]

$$q^2 = 3.421277314 \times 10^{-26} \times 0.7502956931 \times 10^{-19} \times 10^7$$

[for 13.6 eV photon]

$$q^4 = 2.425434789 \times 10^{-35} \times 1.058354422 \times 10^{-10} \times 10^7 \times 3.421277314 \times 10^{-26} \times 0.7502956931 \times 10^{-19} \times 10^7$$

$$q^2 = \pm[9.1093826 \times 10^{-31} \times 2.81794029 \times 10^{-15} \times 10^7]$$

Plainly, the electron-positron mass of $9.1093826 \times 10^{-31}$ kg and radius $2.81794029 \times 10^{-15}$ m is artificially created by a union, or fusion, of the two photon masses, the Rydberg photon at $2.425434789 \times 10^{-35}$ kg and the introduced 13.6 eV photon mass of $3.421277314 \times 10^{-26}$ kg. Charge squared has two outcomes of $\pm 1.60217653 \times 10^{-19}$ C.

This derivation validates the presence of the *Rydberg photon* in the ground state Hydrogen atom. The Hydrogen atom is the arena for electron-positron pair creation by the fusion of two photons under $E = 13.6056923$ eV stress.

Solution 2 for Electron-Positron Rest Mass Formation

Now let us calculate for the electron-positron pair created from the fusion of mass [X] and a photon mass, m , $4.961123308 \times 10^{-34}$ kg derived from 9.382723128×10^8 eV stress at the speed of light, c.

$$q^2 = m \times R \times 10^7$$

$$q^2 = 1.672622216 \times 10^{-27} \times 1.534697799 \times 10^{-18} \times 10^7$$

[for mass [X]]

$$q^2 = 4.961123308 \times 10^{-34} \times 5.1741702 \times 10^{-12} \times 10^7$$

[for 9.382723128×10^8 eV photon]

$$q^4 = 1.672622216 \times 10^{-27} \times 1.534697799 \times 10^{-18} \times 10^7 \times 4.961123308 \times 10^{-34} \times 5.1741702 \times 10^{-12} \times 10^7$$

$$q^2 = \pm[9.1093826 \times 10^{-31} \times 2.81794029 \times 10^{-15} \times 10^7]$$

Clearly, the electron-positron mass of $9.1093826 \times 10^{-31}$ kg and radius $2.81794029 \times 10^{-15}$ m appears in Solution 2 as artificially created by a fusion of the mass [X] of $1.672622216 \times 10^{-27}$ kg and an eV photon mass of $4.961123308 \times 10^{-34}$ kg. Charge squared has two outcomes of $\pm 1.60217653 \times 10^{-19}$ C.

Thus, mass [X] is the arena for electron-positron pair creation by fusion of two masses.

It is important to note that the mass of [X] is nearly the CODATA value of the *proton* mass.

The Rydberg Photon

A photon mass of $2.425434789 \times 10^{-35}$ kg is shown to represent *the extant photon of the nascent Hydrogen atom*. Its radius, $R = 1.058354422 \times 10^{-10}$ m, is precisely twice Bohr's radius. Introducing the photon mass into de Broglie's equation, $m \times c \times \lambda = h$,

$$2.425434789 \times 10^{-35} \times 2.99792458 \times 10^8 \times \lambda = 6.6260693 \times 10^{-34}$$

$$\lambda = 9.11267052 \times 10^{-8} \text{ m} \quad (19)$$

The inverse of lambda, is the wave number defined by the Rydberg constant, $R_\infty = 1.097373155 \times 10^7 \text{ m}^{-1}$. The origin of the Rydberg constant is thus clearly identified as the wave number generated by the *Rydberg photon* mass of $2.425434789 \times 10^{-35}$ kg.

Mass [X]:

By utilizing the experimentally introduced eV energy I have demonstrated in Solution 1 and Solution 2 that pair production occurs.

Mass [X] appears to be very close in mass value to that of a proton listed in CODATA.

$$\text{Proton mass} = 1.672621637 \times 10^{-27} \text{ kg}$$

$$\text{Mass [X]} = 1.672622216 \times 10^{-27} \text{ kg}$$

$$\text{Mass difference} = 0.000000579 \times 10^{-27}$$

The Corpuscular Nature of an H-Atom:

The Rydberg photon mass = $2.425434789 \times 10^{-35}$ kg

The mass [X] = $1.672622216 \times 10^{-27}$ kg

The ratio of mass [X] to the Rydberg photon is,

$$= \frac{1.672622216 \times 10^{-27}}{2.425434789 \times 10^{-35}} = 6.896174754 \times 10^7$$

The ratio of the experimentally determined $9.382723128 \times 10^8 \text{ eV}$ to the 13.6056923 eV is,

$$\frac{9.382723128 \times 10^8}{13.6056923} = 6.89617471 \times 10^7$$

Thus mass [X] is proven to be comprised of 6.89617475×10^7 Rydberg photons.

Conclusions

The true nature of a proton and Hydrogen atom is thus conclusively evidenced in this paper.

The fact that mass [X] is very close to the CODATA proton mass value suggests that mass [X] is the mass out of which a proton emanates in a mass spectroscope.

The Hydrogen spectrum is observed under 13.6 eV experimental stress. In reality the spectrum arises due to the Rydberg Photon. A Rydberg photon mass of $2.425434789 \times 10^{-35}$ kg is shown to represent *the extant photon of the nascent Hydrogen atom*. Its radius, of $1.058354422 \times 10^{-10}$ m, is precisely twice Bohr's radius. Mass [X] is proven to be comprised of 6.89617475×10^7 Rydberg photons.

The determination of the exact number of Rydberg photons that comprise the proton and Hydrogen atom respectively will be up-to future generations who will have more sophisticated technology at their disposal.

I have used the term corpuscles instead of photons to give credit to J. J. Thomson who thought of an atom to be comprised of corpuscles.

S.I. Values CODATA Recommended

Parentheses indicate uncertainty in the last digits of the value.
Descriptor, Symbol Value, Units

First ionization energy	13.6056923(12) eV
Proton mass measured at introduced eV,	$9.382723128 \times 10^8 \text{ eV}$
Bohr's radius, a_0	$5.291772108 \times 10^{-11} \text{ m}$
Rydberg's constant, R_∞	$1.097373155 \times 10^7 \text{ m}^{-1}$
Rest Mass of an Electron, m_0	$9.1093826(16) \times 10^{-31} \text{ kg}$
Planck's constant, h	$6.6260693 \times 10^{-34} \text{ J s}$
Speed of light in vacuum, c	$2.99792458 \times 10^8 \text{ m} \cdot \text{s}^{-1}$
Elementary charge, q_e or e	$1.602176537 \times 10^{-19} \text{ C}$
Classical electron radius, R_e	$2.817940325 \times 10^{-15} \text{ m}$
Alpha, α	$7.2973525504 \times 10^{-3}$
Proton mass	$1.672621637 \times 10^{-27}$

Newly Derived Constants and Ratios

Descriptor, Symbol	Value, Units
$q^2 = \text{mass of a photon} \times \text{radius} \times 10^7, q^2$	Conserved value C^2
Force between a charge couple	29.05350661 N
Rydberg photon radius, R_{Rydberg}	$7.502956187 \times 10^{-20} \text{ m}$
Rydberg photon mass, m_{Rydberg}	$2.425434789 \times 10^{-35} \text{ kg}$
Photon mass generated by 13.6 eV	$3.421277314 \times 10^{-26} \text{ kg}$
$9.382723128 \times 10^8 \text{ eV}$ photon, m	$4.961123308 \times 10^{-34} \text{ kg}$

References

- [1.] Niels Bohr (1914). "The spectra of helium and hydrogen". *Nature* 92: 231-232.
- [2.] http://www.biocrawler.com/encyclopedia/Niels_Bohr.
- [3.] J.H. Hubbell, "Electron-positron pair production by photons: A historical overview." *Radiation Physics and Chemistry* 75 (6) 614-623 (June 2006).
- [4.] F.V. Fernandes, *Photo-Electric Conversions*, Parts 1, 2,3, & 4
- [5.] Prof. J. J. Thomson, "On the Number of Corpuscles in an Atom", *Philosophical Magazine*, Vol. 11, June 1906, p. 769-781.

Photo-Electric Conversions

Part 6: The Source of Electricity

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Electricity is defined by three parameters, namely, voltage, current, and resistance. Voltage, V , is determined to be the acceleration of a photon, current squared, I^2 to be the force exerted by a photon, and resistance, R , the surface tangential velocity per unit charge. Thus, as measured in electricity, the pulsations of a photon body are responsible for voltage, current, and resistance. Science describes voltage in units of joules per coulomb. However, voltage, in fact, simply describes the acceleration of a dynamic photon, while current squared is the force which arises out of an accelerating photon body, and resistance is simplified to velocity of a photon body per unit charge.

Introduction

The three fundamental descriptors of electricity are voltage, V , current, I , and resistance, R . Voltage, V , is the potential difference that arises out of a surplus and deficiency of electrons between two points; this traditional viewpoint can also be stated as energy per unit charge. Furthermore, Ohm's law describes the relationship between voltage, V , current, I , and resistance, R , as $V = I \times R$. This relationship holds true for ohmic conductors. The units of voltage are *volts*, those of current, *amperes*, and those of resistance, *ohms*. Voltage is now redefined as acceleration, ampere squared as force and resistance as velocity of a photon body per unit charge, q , or, e .

Derivations

Ampere Squared is Force

Magnetic permeability, μ_0 , is shown in *Photo-Electric Conversions*, Part 6, Foundation of Physical Constants, [Eq (26)] to be dimensionless, furthermore, ampere squared was proven to be force.

The proof that ampere squared is force can be shown by another method.

The relationship between charge, q , current, I , and time, t , is ,

$$q = I \times t \quad (1)$$

Squaring both sides and rearranging terms,

$$I^2 = \frac{q^2}{t^2} \quad (2)$$

Substituting for charge squared,

$$I^2 = \frac{M \times R \times 10^7}{t^2} \quad (3)$$

Introducing the term, acceleration, a , where

$$a = \frac{R \times 10^7}{t^2} \text{ into Eq. (3)}$$

$$I^2 = M \times a \quad (4)$$

$$I^2 = F, \text{ force} \quad (5)$$

What the above derivation signifies is that in electricity ampere squared is directly related to the acceleration, a , of a photon mass.

Voltage, V , is Acceleration

The electron volt energy is converted to joules, J ,

$$eV \times e = J \quad (6)$$

Rearranging terms,

$$V = \frac{J}{e^2} \quad (7)$$

Substituting for the values of J and e^2 yields,

$$V = \frac{Mc^2}{M \times R \times 10^7} \quad (8)$$

M is photon mass and R is mean volumetric radius.

$$V = \frac{Mc^2}{M \times R \times 10^7} \quad (9)$$

$$V = \frac{c^2}{R \times 10^7} \quad (10)$$

Dimensional analysis reveals that voltage, V , is acceleration, a .

$$V = \frac{L}{T^2 \times 10^{-7}} \quad (11)$$

$$V = LT^{-2} \times 10^7 \quad (12)$$

$$V = a \times 10^{-7} \quad (13)$$

Voltage, V , is thus acceleration. Furthermore, acceleration, a , depicts pulsate motion as is derived in *Photo-Electric Conversions Part 6: Foundations of Physical Constants*.

$$a = \frac{4\pi R}{t^2} \text{ [See } \textit{Photo-Electric Conversions Part 6, Eq. (40)}]$$

Resistance, R , is Velocity per Unit Charge, q

Voltage, V , from Eq (13) is,

$$V = a \times 10^{-7}$$

Ampere squared is force,

$$I^2 = F \text{ [Eq. (5)]}$$

Ohm's law is depicted by

$$V = IR \quad (14)$$

Squaring both sides,

$$V^2 = I^2 R^2 \quad (15)$$

Substituting the value of voltage, V , from Eq (13) and the value of ampere squared, I^2 with force from Eq (5), yields,

$$(a \times 10^{-7})^2 = \text{force} \times R^2 \quad (16)$$

Substituting further for force yields,

$$(a \times 10^{-7})^2 = m(a \times 10^{-7}) \times R^2 \quad (17)$$

Canceling common terms,

$$\frac{(a \times 10^{-7})}{m} = R^2 \quad (18)$$

Substituting the value for centripetal acceleration,

$$\frac{\text{velocity}, v^2 \times 10^{-7}}{R \times m} = R^2 \quad (19)$$

Rearranging terms,

$$\frac{\text{velocity}, v^2}{mR \times 10^7} = R^2 \quad (20)$$

Substituting the denominator with charge squared, q^2 ,

$$\frac{\text{velocity}, v^2}{q^2} = R^2 = \frac{\text{velocity}, v^2}{m \times R \times 10^7} = \frac{a}{m} \quad (21)$$

Resistance, ohms, is simplified to,

$$R = \frac{\text{velocity}, v}{q} \quad (22)$$

Thus resistance is proven to be the velocity of a photon body per unit charge.

Volt, V , as Energy per Unit Charge, Disproved

The potential difference in volts is energy per unit charge in joules per coulomb.

$$V = \frac{J}{Q} \text{ or } 1 \text{ volt} = 1 \text{ JC}^{-1} \quad (23)$$

The value of one electron volt, eV, is depicted as,

Energy = potential difference x charge

$$1 \text{ electronvolt} = 1 \text{ volt} \times 1.6 \times 10^{-19} \text{ C}$$

$$1 \text{ eV} = 1.6 \times 10^{-19} \text{ J} \quad (24)$$

The above relationship Eq. (24) that defines voltage, V , will now be demonstrated to be flawed.

Let us consider the first ionization energy of the Hydrogen atom which is 13.6 eV.

$$V_{\text{volt}} = \frac{13.6 \text{ eV}}{e} = \frac{13.6056923}{1.60217653 \times 10^{-19}} \quad (23)$$

$$V_{\text{volt}} = 8.492005747 \times 10^{19} \text{ m} \cdot \text{s}^{-2} \quad (24)$$

$$V_{\text{volt}} = a \times 10^{-7} \text{ [see Eq. (13)]}$$

Equating Eq. (24) with Eq. (13) yields,

$$V_{\text{volt}} = 8.492005747 \times 10^{19} \text{ m} \cdot \text{s}^{-2} = a \times 10^{-7} \quad (25)$$

Rearranging terms,

$$a = 8.492005747 \times 10^{26} \text{ m} \cdot \text{s}^{-2} \quad (26)$$

Utilizing the equation for mass equals force by acceleration.

$$m = \frac{F}{a} = \frac{29.05350661}{8.492005747 \times 10^{26}} = 3.421277314 \times 10^{-26} \text{ kg} \quad (27)$$

This photon mass Eq. (27) of $3.421277314 \times 10^{-26} \text{ kg}$ is the 13.6 eV photon equivalent ionization energy of the Bohr model [*Photo-Electric Conversions*, Part 5, Eq (23)].

Conclusion

Thus the above derivation with a concrete example of 13.6 eV taken from the Bohr model conclusively proves that voltage is acceleration and not joules per coulomb. Consequently, the former understanding of voltage does not hold.

Furthermore, the derivations prove that ampere squared is force and that resistance is velocity of a photon body per unit charge.

The source of electricity is a dynamic photon body. The acceleration of this photon body has been described in *Photo-Electric Conversions*, Part 6: Foundation of Physical Constants. The electricity we experience is now conceptually easy to follow in terms of a dynamic photon body. When a photon mass accelerates the force produced by this event is measured as amperes squared. The resistance concept developed by Georg Simon Ohm is in fact the tangential velocity at the speed of light, c , per unit charge.

S.I. Values CODATA Recommended

Parentheses indicate uncertainty in the last digits of the value.

Descriptor, Symbol (if any)	Value, Units
Rest Mass of an Electron, M_0	$9.1093826(16) \times 10^{-31} \text{ kg}$
Planck's constant, h	$6.6260693 \times 10^{-34} \text{ J s}$
Speed of light in vacuum, c	$2.99792458 \times 10^8 \text{ m/s}$
Elementary charge, q_e	$1.602176537 \times 10^{-19} \text{ C}$
Classical electron radius, R_e	$2.817940325 \times 10^{-15} \text{ m}$
Alpha, α	$7.2973525504 \times 10^{-3}$
Universal Gravitational constant, G	$6.6742(10) \times 10^{-11} \text{ m}^3 / \text{kg s}^2$
Magnetic permeability of free space, μ_0	$4 \pi \times 10^{-7} \text{ N} \cdot \text{A}^{-2}$
Electric permittivity of free space, ϵ_0	$8.854187817 \times 10^{-12} \text{ Fm}^{-1}$
First ionization energy	$13.6056923(12) \text{ eV}$
Bohr radius, a_0	$5.291772108 \times 10^{-11} \text{ m}$

Rydberg constant, R_∞	$1.097373155 \times 10^7 \text{ m}^{-1}$
Dielectric constant in a vacuum, k	$8.987551787 \times 10^9 \text{ Nm}^2 / \text{C}^2$

Newly Derived Constants and Ratios

Descriptor, Symbol	Value, Units
Photon generated by 13.6 eV	$3.421277314 \times 10^{-26} \text{ kg}$
Charge squared, q^2	$\text{photon mass} \times \text{radius} \times 10^7 \text{ C}^2$
Wavelength, λ	$2\pi R \times 137.036 \text{ m}$
Force: between charge couple	29.05350661 N

Surface tangential velocity, v	$\frac{4\pi R}{t} \text{ m} \cdot \text{s}^{-1}$
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Electron pulsate speed, c	$\frac{2\pi R}{t_1} \text{ m} \cdot \text{s}^{-1}$
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Electron wave front at the speed of light, c	$\frac{\lambda}{t} \text{ m} \cdot \text{s}^{-1}$
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Time period for an electron body, t_1	$5.905966129 \times 10^{-22} \text{ s}$
Time period of an electron wave, t	$8.0933 \times 10^{-20} \text{ s}$

Acceleration of a photon body, a	$\frac{4\pi R}{t^2} \text{ m} \cdot \text{s}^{-2}$
------------------------------------	--

Surface tangential acceleration time period, t	3.332×10^{-23}
A solid angle/magnetic permeability, μ_0	$4\pi \times 10^{-7}$

Electrical permittivity of free space, ϵ_0	$\frac{1}{v^2 \times 10^{-7}} \text{ m}^{-2} \cdot \text{s}^2$
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Ampere squared, force., F	$I^2 \text{ N}$
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Electrical Resistance R	$\frac{\text{velocity}, v}{q} \text{ ms}^{-1} \text{ C}^{-1}$
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Voltage, V	$a \times 10^{-7} \text{ m} \cdot \text{s}^{-2}$
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References

[1] F.V. Fernandes, *Photo-Electric Conversions*, Parts 1, 2, 3, 4, & 5

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Photo-Electric Conversions

Part 7: Ether as Charge Q

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The ether contained within a photon body is what scientists and electricians measure as electric charge. Electrolysis of water is experimental proof for existence of ether. Ether mass contained within protons that accumulate at the cathode is shown to be related to the amount of electric charge passed during electrolysis of water. Furthermore, this is real evidence for the unification of electric and gravitational energies.

Introduction

In *Photo-Electric Conversions*, Part 1, calculations using the equations of Einstein, Coulomb, and Newton at an atomic scale reveal an astonishing equal joules outcome for the rest mass of an electron, the charge, and a *photon body*. It was shown that by utilizing the ether constant one is able to equate electrical and gravitational forces. Furthermore, the equivalence of charge squared with mass and radius of a photon was dealt with in depth.

In this research I will provide experimental evidence for the existence of ether and the astounding fact that this ether is electric charge.

Electrolysis of Water:

Consider the data collected from electrolysis of water.

Current $I = 0.068$ amps

Time $t = 18,000$ s

Equation: $2H_2O \rightarrow O_2 + 4H^+ + 4e^-$

Three Solutions for Ether as Electric Charge

Solution 1:

Charge Q , current I , and time t , are equated as,

$$Q = I t$$

Utilizing the equation $Q = I t$, (1)

$$Q = 0.068 \times 18000 \text{ Coulombs} \quad (2)$$

$$Q = 1224 \text{ C} \quad (3)$$

The charge Q , is the total number, n of charges, e ,

$$Q = ne \quad (4)$$

Rearranging terms,

$$n = \frac{Q}{e} = \frac{1224}{1.60217653 \times 10^{-19}} \quad (5)$$

$$n = 7.639607603 \times 10^{21} \quad (6)$$

Thus, the number of charges that contribute to the total charge Q , is calculated [Eq.(6)].

In *Photo-Electric Conversions*, Part 1, an elementary charge is associated with the two mass body,

$$Ether_{kg} = \frac{1.859222909 \times 10^{-9}}{1.60217653 \times 10^{-19}} \text{ kg / C} \quad (7)$$

One coulomb of charge Q , corresponds to an etheric mass of,

$$Ether_{kg} = 1.160435741 \times 10^{10} \text{ kg/C} \quad (8)$$

The ether mass associated with 1224 coulombs used in the electrolysis of water is,

$$Ether_{kg} = 1224 \times 1.160435741 \times 10^{10} \text{ kg} \quad (9)$$

$$Ether_{kg} = 1.420373347 \times 10^{13} \text{ kg} \quad (10)$$

This etheric mass divided by the number of charges in Eq.(6),

$$Ether_{kg} = \frac{1.420373347 \times 10^{13}}{7.639607603 \times 10^{21}} \text{ kg} \quad (11)$$

$$Ether_{kg} = 1.859222909 \times 10^{-9} \text{ kg} \quad (12)$$

Thus I have conclusively proved that the ether component of the two mass body is the source of electric charge Q .

Solution 2:

Now let us calculate for the mass of oxygen molecules and protons that accumulate at the electrodes by electrolysis of water.

Equation: $2H_2O \rightarrow O_2 + 4H^+ + 4e^-$

Using Faraday's laws in electrochemistry,

$$mass_g = \frac{QMr}{FZ} = \frac{1224 \times 32}{96485.33829 \times 4} \quad (13)$$

$$mass_g = 0.101486922 \text{ g of oxygen molecules.} \quad (14)$$

$$\text{The number of moles of oxygen molecules,} \quad (15)$$

$$\text{moles} = \frac{\text{mass}_g}{Mr} = \frac{0.101486922}{32.0} = 0.003171466313 \text{ mol}$$

For every one mole of oxygen molecules, four protons are formed.

The number of protons, n ,

$$4 \times \text{moles} \times L = 4 \times 0.003171466313 \times 6.022141536 \times 10^{23}$$

$$n = 7.639607603 \times 10^{21} \quad (16)$$

$$\text{mass}_{H^+} = 7.639607603 \times 10^{21} \times 1.672622216 \times 10^{-27} \text{ kg}$$

Mass of protons produced by electrolysis in this experiment is,

$$\text{mass}_{H^+} = 1.27781774 \times 10^{-5} \text{ kg} \quad (17)$$

$$\frac{\text{mass}_g}{Q} = \frac{1.27781774 \times 10^{-5}}{1224.0} = \frac{1.672622216 \times 10^{-27}}{1.60217653 \times 10^{-19}} \text{ kg/C} \quad (18)$$

Clearly, the charge Q of 1224 coulombs produced protons that accumulate at the cathode in the same mass to charge ratio of a proton.[see Eq.(18)]

Experimental Evidence Unifying Electrical and Gravitational Energies:

If the gravitational and electric energies are equal,

$$\frac{GMm}{R} = \frac{kQq}{R} \quad (19)$$

$$M^2 = \frac{kQQ}{G} = \frac{8.987551787 \times 10^9 \times 1224.0^2}{6.6742 \times 10^{-11}}$$

$$M = 1.420373341 \times 10^{13} \text{ kg} \quad (20)$$

The assumption in Eq.(19) is valid since Eq.(20) gives the mass of ether in Eq.(10).

This etheric mass divided by the number of charges in Eq.(6),

$$\text{Ether}_{kg} = \frac{1.420373347 \times 10^{13}}{7.639607603 \times 10^{21}}$$

Yields the etheric component of the two mass body,

$$\text{Ether}_{kg} = 1.859222909 \times 10^{-9} \text{ kg} \quad (21)$$

Thus the electric charge is related to the etheric mass and Coulomb's equation produces the same energy value as Newton's equation.

Solution 3:

Utilizing the ideal gas equation,

$$mc^2 = nRT \quad (22)$$

$$mc^2 = 1.420373347 \times 10^{13} \times 8.987551787 \times 10^{16} \text{ J}$$

$$mc^2 = 1.276567901 \times 10^{30} \text{ J} \quad (21)$$

$$nRT = 4 \times 0.003171466313 \times 8.314578297 \times 10^{-13} \times T \text{ J}$$

$$T = 1.210273708 \times 10^{44} \text{ N} \quad (23)$$

Absolute or Kelvin Temperature or Thermodynamic Temperature is Force or Energy per radial meter of Ether.

$$E = mc^2 = 1.346611109 \times 10^{27} \times 8.987551787 \times 10^{16} \text{ J}$$

$$E = T = 1.210273708 \times 10^{44} \text{ N} \quad (24)$$

Conclusions

The true nature of charge is thus conclusively evinced in this paper by three methods. Charge is a measure of etheric mass. All calculations are derived from experimental data obtained from electrolysis of water.

Absolute or Kelvin or Thermodynamic temperature is force.

The force due to ether is of a huge order of 10^{44} newtons per radial meter. It may be useful to recall that the force between photons is 29.05350661 newtons.

Elementary charge, q_e , squared is a measure of a dynamic photon or electron. Charge, Q , the measure of electric charge is due to etheric mass.

S.I. Values CODATA Recommended

Parentheses indicate uncertainty in the last digits of the value.

Descriptor, Symbol	Value, Units
Elementary charge, q_e or e	$1.602176537 \times 10^{-19} \text{ C}$
Proton mass	$1.672621637 \times 10^{-27} \text{ kg}$

References

- [1] F.V. Fernandes, *Photo-Electric Conversions*, Parts 1, 2, 3, 4, 5, & 6

Photo-Electric Conversions:

Part 8: The Foundation of Physical Constants

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A neat way to validate the correctness of an equation is through the process of dimensional analysis. I have, through dimensional analysis, expressed well known physical parameters or units in their simplified form. The Boltzmann's constant is proven to be radial length of a photon body. Absolute or Kelvin temperature is proven to be a force. The magnetic permeability, μ_o , of free space is shown to be dimensionless. The electric permittivity, ϵ_o , of free space is related with squared surface tangential velocity of an electron. Ampere squared is proven to be force, and voltage to be acceleration of a photon body. Charge squared, q^2 , is shown to be the mass of a photon pulsating at a mean volumetric radius. The reason for simplifying the derived units for Kelvin temperature, magnetic permeability, electric permittivity, ampere, charge squared, and voltage is to demonstrate that they are all founded in photo-electrodynamics.

Introduction

Dimensional Analysis

An equation describing physical quantities will be valid only if the quantities have the same base dimensions on both sides of the equal sign, in which case the equation is said to be dimensionally homogenous. This property of dimensional homogeneity can be useful for examining units of equations, converting between two derived sets of units, and defining dimensionless relationships. All physical phenomena can be described in terms of three base units, namely

L = length, M = mass, T = time.

Charge Squared, q^2

The photon mass or electron mass times the radial distance is shown to be charge squared, q^2 . If we assume that the electrical force due to charge and the centripetal force are equal, then,

$$F = \frac{k \times q \times q}{R^2} = \frac{Mc^2}{R} \quad (1)$$

And then,

$$q^2 = \text{mass of a particle} \times \text{radius of a particle} \times 10^7$$

This equation holds for a photon and an electron.

Just as energy is an effect of a force through a distance, so is charge squared an effect of the mass of a photon pulsating through a distance up to a limit of the classical electron radius.

$$q^2 = M \times R \times 10^7 \quad (2)$$

Dimensional Test

$$F = \frac{k \times q \times q}{R^2} \quad (3)$$

Introducing the value for the dielectric constant, k ,

$$F = \frac{c^2 \times 10^{-7} \times q \times q}{R^2} \quad (4)$$

$$F \times R^2 = c^2 \times 10^{-7} \times q \times q \quad (5)$$

$$q^2 = \frac{F \times R^2 \times 10^7}{c^2} \quad (6)$$

$$q^2 = \left(\frac{ML}{T^2} \right) \left(L^2 \right) \left(\frac{T^2}{L^2} \right) \times 10^7 \quad (7)$$

$$q^2 = M \times L \times 10^7 \text{ [see Eq. (2)]} \quad (8)$$

Thus by the route of dimensional analysis one can conceive of an electron in terms of its mean volumetric radius and mass being the limit of a pulsating photon body. One has to envisage a dynamic model, like a bubble, a photon bubble, whose limits of expansion or contraction are set by the mass and radial parameters of an electron. In this dynamic model the photon or electron mass is exchanged with the etheric mass contained within the boundaries of the bubble. See *Photo-Electric Conversions*, Part 1, "Photon Electrodynamics".

The following two examples are a proof of how charge is conserved by a redistribution of photon mass about a mean volumetric radius.

$$q^2 = \text{mass of a particle} \times \text{radius of a particle} \times 10^7$$

Example 1: Squared charge of the rest mass of an electron.

$$(1.602176537 \times 10^{-19})^2 = 9.1093826 \times 10^{-31} \text{ kg} \times 2.817940325 \times 10^{-15} \times 10^7 \text{ m} \quad (9)$$

Example 2: Charge of $1.602176537 \times 10^{-19} \text{ C}$ for photon mass extant in nascent atoms.

$$(1.602176537 \times 10^{-19})^2 = 1.859222909 \times 10^{-9} \text{ kg} \times 1.380668031 \times 10^{-36} \times 10^7 \text{ m} \quad (10)$$

In other words: if the extant photon mass increases, its mean volumetric radius decreases, and vice versa. This is how charge is conserved. Thus photon mass and photon radius are in an inverse relationship. It must be recalled at this point that an electron is in dynamic equilibrium with a photon body and, moreover, is itself a type of photon.

Source of Boltzmann's Constant

In Eq (10) the value of the photon radius R is 10^{-13} meters less than the value of the Boltzmann's constant, k .

$$k = 1.380668031 \times 10^{-36} \text{ m}, \text{ Boltzmann radius [Eq. (10)]} \quad (11)$$

and

$$k = 1.380668031 \times 10^{-23} \text{ dm}, \text{ Boltzmann's constant} \quad (12)$$

The apparent difference between Boltzmann's constant and the Boltzmann radius is one of units only. In the ideal gas equation, volume is measured in dm^3 or L so that the conversion to meters comes about by a factor of 10^{-3} . The conversion to kilograms from grams is by a factor of 10^{-3} . The factor appearing in the equation for charge squared is 10^{-7} so the powers add up to 10^{-13} . Thus the Boltzmann constant is identical with the photon radius, or *Boltzmann radius*, associated with the two mass body.

Redefining Temperature as Force

Method One

Let us begin with the *ideal gas equation*, where pressure in pascals is P , volume is V in dm^3 , or liters, L , moles is n , and T is absolute temperature in kelvins.

Moles, n , are defined as the ratio of mass in grams and relative atomic mass, A_r or molecular mass, M_r expressed in grams, g . Mathematically the equations can be expressed as

$$n = \frac{g}{A_r}, \text{ or } n = \frac{g}{M_r}$$

Since both numerator and denominator are in grams, the derived mole, n , turns out to be a dimensionless unit. Similarly, Avogadro number, A_N , defines one mole of substance and is dimensionless.

Consider the ideal gas equation,

$$P V = n k T$$

On the left hand side of the ideal gas equation is energy equal to pressure, P , times volume, V . On the right hand side of the equation Boltzmann's constant, k , times absolute temperature, T yields energy. It must be remembered that Boltzmann's constant, k , was determined to be the radius of the two mass body [Eq. (10)]. Since moles n , has no units, temperature, T , must be defined as force.

$$\text{Pressure} \times \text{Volume} = \text{moles} \times \text{Distance} \times \text{Force}$$

$$\text{Energy} = \text{moles} \times \text{Energy}$$

$$\text{Energy} = \text{Energy, since Energy as moles has no units}$$

The dimensional analysis of the ideal gas equation reveals absolute or Kelvin temperature to be force.

$$P V = n k T \quad (14)$$

$$(ML^{-1}T^{-2})L^3 = L \times \text{temperature} \quad (15)$$

$$MLT^{-2} = \text{temperature} = \text{force} \quad (16)$$

The dimensions on the left hand side of the above equation equaling temperature represent the force quantity [see Table I]

Method Two

In Method One, Kelvin temperature, T , is shown to be force. In the following dimensional analysis of the ideal gas equation Kelvin temperature, T , is now shown to be a particle accelerating about a distance equal to Boltzmann's constant.

Another form of the ideal gas equation is shown below

$$M v^2 = 3 R T \quad (17)$$

Here, m is relative atomic mass or relative molecular mass; v , the root mean velocity; R is the molar gas constant equaling Boltzmann's constant, k , times Avogadro's number, A_N , and T , is Kelvin temperature.

Another well established equation is

$$P = h \rho g \quad (18)$$

where P is pressure, ρ is density and g is acceleration due to gravity and h , is length of displacement of a particle.

By replacing density, ρ , with relative molecular mass, Mr , divided by volume, V , and rearranging terms, we arrive at

$$P V = h \times Mr \times g \quad (19)$$

By equating $P V = h \times Mr \times g$, with $P V = n R T$,

$$h \times Mr \times g = n R T \quad (20)$$

For one mole, n is 1, hence,

$$h \times Mr \times g = R T \quad (21)$$

Dividing both sides by Avogadro's number where M is now the mass of one particle,

$$h \times M \times g = k T \quad (22)$$

Rearranging terms we find that

$$T = \frac{h M g}{k} \quad (23)$$

$$T = (\text{meters} \times \text{kilograms} \times \text{acceleration}) / \text{meters}$$

$$T = \text{mass in kilograms} \times \text{acceleration} \quad (24)$$

$$T = \text{Force}$$

Absolute temperature, T , is thus redefined as energy of a particle under scrutiny over a distance of k , the *Boltzmann radius* in decimeters.

Absolute temperature, T , is redefined as force times the radial distance of the two mass photon body [Eq. (10)]

Furthermore, by way of dimensional analysis, absolute temperature, T , is proven to be force.

$$T = \frac{h M g}{k} \quad [\text{see Eq. (23)}]$$

$$\text{Temperature} = L \times M \times \frac{L}{T^2} \times \frac{1}{L} \quad [\text{see Eq. (16)}]$$

$$M L T^{-2} = \text{temperature} = \text{force} \quad [\text{see Table 1}]$$

Magnetic Permeability: a Solid Angle

μ_o is the symbol for magnetic permeability of free space.

$$\mu_o = 4 \pi \times 10^{-7} \text{ newton per amp}^2, \text{ or, } N \cdot A^{-2}$$

$$\frac{M v}{t} = \text{force} \quad (25)$$

Substituting the units for force and ampere squared, yields

$$\mu_o = \frac{\text{force}}{\text{amp}^2} = \frac{M v}{t} \times \frac{t^2}{q^2} \quad (26)$$

$$\mu_o = \frac{M v}{t} \times \frac{t^2}{M \times R \times 10^{-7}} \quad (27)$$

Substitute velocity, $v = \frac{4 \pi R}{t}$ into Eq. (27).

Velocity, v , is the phase velocity of a spherical wave front presenting a surface of $4 \pi R$ in time, t [see Eq. (41)].

$$\mu_o = \frac{(M \times 4 \pi R)}{(t \times t)} \times \frac{(t^2)}{(M \times R \times 10^{-7})} \quad (28)$$

$$\mu_o = 4 \pi \times 10^{-7} \quad (29)$$

The magnetic permeability of free space, μ_o is equal to $4 \pi \times 10^{-7}$ and has no units. What this means is that the magnetic permeability of free space is a tiny angle of $4 \pi \times 10^{-7}$ which is a solid angle subtended by the photon body pulsating about a central fixed point.

The specified units for μ_o are newtons per ampere squared.

$$\mu_o = \frac{\text{force}}{\text{amp}^2} = \frac{M v}{t} \times \frac{t^2}{q^2} \quad [\text{see Eq. (26)}]$$

$$\mu_o = M L T^{-2} \times \frac{T^2}{M L} \quad (30)$$

Notice that all terms cancel, leaving μ_o as a dimensionless constant.

Ampere Squared is Force

If magnetic permeability, μ_o , is dimensionless, ampere squared ampere squared must be in newtons. In other words, ampere squared is force.

There is a second method to prove that ampere squared is force.

$$q = I \times t \quad (31)$$

Squaring both sides and rearranging terms,

$$I^2 = \frac{q^2}{t^2} \quad (32)$$

Substituting for charge squared,

$$I^2 = \frac{M \times R \times 10^7}{t^2} \quad (33)$$

Acceleration, a , introduced for $\frac{R \times 10^7}{t^2}$,

$$I^2 = M \times a \quad (34)$$

$$I^2 = F, \text{ force} \quad (35)$$

What this means is that ampere squared in electricity is directly related to the acceleration, a , of a photon mass, M .

Electric Permittivity, ϵ_0 , is Inverse Velocity Squared

Utilizing the equation for magnetic permeability, μ_0 , and deriving further,

$$\mu_0 = \frac{N}{A^2} \quad (36)$$

Introducing charge squared per unit time period squared,

$$4\pi \times 10^{-7} = \frac{F \times t^2}{M \times R \times 10^7} \quad (37)$$

Rearranging terms for force, F ,

$$F = \frac{4\pi \times M \times R}{t^2} \quad (38)$$

$$F = M \times a = \frac{4\pi \times M \times R}{t^2} \quad (39)$$

$$a = \frac{4\pi R}{t^2} \quad (40)$$

The above derivation clearly describes acceleration, a , of a photon or electron as the velocity, v , of the radial surface front, $4\pi R$, in a given time period, t . Since acceleration, a , is velocity divided by time, t , velocity, v , is

$$v = \frac{4\pi R}{t} \text{ or surface tangential velocity.} \quad (41)$$

Example: Let us consider an electron

$$F = M \times a \quad (42)$$

Substituting the value of force, F , from the force in charge couplets [see *Photo-Electric Conversions*, Part 1 Eq. (13)] and solving for acceleration, a , yields,

$$a = \frac{29.053507}{9.11 \times 10^{-31}} \quad (43)$$

The acceleration of an electron is calculated to be,

$$a = 3.1894 \times 10^{31} \text{ m} \cdot \text{s}^{-2} \quad (44)$$

Utilizing Eq (40) and rearranging for time period squared, t^2 ,

$$t^2 = \frac{4\pi R}{a} = \frac{4\pi \times 2.8179 \times 10^{-15}}{3.1894 \times 10^{31}} \quad (45)$$

$$t^2 = 1.11 \times 10^{-45} \quad (46)$$

$$t = 3.332 \times 10^{-23} \text{ s} \quad (47)$$

The acceleration, a , of a photon or electron body is computed from the mean time period, t , of a pulsating photon/electron body. This acceleration is the ultimate descriptor for pulsate motion or surface tangential motion.

The *surface tangential velocity* [see Eq (41)] for an electron body is calculated as follows,

$$v = \frac{4\pi R}{t}$$

$$v = \frac{4\pi \times 2.8179 \times 10^{-15}}{3.332 \times 10^{-23}} \quad (48)$$

$$v = 10.627 \times 10^8 \text{ m} \cdot \text{s}^{-1} \quad (49)$$

Squaring both sides,

$$v^2 = 112.941 \times 10^{16} \text{ m}^2 \cdot \text{s}^{-2} \quad (50)$$

The value of $v^2 = 112.941 \times 10^{16} \text{ m}^2 \cdot \text{s}^{-2}$ can be expressed as,

$$v^2 = 4\pi \times c^2 \quad (51)$$

Plugging in the value of electric permittivity of free space, ϵ_0 as represented below,

$$\epsilon_0 = \frac{1}{4\pi \times 10^{-7} \times c^2} \quad (52)$$

[into Eq. (51)] yields,

$$v^2 = \frac{1}{\epsilon_0 \times 10^{-7}} \quad (53)$$

Rearranging terms in the above equation depicts ϵ_0 as,

$$\epsilon_o = \frac{1}{v^2 \times 10^{-7}} \quad (54)$$

The electrical permittivity of free space, ϵ_o , is an inverse squared relationship. Thus, ϵ_o is shown to be related to the velocity squared of a radial front of an electron body.

Voltage, V, is Acceleration

The electron volt energy is converted to joules.

$$eV \times e = J \quad (55)$$

$$V = \frac{J}{e^2} \quad (56)$$

Substituting the value of e^2 [see Eq. (2)] yields,

$$V = \frac{Mc^2}{M \times R \times 10^7} \quad (57)$$

$$V = \frac{MR^2}{M \times t^2 \times R \times 10^7} \quad (58)$$

$$V = \frac{R}{t^2 \times 10^7} \quad (59)$$

Dimensional analysis reveals that voltage, V , is acceleration, a .

$$V = \frac{L}{T^2 \times 10^{-7}} \quad (60)$$

$$V = LT^{-2} \times 10^7 \text{ [See Table 1]} \quad (61)$$

$$V = a \times 10^{-7} \quad (62)$$

In Eq. (40) acceleration, a , is shown to be,

$$a = \frac{4\pi R}{t^2}$$

Voltage is thus acceleration of the surface of a pulsating photon body.

Conclusion

It is important to simplify units to fundamentals of mass, length, and time. This brings in simplicity and taps the root out of which reality emanates. And I have thus succeeded in bringing the parameters of mass, length, and time to describe a dynamic photon body.

Absolute or Kelvin temperature, T , has been shown to be a measure of force and it is also shown that this force times Boltzmann's constant, k , equals energy. Boltzmann's constant, k , is the mean volumetric radius of the two mass body described in

Part 1; thus the source of temperature herein determined to be force is emanating from a photon body.

A natural consequence of the empirically determined Boltzmann's constant is that it corresponds to the radius of the two mass body 1.86×10^{-9} kg squared and is referred to as the *Boltzmann radius*.

Temperature is defined as being proportional to the average kinetic energy of a body. This is on a macro scale where atomic mass or molecular mass in motion is measured as temperature. The velocity squared is measured experimentally and kinetic energy determined. On the atomic scale, a photon body is also pulsating and can be measured in terms of an equivalent energy whose force is now shown to be Kelvin temperature.

Now, the force we call Kelvin temperature is in reality due to the atomic or molecular mass accelerating through a distance equal to Boltzmann's constant of 1.38×10^{-23} decimeters. Another clarification is the understanding of the unit of amount of substance-mole. The mole is clearly demonstrated to be a dimensionless unit. The mole depicts amount of substance in terms of its number of particles. Furthermore, the cluster of particles measure as mass and volume. Absolute or Kelvin temperature, T , has been shown to be a measure of force and it is also shown that this force times Boltzmann's constant, k , equals energy. A dimensionless mole simplifies " $k \times T$ " as energy.

Magnetic permeability of free space is shown to be a solid angle and is dimensionless. Consequently, the term permeability is a misnomer because it creates the notion of a material permeating space. Rather what is actually being depicted by $\mu_o = 4\pi \times 10^{-7}$ is volume bounded by a solid angle up to a mean volumetric radius of a photon body.

Once again, the photon body is a source of electric permittivity, $\epsilon_o = \frac{1}{v^2 \times 10^{-7}}$. Electric permittivity of free space is thus related to the inverse of velocity squared, where the velocity is surface tangential velocity. Furthermore, surface tangential velocity, $v = \frac{4\pi R}{t}$ is a descriptor of a photon body whose surface creates a

wave front traveling at velocity, v .

By dimensional analysis voltage is shown to be acceleration. This provides a new perspective about an old symbol, V . An avenue is chalked out for unifying electricity with the photon body rather than limiting its provenance to the more nebulous understanding of moving charges. Charge squared is mathematically shown to be a photon mass pulsating about a mean volumetric radius

Ampere squared is shown to be force. Again, this force is related to charge squared per unit time squared. Thus, the force describing amperes squared can also be found to be associated with the photon.

Simplification (or deconstruction) through dimensional analysis of the imputed fundamental physical units into basic units of mass length and time is essential to unlocking the physical reality they represent. The terms, force, solid angle, velocity, acceleration, mass and length are part of standard scientific vocabulary and are mathematically founded. Terms such as temperature, magnetic permeability, electric permittivity, voltage, ampere, and charge are experimentally derived terms

and are supposed to imply meaning and feeling to the physical reality they represent. Using the dimensional test, I have examined these experimentally derived terms and deconstructed their mathematical embodiment to mass, length and time. Moreover, the units of mass, length, and time converge at a photon body, the foundation of all the physical constants.

The Boltzmann constant is a radial length parameter herein called the Boltzmann radius. This text is an acknowledgement to the remarkable work of Ludwig Boltzmann.

Table 1. Derived Units & Corresponding Base Units

Quantity	SI Unit	Base Units	Dimension
Velocity	m/s	ms ⁻¹	LT^{-1}
acceleration	m/s ²	ms ⁻²	LT^{-2}
Force	N kg m/s ²	kg ms ⁻²	MLT^{-2}
energy (or work)	J N m, kg m ² /s ²	kg m ² s ⁻²	ML^2T^{-2}

Table 2. Summary of Fundamental Constants

Physical Constant	Unit	Formula	Dimension	Photon
Charge squared, q^2	C^2	$q^2 = M \times R \times 10^7$	ML	Mass \times Radius
Moles, n	—	A_R, M_R expressed in g A_N of particles 6.02×10^{23} 23.0 dm ³ at room temp	Dimensionless	Number of particles
Kelvin temperature, T	K	$T = \frac{PV}{nRT}$	MLT^{-2}	Force = $\frac{\text{Mass} \times \text{Radius}}{\text{Time period}^2}$
Magnetic permeability, μ_0	NA^{-2}	$\mu_0 = 4\pi \times 10^{-7}$	Dimensionless	Solid angle
Ampere squared, I^2	$A^2 = C^2T^{-2}$	$I^2 = \frac{Q^2}{T^2}$	MLT^{-2}	Force
Electric permittivity, ϵ_0	$N^{-1}A^2T^2L^{-2}$	$\epsilon_0 = \frac{1}{\mu_0 C^2}$	$L^{-2}T^2$	Inverse velocity squared
Voltage, V	$V = JC^{-1}$	$V = \frac{W}{Q}$	LT^{-2}	Acceleration