I have already shown the rate of change of the kinetic energy with respect to the rate of change of the momentum is equal to the speed of sound. Therefore, I can write:

$$v_p = v_s$$

This says the free electrons in a metal, those producing electromagnetic radiation, move at the speed of sound. For an electron in space v_p may be a variable, but not for an electron roaming relatively free inside a metal. For example, electrons inside an antenna are suggested to be roaming randomly around at the speed of sound.

When a potential is applied to the antenna, some of these electrons are impacted by incoming energetic photons. The electrons accelerate in an organized manner by the same average incremental amount. When they are accelerated they cause other photons to carry away their incremental change in velocity. This explanation is a simplified interpretation I offer to suffice for now.

In order to support this idea as applying to at least the solid materials in general, I will use the speed of sound in glass to calculate the magnetic permeability of glass. I use the formula:

$$\mu = \frac{v_s}{v_c}$$

The typical speed of sound in glass is:

$$v_{sGL} = 6.0\text{x}10^3 \ \frac{\text{meters}}{\text{second}}$$

Substituting this into the equation above:

$$\mu = \frac{v_s}{v_c} = \frac{6.0\text{x}10^3 \ \frac{\text{m}}{\text{sec}}}{3.0\text{x}10^8 \ \frac{\text{m}}{\text{sec}}} = 2.0\text{x}10^{-5}$$

This is the correct magnetic permeability of glass. I will perform the analogous calculation for the metals of gold, copper, and steel. The speed of sound in gold is:

$$v_{sAU} = 2.0\text{x}10^3 \frac{\text{meters}}{\text{second}}$$

Substituting:

$$\mu_{AU} = \frac{2.0\text{x}10^3 \ \frac{\text{m}}{\text{sec}}}{3.0\text{x}10^8 \ \frac{\text{m}}{\text{sec}}} = 6.7\text{x}10^{-6}$$

The speed of sound in copper is:

$$v_{sCU} = 3.5\text{x}10^{3}\ \frac{\text{meters}}{\text{second}}$$

Substituting:

$$\mu_{CU} = \frac{3.5\text{x}10^{3}\ \frac{\text{m}}{\text{sec}}}{3.0\text{x}10^{8}\ \frac{\text{m}}{\text{sec}}} = 1.2\text{x}10^{-5}$$

The speed of sound in steel is:

$$v_{sST} = 5.0\text{x}10^{3}\ \frac{\text{meters}}{\text{second}}$$

Substituting:

$$\mu_{ST} = \frac{5.0\text{x}10^{3}\frac{\text{m}}{\text{sec}}}{3.0\text{x}10^{8}\frac{\text{m}}{\text{sec}}} = 1.7\text{x}10^{-5}$$

Each of these answers gives the empirically measured value of magnetic permeability of the material in question.

The relationship developed between the speed of sound and both electrical permittivity and magnetic permeability allows for the speed of sound to be theoretically introduced into the dynamics of a single atom. The force attracting the first energy level electron is given by:

$$f_{\xi e1} = \frac{q^{2}}{4\pi\varepsilon r_{1}^{2}} = \frac{\Delta t_{c}^{2}}{4\pi\varepsilon\Delta x_{c}^{2}} = \frac{1}{4\pi\varepsilon v_{c}^{2}}$$

I have derived:

$$\varepsilon = \frac{1}{v_{s}v_{c}}$$

Substituting:

$$f_{\xi e1} = \frac{v_{s}v_{c}}{4\pi v_{c}^{2}} = \frac{v_{s}}{4\pi v_{c}}$$

This equation suggests the existence of a relationship between the speed of sound and a single atom. I will wait until a later time to interpret this result. There is, however, a very important immediate use for this formula. It shows force is dimensionless. The units of velocity cancel each other out.

This result presents a profound opportunity for expanding this new theory of physics. The first step in pursuing this opportunity for discovery is to see how a unit free definition of force can be used to define new units for other physical phenomena.

Defining the Units of Physics

Force is a pure number. How could something as physically real as force be free of units? The answer lies in following this lead to its logical conclusion. Newton's force formula is:

$$f = ma$$

It follows that: If force is dimensionless, then, the units of mass must be the inverse of acceleration. What acceleration is represented by mass? The answer is that mass consists only of acceleration. It is the acceleration of light that defines the existence of any particle.

What is being shown here is that mass both experiences acceleration and causes acceleration. In other words, acceleration comes from acceleration. The only given in the universe is the cause of a change of velocity of light. Everything else results from it. We have used the units of kilograms to represent the units of mass. However, this has always been known to be another name for how the acceleration of one mass compares to the acceleration of another mass.

Our concept of mass is a representation of the effect each particle has upon the acceleration of light. Force is defined by comparing, by means of a ratio, the particle's own acceleration to its acceleration of light. If the units of mass change, then, the units of energy and momentum also change. The definition of kinetic energy is:

$$E_K = \frac{1}{2} m v_p^2$$

And the definition of remote observer gravitational potential energy is:

$$E_p = \frac{1}{2} m v_c^2$$

If the mass in these equations is given the units of inverse acceleration, then it follows that the units of energy reduce down to meters. In its simplest form energy is a measure of a distance:

$$\mathrm{E_{units}} = \frac{1}{\frac{\mathrm{m}}{\mathrm{sec}^2}} \frac{\mathrm{m}^2}{\mathrm{sec}^2} = \mathrm{meters}$$

An expression of momentum is:

$$\mathrm{P} = \mathrm{mv_p}$$

Substituting the new units of mass:

$$\mathrm{P_{units}} = \frac{1}{\frac{\mathrm{m}}{\mathrm{sec}^2}} \frac{\mathrm{m}}{\mathrm{sec}} = \mathrm{seconds}$$

The new unit of measurement for momentum is seconds. All other units can now be derived from those given above. For example, the electric field is defined as:

$$\xi = \frac{\mathrm{d}^2\mathrm{E}}{\mathrm{dx_p dt_c}}$$

The new units of electric field are:

$$\xi_{\mathrm{units}} = \frac{\mathrm{m}}{\mathrm{m} \cdot \mathrm{sec}} = \mathrm{seconds}^{-1}$$

For the magnetic field:

$$\mathrm{H} = \frac{\mathrm{d}^2\mathrm{P}}{\mathrm{dx_p dt_c}}$$

The new units of magnetic field are:

$$\mathrm{H_{units}} = \frac{\mathrm{sec}}{\mathrm{m} \cdot \mathrm{sec}} = \mathrm{meters}^{-1}$$

Electric current has the units of:

$$\mathrm{I_{units}} = \frac{\mathrm{coul}}{\mathrm{sec}} = \frac{\mathrm{sec}}{\mathrm{sec}}$$

Planck's constant has the units of:

$$\mathrm{Planck_{units}} = \mathrm{joule} \cdot \mathrm{seconds} = \mathrm{meters} \cdot \mathrm{seconds}$$

Another interesting change, that I will soon interpret and support, is the new units of the universal gravitational constant. The common units for this constant are:

$$G_{units} = \frac{\text{newtons} \cdot \text{meters}^2}{\text{kilogram}^2}$$

Since force is dimensionless, then newtons no longer exist. The units of kilograms are now the inverse of acceleration. Making these substitutions:

$$G_{units} = \left(\frac{\text{meters}}{\text{second}}\right)^4$$

Or perhaps it will prove instructive to use acceleration times distance, the quantity squared:

$$G_{units} = \left(\frac{\text{meters}}{\text{second}^2} \cdot \text{meters}\right)^2$$

In any case, the implementation of new units for physics gives us a new opportunity to discover new physical meanings for what we are measuring.

Electric Potential

My development of photon electromagnetism has so far been directed from the characteristics of the emitting electron. Once the photon has left, the primary consideration is what will be the effect upon a receiving particle. For simplicity I use another electron as the receiving particle.

For the receiving electron the increment of energy is the same as what was first stored onto the photon:

$$\xi_c = \frac{d^2E}{dx_p dt_c}$$

Therefore, all the quantities in the electric field expression remain valid. The way in which it is interpreted depends upon which electron is being observed. For example, the incremental change in position of the receiving electron is the same as was undergone by the emitting electron. This means dx_p also applies to the receiving electron.

I define the electric potential of the receiving particle due to a single photon as:

$$\phi_c = d\phi = \xi\, dx_p = \frac{dE}{dt_c}$$

This equation says the incremental electric potential applied to the electron is equal to the increment of photon energy divided by the fundamental increment of time.

If photons are arriving one after the other with no delay in between, then I can easily perform the indicated integration:

$$\int_0^{\phi} d\xi = \int_0^{x} \xi \, dx_p = \int_0^{t} \frac{dE}{dt_c}$$

For which the solution is:

$$\phi = \xi x = \frac{E}{t}$$

This equation says: The potential energy of an electron moving a distance x away from the emitting electron will equal the total of energy emitted by that electron during the time period it takes for the receiving electron to complete the move. I am assuming, for simplicity, the emission of a continuous stream of photons, all of which are received by the electron.

The units of electric potential are commonly defined as those of potential energy per unit of electric charge. It can be seen from the above result that the new units are those of potential energy per unit of time, or electric field times distance. The new units for electric potential are:

$$\phi_{units} = \frac{\text{meters}}{\text{second}}$$

Although the units are those of velocity, it can be read as energy per unit of time.

Magnetic Field Varying With Distance

I need to complete the electromagnetic radiation equations. I will now offer another analogy to a Maxwell equation. The Maxwell equation, I have in mind here, is:

$$\frac{dH}{dx} = -\varepsilon \frac{d\xi}{dt}$$

I have derived:

$$\xi = \frac{d^2E}{dx_p dt_c}$$

Taking another derivative with respect to time gives:

$$\frac{d\xi}{dt_c} = \frac{d^3E}{dx_p dt_c^2}$$

I have also derived:

$$H = \frac{d^2P}{dx_p dt_c}$$

Taking another derivative with respect to photon length:

$$\frac{dH}{dx_c} = \frac{d^3P}{dx_p dx_c dt_c}$$

I use Maxwell's equation as a guide and write:

$$\frac{d^3P}{dx_p dx_c dt_c} = -\varepsilon \frac{d^3E}{dx_p dt_c^2}$$

Now substituting a result previously derived for electrical permittivity:

$$\frac{d^3P}{dx_p dx_c dt_c} = -\frac{1}{v_s v_c} \frac{d^3E}{dx_p dt_c^2}$$

I offer this equation as being analogous to the Maxwell equation.

Origin of Atomic Electric Effects

This theory does not use either an electric field or magnetic field. There is no fundamental electric force. Even electric charge has been discarded. Instead, electrical and magnetic effects are the result of the acceleration of particular particles of matter. These particles transfer increments of their changes of velocity to photons.

It follows, if such particles are not undergoing a change of velocity, then they have no electric or magnetic effects. For example, if an electron and a proton were passing each other at constant velocities, and if neither of them were accelerated by photons, then they would experience no electrical attraction toward each other.

They work together properly when they are formed into a hydrogen atom only because they are already undergoing acceleration. They then trade a stored form of this change of velocity back and forth between themselves. The acceleration they achieve has its origin in the normal rate of change of the speed of light due to mass. In other words, the same effect we interpret as gravity also causes electrical force. The difference is that for the electric effect the acceleration of light has become stored onto the photon by virtue of its tilt.

ELECTRON ATOMIC ENERGY LEVELS

Modern physics has found it useful to define physical existence in two different ways. One way to define certain physical properties is to use frequency and wavelength. These properties have been interpreted as belonging uniquely to the description of a wave phenomenon.

A second way to define other important physical properties is to use energy and momentum. These two properties are themselves defined with the use of mass. The concept of mass has been interpreted as belonging uniquely to the description of a particle phenomenon.

Wave-Particle Duality

The basis of quantum physics is the belief that everything material in the universe has both of these two natures. This belief is named wave-particle duality. It is known empirically that the effects attributed to the wave nature, and the effects attributed to the particle nature do not exist simultaneously. They are aptly described as mutually exclusive.

Electromagnetic radiation was first believed to consist of only a wave nature. With the discovery of the photoelectric effect, which is the emission of electrons caused by electromagnetic radiation, it appeared necessary to consider light as also having a particle nature. Einstein suggested this duality of a wave nature and a particle nature, and he used the term photon for the particle nature of electromagnetic radiation.

The initial interpretation was that electromagnetic radiation could, for some purposes, be considered to consist of discrete packets or quanta of energy. These quanta of energy were observed to interact with particles of matter in a manner consistent with themselves being particles. The particle nature of electromagnetic radiation, however, remains fundamentally different from the particle nature of matter.

Photons are particles that move at the speed of light. Material particles, on the other hand, cannot move at the speed of light, and may move at any speed below it. So, even though photons are called the particle representation of electromagnetic radiation, they are not yet theoretically united with the type of particles constituting matter.

The idea of wave-particle duality has become a cornerstone of theoretical physics. There have resulted from this idea some mathematical representations that would appear to allow for the conclusion that these two particle natures could possibly be united. This is the case for the de Broglie relation. The de Broglie relation was a fundamental step in the development of a wave nature for matter. Therefore, it will be examined from the perspective of this new theory.

De Broglie Relation

The de Broglie relation makes successful predictions of the stable energy levels for electrons orbiting a nucleus. The formulation of the de Broglie relation is a fundamental application of the theory of wave-particle duality to a material particle. It begins with the assumption that since electromagnetic radiation appears to have a particle nature, particles of matter might in turn have a wave nature.

The relation does not establish a wave nature for particles of matter; however, it assumes this to be true from the beginning. The way in which it incorporates this assumption is to assign the existence of a wavelength to the particle. The de Broglie relation is expressed as:

$$\lambda = \frac{h}{P}$$

It says the wavelength of a particle is equal to Planck's constant divided by the momentum of the particle.

The relation can be described as having two distinct parts. The left side represents a wavelength that can only make sense when describing a wave nature. The right side of the equation contains momentum, descriptive of a property belonging to a particle. So, this simple formula is putting together the two natures of wave and particle.

For this new theory, the concept of a wavelength has no direct physical reality. Yet, quantum physics has been very useful in the analysis of atomic scale phenomena. There is empirical support for the concept of a wavelength for particles. For example, particles exhibit diffraction properties considered unique to a wave nature. Therefore, it is essential that I address the wave phenomenon.

At this time, I will deal with just a part of this phenomenon. The specific analysis will concern the connection between wavelength, frequency and atomic energy levels. I will analyze the de Broglie relation, and explain what this relation is actually describing. Then, I will use this new theory to give a new physical basis for the prediction of atomic energy levels.

The analysis of the de Broglie relation needs to begin with a reconsideration of Einstein's quantum interpretation of electromagnetic energy. The formula for equating energy and frequency already existed:

$$E_{Kc} = h\omega$$

It says the energy of electromagnetic radiation is proportional to its frequency. Einstein concluded from empirical evidence that electromagnetic energy could be considered to be traveling in discrete packets or quanta. He then applied his own energy equation to the analysis of the problem:

$$E = mC^2$$

He deduced: Since these packets contained energy, then his own energy formula implied they would also have a corresponding value of some property represented by what I will call relativity mass. This application of his energy equation says a photon can be represented as a particle having this relativity mass m moving always at the speed of light. Einstein accepted that photons are never at rest; therefore, he concluded they have no rest mass.

I have shown earlier that Einstein’s theory of the mass term for photons, does not lead to incorrect predictions so long as we are considering energy relationships. However, the error becomes apparent when calculations are made in terms of momentum. Einstein used momentum in its conventional sense:

$$P = mv$$

Here it matters greatly what velocity is used. The problem arises because Einstein deduced the correct magnitude for velocity to use when expressing photon momentum is the speed of light. I have already dealt with this matter earlier; however, it is useful to point out in this context that Einstein’s error leads to the prediction that photon momentum, for a given energy content, exceeds particle momentum.

The de Broglie relation also uses momentum, and I will show how this problem of photon momentum is related to de Broglie's relation. Einstein defined photon momentum as:

$$P = \frac{E}{C} = \frac{mC^2}{C} = mC$$

The frequency of the photon is given by:

$$\omega = \frac{E}{h} = \frac{mC^2}{h}$$

The wavelength of the photon is given by:

$$\lambda = \frac{C}{\omega} = \frac{C}{\frac{mC^2}{h}} = \frac{h}{mC} = \frac{h}{P}$$

De Broglie reasoned: Since light has both a wave and particle nature, then perhaps particles of matter also have a wave nature. The manner in which he moved from the idea of a wavelength for light to a wavelength for a particle was to allow the P in the above equation to represent momentum in general.

Since the expression for momentum is not correct, then de Broglie's use of it should be expected to fail. Regardless of the faulty equation he started with, his idea appeared to work. I need to show why this idea appears to work. Then, I will derive the new wavelength formulas for this new theory.

In order to give a physical interpretation to what de Broglie did, I will use the example of an electron moving in a circle. I am not including, for now, a nucleus at the center of the orbit because an electron in a stable orbit is said to not radiate energy. I will use only the electron, which can radiate energy, moving in a circular path.

I hypothetically assume the photons are emitted from the electron in a singular direction, one after another without interruption. These photons, if seen, would be traveling through space at the speed of light and in the formation of a sine wave. The wavelength, as depicted by the photon formation, is representative of our macroscopic idea of a wavelength.

The wavelength of this sine wave formation is the distance an individual photon travels while the formation moves through one cycle. The cycle of the formation corresponds to one cycle for the electron. The wavelength of the photon formation is given by:

$$\lambda_c = \frac{hC}{E_{Kc}} = \frac{h}{P_c}$$

The wavelength of the emitted photons will change with a change in electron speed. The photon wavelength is inversely proportional to the velocity of the electron.

If we define the electron as having a wavelength, then it would have to be the circumference of the circular path in which it moves. The wavelength of the electron is:

$$\lambda_e = \frac{hv_e}{E_e} = \frac{h}{P_e}$$

The calculation of the electron wavelength is only the calculation of the circumference of its circle. Its circumference gives no physical basis for explaining diffraction and interference effects.

There has to be a clear physical explanation for an electron to exhibit these two effects; renaming its orbital circumference, as the wavelength of its wave nature, gives no insight into a possible explanation. The real explanation will have to do with the nature of photons, and that a particle of matter has an equal but opposite reaction to the effect exerted on it by photons.

The formula given above is written in a form that expresses wavelength as a function of electron momentum. However, the photon wavelength formula given before it contains an expression that falsely represents photon momentum. I have shown photon momentum is not a function of the velocity of light.

Therefore, the photon formula written in a form purporting to show wavelength as a function of momentum is an error. De Broglie's transference of the form of the photon equation onto the electron equation works because an error is corrected. The velocity of the particle involved is the correct velocity to use.

This action taken by de Broglie was physically and mathematically unwarranted. It was a purely intuitive step that unknowingly compensated for the error of Einstein. The important part of the problem did not go away.

The import of de Broglie’s relation is the defining of the circumference of the electron's cycle as wavelength and then solving for it. Changing the name of the circumference does not explain wave phenomenon. This new theory needs to show how it can predict atomic energy levels.

First Atomic Energy Level

For this theory there is no wave nature type of wavelength for either a photon or a particle. The prediction of stable electron orbits must be derived from the acceleration of light. In this case, it is the stored acceleration of light contained within a photon. The radius of orbit of the electron is a function of photon length. There is no other means for either measuring or for communicating between particles. The electron energy levels are predicted, in this theory, by assigning them to orbits with radii equal to integer numbers of photon lengths.

I will move from the concept of wavelength to the concept of photon energy. I wish to begin with an expression of photon wavelength and use it to develop an expression of photon energy in terms of electron energy. In order to proceed, it is necessary to correct an error made by Einstein. His equation for the energy of a photon is:

$$E_{Kc} = mC^2$$

I have shown the replacement equation for the energy of a photon emitted by an electron to be:

$$E_{Kc} = m_e v_c \Delta v_{c2}$$

The expression for photon wavelength is:

$$\lambda_c = \frac{hv_c}{E_{Kc}}$$

Substituting my photon energy equation into the photon wavelength equation:

$$\lambda_c = \frac{hv_c}{m_e v_c \Delta v_{c2}} = \frac{h}{m_e \Delta v_{c2}} = \frac{h}{P_c}$$

Where photon momentum is defined as:

$$P_c = m_e \Delta v_{c2}$$

Instead of Einstein's:

$$P_c = m_c C$$

So, the specific description of photon momentum is changed, but the general form of the wavelength equation is retained for now.

The incremental change in v_c and the incremental change in v_{pe} are both measured with respect to the fundamental increment of time. They are a part of the measurement of acceleration. The acceleration of light and particles is always equal but opposite:

$$\Delta v_{c2} = \Delta v_{pe}$$

Substituting this into the wavelength equation:

$$\lambda_c = \frac{h}{m_e \Delta v_{pe}}$$

Next, I need to establish that the electron is in the first energy level of the hydrogen atom. I use the known radial acceleration relation:

$$\frac{\Delta v_{pe}}{\Delta t} = \frac{v_{pe}^2}{r}$$

Using the fundamental increment of time:

$$\frac{\Delta v_{pe}}{\Delta t_c} = \frac{v_{pe}^2}{r}$$

Establishing that the radius of orbit is equal to one photon length:

$$\frac{\Delta v_{pe}}{\Delta t_c} = \frac{v_{pe}^2}{\Delta x_c}$$

Solving for the incremental change in electron velocity:

$$\Delta v_{pe} = \frac{v_{pe}^2}{\Delta x_c} \Delta t_c$$

Since:

$$\frac{\Delta t_c}{\Delta x_c} = \frac{1}{v_c}$$

Then:

$$\Delta v_{pe} = \frac{v_{pe}^2}{v_c}$$

Substituting this into the wavelength formula:

$$\lambda_c = \frac{h v_c}{m_e v_{pe}^2}$$

For the first energy level of the hydrogen atom:

$$v_{pe} = \alpha v_c$$

Substituting:

$$v_{pe} = \frac{h v_c}{m_e \alpha^2 v_c^2} = \frac{h}{m_e \alpha^2 v_c}$$

The energy of the photon is given by:

$$E_{Kc} = \frac{h v_c}{\lambda_c}$$

Substituting the wavelength equation into the energy equation:

$$E_{Kc} = \frac{hv_c}{\frac{h}{m_e\alpha^2 v_c}} = m_e\alpha^2 v_c^2$$

Yielding:

$$E_{Kc} = \alpha^2 E_{e0}$$

This says the energy of the photon is equal to the square of the fine structure constant times the rest energy of the electron. Now I wish to show the relationship between photon energy and particle kinetic energy. Since:

$$v_{pe} = \alpha\, v_c$$

Then:

$$\frac{1}{2} m_e v_{pe}^2 = \frac{1}{2} m_e \alpha^2 v_c^2$$

Or, saying the same thing:

$$E_{Ke} = \frac{\alpha^2}{2} E_{e0}$$

Now, using the equation:

$$E_{e0} = \frac{E_{Kc}}{\alpha^2}$$

I substitute this into the equation immediately above and obtain:

$$E_{Kc} = 2E_{Ke}$$

This says the energy of the photon is equal to twice the kinetic energy of the electron. Since the photon is carrying electrical potential energy, then the equation is giving the established answer: The potential energy of the electron is twice its kinetic energy.

Higher Atomic Energy Levels

Higher electron orbits cannot be deduced from what has been defined in modern physics as particle wavelength. This wavelength is simply a substitute for the circumference of the orbit of an electron in the first energy level of an atom. The circumference of this orbit is not a physical basis for explaining the higher orbits. In other words, the practice of using integral half wavelengths to establish radii of orbit is without a substantive physical explanation.

The explanation for all radii of orbit will have to do with photon length. The quantum theory of half wavelengths for defining stable atomic orbits does make good predictions. This follows automatically from the fact that the theory takes the first level circumference and multiplies it by integer values.

We know empirically that the potential energy due to the proton nucleus decreases with the first order of increasing radius. Therefore, if an electron is positioned at a distance of two photon lengths, then the energy received from the proton is diminished by one half. The potential energy diminishes because the proton is emitting a set number of photons. The photons emitted by the proton are diminishing in number per unit area as the distance of separation increases. For this theory, the higher energy levels are assumed to necessarily be multiples of photon length.

The actual number of photons received by the electron is diminishing inversely with distance. The interesting feature of having the electron receive fewer of the same kind of photons is that when the orbiting electron receives one of these photons, it receives the same increment of energy regardless of the energy level it is in. It receives this increment a proportionately fewer number of times, but its momentary radial acceleration is the same at every level.

The significance of this is that the electrons in higher energy levels are not moving in circular orbits. They would seem to have to move in a path approximating a saw tooth type of waveform. I am not offering this as fact, only as suggested. The most important point to be made is simply that the length of a photon can be used as one criterion for the fundamental distance of separation between energy levels, and this assumption offers a clear physical basis for the existence of stable energy levels.

The Bohr Atom

Neils Bohr explained the early known frequencies of light emitted by the hydrogen atom. He postulated that: The stationary states for the electron orbiting the hydrogen atom are those energy levels where the electron’s angular momentum is equal to integer multiples of Planck’s constant divided by 2π :

$$\wp_n = m_e v_n r_n = n\frac{h}{2\pi} = n\hbar$$

Where $\wp_n$ is the angular momentum and n is an integer called the principal quantum number.

This new theory suggests that the stable energy levels have radii equal to integer multiples of photon length. This is just one criterion. There is another. The second criterion is that: Both the energy and momentum of each photon are constant values that do not change for different energy levels. They are quantized at the values necessary for the first energy level and retain those values regardless of the distance traveled. Their numbers decrease as the square of the distance, but, their individual values of energy and momentum stay the same. Therefore, the stable energy levels are those that satisfy both criteria.

A property that changes for each possible level is also the only common variable for energy and momentum values. It is velocity. Energy is given by:

$$E_n = \frac{1}{2} m_e v_n^2$$

And momentum is given by:

$$P_n = m_e v_n$$

The problem to be solved is: How can both the final energy and momentum be integer values? The answer depends upon velocity being quantized in a manner that allows v_n and $v_n{}^2$ to both be integer values. Therefore, I divide velocity by the integer n:

$$v_n = \frac{v_1}{n}$$

This says that the velocities of each possible energy level are integer quotients of the electron velocity in the first energy level. Momentum is then given by:

$$P_n = m_e \left(\frac{v_1}{n}\right)$$

Energy is given by:

$$E_n = \frac{1}{2} m_e \left(\frac{v_1}{n}\right)^2 = \frac{E_1}{n^2} = F_n r_n$$

Where F_n is force and r_n is the radial distance. F_n is given by:

$$F_n = \frac{ke^2}{r_n^2}$$

Substituting this into the energy equation:

$$E_n = \frac{ke^2}{r_n^2} r_n = \frac{ke^2}{r_n}$$

Therefore:

$$r_n = \frac{ke^2}{E_n} = \frac{ke^2}{\frac{E_1}{n^2}} = n^2\frac{ke^2}{E_1}$$

Where:

$$\frac{ke^2}{E_1} = r_1$$

Therefore:

$$r_n = n^2 r_1 = n^2 \Delta x_c$$

The stable orbits are those for which the radii are n^2 multiples of the first level radius.

The angular momentum for each stable energy level is given by:

$$\wp_n = P_n r_n = \frac{m_e v_1}{n} n^2 r_1 = n m_e v_1 r_1 = n\hbar$$

Electric Force Quantum Numbers

Quantum numbers are currently associated with energy levels. In a sense they are more fundamentally linked to force. Once force is quantized then this effect can easily be extended to energy and momentum. Also, I will shortly define gravitational force as being quantized through the same method employed here. The simple formula for electric force in the first energy level of the hydrogen atom is:

$$f_{\xi H1} = \frac{k}{v_c^2} = \frac{f_{\xi H1} v_c^2}{v_c^2} = \frac{f_{\xi H1} v_c^2 dt_c^2}{dx_c^2}$$

This formula can be expanded to apply to distances greater than one photon length. I do this by introducing a quantum number. This number is the number of photon lengths that separate two charged particles. I define it as:

$$n_r = \frac{r}{dx_c}$$

Or:

$$r = n_r dx_c$$

Inserting this into the electric force equation gives the electric force between two distant charged particles:

$$f_\xi = \frac{f_{\xi H1}\ v_c^2\ dt_c^2}{n_r^2\ dx_c^2}$$

This is equivalent to the electric field theory force equation:

$$f_\xi = \frac{kq^2}{r^2}$$

I can also expand the formula to include more than two charged particles. I introduce two more quantum numbers representing the number of charged particles at each of two locations:

$$f_\xi = \frac{f_{\xi H1}\ v_c^2\ n_1\ dt_c\ n_2\ dt_c}{n_r^2\ dx_c^2}$$

Where, $n_1\ dt_c$ and $n_2\ dt_c$ are equivalent to the two amounts of electric charge used in electric field theory.

FUNDAMENTAL FREQUENCY RELATIONSHIPS

The theoretical concept of frequency is a useful vehicle for describing energetic photons. The energy of a photon is related to frequency through a very simple relationship. This relationship uses Planck's constant as its proportionality constant.

Planck's Constant

Planck's constant is the proportionality constant relating energy to frequency. This relationship is a primary tool of quantum physics. It is interpreted to show where there is energy there is also frequency. Where there is frequency there is also wavelength. In other words, where there is energy there is a wave nature. The relationship is:

$$E = h\omega$$

In this theory, the units of energy are meters. The units of frequency remain inverse seconds. Therefore, the units of Planck's constant are meters times seconds.

Boltzmann's Constant

Planck's relation between energy and frequency is one of three such relations. There is an analogous relationship between force and frequency. To show this I begin with:

$$h = \frac{E}{\omega}$$

For a photon:

$$E_c = \Delta E$$

So I write:

$$h = \frac{\Delta E}{\omega}$$

Dividing both sides by the incremental Δx_c:

$$\frac{h}{\Delta x_c} = \frac{1}{\omega}\frac{\Delta E}{\Delta x_c}$$

Since:

$$f = \frac{\Delta E}{\Delta x_c}$$

Then:

$$\frac{h}{\Delta x_c} = \frac{f}{\omega}$$

Solving for force:

$$f = \frac{h}{\Delta x_c}\omega$$

In order to divide Planck's constant h by a theoretically accurate length of a photon, I will use the ideal radius of the hydrogen atom. In this theory this ideal size is given by:

$$\Delta x_c = v_c \Delta t_c$$

Substituting:

$$f = \frac{h}{v_c \Delta t_c}\omega$$

In the terms of current modern physics, this equation is analogous to: