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Schrodinger equations: derivation, rest mass, fine structure constant and energy- Considering McMahon field theory

Abstract: Here, I first derive Schrodingers time-independent and time-dependent equations, then I use Schrodinger's time-dependent equation to find a term to describe the rest mass of particles moving as waves. The term found in this paper [hR/c] is identical to a term found in other papers of mine- The McMahon rest mass of an electron. Thus, the entire electromagnetic spectrum seems to be composed of electrons, which are particles, that are moving as waves or flux coils as in McMahon field theory (2010), whose masses we cannot detect. I also use the Schrodinger time dependent equation to derive equations for energy, as well as the fine structure constant.

Theory:

Special relativity applies to particles or masses moving close to the speed of light, which is the case for electrons moving as electrical current in a wire, as shown in the paper: **McMahon, C.R. (2015)** *"Electron velocity through a conductor*". Thus, special relativity applies to such particles, which allows us to observe special relativity in the real world as the magnetic field. Thus, through the magnetic field, McMahon field theory explains that particles moving near the speed of light appear as energy fields.

First, allow me to present a new understanding of energy, as already presented in McMahon field theory: Theoretical unification of relativity and quantum physics, thus methods to generate gravity and time. (2010).

This theory begins explaining the nature of light using an example of electrons moving through an electrical wire. Since the velocity of these electrons can be considered as at or near the speed of light, we can assume that they are affected by both time dilation and length contraction, effects predicted by Albert Einstein's famous theory of relativity.

Let's perform a thought experiment: Let's imagine a stretched out spring. Let the straight stretched out spring represent the path of electrons moving in an electrical wire. Now, since length contraction occurs because of relativity, the electron path is affected. As a result, the straight line path of the electron is compressed. This is the same as allowing a spring to begin to recoil. As a result, the straight line path of the electron begins to become coiled. I call this primary coiling. This is the effect length contraction has on mass as is approaches the speed of light and is dilated by length contraction. When a particle such as an electron reaches the speed of light, it becomes fully coiled or fully compressed, and Einsteins length contraction and time dilation equations become equal to zero and "undefined". This particle, now moves as a circle at the speed of light in the same direction it was before. If this particle tries to move faster still, it experiences secondary coiling. Ie: the coil coils upon itself, becoming a secondary coil. This is why energy is observed on an Oscilloscope as waves: we are simply looking at a side on view of what are actually 3-dimentional coiled coils or secondary coils. Waves are not simply 2 dimensional; rather, they are 3 dimensional secondary coils. It was easy for scientists of the past to assume waves were 2 dimensional in nature, as the dimensional calculations and drawings for relativity were carried out on flat pieces of paper which are also 2-

dimentional. The human imagination, however, is able to perform calculations in multiple dimensions. Now, let's consider the effect of time dilation.

When an electron approaches the speed of light, according to relativity, it undergoes time dilation. What does this actually mean? I believe this is the effect: time dilation allows a body, particle or mass- in combination with the effects of length contraction, to exist in multiple places at the same time. This is why we observe magnetic flux. Electricity is composed of high speed electrons, so these electrons would be affected by time dilation and length contraction. As a result, the electron is both inside the electrical wire, and orbiting around the wire as magnetic flux (because of full primary coiling at the speed of light). Magnetic flux is the combined effect of length contraction and time dilation on the electron. The coiling effect is why electrical wires carrying electricity exhibit magnetic fields- the electron path is compressed into coils, and time dilation permits the electron to occupy multiple positions at the same time, which is why magnetic flux is detected as coils at different distances from the electrical wire. Please refer to figure 1 on the following page.

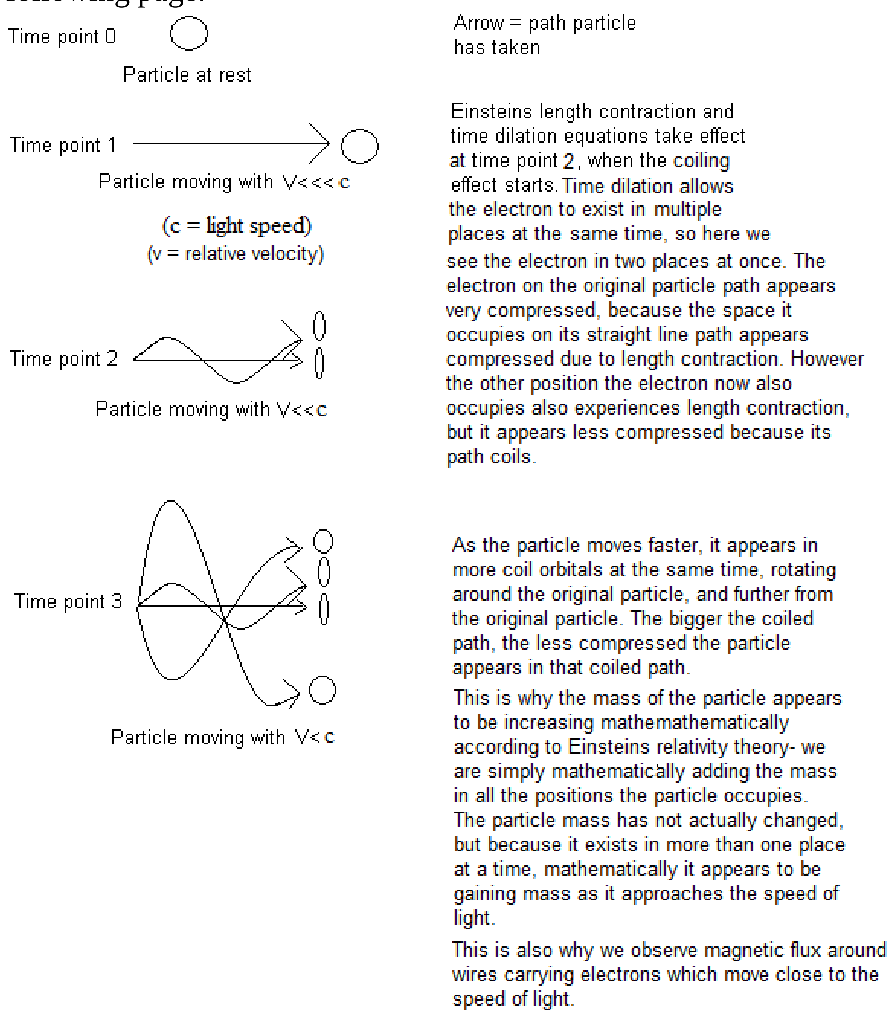

Figure 1: particle relativity- Taken from the McMahon field theory (2010): What we observe as relative stationary observers of a particle as it travels faster.

However- the McMahon field theory goes on to explain much more, including the electromagnetic spectrum- hence light, which I will briefly cover now. Refer to figure 2 below:

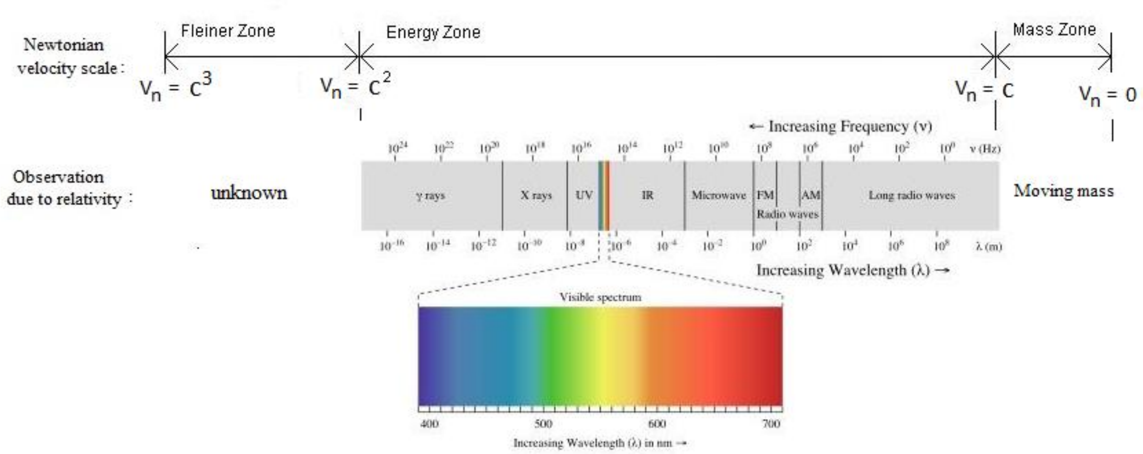

Figure 2: How an electron is observed at different Newtonian speeds: modified from the McMahon field theory (2010): Here, we see that as an electron moves with increasing speed according to Newtonian physics (although the speed we observe is dilated back to that of light because of relativity as in figure 4) and becomes a coil because of relativity, as the electron speed is increasingly dilated back to light it is observed as different types of energy. This is because the electron becomes more coiled (more velocity dilation) as it tries to move faster, so we say that the frequency increases and wavelength decreases. In this diagram, let the value of true, un-dilated Newtonian velocity due to relativity be Vn as in figure 4, and let the velocity of light be equal to c. I believe that electrons are on the boarder of mass and energy, so in the diagram above electricity would be at the point where Vn=c. If the electrons in electricity tried to move faster, they would be compressed further into a secondary coil to become long radio waves, then AM radio waves, then FM radio waves, then microwaves, then Infra-red (IR), then X-rays, then y-rays. Hence, the electromagnetic spectrum is nothing more than an electron dilated by different magnitudes of relativity. Other particles, such as protons and neutrons, will also have their own spectrums, which may be different or similar to that of the electron.

From Figure 2, we see that if electricity or electrons in an electrical wire tried to move faster, the electrons path would be compressed further, making it coil upon itself again creating secondary coiling or a coiled coil path. Hence it would be further affected by length contraction. As a result, the electron will be observed as different forms of energy. In the figure above, we see that an electron is considered as mass when it has an undilated velocity or Newtonian velocity between 0 and c. If an electron tries to travel faster than this, it enters the energy zone, where the electron path becomes fully compressed and moves as a full primary coil or circle which undergoes secondary coiling or coils upon itself. A particle moving as energy or a secondary coil has an un-dilated velocity or Newtonian velocity range between c and c^2. In this range, the particle now experiences secondary coiling, so the coil now coils upon itself. Figure 3, taken from the McMahon field theory (2010), also explains what happens if an electron tries to move faster than C^2: The secondary coiled or coiled coil path becomes overly dilated, and the length contraction effect becomes so great that the particle now undergoes tertiary coiling- ie it becomes a coiled coil coil. As a result, because of excess coiling the particle becomes undetectable or unidentifiable. These undetectable states are what are known as dark matter and/or dark energy. See figure 3.

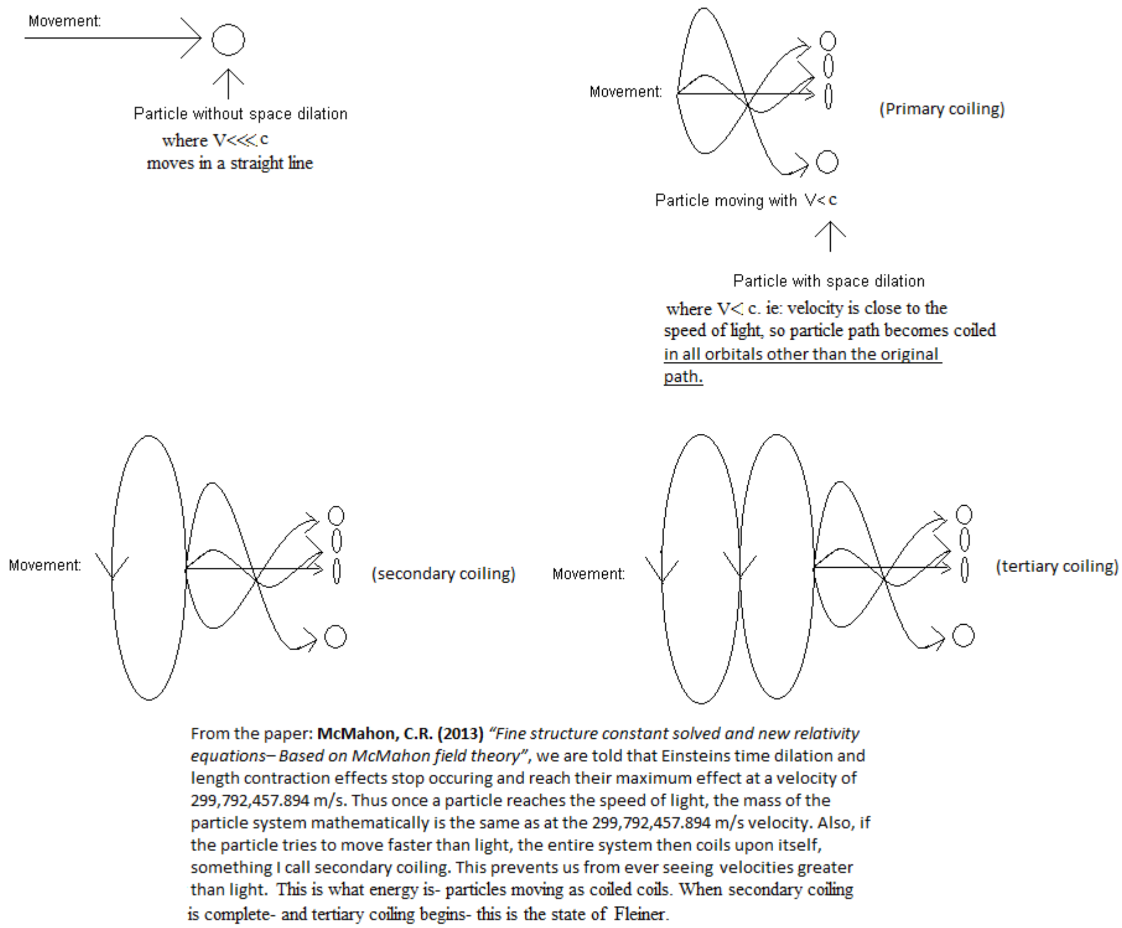

Figure 3: The actual affect Einsteins relativity theory has on the movement of a particle, causing it to first appear as mass during primary coiling, then energy during secondary coiling, and Fleiner during tertiary coiling, during which it becomes dark matter or dark energy. Einstein was unaware of this.

Now, we must consider conventional science of the current day. Conventional oscilloscopes are used for energy only. Therefore, the "waves" we see on oscilloscopes are in fact, the side views of secondary coils and higher degrees of coiling. Once full primary coiling is achieved, the fully compressed primary coil remains as it is, but with more momentum it begins to coil upon itself, which is secondary coiling. Thus, "wavelength" and "frequency" according to the science of this day are measurements from the reference point where a full primary coil forms.

Lets consider McMahon field theory (2010). From the McMahon field theory, we realize that magnetic flux arises due to the length contraction and time dilation of the electron. We observe this flux differently depending on the Newtonian velocity of the electron (ie:

the electromagnetic spectrum in figure 2). Keep in mind that relativity prevents observers from measuring the true velocity (Newtonian velocity) of the electron- relativity dilates velocities greater than light back down to the speed of light. Refer to figure 4 below.

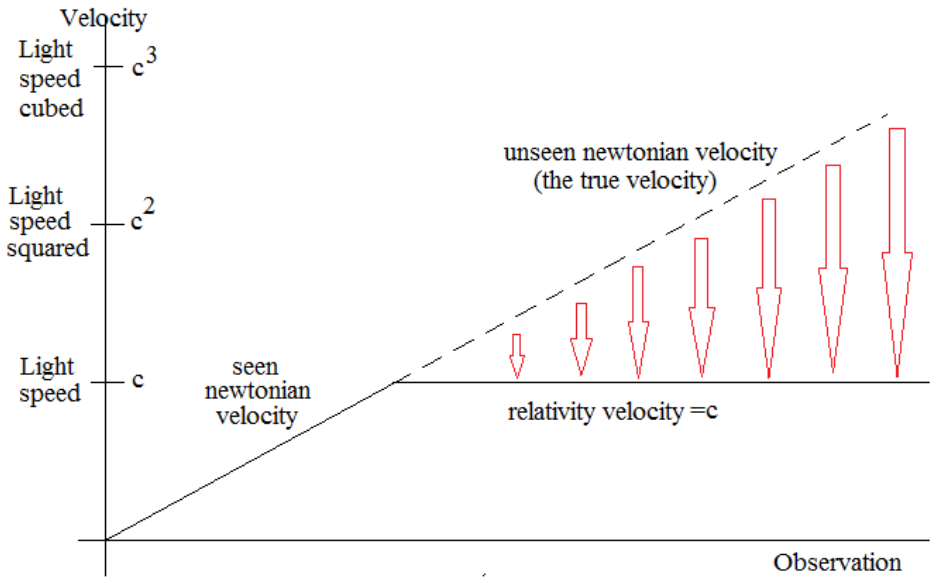

Figure 4: The dilation of the true velocity or Newtonian velocity by relativity. Here, we see that the dotted line represents the true velocity of particles travelling faster than the speed of light, but relativity dilates this velocity down to the speed of light which coils the path of the particle, so observers don't ever see particles travelling faster than light. The degree of velocity dilation is represented by the red arrows. Hence, the solid lines represent that which is seen, but the dotted line, which is the true velocity above light, is unseen due to dilation by relativity.

Now, figures 1 and 3 depict the length contraction effect on the electron, but the length contraction effect occurs simultaneously with the time dilation effect, which causes the electron to exist in multiple places along-side itself at the same time. As a result, as a particle approaches the speed of light, the original electron remains in its original linear position, but it also exists tangentially to itself, which rotates around its original self.

From figure 5 in A), we see a stationary electron in a wire. If this electron moves to the other end of the wire at speeds much less than N, or C for us on Earth, the particle obeys the laws of Newtonian Physics. In B), we see our electron now moves through the wire with a speed of c, so as discussed earlier it undergoes full primary coiling, which results in the appearance of a magnetic field (the magnetic field is the primary coiling) so it obeys the laws of relativity. From Einstein, when the electron moves at a speed where V=c, t'= undefined (time dilation = undefined) and s'= 0 (length compressed to zero). This means that to us, the particle no longer experiences time as in Newtonian physics, and now moves as a full primary coil or circle which propagates along with a speed equal to c. Because t'=undefined, the electron is able to be in more than one place at a time. Because s'=0, the particle is seen to move as a full primary coil or circle, which moves along the wire, always with a relative speed equal to c. this means that the electron is

both inside the wire, and orbiting around the wire in multiple orbits multiple distances from the wire at the same time.
These “ghost or flux particles” which are all one particle that exist in different places at the same time, are responsible for the strange observations and theories made in quantum physics. These theories arise from the fact that ghost particles appear in their experiments involving high speed particles, such as the double slit experiment, and physicists cannot explain what they observe.

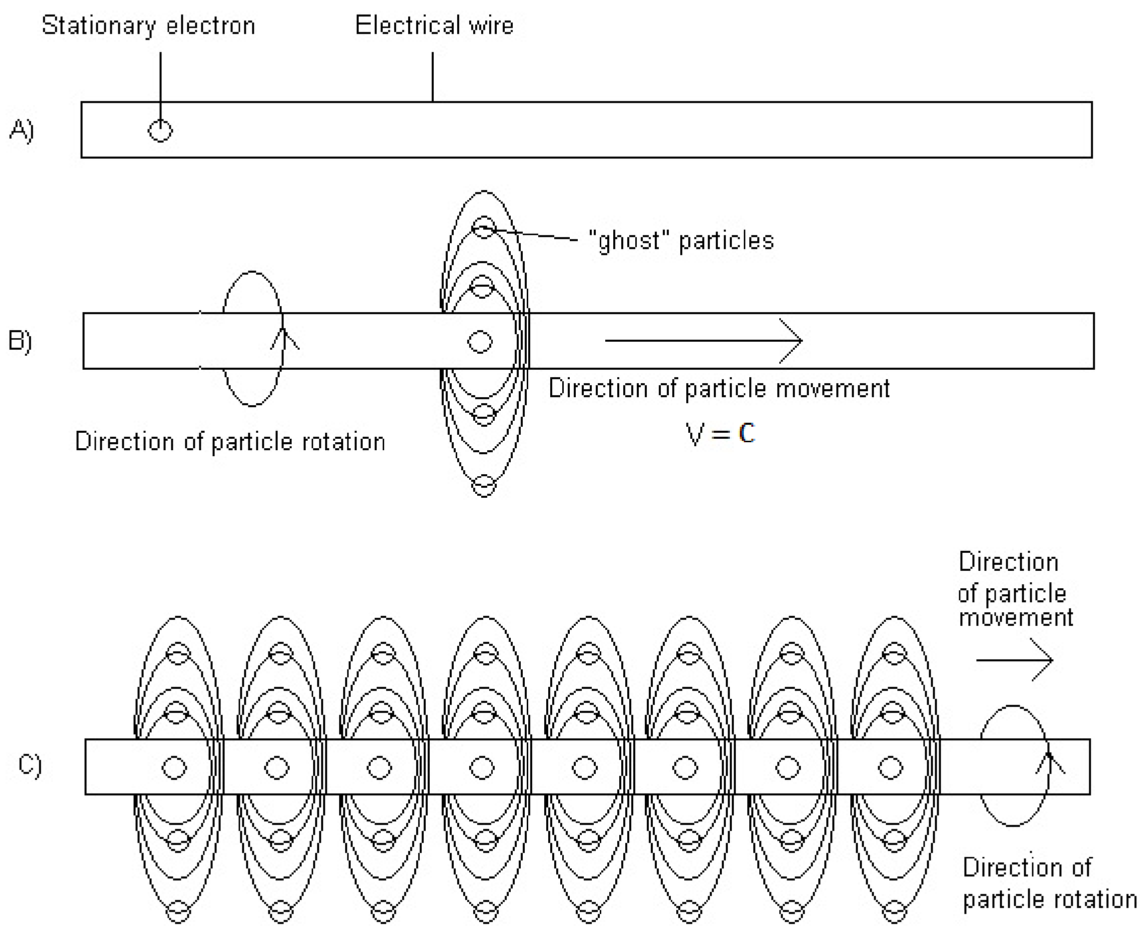

Figure 5: In A), we see a stationary electron in a wire. If this electron moves through the wire at speeds far below c, then the particle simply moves in a straight line through the wire, and no magnetic field is observed.
In B), our electron is now moving at c, so space dilation is occurring, causing the electron to now move as a circle (full primary coil) rather than in a straight line. As a result, the entire primary coil is always seen to move at a relative speed of c. However, the particle is experiencing maximum time dilation, t'=undefined. As a result, relative to us as stationary observers, the electron is in more than one place at the same time. In fact, the electron is both inside the wire, and orbiting around it in multiple orbital positions at the same time. As a result, we observe a magnetic field around the wire, which is just the electron orbiting around the outside of the wire. This is explained in section II table 1 of the McMahon field theory. When a particle is seen in more than one place at the same time, I call this a ghost or flux particle.
In C), the situation described in B) is exactly what is observed when electricity moves through an electrical wire. Note that conventional current moves in the opposite direction to electron flow.

From figure 5, we see that the original moving electrons we observe as electricity still exist inside the wire, but the length contraction and time dilation effects allow these electrons to simultaneously exist tangentially to their direction of movement outside the wire.

I shall now derive Schrodingers time-independent equation, an equation that implies that particles move as waves, or that waves have particle properties- both of which are features of McMahon field theory.

Derivation of the Time-independent Schrodinger equation:

Lets start with a basic equation for energy, namely:

Energy = Kinetic Energy + Potential Energy, or:

E=KE + PE

This can be expressed as:

$$E = \frac{1}{2} m v^2 + u \qquad \text{.......... equation (1}$$

Where:

E = Energy

m = mass (rest mass)

v = velocity

u = potential energy

Now, lets express Kinetic energy in terms of momentum.

P (momentum) = mv, so:

$$P^2 = m^2 v^2$$

Thus: $$\frac{P^2}{2m} = \frac{1}{2} m v^2 \qquad \text{..........equation (2}$$

Inserting equation 2 into equation 1 gives:

$$E = \frac{P^2}{2m} + u \qquad \text{.........equation (3}$$

Next, lets consider the basic equation for a freely moving wave.

(as in "hyperphysics (2000)")

$$\Psi = A e^{i(kx-wt)} = A\cos(kx-wt) + iA\sin(kx-wt) \qquad \text{..........equation (4}$$

$$\frac{d\psi}{dx} = (ik) A e^{i(kx-wt)} = \Psi(ik) \qquad \text{..........equation (5}$$

$$\frac{d^2\psi}{dx^2} = (ik)^2 A e^{i(kx-wt)} = \Psi(ik)^2 \qquad \text{..........equation (6}$$

From basic wave theory: (as in "**Serway, R.A. (1996)**")

$$k \text{ (angular wave number)} = \frac{2\pi}{\lambda} \quad (\lambda = \text{wavelength}) \quad \text{..........equation (7}$$

$$w \text{ (angular frequency)} = \frac{2\pi}{T} = 2\pi f \quad (T = \text{time of 1 period}) \; (f = \text{frequency}) \quad \text{..........equation (8}$$

$$P \text{ (momentum)} = \frac{h}{\lambda} \quad (h = \text{plancks constant}) \quad \text{..........equation (9}$$

$$\hbar \text{ (h-bar)} = \frac{h}{2\pi} \quad \text{.......... equation (10}$$

Inserting equation 7 into equation 9 gives:

$$P = \frac{hk}{2\pi} \quad \text{.......... equation (11}$$

Inserting equation 10 into equation 11 gives:

$P = \hbar k$, thus:

$$k = \frac{P}{\hbar} \quad \text{.......... equation (12}$$

Going back to equation 6, we can say:

$$\frac{d^2\psi}{dx^2} = (ik)^2 Ae^{i(kx-wt)} = -k^2 Ae^{i(kx-wt)} \quad \text{.......... equation (13}$$

Inserting equation 12 into equation 13 gives:

$$\frac{d^2\psi}{dx^2} = \left[-\frac{P^2}{\hbar^2}\right] Ae^{i(kx-wt)} = \left[-\frac{P^2}{\hbar^2}\right]\psi \quad \text{.......... equation (14}$$

Multiplying both sides of equation 14 by $-\hbar^2$ gives:

$$-\hbar^2\left[\frac{d^2\psi}{dx^2}\right] = P^2\psi \quad \text{.......... equation (15}$$

Multiplying equation 3 by ψ gives:

$$E\psi = \frac{P^2\psi}{2m} + u\psi \quad \text{..........equation (16}$$

Inserting equation 15 into equation 16 gives us the Time independent Schrodinger equation, namely:

$$E\psi = \frac{-\hbar^2}{2m}\left[\frac{d^2\psi}{dx^2}\right] + u\psi \quad \text{.......... equation (17}$$

Time-Dependent Schrodinger equation derivation:

Considering Plancks constant and energy, we have:

$$E = \hbar w = \frac{2\pi f h}{2\pi} = hf \qquad \text{.......... equation (18}$$

Once again, considering the basic equation for a freely moving wave:

$$\psi = Ae^{i(kx-wt)}$$

$$\frac{d\psi}{dt} = (-iw)Ae^{i(kx-wt)} = \psi(-iw) \qquad \text{.......... equation (19}$$

Multiplying equation 18 by ψ gives:

$$E\psi = \hbar w \psi \qquad \text{.......... equation (20}$$

Multiplying both sides of equation 20 by $\left[\frac{-i}{\hbar}\right]$ gives:

$$\left[\frac{-i}{\hbar}\right]E\psi = -iw\psi = \frac{d\psi}{dt} \qquad \text{.......... equation (21}$$

Multiplying both sides of equation 21 by $\left[\frac{\hbar}{-i}\right]$ gives:

$$E\psi = \left[\frac{\hbar}{-i}\right]\frac{d\psi}{dt} = i\hbar\left[\frac{d\psi}{dt}\right] \qquad \text{..........equation (22}$$

Inserting equation 22 into equation 17 gives us the Time-Dependent Schrodinger Equation, namely:

$$i\hbar\left[\frac{d\psi}{dt}\right] = \frac{-\hbar^2}{2m}\left[\frac{d^2\psi}{dx^2}\right] + u\psi \qquad \text{.......... equation (23}$$

Determination of "particle rest mass" term form the schrodinger Time-dependent equation:

The term "m" for mass as in equation 23 comes from equation 1, where "m" = rest mass. That is because equation 1 was used to derive equation 23. Thus, by this inarguable fact, "m" in equation 23 should be a non-varying mass. However, Schrodinger and current physicists don't treat this "m" term in equation 23 as rest mass- they treat it as a value called the "reduced mass". This is because this "m" value in equation 23 varies, hence does not behave as a rest mass at all. Hence Schrodingers equations are actually incorrect, but I correct them in the paper: **McMahon, C.R. (2015)** *"McMahon-Schrodinger equations*" Anyhow, let's play along and treat the "m" term in equation 23 as "reduced mass" rather than "rest mass", and try to convert this "reduced mass" term into a rest mass term. Thus:

$$m = \left[\begin{array}{c}\text{Schrodinger equation term}\\ \text{for reduced mass (Kg)}\end{array}\right] = \left[\begin{array}{c}\text{Rest mass term}\\ \text{(Kg)}\end{array}\right] \times \left[\begin{array}{c}\text{Dilation factor term}\\ \text{(no units)}\end{array}\right]$$

..........equation (24

Thus, we first need to express equation 23 in terms of "m", then we need to seperate out a "rest mass" term, as shown in equation 24. This rest mass term must posess a number of features. Firstly, it must be a constant- it must not contain variable terms, such as frequency or wavelength, as the rest mass is expected to be a constant value. If any of the terms within this rest mass term did somehow change, then the other terms that make up the rest mass term would be expected to change also, to keep the value a constant value. Secondly, it must have units of mass, such as Kg. Thirdly, the dilation factor term, as in equation 24, must have no units- it simply affects the overall "m" value in the Schrodinger equation, causing the "m" term of the Schrodinger equation to vary. Thus, the dilation factor of equation 24 is expected to contain variable terms, and will vary in value. Starting with equation 23, we have:

$$i\hbar\left[\frac{d\psi}{dt}\right] = \frac{-\hbar^2}{2m}\left[\frac{d^2\psi}{dx^2}\right] + u\psi$$

Some re-arranging gives:

$$i\hbar\left[\frac{d\psi}{dt}\right] - u\psi = \frac{-\hbar^2}{2m}\left[\frac{d^2\psi}{dx^2}\right]$$

$$2m\left[i\hbar\left[\frac{d\psi}{dt}\right] - u\psi\right] = -\hbar^2\left[\frac{d^2\psi}{dx^2}\right]$$

Thus, equation 23 expressed in terms of "m" (the reduced mass) gives:

$$m = \frac{-\hbar^2\left[\dfrac{d^2\psi}{dx^2}\right]}{2\left[i\hbar\left[\dfrac{d\psi}{dt}\right] - u\psi\right]}$$ .... equation (25

Interting equations 6 and 19 into equation 25 gives us:

$$m = \frac{-\hbar^2\,\psi(ik)^2}{2\left[i\hbar\,\psi(-iw) - u\psi\right]} = \frac{-i^2k^2\hbar^2\psi}{2\left[-i^2w\hbar\psi - u\psi\right]}$$

Since $i^2 = -1$, we have:

$$m = \frac{k^2\hbar^2\psi}{2\left[w\hbar\psi - u\psi\right]} = \frac{\psi\left[k^2\hbar^2\right]}{\psi 2\left[w\hbar - u\right]}$$

$$m = \frac{\left[k^2\hbar^2\right]}{2\left[w\hbar - u\right]} = \left[k^2\hbar^2\right] x \frac{1}{2\left[w\hbar - u\right]}$$ .... equation (26

Inserting equations 8 and 10 into equation 26 gives us:

$$m = \left[k^2\hbar^2\right] x \frac{1}{2\left[w\hbar - u\right]} = k^2\left[\frac{h^2}{\left[2\pi\right]^2}\right] x \frac{1}{2\left[\dfrac{2\pi f h}{2\pi} - u\right]}$$

$$m = k^2\left[\frac{h^2}{\left[2\pi\right]^2}\right] x \frac{1}{2\left[hf - u\right]}$$ .... equation (27

Inserting equation 7 into equation 27 gives:

$$m = \left[\frac{2\pi}{\lambda}\right]^2\left[\frac{h^2}{\left[2\pi\right]^2}\right] x \frac{1}{2\left[hf - u\right]} = \left[\frac{h^2}{\lambda^2}\right] x \frac{1}{2\left[hf - u\right]}$$

$$m = \frac{h^2}{2\lambda^2 \left[hf - u \right]} \qquad \text{.......... equation (28}$$

Now, we must try to express equation 28 in the form of equation 24:

Multiplying both sides of equation 28 by R/c (Rydbergs constant/light speed) gives us:

$$m\left[\frac{R}{c}\right] = \left[\frac{R}{c}\right]\frac{h^2}{2\lambda^2\left[hf - u\right]} = \left[\frac{hR}{c}\right]\left[\frac{h}{2\lambda^2\left[hf - u\right]}\right]$$

Re-arranging for m gives us:

$$m = \left[\frac{hR}{c}\right]\left[\frac{hc}{2R\lambda^2\left[hf - u\right]}\right] \qquad \text{.......... equation (29}$$

Now, lets check to see if equation 29 is in the form of equation 24, by checking the units:

$$\text{units of } \left[\frac{hR}{c}\right] = kg \cdot \frac{m^2}{s} \cdot \frac{1}{m} \cdot \frac{s}{m} = kg$$

$$\text{Units of } \left[\frac{hc}{2R\lambda^2\left[hf - u\right]}\right] = \frac{kg \cdot \frac{m^2}{s} \cdot \frac{m}{s}}{\frac{1}{m} \cdot m^2 \cdot \left[kg \cdot \frac{m^2}{s^2}\right]} = \frac{kg \cdot \frac{m^3}{s^2}}{kg \cdot \frac{m^3}{s^2}} = \text{no units}$$

Thus, equation 29 is in the form of equation 24, in that hR/c has units of kg, which is multiplied by a dilation factor with no units. Thus:

$$m = \left[\begin{matrix}\text{Schrodinger equation term} \\ \text{for reduced mass (Kg)}\end{matrix}\right] = \left[\begin{matrix}\text{Rest mass term} \\ \text{(Kg)}\end{matrix}\right] x \left[\begin{matrix}\text{Dilation factor term} \\ \text{(no units)}\end{matrix}\right]$$

$$m = \left[\left[\frac{hR}{c}\right]\left[\frac{hc}{2R\lambda^2\left[hf - u\right]}\right]\right] = \left[\left[\frac{hR}{c}\right]\right] x \left[\frac{hc}{2R\lambda^2\left[hf - u\right]}\right]$$

Note: Conventionally speaking, “h”, “R” and “c” are all considered to be constant values. Thus the (hR)/c term has units of kg, and thus is made up of only constants. McMahon field theory predicts that special conditions exist whereby the observed speed of light will

be different to the conventional value of 299,792,458 m/s, but that if the observed speed of light was observed at a different value, then other constants would appear different also. Thus, if conditions existed whereby the speed of light was observed to be different to the conventional value, it is expected that Plancks constant (h) and Rydbergs constant (R) would also vary- the net effect being that the value (hR)/c is always the same value. Note that the dilation factor term has no units, and contains terms which can vary in value: namely wavelength and frequency.
Thus the value ***"(hR)/c" is likely the rest-mass value of particles of the electromagnetic spectrum that move as waves***, which according to McMahon field theory, we cannot detect. This value "[hR/c]" was also found to be the rest mass of the electron, which is different to the currently conventionally accepted value, as shown in the papers:

1) **McMahon, C.R. (2013)** *"Fine structure constant solved and new relativity equations– Based on McMahon field theory".* The general science journal. (This paper is a more convincing proof)
2) **McMahon, C.R. (2012)** *"Calculating the true rest mass of an electron – Based on McMahon field theory"*. The general science journal.

Thus, it is possible that the entire electromagnetic spectrum is nothing more than electrons moving as waves, which prevents us from detecting their mass. This supports McMahon field theory.

Analysis of equation 29:

Lets go back to equation 29, and express it differently.

$$m = \left[\frac{hR}{c}\right]\left[\frac{hc}{2R\lambda^2\left[hf - u\right]}\right]$$

$$m = \left[\frac{hR}{c}\right]\left[\frac{hc}{2R\lambda h(\lambda f) - 2R\lambda^2 u}\right]$$

Since $c = f\lambda$, we can say:

$$m = \left[\frac{hR}{c}\right]\left[\frac{hc}{2R\lambda hc - 2R\lambda^2 u}\right] \qquad \text{.......... equation (30}$$

According to **Hyperphysics (2000)** *Schrodinger equation*, for a free particle u=0. Thus equation 30 becomes:

$$m\,(\text{for a free particle with u=0}) = \left[\frac{hR}{c}\right]\left[\frac{hc}{2R\lambda hc}\right]$$

$$m\,(\text{for a free particle with u=0}) = \left[\frac{hR}{c}\right]\left[\frac{1}{2R\lambda}\right] \quad \text{.......... equation (31}$$

or, again since $c = f\lambda$, thus $c/f = \lambda$:

$$m\,(\text{for a free particle with u=0}) = \left[\frac{hR}{c}\right]\left[\frac{f}{2Rc}\right] \quad \text{.......... equation (32}$$

Here, in equation 32, we see that as f increases in value, or the energy of the system increases, the "reduced mass" or "m" increases in value. Thus, for this free particle moving as a wave of energy in the electromagnetic spectrum, it would seem that as the energy of the particle-wave system increases, the theoretical "reduced mass" of the system approaches infinity.

Reduced mass term converted to mathematical mass and rest mass terms:

At the present time, we don't have the technological capability to detect mass for electromagnetic waves of the electromagnetic spectrum (as described by equation 50 in this paper). Perhaps someday we will have such capability. But what if we could? Lets explore this idea. Lets express equation 32 in terms of energy.

$$m\,(\text{for a free particle with u=0}) = \left[\frac{hR}{c}\right]\left[\frac{f}{2Rc}\right]$$

$$m\,(\text{for a free particle with u=0}) = \left[hf\right]\left[\frac{R}{2Rc^2}\right]$$

Since E (Energy) = hf:

$$m\,(\text{for a free particle with u=0}) = \left[E\right]\left[\frac{1}{2c^2}\right]$$

$$\text{Thus, } E = 2[\text{reduced mass "m"}]c^2 \quad \text{.......... equation (33}$$

Notice that equation 33 has the detected Energy = $2mc^2$ rather than Einsteins detected Energy = mc^2. Thus, in the case of equation 33, multiplying the reduced mass "m" by 2 gives us Einsteins special relativity mass or mathematical mass. Thus: in our case:

Reduced mass x 2 = mathematical mass ………. equation (34

Recall from Einsteins special relativity that:

$$\text{Mathematical mass} = \text{Rest mass} \times \frac{1}{\sqrt{1-\frac{v^2}{c^2}}}$$

or:

$$\text{Mathematical mass} = [\text{Rest mass}] \times [\text{Dilation factor}]$$ .... equation (35

Inserting equation 34 into equation 35 gives us:

$$2 \times \text{Reduced Mass} = \text{Mathematical mass} = [\text{Rest mass}] \times [\text{Rest mass dilation factor}]$$ .... equation (36

With this information (equation 36) in mind, if we reconsider equation 32, we can find a rest mass dilation factor for particles that move as free waves. Thus, we have:

$$2 \times [\text{reduced mass}] = \text{Mathematical mass} = \left[\frac{hR}{c}\right]\left[\frac{f}{Rc}\right]$$ .... equation (37

Thus, if the "rest mass" of particles moving as free waves = hR/c, then the rest mass dilation factor for particles moving as free waves (where the velocity we observe for these waves =c) is:

$$\text{Special relativity mass dilation factor, or Rest mass dilation factor for a particle moving as a wave} = \left[\frac{f}{Rc}\right] = \left[\frac{1}{R\lambda}\right]$$ ………. equation (38

<u>Thus, if we had the technological capability to detect mass for electromagnetic waves, we see that equation 38 would dilate the mathematical mass of wave systems down to values close to zero, unless the frequency is extremely high.</u> Allow me to show this.

$$\left[\frac{f}{Rc}\right] = \frac{f}{1.097373156853955 \times 10^7 \times 299792458}$$

$$\left[\frac{f}{Rc}\right] = \frac{f}{3.28984196036 \times 10^{15}}$$ .... equation (39

However, this equation (and equation 38) applies to secondary coiling and higher order coiling as in figure 3 (waves)- it does not consider primary coiling (particles) as in figure 1. This is because the Schrodinger equations were constructed using the term ψ, which applies to waves.

Consideration of the fine structure constant:

According to the paper "McMahon, C.R. (2012) *"Calculating the true rest mass of an electron – Based on McMahon field theory""* we are told that ***the conventional rest mass of the electron used today does not take the effect of special relativity into account, which increases the observed mass.*** Hence the conventional rest mass of an electron used as of 2015 is larger than the true rest mass of the electron. The conventional rest mass used as of 2015 is presented in the reference **Wikipedia (2015)** *Electron rest mass, as:*

$$\text{Conventional electron rest mass (Used in scientific literature as in the year 2015)} = \left[\frac{hR}{c}\right]\left[\frac{2}{\alpha^2}\right] \quad \text{.......... equation (40}$$

However the paper "**McMahon, C.R. (2013)** *"Fine structure constant solved and new relativity equations– Based on McMahon field theory""*, shows that:

$$\left[\frac{hR}{c}\right]\left[\frac{2}{\alpha^2}\right] = \left[\frac{hR}{c}\right] \times \left[\frac{2}{\alpha^2}\right] \quad \text{.......... equation (41}$$

Conventional electron rest mass = True rest mass x Special relativity mass dilation factor

or:

$$\frac{\left[\frac{hR}{c}\right]}{\sqrt{1-\frac{v^2}{c^2}}} = \left[\frac{hR}{c}\right] \times \frac{1}{\sqrt{1-\frac{v^2}{c^2}}} \quad \text{.......... equation (42}$$

Conventional electron rest mass = True rest mass x Special relativity mass dilation factor
Where α = The fine structure constant.

The paper "**McMahon, C.R. (2013)** *"Fine structure constant solved and new relativity equations– Based on McMahon field theory""*, also shows that:

$$\alpha = \text{electron coiling factor due to relativity} = \sqrt{2\sqrt{1-\frac{V^2}{C^2}}} \quad \text{.......... equation (43}$$

Where $v \leq 299792457.893735$ metres/sec

To prevent the appearance of infinate mass at light velocity, α remains constant from 299792457.893735 metres/sec to 299792458 metres/sec, or lightspeed.

Thus, equation 41 shows that $2/\alpha^2$ is a special relativity mass dilation factor. As shown in equation 38, f/(Rc) and and 1/(Rλ) are also special relativity mass dilation factors. Thus:

$$\left[\frac{f}{Rc}\right] = \left[\frac{1}{R\lambda}\right] = \left[\frac{2}{\alpha^2}\right] \qquad \text{.......... equation (44}$$

Thus, we can say:

$$\alpha^2 = \left[\frac{2Rc}{f}\right]$$

$$\alpha = \sqrt{2\left[\frac{Rc}{f}\right]} \qquad \text{.......... equation (45}$$

or:

$$\alpha^2 = 2R\lambda$$

$$\alpha = \sqrt{2\left[R\lambda\right]} \qquad \text{.......... equation (46}$$

Comparing equations 43, 45 and 46, we see that:

$$\alpha = \sqrt{2\left[\sqrt{1-\frac{v^2}{c^2}}\right]} = \sqrt{2\left[\frac{Rc}{f}\right]} = \sqrt{2\left[R\lambda\right]} \qquad \text{.......... equation (47}$$

Thus, we see a pattern where:

$$\alpha = \sqrt{2\left[\text{special relativity mass dilation factor}\right]^{-1}} \qquad \text{.......... equation (48}$$

Notice that the "special relativity mass dilation factor", as referred to in equation 48, can be made equal to the "special relativity mass dilation factor" values as used in equations 38 and 42.

Equations 47 and 48 thus show perfect agreement between mass dilation factors I have independently derived using the Schrodinger equation and the fine structure constant, derived in this paper and the paper "**McMahon, C.R. (2013)** *"Fine structure constant solved and new relativity equations– Based on McMahon field theory""*. ***Such perfect agreement shows that McMahon field theory holds true.***

Consideration of Energy:

Special note: Considering McMahon field theory, and special relativity, mathematically mass dilation reaches its maximum value (for particles) once a particle reaches a relative speed of 299,792,457.893735 m/s, according to the equation:

$$\text{Mathematical mass due to a single particle being in multiple places at the same time (as described in figure 1)} = \frac{\text{Particle rest mass}}{\sqrt{1 - \frac{v^2}{c^2}}} \quad \text{.......... equation (49}$$

However, as a particle moves faster, it actually becomes more difficult to physically detect mass, as given by the following equation which was derived in the paper: **McMahon, C.R. (2013)** *"Review of Einsteins E=Mc^2 papers- Einsteins own validation of the McMahon field theory*.

$$\text{Physically Detectable mass} = [\text{particle rest mass}] \times \left[\sqrt{1 - \frac{v^2}{c^2}}\right] \quad \text{.......... equation (50}$$

Thus, once a particle reaches the speed of light, its mass becomes undetectable, which is why the entire electromagnetic spectrum appears massless.

Equation 49 applies to particles, undergoing primary coiling as in figure 1 to the point where a secondary coil forms (as in figure 3). Thanks to this paper, once a secondary coil forms I can write what the mass would be ***if*** we could detect it, using the mass dilation factors (equation 38) obtained using the time dependent Schrodinger equation.

$$\text{Mathematical wave mass (ignoring primary coil mass)} = \text{Particle rest mass} \times \text{Mathematical primary coil mass dilation factor} \times \text{Mathematical Secondary and higher order coiling mass dilation factor}$$

.... equation (51

Thus, we have:

$$\text{Mathematical wave mass (ignoring primary coil mass)} = \text{Particle rest mass x } \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} \text{ x } \left[\frac{f}{Rc}\right]$$

$$\text{Mathematical wave mass (ignoring primary coil mass)} = \frac{\text{Particle rest mass x } \left[\frac{f}{Rc}\right]}{\sqrt{1 - \frac{v^2}{c^2}}} \quad \text{..........equation (52}$$

Or:

$$\text{Mathematical wave mass (ignoring primary coil mass)} = \text{Particle rest mass x } \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} \text{ x } \left[\frac{1}{R\lambda}\right]$$

$$\text{Mathematical wave mass (ignoring primary coil mass)} = \frac{\text{Particle rest mass x } \left[\frac{1}{R\lambda}\right]}{\sqrt{1 - \frac{v^2}{c^2}}} \quad \text{.......... equation (53}$$

Considering the equation $E = mc^2$, if we multiply both sides of equation 52 by C^2, we obtain an equation for the energy of waves, ignoring primary coil energy. Ie:

$$\text{Mathematical wave mass (ignoring primary coil mass)} = \text{Particle rest mass x } \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} \text{ x } \left[\frac{f}{Rc}\right]$$

$$\text{Mathematical wave energy (ignoring primary coil energy)} = M_{wave}\, c^2 = \frac{M_{rest}\, c \left[\frac{f}{R}\right]}{\sqrt{1 - \frac{v^2}{c^2}}} \quad \text{..........equation (54}$$

If we also consider Einsteins energy equation for the ***energy of particles***, which ignores secondary and higher order coiling, we obtain the complete equation for energy, or Emax. Ie:

$$E_{max} = \text{Einsteins Mathematical particle energy (ignoring secondary and higher coil energy)} + \text{Mathematical wave energy (ignoring primary coil energy)}$$

$$E_{max} = \frac{M_{rest}\, c^2}{\sqrt{1 - \frac{v^2}{c^2}}} + \frac{M_{rest}\, c \left[\frac{f}{R}\right]}{\sqrt{1 - \frac{v^2}{c^2}}} \quad \text{.......... equation (55}$$

Where:
$E_{(max)}$ = maximum possible energy ($Kg(m^2/s^2)$)
M_{rest} = Rest mass (Kg)
v = 299,792,457.893735 (m/s)
c = the speed of light =299,792,458 (m/s)
F= conventional frequency (1/s)
R = Rydberg constant = $1.097373156853955 \times 10^7$. units = ($m^{-1}$)

Note 1: If the particle velocity or observed velocity is greater than 299,792,457.893735 m/s, take v in equation 55 as = 299,792,457.893735 m/s, as at this velocity, maximum particle mass dilation occurs. Refer to the paper: **McMahon, C.R. (2013)** *"Fine structure constant solved and new relativity equations– Based on McMahon field theory".*

Note 2: If the particle velocity or observed velocity is less than 299,792,458 m/s, then take f in equation 55 as = 0, and take v as ≤ 299,792,457.893735 m/s, as conventional frequency only appears once observed velocity = c. (ie: a particle appears wave-like with a conventional frequency once it is observed to be moving at light speed.)

This is not the first time I have seen equation 55. In this paper, I derived it using the Schrodinger equation, but I have also derived it independently in the paper: **McMahon, C.R. (2013)** *"The McMahon equations"*. ***Such perfect agreement indicates McMahon field theory holds true.***

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