the general science journal

Mr Casey Ray McMahon, B.Sci (Hons), B.MechEng (Hons)

 Version: 8th June 2013, Updated 8th October, 2015

Rydbergs constant solved.

Abstract: The Original McMahon field theory was developed and written over a period of almost 14 years, between the 31st of December 1996 and the 20th February, 2010. As time goes on, I am constantly coming up with more data to add to it- data that explains observations made in the real world. Here, I use the McMahon field theory to explain exactly what Rydbergs constant is, and exactly what it is measuring- which even Rydberg himself was unaware of.

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.

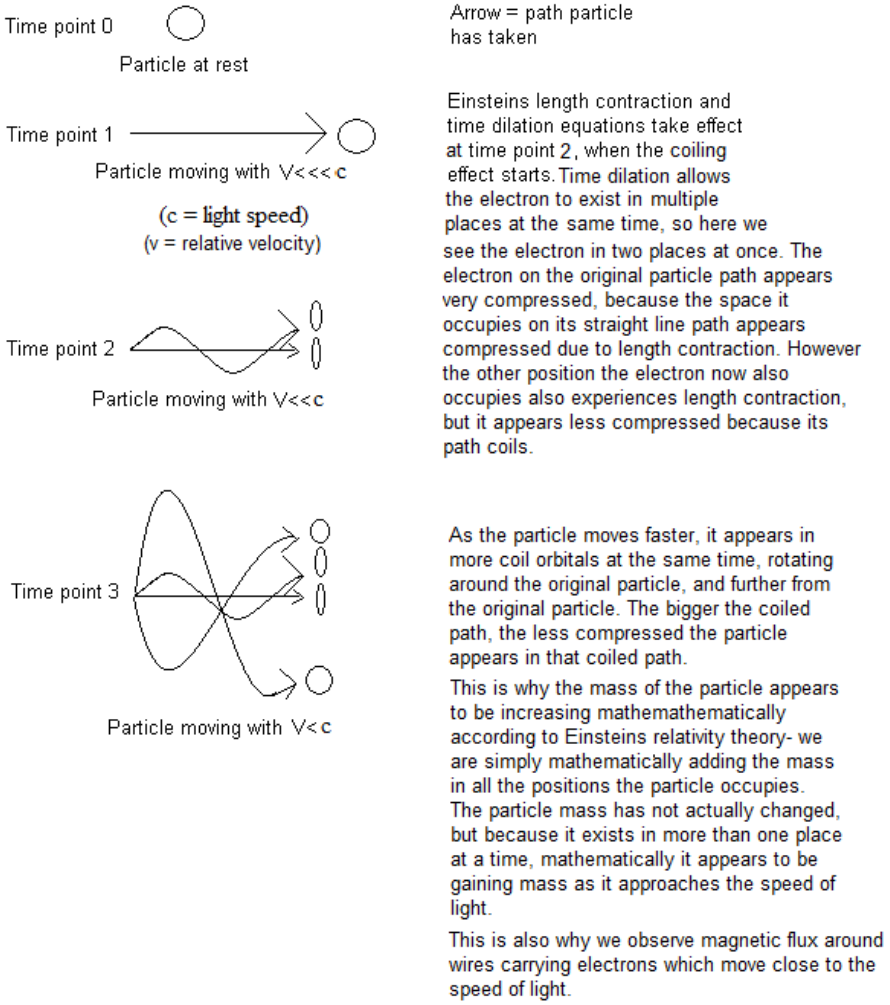

Figure 1: particle relativity- Taken from the McMahon field theory (2010): What we observe as relative stationary observers of a particle as it travels faster.

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:

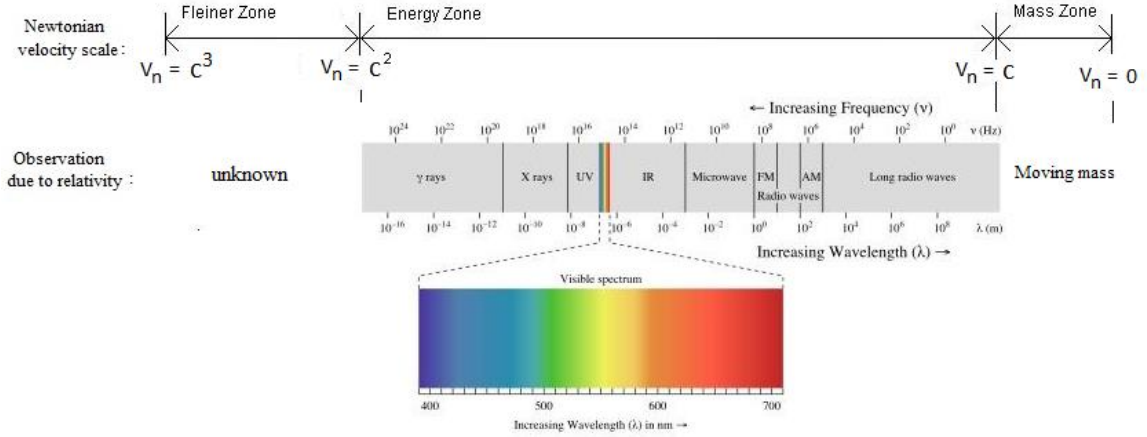

Figure 2: How an electron is observed at different Newtonian speeds: modified from the McMahon field theory (2010): Here, we see that as an electron moves with increasing speed according to Newtonian physics (although the speed we observe is dilated back to that of light because of relativity as in figure 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.

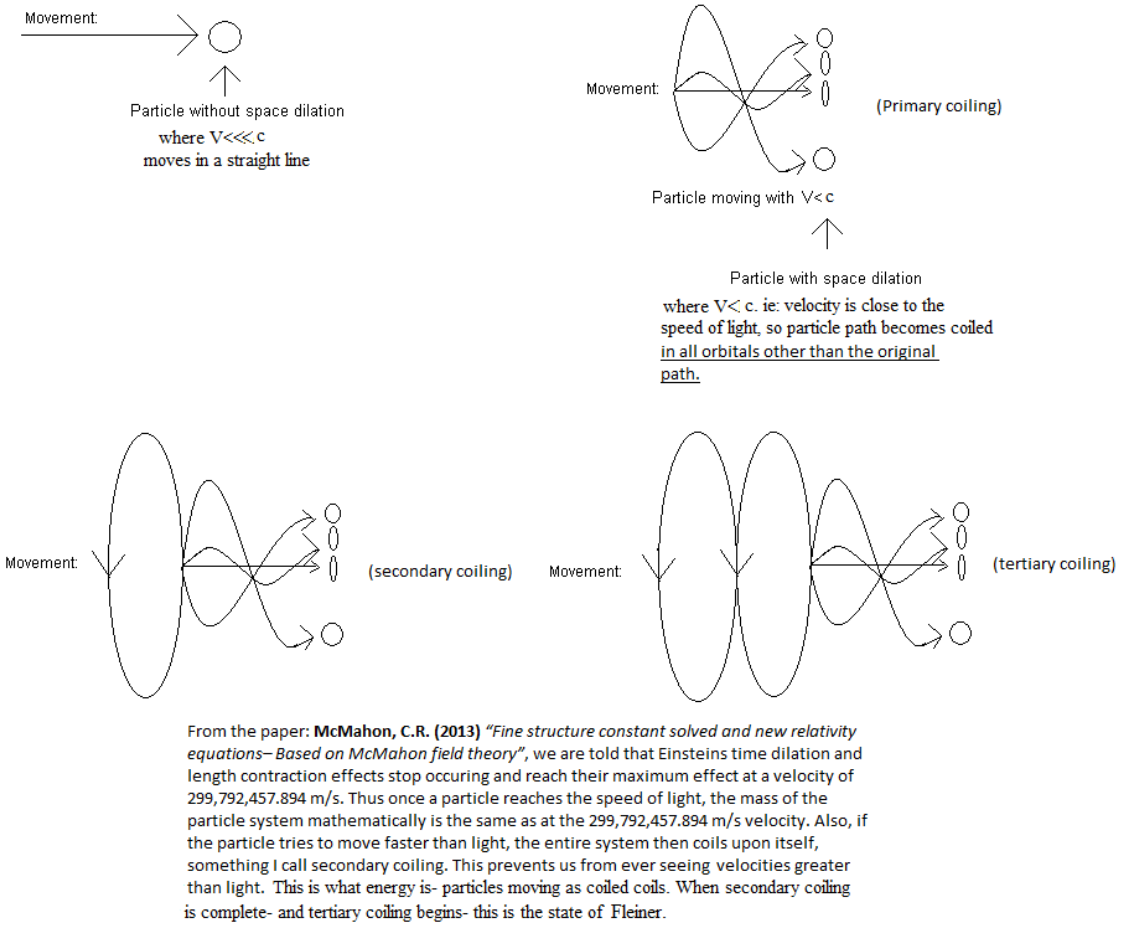

Figure 3: The actual affect Einsteins relativity theory has on the movement of a particle, causing it to first appear as mass during primary coiling, then energy during secondary coiling, and Fleiner during tertiary coiling, during which it becomes dark matter or dark energy. Einstein was unaware of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

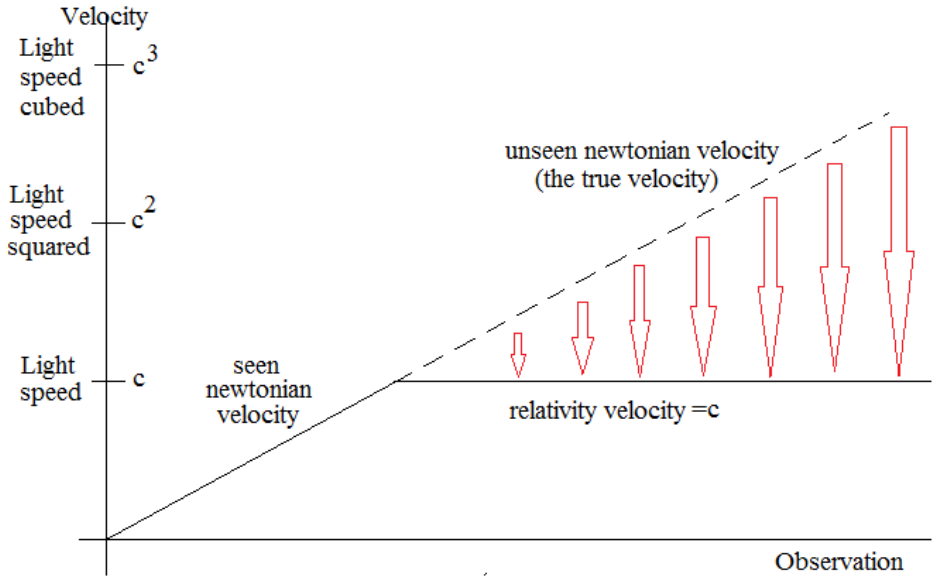

Figure 4: The dilation of the true velocity or Newtonian velocity by relativity. Here, we see that the dotted line represents the true velocity of particles travelling faster than the speed of light, but relativity dilates this velocity down to the speed of light which coils the path of the particle, 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.

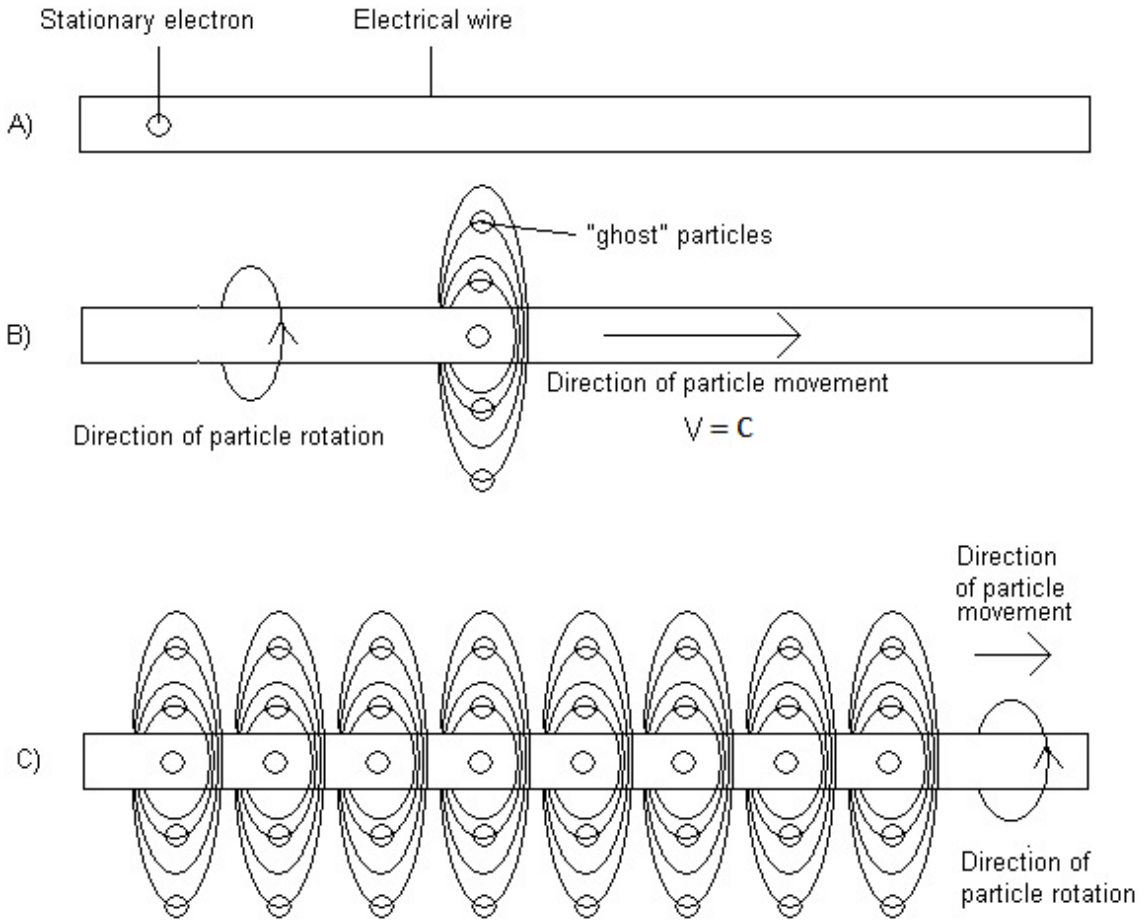

Figure 5: In A), we see a stationary electron in a wire. If this electron moves through the wire at speeds far below c, then the particle simply moves in a straight line through the wire, and no magnetic field is observed.
In B), our electron is now moving at c, so space dilation is occurring, causing 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.

Before a particle reaches the speed of light, it exhibits time dilation and length contraction effects. However, once it come close to the speed of light, (v= 299,792,457.893735 m/s) or tries to move faster, the time dilation effect remains constant. Because of this, the particle velocity appears to remain constant at v = c or 299,792,458 m/s, while it continues to experience length contraction.

Now, I will present Rydbergs constant.

From Wikipedia (2013), The Rydberg formula is used to describe the spectral lines (electron orbitals or coils) of chemical elements. Since magnetic flux also moves within such orbitals, we can use it to determine the total area these orbitals occupy. Using the simplest case, the Rydberg formula (as for hydrogen) is:

$$\frac{1}{\lambda_{\text{vac}}} = R\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$$

…….(equation 1)

Where

λ_{vac} is the wavelength of electromagnetic radiation emitted in vacuum,
R is the Rydberg constant, approximately 1.097 * 10^7 m^{-1},
n_1 and n_2 are integers greater than or equal to 1 such that $n_1 < n_2$

In the McMahon field theory (2010), I explained about atomic energy levels- so please refer to the section that talks about emission spectra for more details about orbitals. Anyhow, the integer n1 represents a real electron orbit, which moves further away from the nucleus as it increases, and the n2 integer represents an electron flux or ghost orbit, which becomes closer to the real electron orbit as its value increases. Refer to figure 6 below for a visual depiction of this explanation.

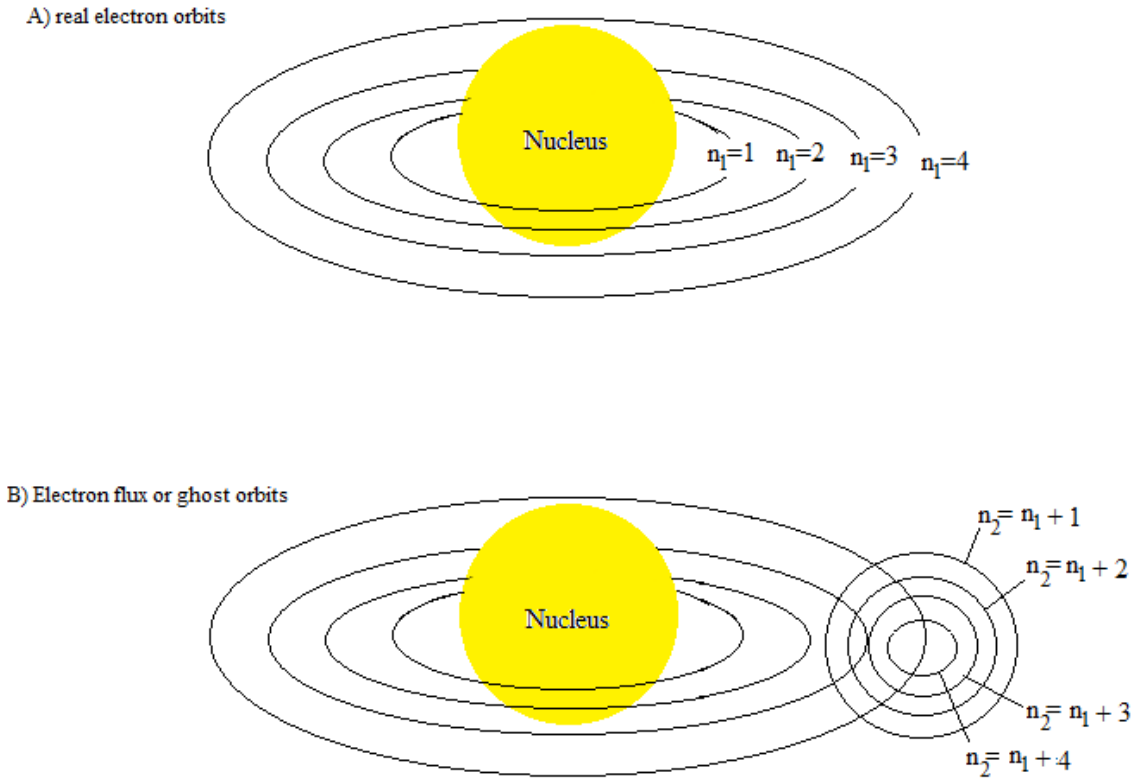

Figure 6: Real electron orbits and electron flux or ghost orbits for hydrogen. In A) we see how n1 is labeled, in that as n1 increases, we move further away from the nucleus. In B), we see how the flux orbits are labeled, in that as n2 increases, we move further towards the real n1 orbit. Flux orbits occur tangentially to the real electron orbits. Thus, considering image B), if we want to calculate the wavelength of the depicted flux orbital n2 = n1+1, using the Rydberg formula we set n1=4 as we are considering the 4th real orbital, thus n2 = n1+1 becomes: n2 = 4+1=5. This is done using equation 1. Note that flux orbitals occur tangentially to the real electron orbits: this is because of the coiling effect described by McMahon field theory (2010), as depicted in figure 1.

Figure 6 above explains all the Hydrogen spectral lines we observe, using the Rydberg formula. When we set n1=1, and vary n2, we find the hydrogen spectral series known as the Lyman series. When we set n1=2, and vary n2, we find the hydrogen spectral series known as the Balmer series. When we set n1=3, and vary n2, we find the hydrogen spectral series known as the Paschen series, etc. Thus these different spectral series appear because of the coiling that occurs as explained by the McMahon field theory. Because the real electron orbit (n1 values) are moving with Newtonian velocities greater than light, relativity dilates this velocity back down to c, hence this is the velocity we observe. The time dilation of relativity causes the electron to exist in multiple places at the same time, and the length contraction effect of relativity causes coiling. These two effects combined cause the appearance of the flux orbitals (the n2 values).

Notice the pattern the flux orbitals make are identical to the magnetic field pattern around electrical wires that are carrying electrical current. This is because electricity, which is

composed of moving electrons, is also experiencing Einsteins time dilation and length contraction effects, which are causing the coiling pattern. Also notice that there are lots of magnetic flux lines close to the wire, but less flux lines further away from the wire. This is the exact same pattern we see in the different Hydrogen spectral lines. Spectral lines further from the real electron are spaced further apart. Refer to figure 7 below.

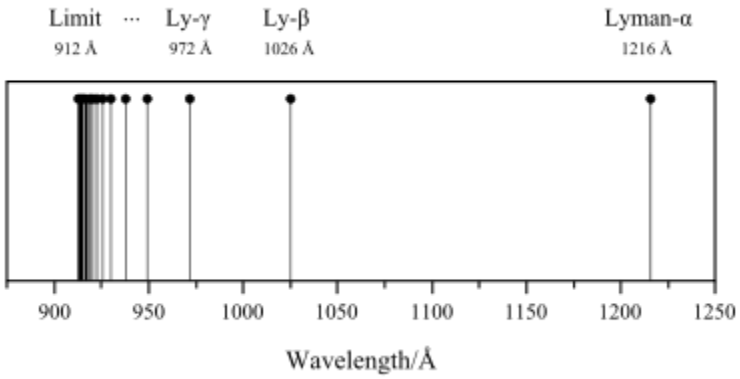

Figure 7, **Lyman series**. from: **Wikipedia (2013)** *"Hydrogen spectral series"* link: http://en.wikipedia.org/wiki/Hydrogen_spectral_series. Notice that the spectral lines occur closer together on the left side of the image- this is because the flux orbitals are converging toward the real electron orbital, just as what happens with magnetic fields around electrons in wires carrying electrical current.

To this day, no one has figured out exactly what the Rydberg constant is- but I feel I have, so I will explain it for the reader below:

$$\text{Rydberg constant } (M^{-1}) = \frac{\text{The total circumference of the coils } \left(\frac{M}{s}\right)}{\text{The total area of the coils } \left(\frac{M^2}{s}\right)}$$

…….(equation 2)

This relation appears valid for the full primary coil state. Since secondary and higher order coiling are the result of the full primary coil coiling upon itself, there are situations where this relation can be used for secondary and higher order coiling equations. In the case of frequency, since we know from the McMahon field theory that as a full primary coil is compressed due to a higher Newtonian velocity above light (as in figure 4) causing secondary coiling, the frequency increases as a direct consequence to keep Rydbergs constant a constant. This means that:

$$R = \frac{F}{(V_n - c)}$$

…….(equation 2a)

Where:
R =Rydberg constant. Units = metres^{-1}

F = Frequency, where F > 0. Units = seconds^{-1}
V_n = The Newtonian velocity, which is the true velocity undilated by relativity, where Vn > c. Units = metres/second.
C = the speed of light. Units = metres/second

See the end of this paper for a derivation of equation 2a.
Anyhow, according to **Wikipedia (2013)** *frequency,* we are told that:

$$f = \frac{c}{\lambda}$$, where λ = wavelength.

Inserting this into equation 2a, we have:

$$R = \frac{c}{\lambda (V_n - c)}$$

…….(equation 2b)

Where:
R =Rydberg constant. Units = metres^{-1}
λ = wavelength, where λ > 0. Units = metres.
V_n = The Newtonian velocity, which is the true velocity undilated by relativity, where Vn > c. Units = metres/second.
C = the speed of light. Units = metres/second

The Rydberg constant (R) is simply the total circumference of the coils covered per second, divided by the total circular area covered by these coils per second, at the full primary coil state. This is why the Rydberg constant has units of Meters^{-1}.
For electricity, where an electron is just moving as a primary coil before secondary coiling starts, we can use the Rydberg constant to find the total area these electron coils occupy. When an electron is moving at exactly light speed (primary coil state, no secondary coiling), the total circumference of the coils is equal to the distance light travels in one second.

Therefore: over a 1 second interval for a single electron only, we have:
R = c / total coil area.
1.0973731568539(55) x 10^7 M^{-1} = 299,792,458 (Metres) / Total coil area per second.
Total coil area covered in 1 second = 27.3190988979 Metres^2/second.
(same as c/R)

In McMahon, C.R. (2012) *"calculating the true rest mass of an electron- based on McMahon field theory"*, it was shown that:

Electron rest mass = hR /c = 2.42543489361 x 10^{-35}Kg
Total coil area covered by an electron per second at light speed = c/R = 27.3190988979 Metres^2/second

Therefore:
Electron rest mass x **area covered by the electron per second at light speed** = **Plancks constant**. Ie: Kg x M^2/s = Plancks constant.
Thus 2.42543489361 x 10^{-35}Kg x 27.3190988979 $Metres^2/sec$= 6.626 x 10^{-34} $Kg*M^2/s$.

Anyhow, back to the Rydberg constant, which I shall mathematically explain now.
From basic geometry, since the circumference of a circle = Diameter x π = Dπ,
And the area of this circle = $(Diameter/2)^2$ x π = $\pi(D/2)^2$ = $\pi D^2/4$, we can say:

Area of a circle = circumference x D/4, and since
Diameter = circumference/π, this gives us:

Area of the circle = Circumference x (circumference/π)/4
Area of a circle = $Circumference^2/4\pi$.
Rearranging, we have:

$$\mathbf{4\pi = Circumference^2 / Area\ of\ the\ circle}$$

…….(equation 3)

Re- arranging, this gives:

$$\frac{\text{Circumference}}{\text{Area}} = \frac{4\pi}{\text{Circumference}}$$

…….(equation 4)

or:

$$\frac{\text{Circumference}}{\text{Area}} = \frac{4}{\text{Diameter}}$$

…….(equation 5)

Equation 5 is the basic form of Rydbergs constant, as in equation 2, with the exception that Rydbergs constant considers multiple coils, thus multiple circumferences and areas. Thus equation 5 (for a single electron at light speed producing multiple flux coils) becomes:

$$\frac{\text{Total Circumference of the coils per second (m/s)}}{\text{Total area of the coils per second } (m^2/s)} = \frac{4}{\text{Diameter resultant value}} = \text{Rydberg constant}$$

…….(equation 6)

The Diameter resultant value is the calculated resultant due to many coils (or circles). Note that since multiple coils are being considered here;

Total Circumference of the coils per second ≠ π x Diameter resultant value

…….(equation 7)

This is because Circumference = π x Diameter holds for single circles only. Thus it is best to express the Rydberg constant as presented in equation 6, in terms of a diameter resultant value.
Solving for the diameter resultant value in equation 6 gives:

$$\text{Diameter resultant value} = \frac{4}{\text{Rydberg constant}}$$

$$= \frac{4}{1.0973731568539 \times 10^{7}\ \text{m}^{-1}}$$

$$= 3.6450682022036 \times 10^{-7}\ \text{(metres)}$$

…….(equation 8)

Next, Considering **Wikipedia (2013)** *Balmer series*, which tells us that:

$$\frac{4}{\text{Balmer constant}} = \text{Rydberg constant}$$

…….(equation 9)

The Balmer constant has units of metres, thus considering equations 6 and 9 we see that:

$$\text{Rydberg constant} = \frac{4}{\text{Diameter resultant value}} = \frac{4}{\text{Balmer constant}}$$

Thus:

$$\text{Diameter resultant value} = \text{Balmer constant} = 3.6450682022036 \times 10^{-7}\ \text{(metres)}$$

…….(equation 10)

Thus, we now realize the connection between Balmers constant and Rydbergs constant more clearly, because of the geometry that arises (explained in this paper) due to the coiling effect as described in McMahon field theory (2010).

With this in mind, basically, equation 1 means:

$$\frac{1}{\lambda_{vac}} = \left(\frac{\text{The total circumference of the coils} \left(\frac{M}{S}\right)}{\text{The total area of the coils} \left(\frac{M^2}{S}\right)} \right) x \left(\begin{matrix} \text{Difference in orbital positions of} \\ \text{two coils, as integer values} \end{matrix} \right)$$

Note: this value (Rydberg constant) is the same for all coils or orbitals, so no difference value (subtraction) is needed.

Different coils or orbitals have different integer positions, so a difference value (subtraction) is needed.

Notice from equation 1, that when you use the Rydberg formula, the $\frac{1}{n_1^2}$ value is <u>always greater</u> than the $\frac{1}{n_2^2}$ value. This is because the n_1 coil or orbital has more energy, and is closer to the nucleus, as stated in the McMahon field theory (2010). Niels Bohr had his model of the atom back-to-front, he thought atoms further from the nucleus had more energy- he was wrong. For this reason, the orbital integer equation component in Rydbergs formula is always written as $\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$, so the energy difference between the orbitals is: the bigger energy value orbital – the energy lost from the big energy orbital now the electron is coexisting in the flux energy value orbital. This proves that the n_1 coil or orbital which is closer to the nucleus does indeed have more energy than the n_2 flux coil or orbital, verifying McMahon field theory (2010). **Update: The paper: McMahon, C.R. (2013) "The McMahon equations" Also reveals that n1 represents a real or original orbital, whereas n2 represents a flux or a ghost particle orbital, due to Einsteins time dilation. Thus,** $\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$ **= the condition of the flux or ghost particle in the n_2 orbital. <u>Thus, the Rydberg formula gives spectral values which are actually flux orbitals, or ghost particle orbitals!</u> Orbitals closer to the nucleus have more energy, which is why $1/n_2^2$ is subtracted from $1/n_1^2$. The first flux or spectral lines given by the Rydberg formula, when n_2 is its smallest permissible value, are flux lines furthest from the real electron. Refer to McMahon, C.R. (2013) "The McMahon equations" for mathematical verification.**

Now, when using the Rydberg formula for hydrogen-like atoms, we must take into account the effect protons have on the coils or orbitals. From the McMahon field theory (2010) it is postulated that protons are able to produce proton fields, just as an electron can produce a magnetic field. Hence, the proton flux pattern will be just like that of magnetic flux- only instead of being composed of electrons, it will be composed of

protons. Thus, protons will exhibit coiling just as electrons do. I would therefore expect that a proton term, when added to the Rydberg formula, will be squared just as the orbital integer terms are squared in the Rydberg formula for hydrogen- because coiling indicates a circular area, as units used for area values are typically squared. I.e: Length = units of metres, Area = units of metres^2. Lets see:
From Wikipedia (2013) *"Rydberg constant"*, The Rydberg formula for any Hydrogen-like atoms (single electrons being affected by proton charge) is given as:

$$\frac{1}{\lambda_{\text{vac}}} = RZ^2\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$$

.....(equation 11)

where

λ_{vac} is the wavelength of the light emitted in vacuum;
R is the Rydberg constant for this element;
Z is the atomic number, i.e. the number of protons in the atomic nucleus of this element;
n_1 and n_2 are integers such that $n_1 < n_2$.

Here, we see that indeed the proton term (Z) is squared, indicating it acts over an area just like electrons do- demonstrating that indeed proton fields do exist. McMahon field theory (2010) indicates that a proton field will be gravitational- in that it will pull in electrons from all directions, as well as electrons on the outer shells of atoms because opposite charges attract. McMahon field theory (2010) postulates the same coiling behavior for neutrons, only a neutron field will affect time (and perhaps space also, so a neutron field could be used to create an Einstein-Rosen bridge, or wormhole). McMahon field theory (2010) describes some basic methods of how to create both proton and neutron fields, although I have since published better methods in the paper: **McMahon, C.R. (2013)** *"generating gravity and time."*

Points of view:

Equation 2 in this paper, is the Rydberg constant from the point of view of the full primary coil state. This is the easiest way for me to visualize it, which is simply total coil circumference per second divided by total coil area per second. However, there are other ways to visualize it. Considering equation 2a, from the point of view of velocity and time, for the Rydberg constant we can say:

$$R = \frac{F}{(V_n - c)} = \frac{\dfrac{1}{\text{time taken to complete one secondary coil revolution}}\ (=F)}{\text{dilated velocity}\ (=V_n - c)}$$

Considering equation 2b, from the point of view of velocity and distance, for the Rydberg constant we can say:

$$R = \frac{c}{\lambda (V_n - c)} = \frac{\text{Velocity limit } (=c)}{\left[\text{Distance covered for one secondary coil revolution } (=\lambda)\right] \text{ x } \text{dilated velocity } (=V_n - c)}$$

Supporting evidence and derivation for equation 2a

The Rydberg formula is presented in equation 1, as:

$$\frac{1}{\lambda_{vac}} = R\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$$

As shown earlier, c=fλ, (light speed = frequency x wavelength) so we can say:

$$\frac{C}{\lambda_{vac}} = F$$

, thus:

$$\frac{1}{\lambda_{vac}} = \frac{F}{C} = R\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$$

$$\frac{C}{\lambda_{vac}} = F = RC\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$$

$$\frac{C}{\lambda_{vac}} = F = R\left(\frac{C}{n_1^2} - \frac{C}{n_2^2}\right)$$

…….(equation 12)

From equation 12, it is clear that Frequency = Rydberg's constant x a velocity value, where the component in brackets of equation 12 (c/n_1^2-c/n_2^2) is the velocity value in question. It has units of metres/seconds. This velocity value is a velocity value that has been dilated to cause secondary coiling, which we call frequency. Refer to figure 4 for a moment- we see that Newtonian velocities above light from figure 4 are dilated by relativity back down to that of light, so it seems that nothing can travel faster than light. The red arrows in figure 4 represent the velocity we don't see, because at newtonian velocities above light such velocities are dilated by relativity back down to light, and as a result we observe secondary coiling as described by McMahon field theory (2010). Thus, if the component in brackets of equation 12 (c/n_1^2-c/n_2^2) is the velocity above light that is dilated back down to c to cause coiling, then the true newtonian velocity, undilated by relativity (Vn) as in figure 4 would be given by:

$$V_n = \left(\frac{C}{n_1^2} - \frac{C}{n_2^2}\right) + C$$

……(equation 13)

Re-arranging equation 13, we have:

$$\mathrm{Vn} = \left(\frac{\mathrm{C}}{n_1^2} - \frac{\mathrm{C}}{n_2^2}\right) + \mathrm{C}$$

$$\mathrm{Vn} - \mathrm{C} = \left(\frac{\mathrm{C}}{n_1^2} - \frac{\mathrm{C}}{n_2^2}\right)$$

…….(equation 14)

Inserting equation 14 into equation 12 we have:

$$\frac{\mathrm{C}}{\lambda_{\mathrm{vac}}} = \mathrm{F} = R(\mathrm{Vn} - \mathrm{c})$$

…….(equation 15)

Thus, we have verified and derived equation 2a

References:

EBTX (2013). *Plancks constant.* Link: http://www.ebtx.com/ntx/ntx27.htm. Link last accessed 8th June, 2013.

McMahon, C.R. (2010) *"McMahon field theory: Theoretical unification of relativity and quantum physics, thus methods to generate gravity and time."* The general science journal.

McMahon, C.R. (2012) *"Calculating the true rest mass of an electron – Based on McMahon field theory."* The general science journal.

McMahon, C.R. (2013) *"Fine structure constant solved and new relativity equations– Based on McMahon field theory".* The general science journal.

McMahon, C.R. (2013) *"Generating gravity and time."* The general science journal.

McMahon, C.R. (2013) *"Plancks constant solved"* The general science journal.

McMahon, C.R. (2013) *"The McMahon equations"* The general science journal.

McMahon, C.R. (2015) *"Electron velocity through a conductor*". The general science journal.

Wikipedia (2013) *Balmer series.* http://en.wikipedia.org/wiki/Balmer_series Link last accessed 25th January, 2014.

Wikipedia (2013) *"Hydrogen spectral series"* Link: http://en.wikipedia.org/wiki/Hydrogen_spectral_series Link last accessed 4th September, 2013.

Wikipedia (2013) *speed of light.* Link: http://en.wikipedia.org/wiki/Speed_of_light. Link last accessed 8th June, 2013.

Wikipedia (2013) *Planck's constant.* Link: http://en.wikipedia.org/wiki/Planck_constant. Link last accessed 8th June, 2013.

Wikipedia (2013) *Rydberg formula.* Link: http://en.wikipedia.org/wiki/Rydberg_formula. Link last accessed 8th June, 2013.

Wikipedia (2013) *Electron rest mass.* Link: http://en.wikipedia.org/wiki/Electron_rest_mass. Link last accessed 8th June, 2013.

Wikipedia (2013) *frequency* http://en.wikipedia.org/wiki/Frequency Link last accessed 30th August, 2013.
Wikipedia (2013) *Wormhole.* Link: http://en.wikipedia.org/wiki/Wormhole
Link last accessed 8th June, 2013.