Energy Wave Equations: Correction Factors

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Summary

The equations in Energy Wave Theory accurately model particle energy, photon energy, forces, atomic orbitals and derive 19 fundamental physical constants from only five *wave* constants. Yet three correction factors are apparent in the equations, even though all three can be derived from the wave constants. A circular reference occurs when trying to remove these correction factors. Because of their placement in the equations and similarities to known g-factors in modern physics, the correction factors were given the same names: orbital g-factor, spin g-factor and total angular moment g-factor. In this paper, a potential reason for these factors is discussed and the potential of consolidating the three factors into one, based on the velocity of the Earth, which was neglected in the original construction of the Energy Wave equations.

The Correction Factors

Three correction factors were added to the equations found in Energy Wave Theory, similar to the g-factors found in physics equations: orbital g-factor, spin g-factor and total angular momentum g-factor. Total angular momentum is a product of the first two (orbital and spin g-factors), so there are only two unique g-factors.

The correction factors in Energy Wave Theory were also labeled after these three g-factors because of the similarities in where they occur in equations and that one of the factors is a product of the other two (angular momentum). However, the values are different than the CODATA values for g-factors used in modern physics.[1] The value difference can be explained by the fact that different constants and values are used in energy and force equations, thus the correction factor value would also be different.

The g-factors for Energy Wave Theory appear in the papers: *Particle Energy and Interaction*[2], *Forces*[3], *Fundamental Physical Constants*[4], *Key Physics Equations and Experiments*[5] and Atomic Orbitals[6] These constants and their notation are found in the Appendix of this paper.

Although the g-factor in modern physics has a different value, the Energy Wave Theory g-factor value can be seen in modern physics. In fact, the Wikipedia page for the electron's Compton wavelength discusses the relation of this wavelength to the electron's radius, but its value does not exactly equal the radius.[7]

$$r_e = \alpha\left(\frac{\lambda_e}{2\pi}\right) \simeq \frac{\bar{\lambda}_e}{137} \simeq 2.82\ \mathrm{fm} \quad (1)$$

When using the orbital g-factor from Energy Wave Theory, this relationship is indeed correct, illustrating that the g-factors that appear in equations from this theory are prevalent throughout modern physics too. In Eq. 2, the electron radius is **now accurate to 0.000%** with the orbital g-factor **(Δ_e)** applied. It has a value of 0.9936.

$$r_e = \alpha\left(\frac{\lambda_C}{2\pi}\right)\Delta_e = 2.8179 fm \quad (2)$$

When drafting previous papers for Energy Wave Theory, the reason given for the two g-factors (orbital and spin) was an imperfect sphere as a result of motion and spin. The equations for particle energy rely on a perfectly spherical volume, and a perfect sphere may be an impossible shape given a particle's motion.

Now, this imperfection is further explained as a result of the Earth's velocity through the universe, as seen in relativity, affecting the shape and energy of particles like the electron and proton. A potential velocity for Earth has been calculated, which reduces the three g-factors to only one. This approach could explain why the proton's orbital g-factor is slightly different than the electron's g-factor in Energy Wave Theory. These possibilities are discussed here in this paper.

Earth's Velocity Relative to Universe

The Earth spins on its axis each day, while orbiting the Sun, which is spinning around the Milky Way galaxy. In addition, the Milky Way and other galaxies are expanding. A frame of reference is required to understand Earth's true speed in the universe, but when measured against other galaxies, it is found that nearby galaxies are rushing towards a *Great Attractor* at a speed of 1,000,000 meters per second.[8]

The potential velocity of Earth, as determined by the g-factors, is 33,000,000 meters per second (3.3×10^7 m/s) when measured against the reference frame of a stationary universe. This is 33 times faster than the above-mentioned velocity and it is roughly 11% of the speed of light.

Orbital G-Factor (Longitudinal)

The orbital g-factor, at least in Energy Wave Theory, should be appropriately named the longitudinal relativity factor. When the original Longitudinal Energy Equation was derived, it correctly measured the electron particle at rest to be 8.1871×10^{-14} joules.

$$E_e = \frac{4\pi\rho K_e^5 A_l^6 c^2 O_e}{3\lambda_l^3} = 8.1871x10^{-14}J \tag{3}$$

While this value is correct, the fact that the Earth is moving in the universe was neglected. With relativity, the electron's energy increases with velocity, although it is only noticeable at relativistic speeds. However, an Earth velocity of 11% of the speed of light would be detectable. On Earth, the electron's energy is truly measured at 8.1871 x 10^{-14} joules. However, at true rest (zero velocity in the universe's stationary frame), the electron's energy would be lower. Eq. 4 shows the Lorentz factor and how the electron's energy in Earth's frame of reference (E_e) would be greater than the electron's energy at rest in the stationary universe frame ($E_{e(rest)}$).

$$E_e = \gamma E_{e\,(rest)} \qquad 4)$$

The Lorentz factor is based on velocity as seen in Eq. 5 where v is the velocity of Earth and c is the speed of light.

$$\gamma = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} \qquad 5)$$

Therefore, the rest energy of the electron in the stationary universe frame would be:

$$E_{e\,(rest)} = \frac{\frac{4\pi\rho K_e^5 A_l^6 c^2 O_e}{3\lambda_l^3}}{\gamma} \qquad 6)$$

If one assumes that Earth's speed relative to the stationary universe is 3.3 x 10^7 m/s, then the rest energy of the electron in the stationary universe frame can be calculated (Eq. 9). It is slightly less than the electron rest energy measured on Earth – at 8.1374 x 10^{-14} joules.

$$v_{earth} = 3.3 \cdot 10^7 \qquad 7)$$

$$\gamma_e = \frac{1}{\sqrt{1 - \frac{v_{earth}^2}{c^2}}} \qquad 8)$$

$$E_{e\,(rest)} = \frac{4\pi\rho K_e^5 A_l^6 c^2 O_e}{\gamma_e 3\lambda_l^3} = 8.1374x10^{-14}J \qquad \textbf{9)}$$

On Earth, due to a velocity in the universe of roughly 11% the speed of light, the electron's rest energy increased by **1.006 times**. Neglecting this increase in the original derivation of the Longitudinal Energy Equation for particle energy caused it to be compensated for elsewhere. This is one possible reason why the orbital g-factor appears. It is the inverse of the Lorentz factor when the Earth is in motion (11% of the speed of light). The inverse of the orbital g-factor is:

$$\frac{1}{\Delta_e} = 1.006 \qquad \textbf{10)}$$

And the Lorentz factor at Earth's potential velocity is:

$$\gamma_e = 1.006 \qquad \textbf{11)}$$

Again, the inverse of this factor resolves the relationship between the electron's radius and the Compton wavelength as shown in Eq. 2, and it appears in many equations through Energy Wave Theory. The imperfect particle sphere calculated in longitudinal energy and force equations may be a result of particles at relativistic speeds.

$$\Delta_e = \frac{1}{\gamma_e} \qquad \textbf{12)}$$

Spin G-Factor (Transverse)

In addition to straight line motion which affects longitudinal waves, the electron is also spinning, affecting the spin (transverse waves). These equations are found in magnetism and gravity and include a second g-factor, referred to as the spin g-factor (Δ_{Ge}). However, this might be more appropriately named the transverse g-factor.

While the electron spins, the Earth is spinning, while rotating around the Sun and Milky Way. Each of these would need to be considered for a g-factor to be accurate to many digits, but even without this level of detail, the speed at which the Earth moves relative to the stationary universe frame is rather accurate if one assumes a speed of $3.3x10^7$ m/s. The inverse of the spin g-factor found in Energy Wave Theory is compared to the cube of the Lorentz factor at this speed:

$$\frac{1}{\Delta_{Ge}} = 1.018 \quad \textbf{13)}$$

$$\gamma_e^3 = 1.018 \quad \textbf{14)}$$

The transverse wave is a 1D wave, compared with the longitudinal wave which is 3D and spherical. This likely explains the cube factor in this correct factor.

A difference in the proton's radius compared to the electron's radius may also explain why the proton has a very slightly different spin g-factor (Δ_{Gp}) to calculate proton mass, as found in *Fundamental Physical Constants*.

The spin g-factor only appears in a few equations as a standalone g-factor (including the proton mass, Planck mass and the gravitational constant). In most cases, the spin g-factor appears in the same equations as the orbital g-factor, and the resultant correction factor is a product of these two, known as the total angular momentum g-factor.

$$\Delta_{Ge} = \frac{1}{\gamma_e^3} \quad \textbf{15)}$$

Total Angular Momentum G-Factor (Longitudinal & Transverse)

The last g-factor is a product of orbital and spin g-factors. It is represented as:

$$\gamma_e \gamma_e^3 = 1.024 \quad \textbf{16)}$$

$$\frac{1}{\Delta_e}\frac{1}{\Delta_{Ge}} = \frac{1}{\Delta_T} = 1.024 \quad \textbf{17)}$$

$$\frac{1}{\Delta_T} = \gamma_e^4 \quad \textbf{18)}$$

Conclusion

The possibility of the Earth moving at high velocity throughout the universe, and its effect on particle energy, was not considered in the original equations for Energy Wave Theory. When considering relativistic speeds, it simplifies three g-factors to be based on one variable: velocity. The g-factors are then derived from the Lorentz factor.

Although it is a possibility, a velocity of 3.3×10^7 m/s (11% of the speed of light) would be significant for the Earth to be traveling at this speed relative to a reference frame of a stationary universe. It may also be a coincidence that this matches the two values for orbital and spin g-factors (the third g-factor would not be a coincidence since it is a product of orbital and spin g-factors).

If it is indeed true, it provides an explanation for the reason for these g-factors and also why the proton has a slightly different value.

Appendix:
Energy Wave Constants and Variables

Notation

The energy wave equations include notation to simplify variations of energies and wavelengths at different particle sizes (K) and wavelength counts (n), in addition to differentiating longitudinal and transverse waves.

Notation	Meaning
K_e	e – electron (wave center count)
$\lambda_l\ \lambda_t$	l – longitudinal wave, t – transverse wave
$\Delta_e\ \Delta_{Ge}\ \Delta_T$	e – electron (orbital g-factor), Ge – gravity electron (spin g-factor), T – total (angular momentum g-factor)
F_g, F_m	g - gravitational force, m – magnetic force
$E_{(K)}$	Energy at particle with wave center count (K)

Table 1.1.1 – Energy Wave Equation Notation

Constants and Variables

The following are the wave constants and variables used in the energy wave equations, including a constant for the electron that is commonly used in this paper. Of particular note is that variable n, sometimes used for orbital sequence, has been renamed for particle shells at each wavelength from the particle core.

Symbol	Definition	Value (units)
	Wave Constants	
A_l	Amplitude (longitudinal)	$3.662796647 \times 10^{-10}$ (m)
λ_l	Wavelength (longitudinal)	$2.817940327 \times 10^{-17}$ (m)
ρ	Density (aether)	$9.422369691 \times 10^{-30}$ (kg/m^3)
c	Wave velocity (speed of light)	299,792,458 (m/s)
	Variables	
δ	Amplitude factor	variable - (m^3)
K	Particle wave center count	variable - *dimensionless*
n	Wavelength count	variable - *dimensionless*

Q	Particle count (in a group)	variable - *dimensionless*
Electron Constants		
K_e	Particle wave center count - electron	10 - *dimensionless*
Derived Constants*		
O_e	Outer shell multiplier – electron	2.138743820 – *dimensionless*
Δ_e / δ_e	Orbital g-factor /amp. factor electron	0.993630199 – *dimensionless* / (m^3)
Δ_{Ge}/δ_{Ge}	Spin g-factor/amp. gravity electron	0.982746784 – *dimensionless* / (m^3)
Δ_T	Total angular momentum g-factor	0.976461436 – *dimensionless*
α_e	Fine structure constant	0.007297353 – *dimensionless*
α_{Ge}	Gravity coupling constant - electron	$2.400531449 \times 10^{-43}$ - *dimensionless*

Table 1.1.2 – Energy Wave Equation Constants and Variables

The derivations for the constants are:

The outer shell multiplier for the electron is a constant for readability, removing the summation from energy and force equations since it is constant for the electron. It is the addition of spherical wave amplitude for each wavelength shell (n).

$$O_e = \sum_{n=1}^{K_e} \frac{n^3 - (n-1)^3}{n^4} \qquad \textbf{(1.1.1)}$$

The three modifiers (Δ) are similar to the g-factors in physics for spin, orbital and total angular momentum. These modifiers also appear in equations related to particle spin and orbitals, however the g-factor symbol is not used since their values are different. This is due to different wave constants and equations being used.

The value of Δ_{Ge} was adjusted slightly by 0.0000606 to match experimental data. Since Δ_T is derived from Δ_{Ge} it also required an adjustment, although slightly smaller at 0.0000255. This could be a result of the value of one or more input variables (such as the fine structure constant, electron radius or Planck constant) being incorrect at the fifth digit. The fine structure constant (α_e) is used in the derivation in Eq. 1.1.2 as the correction factor is set against a well-known value.

$$\Delta_e = \delta_e = \frac{3\pi\lambda_l K_e^4}{A_l \alpha_e} \qquad \textbf{(1.1.2)}$$

$$\Delta_{Ge} = \delta_{Ge} = 2A_l^3 K_e^{28} \tag{1.1.3}$$

$$\Delta_T = \Delta_e \Delta_{Ge} \tag{1.1.4}$$

The electromagnetic coupling constant, better known as the fine structure constant (α), can also be derived. In this paper, it is also used with a sub-notation "e" for the electron (α_e).

$$\alpha_e = \frac{\pi K_e^4 A_l^6 O_e}{\lambda_l^3 \delta_e} \tag{1.1.5}$$

The gravitational coupling constant for the electron can also be derived. α_{Ge} is baselined to the electromagnetic force at the value of one, whereas some uses of this constant baseline it to the strong force with a value of one ($\alpha_G = 1.7 \times 10^{-45}$). The derivation matches known calculations as $\alpha_{Ge} = \alpha_G / \alpha_e = 2.40 \times 10^{-43}$.

$$\alpha_{Ge} = \frac{K_e^8 \lambda_l^7 \delta_e}{\pi A_l^7 O_e \delta_{Ge}} \tag{1.1.6}$$

The gravitational coupling constant for the proton is based on the gravitational coupling constant for the electron (above) and the proton to electron mass ratio (μ), where $\mu = 1836.152676$.

$$\alpha_{Gp} = \alpha_{Ge}(\mu^2) \tag{1.1.7}$$

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[1] Mohr, P., Newell, D. and Taylor, B., CODATA Recommended Values of the Fundamental Physical Constants 2014 Rev. Mod. Phys. 88, 035009 (2016).

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[3] Yee, J., Forces, Vixra.org 1606.0112 (2017).

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[7] Wikipedia, *Compton Wavelength*, Online: https://en.wikipedia.org/wiki/Compton_wavelength (Accessed March 15, 2018).

[8] Scientific American, *How Fast is the Earth Moving*, https://www.scientificamerican.com/article/how-fast-is-the-earth-mov/ (Accessed March 15, 2018).