A new conjecture linking particle size and particle energy.

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March 2022

Abstract:

In this paper, we build on the work of Max Planck, Louis de Broglie and Arthur Compton. We add our research on Atomic Structure and Potential Energy Fields and we explore ideas on Potential Energy Standing Waves. This leads to a new conjecture for particles: **Energy x Diameter = Constant.**

1. Introduction:

In earlier papers, the fundamental principles of Physics have been reviewed by the analysis of the results of basic experiments:

Atomic spectra have been analyzed to explore the structure of atoms and molecules. Movements and interactions have been analyzed, to explore the behavior of energy fields (presently called magnetic and electro-magnetic fields). So far, it has not been necessary to invent any magical entities such as "charge" or "electron orbits".

In this paper, the foundations of physics and the nature of "matter" are studied, from first principles. We build on the work of Max Planck, Louis de Broglie and Arthur Compton. This is added to our conclusions on Atomic Structure and Potential Energy Fields. We explore ideas on Potential Energy Standing Waves.

We note that in Electron microscopes, higher energy electrons have shorter wave-lengths (and higher frequencies).

Research notes from 2007 are the starting point, where the similarity in behavior of electrons and photons is added to the hypothesis that "the proton is smaller than the electron", to formulate the new conjecture – see Figure 1:

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9/6/07
- 11/6/07

cegetel
Electron

Electrons convert to Xrays.
Protons do convert to Gammas?

Energy
frequency ν.

$c^2 \times$ electron rest mass. $=$ Energy $= h\nu = 6.6 \times 10^{-34} \times \nu. = mc^2.$
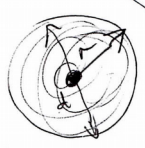
$(3 \times 10^8)^2$ 9.1×10^{-31} kg

$h\nu = mc^2$ say $\lambda = \pi d$

$d = \frac{\lambda}{\pi} = \frac{h c}{m c^2 \pi} = \frac{6.6 \times 10^{-34}}{9.1 \times 10^{31} \cdot 3 \times 10^8 \cdot \pi}$

$\nu_{electron} = \frac{9 \times 10^{16} \times 9.1 \times 10^{-31}}{6.6 \times 10^{-34}} = 1.24 \times 10^{20}$ Xrays/gammas.

Electron Energy in Circular motion?

Speed of light 3×10^8 m.
Freq. 1.24×10^{20}.
circumference πd

page 187 Electron theory 4.0×10^{-12} 4.65×10^{-12}
100kV & 500 keV.
8/2/12

$\frac{3 \times 10^8}{1.24 \times 10^{20}} = \pi d.$

$d = 0.8 \times 10^{-12}$ m. for Electron. ?

12/01/11
Same net "angular momentum" for electron and proton
→ Same "charge" (+ or −)

Proton   931 MeV

$c^2 \times$ proton rest mass

$(3 \times 10^8)^2$ 1.7×10^{-27} kg $=$ Energy $= h\nu = 6.6 \times 10^{-34} \times \nu.$

$E \times D = $ Constant
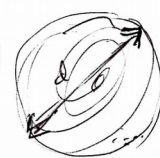
$\nu_{proton} = \frac{9 \times 10^6 \times 1.7 \times 10^{-27}}{6.6 \times 10^{-34}} = 2.2 \times 10^{23}$ gamma region.

highest detected is 33 GeV in 2000

Proton Energy in Circular motion

$\frac{3 \times 10^8}{2.2 \times 10^{23}} = \pi d.$

$d = 4.0 \times 10^{-16}$ m. for a proton

NB: Proton is "smaller" than electron

Heavier muon + hadrons — higher frequency/energy — need bigger collider to detect — but "smaller" particles.

① "Density" of "mass" is variable, not constant.
Heavier the particle, the more/innate energy, the "smaller".
the particle, the "denser" the particle.

② Atom size typically 10^{-10} m } good agreement
Nucleus size typically 10^{-15} m } with the above.

③ Is Neutron a Proton (+ve) plus Electron (−ve) plus a bit? No net charge.
— neutrinos?

Figure 1. Notes from 2007.

2. The nature of matter:

With reference to the work of Max Planck, Louis de Broglie and Arthur Compton:

For a **photon**, Max Planck proposes: Energy = Constant x Frequency

For a **particle**, Louis de Broglie proposes: Mass (energy) = Constant x Frequency

Arthur Compton combines the two and proposes the wavelength of a **particle** is the wavelength of a **photon** of the same energy:

In Electron microscopes, higher energy electrons have shorter wavelengths (and higher frequencies). The wavelength reduces as the inverse of energy.

To these conjectures, we add the findings of our own analysis of atomic spectra and atomic structure **[1]**, in which we conclude that electrons are much larger than protons – see Figure 2:

This leads to a new conjecture and a new equation: Just as higher energy photons have shorter wavelengths, so higher energy particles have smaller diameters:
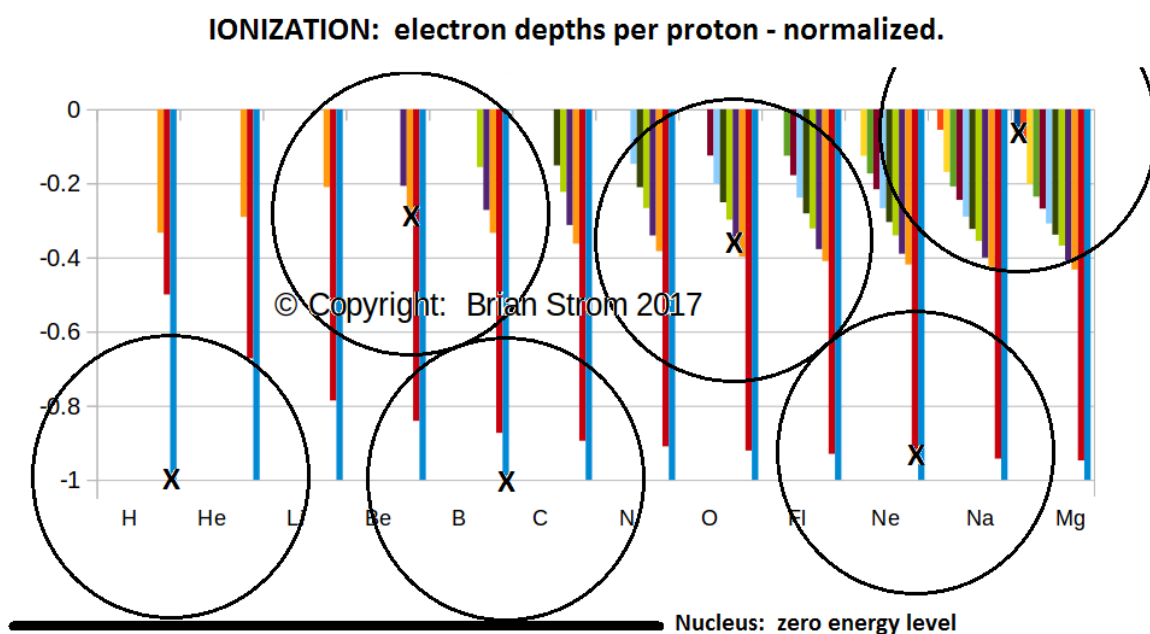
Energy x Diameter = Constant.

IONIZATION: electron depths per proton - normalized.

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Nucleus: zero energy level

Figure 2. Atomic Structure   - the size of electrons.

3. The particle as a "Potential Energy Standing Wave":

The new conjecture is that a particle is a Potential Energy Standing Wave, where the frequency is proportional to the particle's energy.

The "energy standing wave" idea has also been postulated by others including Milo Wolff, Gabriel LaFreniere and Geoffrey Haselhurst. Their common conjecture is that particles are **spherical** standing waves [2].

In this paper, the proposal is for a simple, **linear** Potential Energy Standing Wave which hereafter is called a **"wave-particle"**.

Figure 3 shows the diameter of the wave-particle as half its wavelength. If a wave-particle transposes into a photon, the emergent photon will have a wavelength of twice the particle diameter.
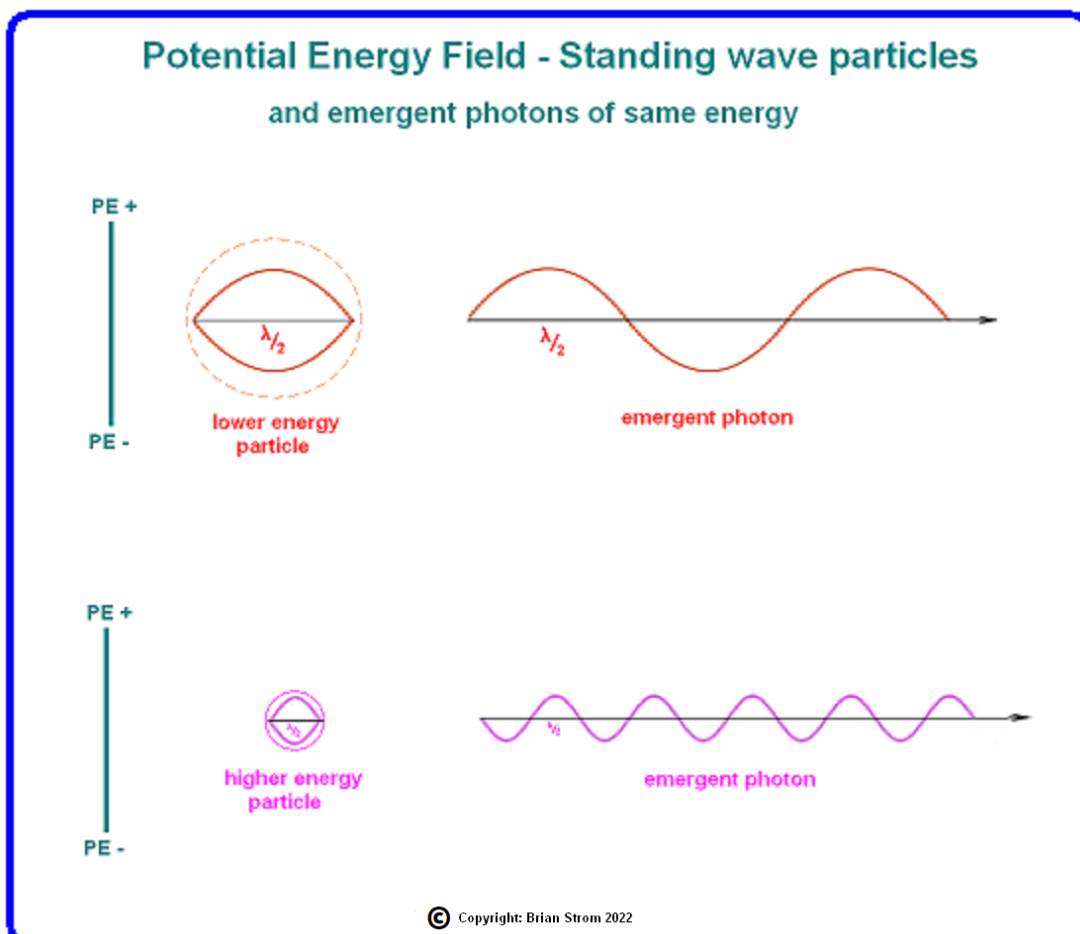

Figure 3. Potential Energy Field – Standing Wave Particles.

4.   Wave-particles: energy and size:

An important consequence of this conjecture is:

"The higher the energy – the smaller the particle."

Figure 4 shows how the spectrum of wave-particles could extend to infinity – with no beginning, and no ending. On Earth, we can observe a small number of stable wave-particles: - the proton, the electron and (possibly) the neutrino. But could there be more?

Could the spectrum of wave-particles extend to very-high-energy wave-particles (Cosmic Rays) and to very-low-energy wave-particles (Gravity Waves)?

The Energy x Size equation may be an infinite series but, on Earth, we humans can experience only a very small part of it.

Note: Could there be be parallel universes, where the value of the Universal Constant is different?
Could these universes co-exist in the same "space" but, because of the different frequencies, the parallel universes are unable to "observe" one another?
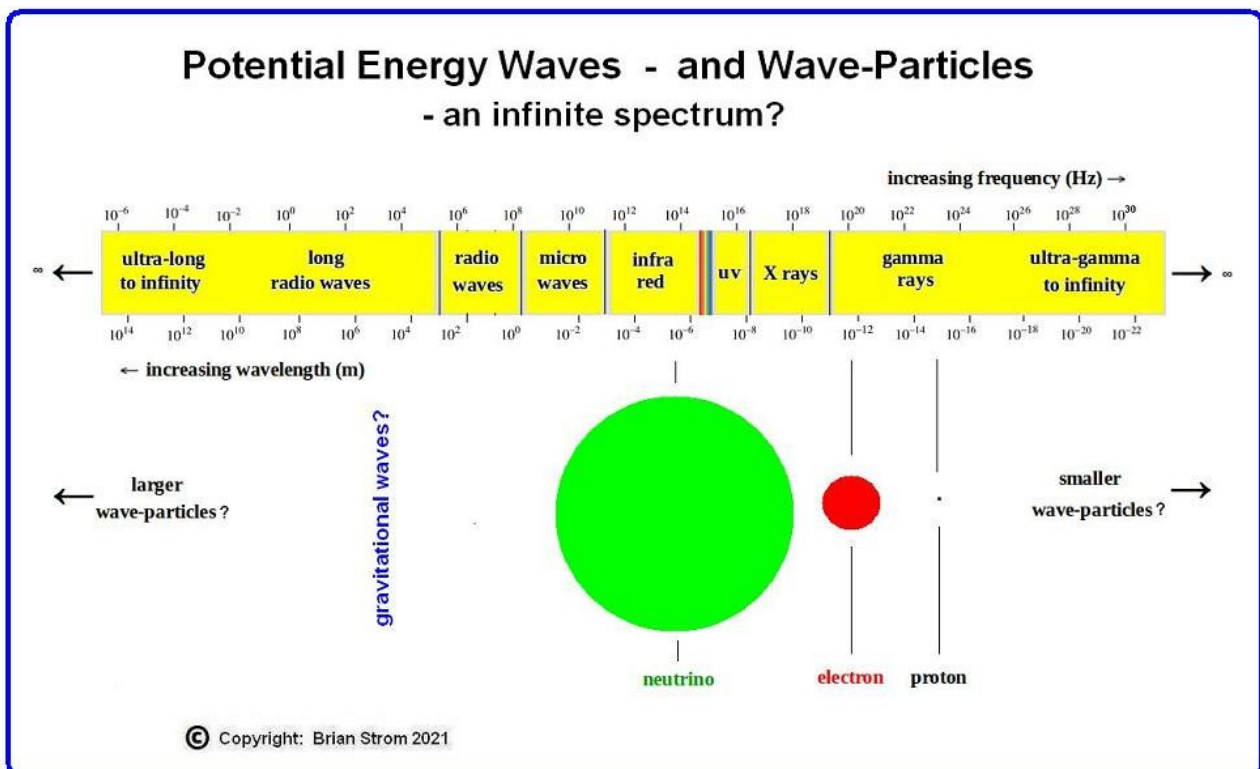
Figure 4. Infinite spectrum of wave-particles.

5.   The Potential Energy Standing Wave – Mathematics:

With acknowledgements to the work of Max Planck, Louis de Broglie et al, the basic mathematics for the wave-particle is as follows:

The Planck constant (h), is the proportionality constant between the energy (E) of a photon and the frequency of its associated "electromagnetic" or potential energy wave (f):

E = hf

And since frequency (f) equals the speed of light (c) divided by wavelength, then substituting for (f) we have:

E = hc/λ   or   E λ = hc   (Equation 1)

Now consider that this "potential energy wave" is not travelling as a spherical wave-front (as we believe a typical photon travels). Instead, imagine that the "potential energy wave" is stationary (a standing wave) so that it oscillates in its spherical volume at its fundamental frequency. (In wave terms, it reverses direction each half-cycle, so that it appears to make one complete "revolution" per wavelength.) This standing wave is the essence of a "wave-particle".

Then the effective diameter (D) of the "wave-particle" will be half the wavelength:

λ = 2 D

Substituting for λ in Equation 1 above:

E x D = hc/2   (Equation 2)

Hence:

E x D = Constant   (Equation 3)

Energy x Diameter = Constant.

The detailed parameters for the electron are shown in Figure 5. The detailed parameters for all the known particles (electron, proton and neutrino), are shown in Appendix A.

Figure 5. The parameters for an electron.

6.   Wave-particles: Sphere of Influence and The Universal Constant:

Although this conjecture is that wave-particles are smaller at higher energies, it must be remembered that the size of the **"sphere of influence"** of their Potential Energy Wells will be in proportion to their energies, which will be in proportion to the depths of the Potential Energy Wells.

So, the Potential Energy Well of the Proton (938 MeV) is 1836 times deeper than that of the Electron (511 keV).

And the Potential Energy Well of the Electron (511 keV) is 511,000 times deeper than that of the average Neutrino (say 1 eV).

The Universal Equation (for this universe) is:

Energy(eV) x Diameter (m) = 6.2 x 10^-7

The general formula and graph is shown in Figure 6 as a log-log plot:
(Note: By changing the units of energy and the units of diameter, the Constant can become any value e.g. 42.)

The Universal Constant

An infinite series of wave-particles?

Energy x Diameter = 6.2×10^{-7}

Energy (ev) log scale

proton

electron

PE wells

neutrino

not to scale

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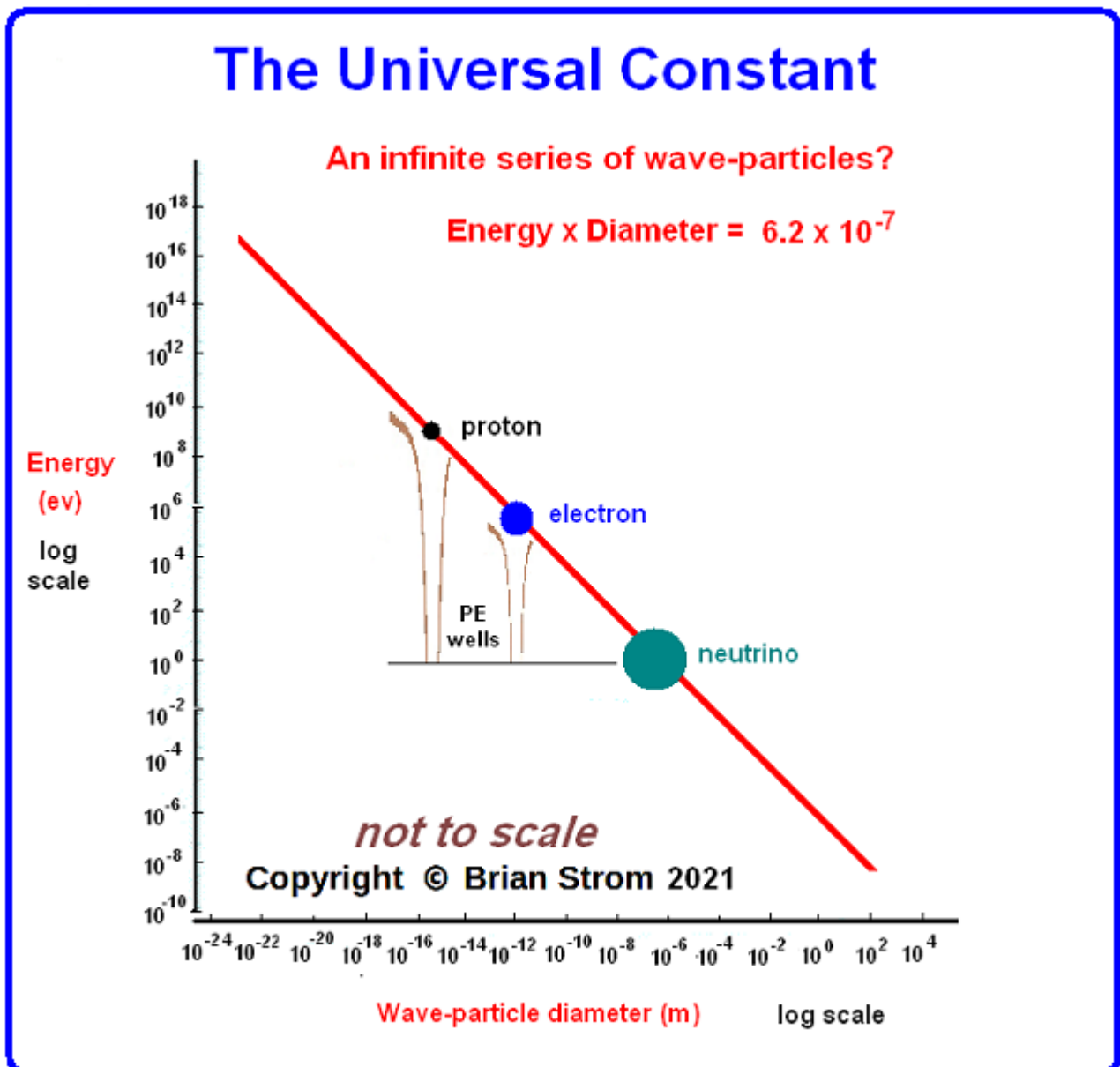Wave-particle diameter (m)   log scale

Figure 6. The Universal Constant.

7. Wave-particles: Energy-density to the Fourth Power

In the Standard Model conjecture, the density of nuclear matter (the proton) is assumed to be "high".   The density of an electron is assumed to be "low".

In this new conjecture: **E x D = Constant**   - the density of matter increases with Energy to the Fourth Power.

Repeat: The Energy-density of wave-particles varies with the fourth power of the Energy – see Figure 7:   and the mathematics in Appendix B.

This results in large differences in the energy-densities of the proton, electron and neutrino wave-particles.

In this scenario, the density of the neutrino is very low - which could be one of the reasons it is so difficult to detect in our experiments on Earth.
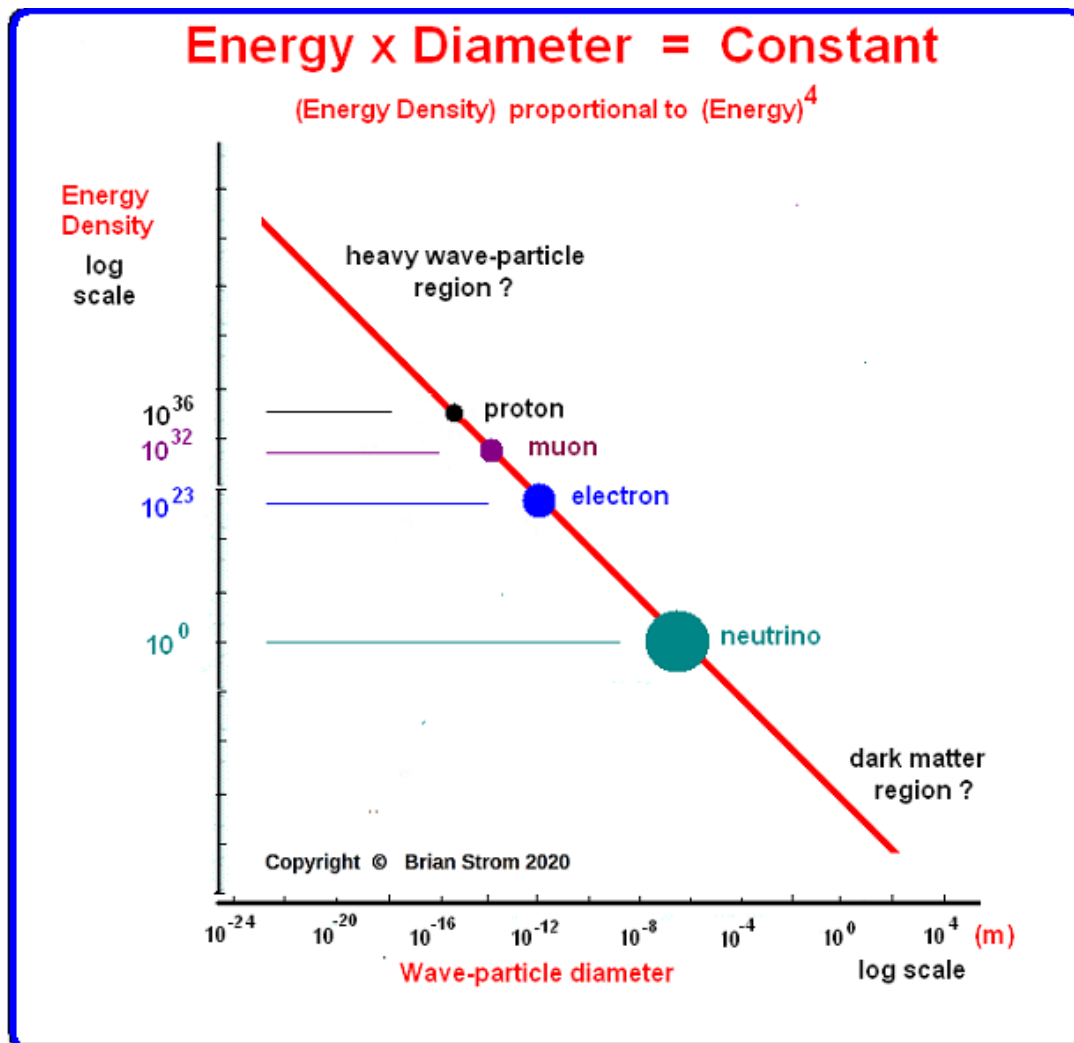

Figure 7. Energy density of wave-particles.

8. Wave-particles: Adding energy changes the wave-particle size and density:

According to the mathematics, if energy is added to, or subtracted from, a wave-particle (Potential Energy or Kinetic Energy), the size of the wave-particle will change.

The simplest scenario is adding Kinetic Energy to a wave-particle such that it increases velocity. This Kinetic Energy may later be converted into Potential Energy in an Energy Field environment.

A fast Neutrino will be smaller than a slow Neutrino and will have much higher energy density – see Figure 8:
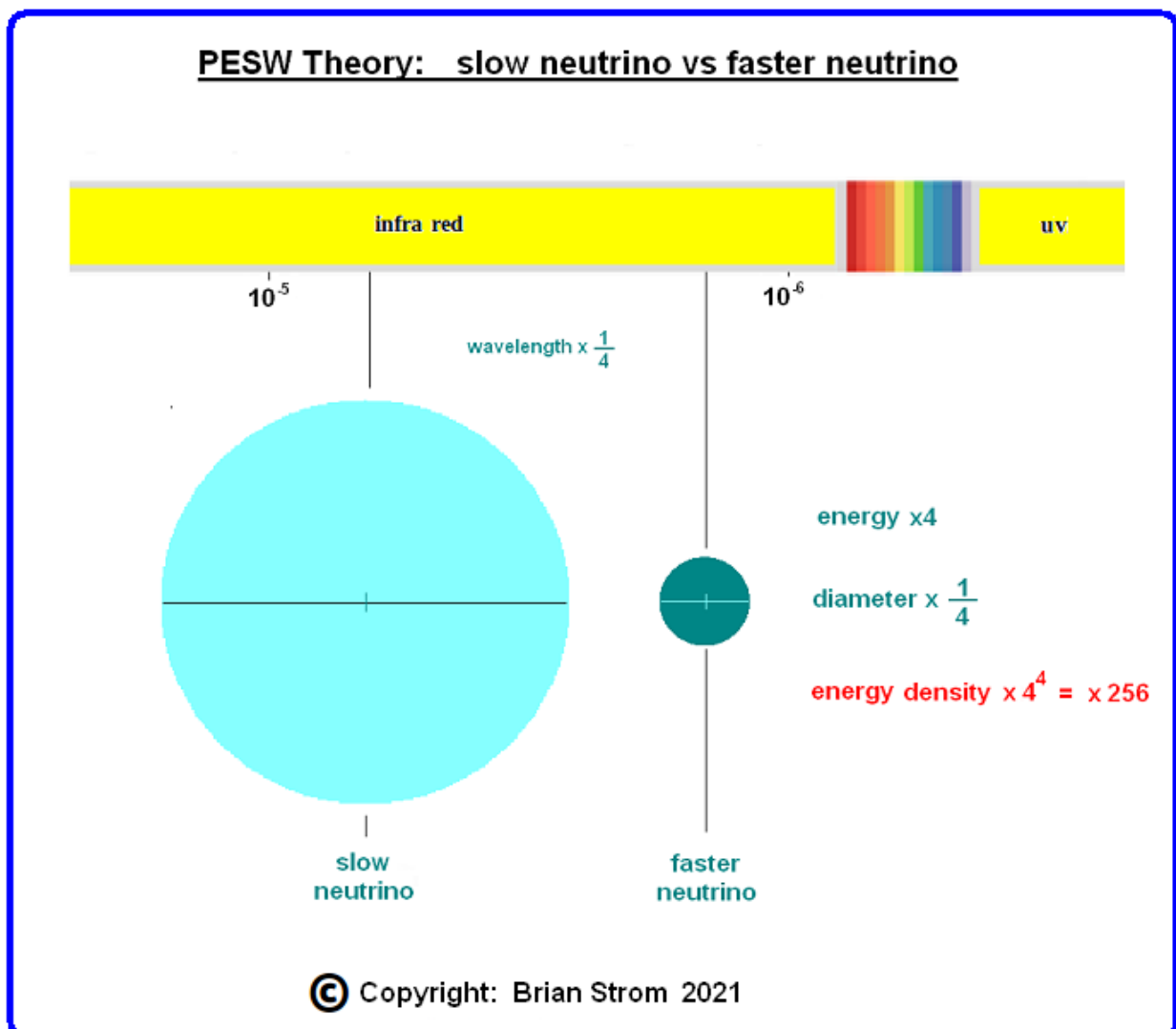

PESW Theory: slow neutrino vs faster neutrino

infra red   uv

10^{-5} 10^{-6}

wavelength x $\frac{1}{4}$

energy x4

diameter x $\frac{1}{4}$

energy density x 4^4 = x 256

slow neutrino   faster neutrino

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Figure 8. Energetic neutron is smaller and denser.

9. Wave-particles: overlapping range of energies, sizes and densities:

From experimentation, the known stable particles can be observed with a wide range of energies. Some of these energies can overlap – see Figure 9:
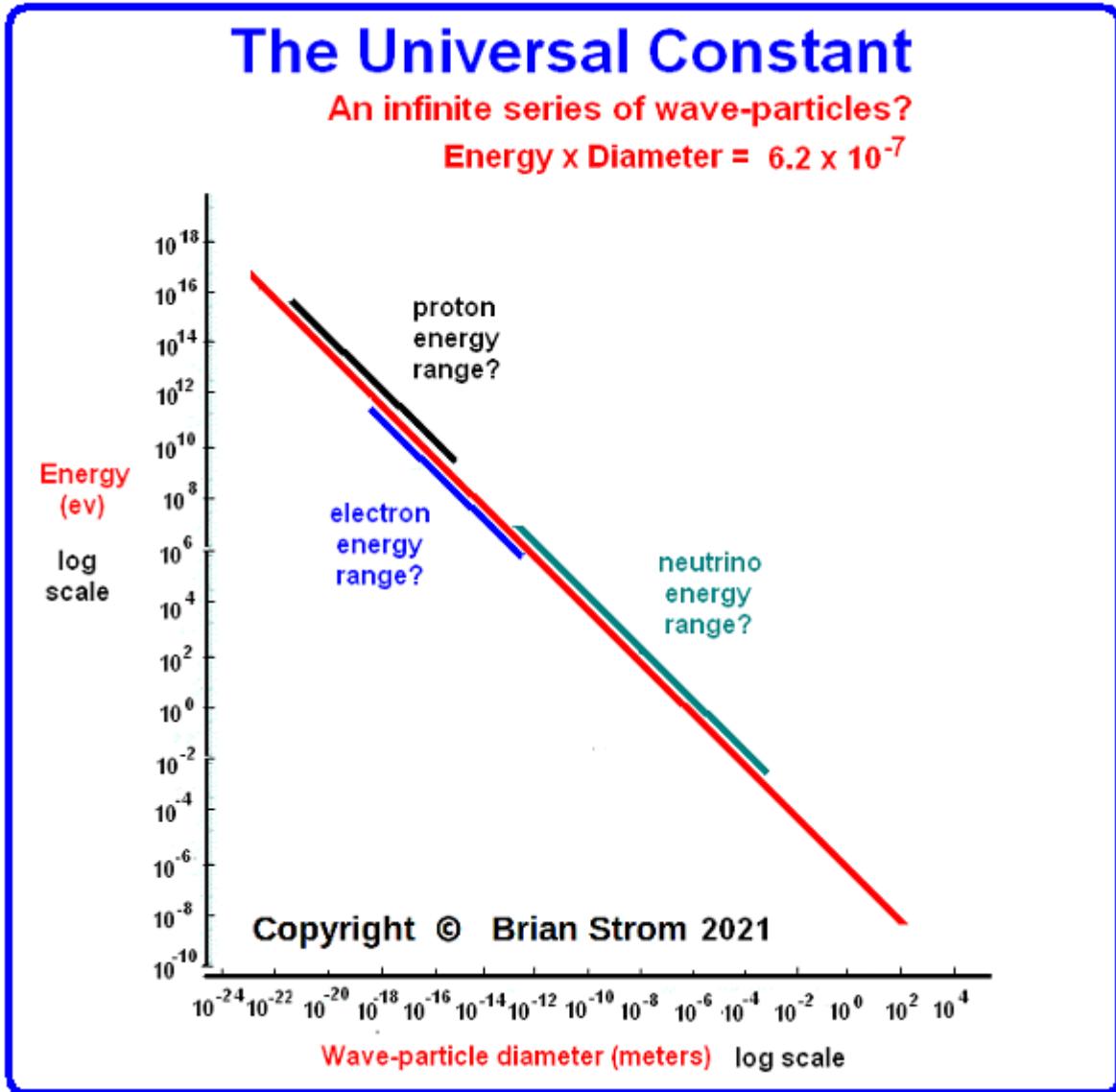

Figure 9. Overlapping ranges of wave-particles.

10. Consequences: The size of a spaceship:

A consequence of the **Energy x Diameter = Constant** conjecture is that, if a space ship is accelerated (by a propulsion system) and its Kinetic Energy or Potential Energy changes, its energy (mass) will also change, and its size will change – see Figure 10:

From observation, we know the Potential Energy level varies with distance from the Earth and with the distance from the Sun and galaxies. A general paper on the Potential Energy levels in the universe is at **[3].**

We know we can observe protons, electrons and neutrinos - with various energies - as shown in the previous section. But what about relative velocities?
If an observer changes his/her velocity, will all other wave-particles appear to change their energies, and hence their sizes?
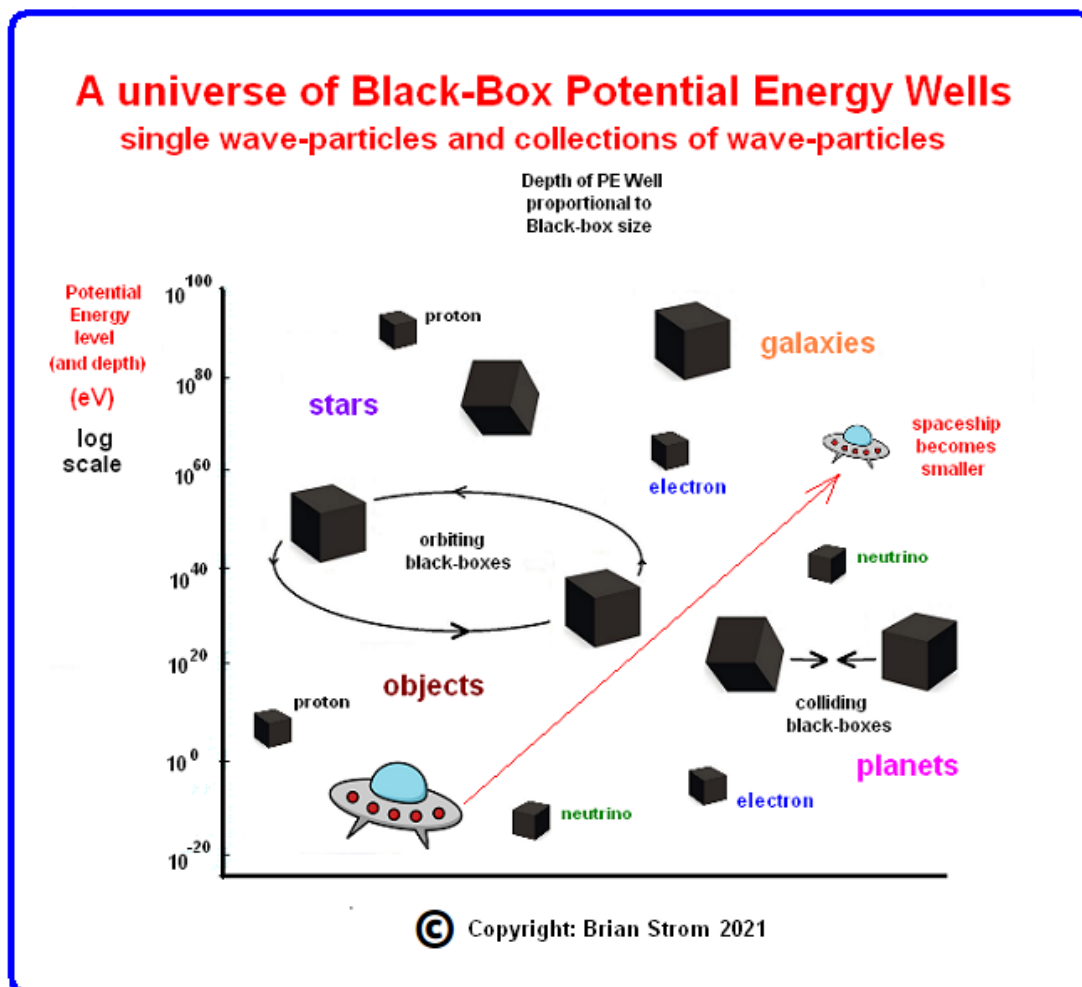

Figure 10. A universe of black-box PE Wells.

11. Consequences: Pound-Rebka:

An important experiment was conducted by Pound and Rebka in 1960 **[4]**.

A key assumption in the Pound-Rebka experiment is that the frequency of the Fe-57 gamma emission remains constant at both Potential Energy levels.

In the **E x D = Constant** conjecture, the frequency of the Fe-57 gamma emission will change when the Fe-57 is moved to a different Potential Energy level.

The observations seem to be the same for both theories, so it will be difficult to prove what is really happening.

Note: With the **E x D = Constant** conjecture, the characteristics of the measuring equipment will also change with different Potential Energy levels.

It may be impossible to find a definitive experiment to prove (at least) one theory is wrong. It may be the same dilemma as when trying to measure the one-way Speed of Light.
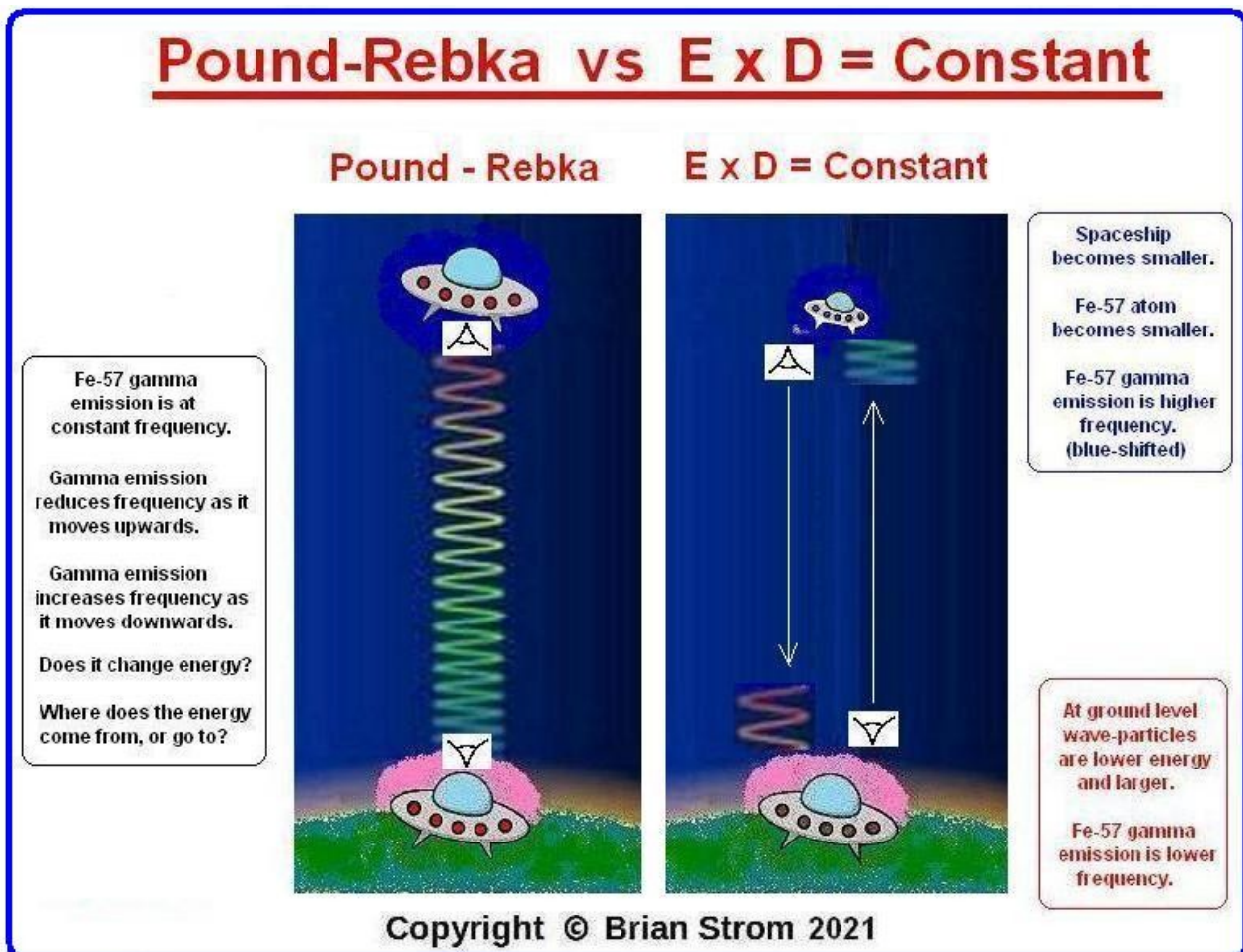

Figure 11. The Pound-Rebka experiment.

12. Consequences: Time Dilation:

There are many experiments purporting to show how "time slows down", but are there alternative explanations? For instance, if a frequency counter is moved to a different Potential Energy level, does it measure differently?

A key assumption in orbital time-dilation tests of Relativity is that the Caesium in the Caesium clocks behaves exactly the same at different Potential and Kinetic Energy levels. This has not been proven.

There are a number of alternative explanations for this scenario. To jump to the conclusion that "time slows down" is a leap of faith without foundation - like writing a new fantasy script for a magical novel.

Can this new **E x D = Constant** conjecture help solve the problem of Time Dilation and its contradictions?

The original experiment by Hafele–Keating in 1972 **[5]** combined the Potential Energy effect (General Relativity - gravitational) with the Kinetic Energy effect (Special Relativity – velocities). See Diagram 12a:

But the Kinetic Energy effect is reciprocal: both parties would "see" the other clock as slower. This cannot be true when the clocks come back together in the Hafele-Keating scenario.
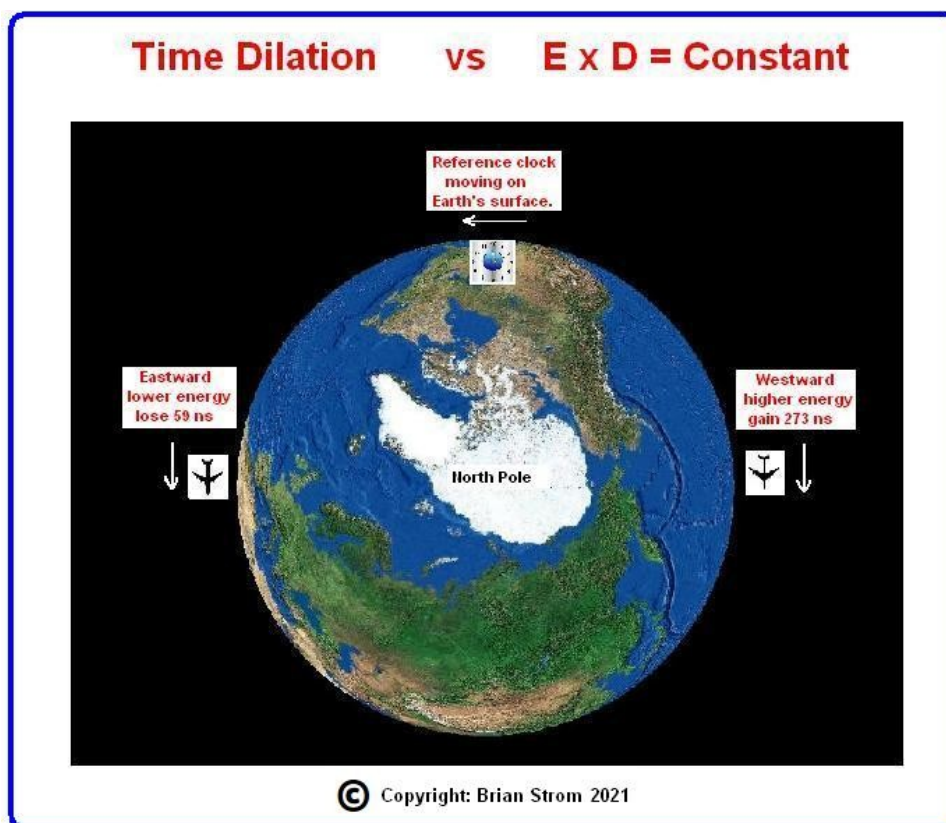
Figure 12a. Time dilation – or not?

Subsequent analysis of the Hafele-Keating results casts doubt on the accuracy of their experimentation. Other experiments have referred only to the Potential Energy effect (General Relativity – gravitational) which shows the "higher" clock as running faster. See Diagram 12b:
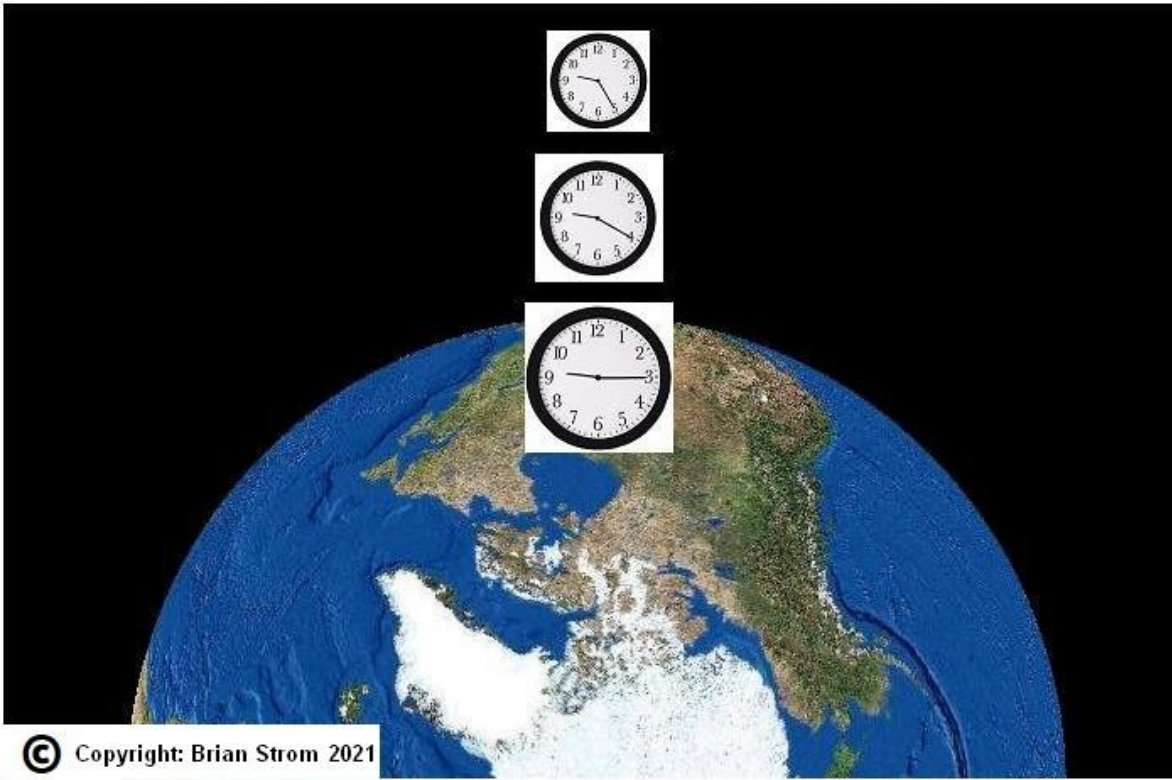
The   **E x D = Constant**   conjecture is that every wave-particle in the higher clock (with higher Potential Energy) has higher energy and is smaller, causing the atomic emissions to be at a different frequency, causing the clock to run at a different speed.

The General Relativity conjecture is that the gravitational forces on the components of the higher clock are reduced, so it runs faster.

As with many physics experiments, there are different theories that fit the observations, and it may be difficult to prove which is wrong.

Figure 12b. Time dilation – or not?

The **E x D = Constant** conjecture gives a possible explanation to another similar paradox. An atomic clock at the Earth's core is thought to read slower than a clock on the Earth's surface – see Figure 12c:

But with the **E x D = Constant** conjecture, the whole Earth could have been created at approximately the same time, and the Earth's core can be the same age as the Earth's crust.

Figure 12c. Time dilation – or not?

13. Consequences: The Twin Paradox:

The Twin Paradox is a confusing thought experiment with many interpretations by experts and non-experts. Explanations involve Special Relativity, Doppler, General Relativity, reciprocity, acceleration etc. The lack of any agreement suggests a high degree of misunderstanding and mis-application. It may also indicate that the theory is flawed. Each theorist proclaims they have the real solution – see Figure 13:

The Special Relativity conjecture proposes that the "speed of time" will APPEAR to change if there is a speed differential between two objects (regardless of direction).

Each twin would "see" the other's clock "appear" to run slower than their own clock. The APPEARANCE will be reciprocal, and hence cannot be real.

The **E x D = Constant** conjecture makes more sense:

The travelling twin's clock has higher energy for at least part of its journey.
Hence, at the end of the whole journey, this clock will read faster than the Earth clock.

But only one twin is making the journey, so what are the effects of acceleration and deceleration on that twin?   No one knows the biological effect.
He/she may age at a faster or slower rate than the Earth twin.
No one really knows.

Figure 13. Twin paradox assertions!

14. Consequences: The nature of the Neutrino:

In the **E x D = Constant** conjecture, the size of the neutrino wave-particle, based upon an energy level of about one electron-volt, is a diameter of about 3x10^-5 meters.

This is about the same size as some human skin cells.

If there is a stream of neutrino wave-particles from the Sun, would they collide and resonate with similarly-sized cells at some depth in the human skin, and the neutrino kinetic energy transpose into heat energy to warm the skin?
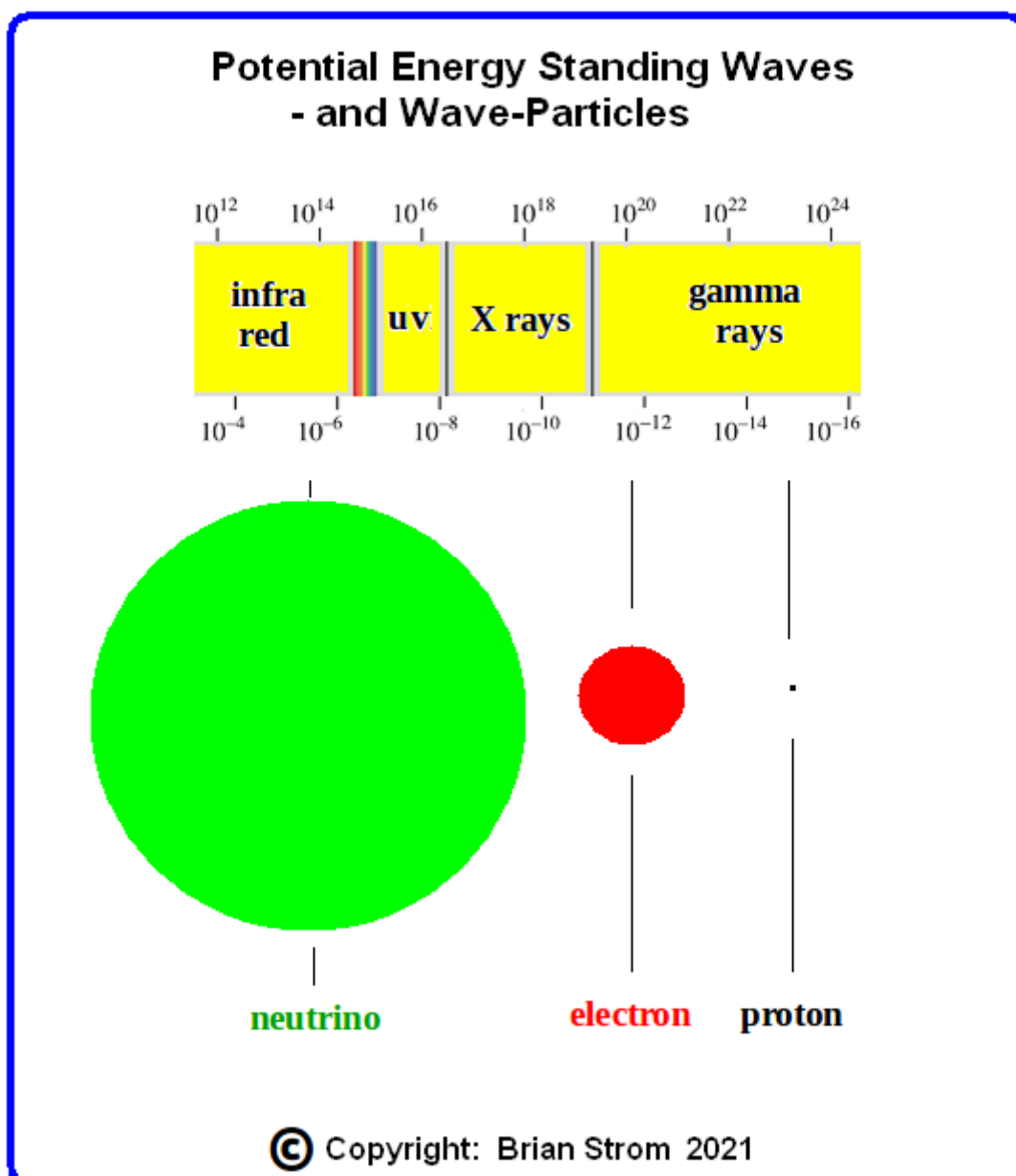
Figure 14. How big is a Neutrino?

15. Summary and Conclusions:

In this paper, a new conjecture for particles: **Energy x Diameter = Constant**
has been proposed, and some of the consequences analyzed.

These studies began in 2001, and the various steps along the way are listed in the Research History shown in Appendix C.

By 2004, the textbooks were thrown away as inadequate and incomplete. All the textbooks and research papers accepted the Standard Model as factual and unquestionable. They all failed to question the basic foundations of the Standard Model. Hence, they may as well be studying the number, size and characteristics of the stitches on "the emperor's new clothes".   Here we challenge the Standard Model.

In 2007, the similar characteristics of electrons and photons with changing energy, plus the hypothesis that "the proton is smaller than the electron", led to the conjecture for particles: "Energy x Diameter = Constant".

For photons: The wavelength is proportional to the inverse of energy.
Higher energy photons have shorter wavelength.
Energy x Wavelength = Constant.

For particles: The diameter is proportional to the inverse of energy.
Higher energy particles have smaller diameter.
Energy x Diameter = Constant.

The Energy x Size equation gives an infinite series for our universe, though Humans can experience only a very small part of it.

Parallel universes could be based on different constants, yet occupy the same Space.

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[2] Energy Wave Theory (EWT) project: https://energywavetheory.com/about/

[3] Potential Energy Blue/red Shift and Hubble Tension: Brian STROM.
viXra: 2111.0110.   November 2021.   https://vixra.org/abs/2111.0110

[4] "Apparent Weight of Photons." R. V. Pound and G. A. Rebka, Jr.   Phys. Rev.
Lett. 4, 337 (1960).   Published April 1, 1960.

[5] J.C. Hafele and R. E. Keating, Science 177, 166 (1972)

ANNEX A - Parameters for the electron, proton and neutrino:

For an ELECTRON:

Electron Rest Energy = 511 keV

Planck's constant h (in J/s) = 6.626 x 10^-34

The speed of light c (in m/s) = 3.00 x 10^8

Energy Conversion factor: 1 keV = 1.60210 x 10^-16 Joules

The Electron diameter D (in metres) will be, from Equation 2 above:

D = hc/2E = 6.626 x 10^-34 x (3 x 10^8) / (2 x 511 x 1.60210 x 10^-16)

So, the diameter of the Electron at rest is: 1.2 x 10^-12 metres.

(This correlates with the accepted size of the atom at over 60 x 10^-12 m).

And the "natural frequency" of the Electron at rest is: 0.8 x 10^20 Hz.

For a PROTON:

The Proton rest energy is = 938 MeV

So, the diameter of the Proton at rest is: 0.66 x 10^-15 metres.

(This correlates with the accepted size of the nucleus at over 2 x 10^-15 m)

And the "natural frequency" of the Proton at rest is: 1.5 x 10^23 Hz.

For a NEUTRINO:

The Neutrino rest energy is typically = 1.0 eV

So, the diameter of the Neutrino at rest is about: 0.6 x 10^-6 metres.

And the "natural frequency" of the Neutrino is: 0.4 x 10^14 Hz.

For other possible WAVE-PARTICLES:

The lowest energy wave-particles we might measure are those at the frequency of the cosmic microwave background radiation (CMB). These wave-particles would have a diameter of over 1 mm and are numerous enough to overlap as they pass our detectors and appear as a continuous stream.

(End of Annex A)

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ANNEX B -   Energy Density:

Since "Energy x Diameter = Constant", then for a wave-particle of double energy, its diameter/radius will be halved, and its volume will be one eighth.

Hence its "energy density" will be sixteen times greater.

The general formula is: Energy Density is to the fourth power of Energy.

The "apparent force of attraction" between particles will appear to increase with the fourth power of the energy increase.

Hence a proton will have an energy density of $(1836)^4$ which is over 10^{12} times greater than an electron.

This factor will apply to the comparative dimensions of the potential wells for the proton and the electron.

As a result, a small, dense proton can pass straight through a large, "fluffy" electron without any interaction.

Normally, there will only be an interaction for energy densities within one or two orders of magnitude.

Note: The energy density of the electron is about $(0.5 \times 10^6)^4$ which is almost 10^{23} times greater than the neutrino.

(End of Annex B)

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Appendix C: Research history:

The Timeline of the research for this paper is as follows:

This review of the fundamentals of physics – from first principles - started in 2001 with the analysis of popular physics textbooks.

By 2004, the textbooks were thrown away as inadequate and incomplete.
All the textbooks and research papers accepted the Standard Model as factual and unquestionable. They all failed to question the foundations of the Standard Model.
Hence, they may as well be studying the number, size and characteristics of the stitches on "the emperor's new clothes".   Here we challenge the Standard Model.

In 2007, the similar characteristics of electrons and photons with changing energy, plus the hypothesis that "the proton is smaller than the electron", led to the conjecture: "Energy x Diameter = Constant".

There were many exchanges of ideas on Yahoo Groups, then on the Star Trek website, then on WordPress and then on Facebook.

It attracted the attention of nine like-minded physicists around the world, plus one chemist in England and one mathematician in Australia.

Together, starting from first principles, we have prepared 19 papers on Atomic Structure, Molecular Structure and on Potential Energy Fields.

The papers have been published on viXra.

All the ideas have been posted on the blog: https://edisconstant.wordpress.com

All early conversations at: https://edisconstant.wordpress.com/2015/04/06/5/

Facebook pages at: https://www.facebook.com/edis.constant

(End of Annex C)

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