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Matter and Energy Disengaged

Ionization Energy, the Solar Constant, the Temperature Scale, and the Refractive Index of Light

[1.36 | 1.366 | 1.367]

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Abstract

Although matter-energy exists united in reality, conceptually the two concepts are disengaged at times. Consider some spacetime events where matter-energy are united, yet unrecognized as such in the literature. The temperature scale, ionization energy, the solar constant and the refractive index together present a value of measurement revolving around fractal **1.36(6).** The fractal expression of 1.36(6) is relevant to matter-energy events as a unit and as a ratio of measurement. The ionization energy of *hydrogen* is **13.6** electron volts. The solar constant, the amount of energy reaching the surface of the Earth from the Sun is **1.367** kilowatts per square meter. The thermodynamic temperature scale presents a ratio of **1.366** as the relationship between the boiling and freezing points of water. Water is made up of *hydrogen* and oxygen. *[373.15 / 273.15 = **1.366**]*. A refractive index of **1.366** represents a ratio that produces a velocity for light in a medium that yields a difference of exact multiples of the velocity of light. One such medium involved, ethyl alcohol, contains *hydrogen* and oxygen plus carbon. Within this realm of measurement, "*Living cells* typically have a refractive index of between 1.33 and 1.38." Approximately **1.36** is the average of these two cited values. All of these matter-energy events reflect the same/similar spacetime coordinates; little wonder their fractal measurements match.

For nearly a century now, scientists have been propagating the belief that matter and energy are equivalent, one transfers to the other, each exists as itself and as the other. In reality matter and energy are united; conceptually they are disengaged even when efforts are made to unite them. Everyone knows the formula: $E = mc^2$. It is understandable that the numbers that reflect the equivalency of matter-energy are themselves relational, if not the same or similar. Think about it, if the numbers reflecting spacetime did not match or were not interchangeable, well, then something would be erroneous with the initial postulate. It only makes sense. There should be no surprise in finding the fractal expressions of equivalency as illustrated in this essay. What surprises me is that no one has drawn attention to these relationships in the numbers, especially with regard to the 1.366 ratio in the thermodynamic temperature scale as I have been calling attention to in my writing for the past few years.

If matter and energy are relational, equivalent, then, obviously the numbers reflecting their behavior must also be equivalent and relational, or at least complementary, in the same/similar manner and to the same/similar degree. To exemplify this point, let us examine some of the fractal expressions of specific matter-energy events measured by the scientists. Let

us begin by considering the elementary level of the ionization energy of *hydrogen*, the binding energy of the electron in the first element on the periodic table of the elements. This level is most basic throughout the existence of matter-energy.

The Ionization Energy of Hydrogen: 13.6 eV

The ionization energy of *hydrogen* is **13.6** eV, a *unit* of measurement. This represents the ground state energy of the electron. Energy of 13.6 electron volts is required to remove an electron in the ground state from the hydrogen atom. Two aspects are significant for this study. The fractal expression of 1.36 represents a value that is significant in the composition of matter-energy. And, the fact that the fractal value of 1.36 relates to the electron of the hydrogen atom means that it is also likely to be significant for other units and ratios of measurement in matter-energy. One suspects that the fractal unit 1.36 in relation to the electron of the hydrogen atom represents a basic relationship of spacetime.

One should not be surprised to find the same/similar fractal expression in other forms of matter-energy, but rather expect it to appear. For other relationships of spacetime and specific forms of matter-energy also relate to the hydrogen atom. Let us examine some of the apparent relationships in an effort to comprehend the manner in which matter and energy behave.

The Solar Constant: 1.366 kw/m^2

The Sun is the main external producer of light near our planet. The solar constant is often presented as being **1367** w/m^2. The solar constant represents the amount of energy reaching the surface perpendicular to the Sun's rays on Earth as expressed in **1.367** kilowatts per square meter. Frequently, the solar constant is also cited in the literature as 1.366, where solar radiation is said to reach the Earth's upper atmosphere at a rate of **1.366** watts per square meter. *[Depending upon the unit of measurement (watt, kilowatt), the decimal place floats in the fractal expression of the numbers; consider this aspect for all numbers expressed in this study in comparing the different events being analyzed.]*

Nowhere in the scientific literature have I found a comparative study of the fractal expression of the ionization energy of hydrogen **(1.36)** and that of the solar constant **(1.366).** These two matter-energy events reflecting similar fractal expressions in their unit measurement are maintained as separate events, when we know that in reality they are intimately related, if not one and the same thing. Now, let us make a third comparison of these two events to the thermodynamic temperature scale that presents a ratio of measurement of fractal **1.3661.**

The Earth/matriX Thermodynamic Temperature Scale: 1.366

In my studies, I have emphasized the relationship between the boiling point of water and the freezing point of water on Earth as being that of 1.3661. For the past few years, I have been exploring a gradation scale for thermodynamic temperature based on the **1.3661** ratio between

the boiling and freezing points of water. To produce the scale, simply divide the boiling point of water (373.15 Kelvin) by the freezing point of water (273.15 Kelvin).

373.15 *divided by* 273.15 *equals* **1.3661**

In this case, the freezing point of water, then, acts as unit **1.0**, and the boiling point of water lies **.3661** gradations above that mark.

Nowhere in the scientific literature have I ever found a study that considers the ratio of the thermodynamic temperature scale in relation to the binding energy of hydrogen and the solar constant as of their similar fractal values of measurement [1.36(6)]. In reality, we know that these three levels of matter-energy events are related, yet considerations about their existence are maintained in separate conceptual frameworks. No emphasis is given to the now apparent fact that they reflect similar fractal expressions of measurement either by unit or by ratio.

Fractal 1.36(6) as unit and ratio of measurement of matter-energy

From the three previously cited examples alone, the value hovering around **1.36(6)** relating to the measurement of matter-energy is highly significant. The cited fractal values are the result of the ability of today's scientists to measure spacetime (matter-energy). The three aspects reviewed above reflect the transference of matter and energy. Many other examples exist of the relational significance of the fractal value of 1.36(6) to events of matter-energy. Consider a couple of the more obvious ones.

Hartree energy 27.2113961 / 2 = **13.60569805**

Rydberg constant **13.6056981**
[same as Hartree energy; half value]

136 Gigapascals of pressure at the Core-mantle boundary

Some examples are unsuspected. Recently, while writing a book on the geography of the Earth, I found data from geophysicists regarding the pressure at the core-mantle boundary of the Earth is **136** *gigapascals.* No comment.

The Newtonian Constant of Gravitation: 6.6742 x10^{-11} m^{3} kg^{-1} s^{-2}

Other examples must be sought out. Consider the multiples of the gravitational constant that is now cited to be fractal 6.6742. Double this value eleven times and the fractal expression **1366**8.7616 obtains.

Reciprocal of the neutron mass

Fractal numerical values as units and ratios are evident in the above analyses. But, the physical and chemical constants are related by way of their reciprocals, a common practice among physicists. One outstanding example is how the reciprocal of the neutron mass relates to the fractal value of the boiling point of water, as may be seen in the following computation:

1 / **1.67492716** = .5970408886
.2985204443
.1492602222
.0746301111
.0**37315**0555 [373.15 BPW]

The Sidereal Day-Count of Earth: 365.256

Now, consider the reciprocal of the sidereal day-count of Earth's orbital time, 365.256 days.

1 / 365.25 = .0027378608
.00**13689**254

Inversely,

1 / **136**89 = 7.30513551
3.652567755 *[ca. 365.256 Earth's orbital time]*

The Speed of Light

In a study a few years ago, I considered the reciprocal of the speed of light and the gravitational constant fractal values. The reciprocity of the speed of light and the gravitational event makes sense to me; they reflect electrical fields of positive/negative energy. They involve, respectively, energy either emanating from a central point or converging on a central point.

1 / 299792458 = 3.335640952
6.671281904 *[ca. Newtonian Gravity Constant 6.67259]*
13.34256381
...this values doubles to
1.366278534

General Observation

The preceding considerations about specific matter-energy events in relation to their corresponding unit/ratio measurements represent briefly the different aspects of spacetime that I have been contemplating for the past few years in my writing. We know that spacetime/motion are interconnected; we are yet unsure just how they are connected. We know that matter-energy are a form of spacetime (not the other way around). And, with the previous examples of

scientific measurement in physics, chemistry and related fields, the fractal expression 1.36(6) appears to repeat itself throughout specific forms of matter-energy.

With that, a few days ago, I stumbled upon the data relating to the **refractive index of light.** And, armed with the knowledge regarding the cases presented above, I was not surprised to find that the 1.36(6) fractal expression is also significant in the refractive index values. But, I was surprised to find just how the 1.36(6) value makes its appearance in the values of the refractive index. Below is what I found.

The Refractive Index: 1.366933387

Here is a succinct statement of the concept of the refractive index: "The ratio of the velocity of light in a vacuum to the velocity of light in a medium is referred to as the medium's refractive index, denoted by the letter *n*." [1]

The numerical value of the velocity of light fascinates me: 299792458 meters per second. In my mind, somehow, this particular number demands an explanation in terms of matter-energy that we have yet to discern. The refractive index has symbol *n*, and, being a ratio, has no unit. The refractive index is a ratio of the fastest possible speed of the wave (the velocity of light) to the speed of the medium. Indices of refraction must be greater than or equal to 1. Light cannot refract by more than 90 degrees. And so on.

Now, here is the concept that caught my eye: *"Living cells typically have a refractive index of between* **1.33** *and* **1.38***."* [2]

Water @100^{o}C	=	1.31819 *n*
Water @ 35^{o}C	=	1.33157 *n*
Water @20^{o}C	=	1.33335 *n*

Aside from variations in the refractive index due to temperature there are other variations due to *dispersion.* For now, let's work with the values without considering all of the variable aspects, which might distract us from the points being made in this study.

In considering the refractive index of light, one takes the refractive index number of a particular medium and divides that into the velocity of light, obtaining thereby the velocity of light in the medium under analysis. "For light, the index of refraction n equals the ratio of the velocities of light in vacuum (*c*) to that in the medium (*v*), that is *n = c/v."* [3]

Now, when the numbers relating to the refractive index of light are examined, it is easy to perceive a similarity between those values and the solar constant ---since we are talking about light. Consider the following examples and their refractive index numbers.

Acetone	**1.36**	
Ethanol	**1.36**	
Ethyl Alcohol	**1.36**	*[Carbon – Hydrogen - Oxygen]*

Now divide the velocity of light by the refractive index number given:

299792458 / **1.36** = 220435630.9

The velocity of light, then, in Acetone, Ethanol and Ethyl Alcohol is 220435630.9 meters per second. That is still very fast, no doubt. But, I ask myself what is the meaning of the 1.36 fractal value. Let us consider the numbers in a distinct manner, following some of the procedures in ancient reckoning. Consider the difference between the velocities of the two values cited.

299792458.0 minus 220435630.9 equals **79356827.12** *difference*

Now, use the *mediatio/duplatio* method here:

79356827.12 halves down to -0.**29562718**

The result is suggestively near the velocity of light. Therefore, what if we employed the velocity of light as *a multiple for the difference* in the above procedure and reverse engineer the computations:

Inversely, then, the velocity of light

0.**299792458** doubles relationally to **80474925.17**

80474925.17 minus 299792458 equals 219317532.8

Therefore, 299792458 divided by 219317532.8 equals **1.366933387**

In other words, a velocity of light in a medium that would register 219317532.8 meters per second would *produce* a refractive index of **1.366933387**.

The significant point is that the *difference* between the velocity of light (299792458.0) and the value from said refractive index (219317532.8) is **80474925.17** ---which ***represents an exact multiple of the velocity of light itself.*** The fractal value of .299792458 is thus doubled 28 times, meaning 268435456 times .299792458 equals the 80474925.17 *difference* value.

Again, reverse engineer the computations:

299792458.0 minus **219317532.8** equals	80474925.17
	40237462.58
	20118731.29
	10059365.65
	…halves down to
	.299792458 *[fractal of the speed of light]*

Again: **.299792458 x 268435456 = 80474725.17**

The significant aspect of these computations, in my mind, is the value derived for the refractive index, that of **1.366933387.** Two aspects impress me about this refractive index value.

First of all, the 1.366933387 appears to have very special characteristics, because when we double this value, look what happens:

1.366933387
2.733866774
5.467733548
10.9354671
…*doubles to*
366933387.1

The refractive index value 1.366933387 doubles to its exact **mantissa, 3.66933387** ---with the unit value 1 shifted to the end of the expression.

1.366933387 | .366933387.1

The second feature of this particular value is that it can be rounded off to the value of the solar constant: **1.367** kw/m^2.

1.366933387 *rounds off to* **1.367**

One might suspect that the solar constant, which has been shown in the literature to be 1.366 or 1.367, may in fact be exactly 1.36693387, given its functional value as shown in the previous computations. However, the fact that variation exists in the solar constant, obviously makes it next to impossible to measure such exactness in the solar constant. Still, the values and computations are suggestive in this regard.

In summary: a refractive index value of 1.366933387 produces a ratio between the velocity of light in a vacuum, and the velocity of light in a distinct medium, that yields a *difference* which is an exact multiple of the velocity of light.

Let me summarize the example:

299792458 / **1.366933387** = 219317532.8

299792458.0 – 219317532.8 = 80474925.16 [*halves down to* **.299792458**]

Now, consider a medium that will produce a refractive index value close to the 1.366933387 *n* value.

Acetone	**1.36**
Ethanol	1.36
Ethyl Alcohol	1.36

Isoenzyme	**1.3669**	
Binary mixtures and pure liquids	1.3669	
Polyethylene	1.3669	
(R) - (+) - Propylene Oxide	1.3669	
33% Ethanol		
(within a range of 1.35586 to 1.37357]	**1.36693**	
Alcoholic crystallization of sucrose		
[refractive index measurements for solutions of ethanol-water and sucrose]	1.36693	[4]

Obviously, there are many other examples of a distinct medium that may have a similar refractive value, but for the purposes of exemplification, I have chosen only a few.

In summary, the fractal expression of **1.36(6)** is relevant to matter-energy events reflective as a unit and as a ratio of measurement. Some examples are as follows:

Unit: The ionization energy of *hydrogen* is **13.6** electron volts, a unit of measurement. It takes an energy of 13.6 electron volts to remove an electron in the ground state from the hydrogen atom.

Unit: The solar constant, the amount of energy reaching the surface of the Earth from the Sun is **1.367** kilowatts per square meter. Solar radiation reaches the Earth's upper atmosphere at a rate of **1.366** watts per square meter.

Ratio: The thermodynamic temperature scale presents a ratio of **1.366** as the relationship between the boiling and freezing points of water. Water is made up of *hydrogen* and oxygen. *[373.15 / 273.15 = **1.366**]*

Ratio: A refractive index of **1.366** represents a ratio that produces a velocity for light in a medium that yields a difference of exact multiples of the velocity of light. One such medium involved, ethyl alcohol, contains *hydrogen* and oxygen plus carbon. Within this realm of measurement, "*Living cells* typically have a refractive index of between 1.33 and 1.38." [5] Approximately **1.36** is the average of these two cited values.

Scientists establish the fractal value 1.36(6) in relation to the measurement of matter-energy events today. In my view, it would be improper to suggest that the coincidence of the relational fractal values revolving around the 1.36(6) number could be due to statistical happenstance. There exists an underlying core to the existence of the cited 1.36(6) fractal values, and that relates to the existence of spacetime/motion. The measurements are not due to some quirk of numbers, but rather obtain from the behavior of matter-energy, irrespective of whether one is measuring a unit event or a ratio of related events.

The *difference* between the 1.36(6) value is that of its corresponding unit **1.0** and its mantissa of **.36(6).** Matter-energy events may be analyzed as of this particular relationship **1.0 | 1.36(6),** or as of the mantissa, **.36(6).** In this regard many more spacetime (matter-energy) events will come into play within the analysis. Consider the internal axial rotation of the Sun, hovering between 26 – 36 days. Or, consider the distance between the Sun and the planet Mercury

(36,000,000 miles), or that between the Sun and the once-upon-a-time planet Pluto (3,660 billion miles) ---either of which I have suggested could be employed as the astronomical unit (AU), instead of the distance between the Earth and the Sun. For Mercury and Pluto represent the inner and outer boundaries of the solar system. But let me stop here. In order to analyze the fractal expression .36(6) by itself an additional essay is required. The purpose of this essay is to introduce the reader to the significance of the **1.36(6)** fractal expression for the physical and chemical constants of matter-energy. The significance of the mantissa **.36(6)** will be examined in a later essay.

Table of Matter-Energy Events and Corresponding Fractal Values

Ionization Energy of Hydrogen
The ionization energy of hydrogen is **13.6** eV.

Solar Constant
The solar constant is **1.367** w/m^2.

Thermodynamic Temperature Scale
The thermodynamic temperature reflects the **1.3661** ratio between the boiling and freezing points of water.

Hartree Energy
Hartree energy 27.2113961 / 2 = **13.60**569805

Rydberg Constant
Rydberg constant **13.60**56981
[same as Hartree energy half value]

Core-Mantle Boundary
136 Gigapascals of pressure at the Core-mantle boundary

Newtonian Constant of Gravitation
The Newtonian Constant of Gravitation: 6.6742 is a multiple of **1366**8.7616

Sidereal Year of Earth
The Sidereal Day-Count of Earth: 365.256 is a reciprocal multiple of .00**1368**9254

Velocity of Light
The Speed of Light is a reciprocal of **1.366**278534

Refractive Index of Light
The Refractive Index of Light: **1.366**9

"*Living cells* typically have a refractive index of between 1.33 and 1.38."
Approximately **1.36** is the average of these two cited values.

References

[1] *Source: www.acept.asu.edu, ACEPT W³ Group, Department of Physics and Astronomy, Arizona State University, Tempe, 1999*

[2] *[Source: Microscopy Resource Center; www.olympusmicro.com]* These extreme values produce an average of 1.355.

[3] *Source: www.acept.asu.edu, ACEPT W³ Group, Department of Physics and Astronomy, Arizona State University, Tempe, 1999*

[4] *Source: The last two values listed are from Narelle Burns, "Alcoholic Crystallization of Sucrose", Individual Inquiry, The University of Queensland, Department of Chemical Engineering, 27 October 2000*

[5] *[Source: Microscopy Resource Center; www.olympusmicro.com]* These extreme values produce an average of 1.355.

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