

The Basic Approaches of Observer Physics

by

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In this article I present an overview of some basic approaches to Observer Physics as it is currently developing. First I list some of the topics for research in the study of the Awareness and Consciousness of the Observer. Then I consider the notation systems we use in quantifiable scientific research. The two most popular approaches are base two and base ten number systems. I note some practical benefits of each. I discuss in detail the power of modern scientific notation as a tool for understanding the fundamental components of phenomena: dimensional units, ratios (relationships), and self-similar scales. In the discussion of units I discuss the problem of undefined primitive units at the basis of mathematics and physics. In the section on ratios I introduce the fundamental ratios of mathematics and physics and distinguish variables, dimensional constants, and dimensionless constants. Then I show how study of the constants reveals remarkable bridges between the Mental world of math and the Material world of physics in the form of the Magnetic Unit constant of space (b) and the Scaling Operator of space ($\%$), both of which are based on the modern unit of length, the meter. Armed with these new units we gain new insights into Heisenberg Uncertainty and the quantum nature of space and energy. Also the fundamental electromagnetic fine structure of physical matter and its relation to the phenomenon of mass become apparent. I present the concept of nuclear mass (protons) in terms of the Fine Structure Constant, Quantum Magnetic Flux, the Magnetic Unit of Space, the Coulomb Constant, and the Elementary Electric Charge Quantum: $M_p = \pi b e / c$, or $M_p = \alpha b \Phi_0 / \kappa$. Finally I outline a program for generating a working physical universe from an initial condition in which an undefined Observer defines for himself a small set of fundamental concepts and relationships that fit together in such a way as to generate a dynamic Unitary Nothingness symbolized mathematically as a Field of zeros containing a single unknown quantity taken to the Zeroth power.

* Scientists study the world we live in, but tend to neglect study of the means by which they study the world: the **Observer**. In Observer Physics the study of the Observer is a key component that can not be neglected, because study of anything requires the participation of an observer. The most complete and elegant presentation of a science and technology of Observer Awareness that I have seen is in the Avatar Materials developed by Harry Palmer. Here are some fundamental topics explored in a **Science and Technology of Observation**. (For more information

about the Avatar Materials you can visit the website: www.avatarepc.com.)

- * **Awareness** as Observer, Observation, and Observed Object co-existing as an Undefined Field of All Possibilities.
 - * **Will** as the possibility within that Field to make decisions, choices, changes.
 - * **Consciousness** as a Subset of Awareness with the following characteristics:
 - * **Viewpoint** and how it affects awareness (generates consciousness)
 - * **Definition** and how it affects viewpoints (generates states and modes) and places limits on Awareness that result in Consciousness.
 - * **Attention** as the flow of Awareness through Viewpoints, Definitions.
 - * **Definition of Attention** and its various functions
 - * **Focusing and Un-focusing**
 - * **Expanding and Contracting**
 - * **Fixing and Un-fixing**
 - * **Shifting and Dividing (major phase transitions)**
 - * **Experiencing:** Use of Attention for Seeking or Exploring
 - * **Belief** as Awareness Defined by an Observer to Create Observable Reality
 - * **Identity** as an Observer's Recognized or Hidden Definition of **Viewpoint**.
 - * **Creation and Dissolution** (Operators and Creation Handling Procedure)
 - * **Integrity (Truth)** as the Complete Matching of Beliefs and Experiences.
- * **The Notation Systems** we use to study the world and communicate about our studies and experiences reveal fundamental insights into the Observer and the World that he observes. Here are some examples that I have begun to explore on the Ideas and Experiences Website.
- * **The Egyptian Base Two or Binary System** of weights and measures reveals insight into the fundamental binary structure of data in the universe. It anticipates the Chinese **I-jing** and modern development of computers and digital technology.
 - * **The Modern Decimal Metric System** of weights and measures reveals another set of fundamental insights into the basic structure of data relationships.
 - * **Scientific Notation** describes phenomena from three core viewpoints:
 - * **Units:** A dimensional viewpoint for observing phenomena.
 - * **Ratios:** A relationship between two observables, one of which is often taken as an arbitrary standard.
 - * **Scales:** An order of magnitude relative to an arbitrary standard.

Example: Earth's mass is approximately 5.98×10^{24} kg. The unit is

kilograms (kg), the ratio is the factor [5.98] and expresses a portion larger than 1 and less than 10 and thus is relative to a standard of base 10, and the scale is 10^{24} , or 10 taken to the 24th power, that is, multiplied iteratively 24 times. Thus the scale is also conventionally in base 10. This is merely a convention and could be in base 12 or some other notation. Different notations have different characteristics and reveal different insights. A binary system is useful for computers, but base 10 numbers are most convenient for humans, though we like to use base 12 for telling time and it gets confusing because we use base 10 numbers doing it.

Some Examples Illustrating Core Viewpoints.

Units

Scientists in different disciplines describe phenomena with different sets of units. They generally define units in terms of the particular viewpoint they take toward what they study. These viewpoints are arbitrary, but any field must have at least three primitive undefined **dimensions** or **units** with which to define other units and to describe the contents of the discipline. The primitive units can then be fleshed out with subunits and derivative units. For example, the “three” dimensions of space are subunits of a single spatial dimensional unit. Velocity is a derived unit based on a ratio between space and time. Mathematicians often claim that a mathematical system requires only two undefined primitives, but that means they leave out the Observer.

Thus, **Geometry** arises from the three primitives **point**, **space**, and **observer**. We can create systems for these terms and interpret them into various models, but they have no inherent meaning in spite of our intuitive sense about them. In terms of Observer Physics as a Science of Awareness we might rename these three primitives **Belief**, **Will**, and **Awareness**. (The names are not important.) The points are viewpoints or beliefs, the will is the space that creates and sustains and experiences those beliefs, (or vice versa) and the observer is pure awareness watching and managing the show. The observer defines various relationships and operations to generate a rich mathematical system (or any other type of system). But the Observer can not define himself without missing out on lots of alternative possibilities. Algebra, number theory, set theory, and other mathematical disciplines, turn out to be different versions of geometry done from different viewpoints. And there are countless kinds of geometry beyond the Euclidean type we generally use by default.

In number theory **points** become algebraic numbers, and **spaces** become non-algebraic irrational numbers (or vice versa.) “Infinity” does not mean endlessly many. It means that the number or size of something is undefined (as big, small, or precise as you like). For example, pi (π) is called an infinite decimal because its “precise” calculation is a process you can carry as far as you like and then give it an arbitrary cutoff point. Fortunately you can describe it exactly with a formula, though you can not write out its full value with a numerical notation unless you define your numbers that way (such as imaginary numbers), so we use the Greek letter pi to stand for it. If you count everything in terms of pi, then integers become irrational. When mathematicians say something like a series or a decimal goes on forever, they don’t want to give it a cutoff limit, and so they just let it hang there undefined with a bunch of dots for a tail (. . .) so you can decide how far to take it. Calculus commonly uses a supposedly infinite series of steps to reach a limit. However, the precise limit is reached only when the observer takes a quantum leap across a tiny gap between the series of steps and the limit that the steps converge on. The non-algebraic irrational numbers that can not be captured in a formula and the step from a convergent series to its limit must represent undefined spaces or gaps () between well-defined points. The Observer shifts viewpoints and fills in or leaps over the gaps. Thus the lines and figures of geometry consist of points interacting in space defined by an Observer. Some geometers like to use the term **neighborhood** instead of **space** for the second primitive. The labels do not matter. The **observer** generates all the systems, relationships and insights and labels.

Physics has three primitive “units”: **Time**, **Length (Space)**, and **Mass**. Abstractly we can symbolize them as T, L, and M. For studying concrete phenomena scientists establish standard units for measurement: seconds, meters, and kilograms. All the other units of physics are either disguised names for T, L, and M or derivations from relationships among the three. For example, the electrical units such as Amperes, Coulombs, Volts, Ohms, Teslas, Webers, and so on, are all just made of Time, Space, and Mass components renamed so as to disguise them as if electricity was somehow different from mechanical physical phenomena. Kelvin temperature and molar units in chemistry also are derived from the basic three. Energy is mass interacting with space and time. Einstein showed that Time and Space, and Mass can not be separated. What many physicists do not yet realize is that Mass is the measure of an Observer’s participation in the World of Space/Time. If he is a pure observer, he experiences no mass. If he resists the Space/Time images in the light show of life, he experiences mass and certain forces. He may even imagine things such as energy. Thus when we speak of mass, energy, momentum, and forces, we actually are

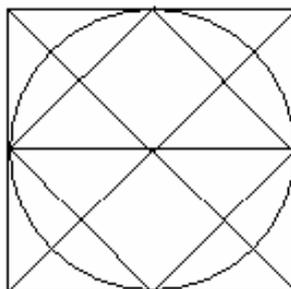
describing the Observer's interaction with his own personal beliefs and his resistance to them.

Ratios

Ratios can have variable or invariable values. Ratios that can change in value, such as velocity or size, reflect shifting viewpoints in the dynamic perspective of an Observer. However certain ratios appear to be invariant under all sorts of transformations of phenomena. We often call them constants. They bring us closer to the unchanging nature of the Observer. One of the fundamental constant ratios in geometry is pi (π). It expresses the ratio within a circle of the Circumference to the Diameter (C / D). This ratio holds for all circles. It then extends to waves and other cyclical forms. All forms can be generated from simple waves, so pi is a truly fundamental constant.

The diagram below shows a unit square with a circle inscribed in it and then a smaller square inscribed in the circle. This diagram shows the foundation of geometry.

Unit Square



Diameter = 1

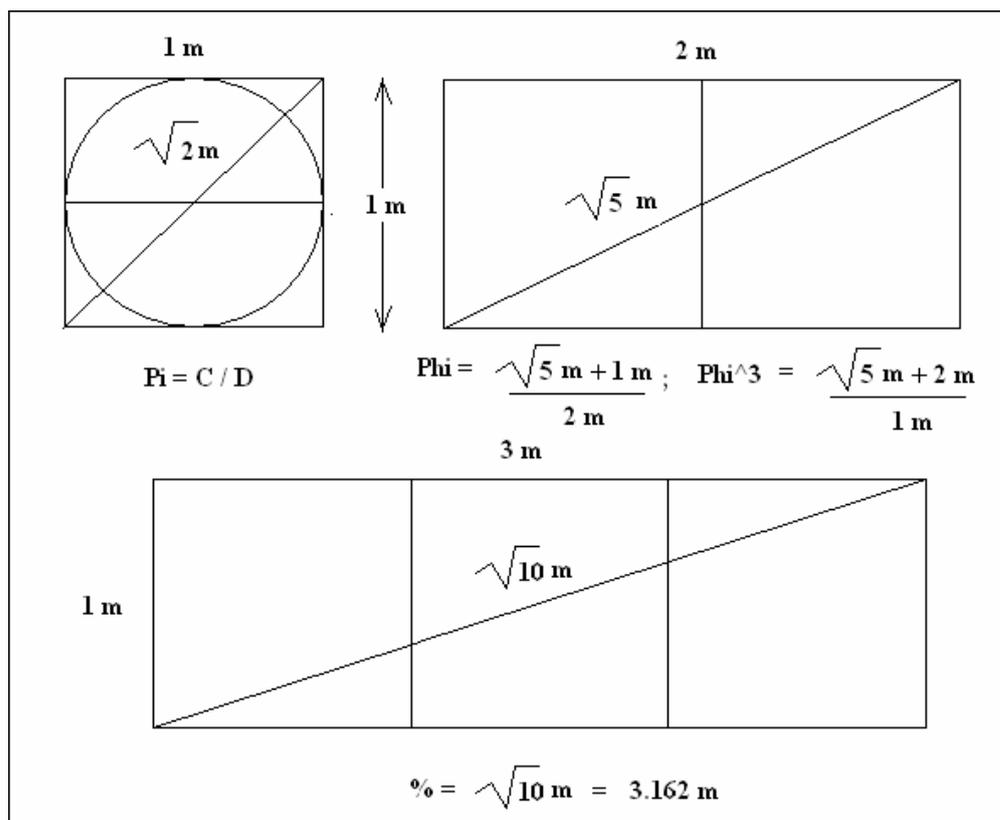
Circumference = 3.1416 = Pi

Side of Small Square = .7071 = $\frac{\sqrt{5}}{10}$

$(\sqrt{5}) (\sqrt{10}) = \sqrt{5}$

We assign the value of 1 arbitrary unit to the larger square's side which is also the value of the diameter of the inscribed circle. The circumference of the circle is then π units. The diagonal of the unit square is $(\sqrt{2})$. The length of a side of the smaller square is $(\frac{\sqrt{5}}{10})$ or the irrational decimal that begins .7071. . . . This number establishes the ratio between two other fundamental constants of geometry: $(\sqrt{5})$ and $(\sqrt{10})$.

* $(\frac{\sqrt{5}}{10}) = [(\sqrt{5}) / (\sqrt{10})]$



Another way of saying this is to simply note that $(\sqrt{2})(\sqrt{5}) = (\sqrt{10})$. The above diagram shows how $(\sqrt{2})$ is the diagonal of a single unit square, $(\sqrt{5})$ is the diagonal of a doublet of unit squares, and $(\sqrt{10})$ is the diagonal of a triplet of unit squares. The triangle formed by the diagonal of the doubled unit square is the basis of the fundamental constant phi (ϕ), which is known as the Golden Ratio. The physical universe uses phi as the basic tool for generating diversity of forms beyond simple circles and squares as embodied in the unit square/circle.

There are many complex aspects to geometry, but all forms emerge from the basic figures: points, lines, angles, circles, triangles, and squares. The numbers derived above come directly from these fundamental relationships in geometry and thus are fundamental numbers.

Scientists and mathematicians have studied phi in much detail. Less well studied is the fundamental constant that arises from the diagonal of the triplet of unit squares or the product of the diagonals of the unit square and the doubled unit square: $(\sqrt{10} = 3.16227766 \dots)$ I use the percent symbol (%) to represent this number, since it represents a ratio $(\sqrt{10}) = [(\sqrt{5}) / (\sqrt{.5})]$ that relates to the base ten on which our number system operates. It also has the curious property that it is a constant in physics as well as mathematics. It turns out that in physics this spatial constant (%)

has the value of $(\sqrt{10})$ meters. The pure number value of $\% = 3.16227766$ is the ratio of the diagonal of the tripled unit square to its unit side. This rectangle's length of 3 units is also important, and its square is 9. By the Pythagorean relation, 1 squared (1) plus 3 squared (9) equals % squared (10). The ratio $(10 / 9) = 1.11111. . . .$ This is the "unit" value in the curious domain of infinite recursion. Integer multiples of it give 0.0000, 1.1111, 2.2222, 3.3333, 4.4444, on up to 9, and then we get 11.1111, 12.2222, 13.3333, and so on.

In physics constant ratios are invariable under most if not all conditions. These are fundamental relationships out of which physical systems emerge. By maintaining these stable relationships without change the universe can appear to survive because time is a component of all the fundamental constants of physics, with the exception of one which is the bridge between mathematics and physics: (%). Below are the fundamental constants. Study of them reveals many insights into physics.

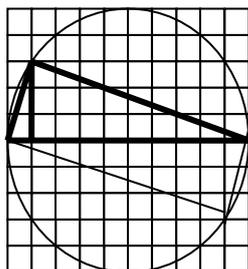
- $c = 3 \times 10^8$ m/s (Velocity of Light)
- $\hbar = 1.504 \times 10^{-34}$ J-s (Reduced Planck's Constant, [Dirac's Constant])
- $e = 1.602 \times 10^{-19}$ C (Coulomb Elementary Electric Charge Quantum)
- $G = 6.672 \times 10^{-11}$ N m² / kg² (Newton's Gravitational Constant)
- $\epsilon_0 = 8.854 \times 10^{-12}$ C²/N m² (Permittivity Constant of Vacuum)

(Note: ϵ_0 expressed as kg / m³ can also be considered timeless.)

There are also some frequently encountered compound constants such as the Quantum Factor interaction of Planck's Constant with Light Speed ($\hbar c$) and the Fine Structure Constant (α). The factor ($\hbar c$) is embedded in (α). The compound ($\hbar c$) is actually the interaction of a quantum of energy with (%).

- $(\hbar c) = (\%)(@)$.

Here (@) represents a quantum unit of energy: (10^{-26} J) defined by the interaction of the quantum limit (\hbar), the speed of light (c), and the geometry of (%). To explore this draw a circle with a diameter 3.333.... units long, and erect a perpendicular from a point 3 units along the diameter. The perpendicular will intersect the circle at a height of 1 unit. We get a figure that looks like this:



The hypotenuse chord that connects the end of the 3-unit segment of diameter where it meets the circle and the end of the perpendicular where it meets the circle is the diagonal of a triplet unit square and thus has a length of (%). The hypotenuse chord of the small triangle that connects the .3333 unit segment of the diameter where it meets the circle and the end of the perpendicular where it meets the circle is 1.054 . . . units long. The two chords form a right angle and thus define a new two-dimensional space that is twisted out of phase from the space defined by the diameter and its perpendicular. This large right triangle reflects over the diameter and also flips. This gives us two criss-crossing rectangles, each 1.054 x 3.1622. (Note the lighter diagonal chords drawn below the diameter to reveal one of the larger rectangles.)

The numbers 1.054 and 3 are the ratio components of Planck's Constant and Light Speed respectively. We can label the units of the skewed grid axes any way we like and thus take the %-axis in meters and the Planck axis in units of 10^{-34} Joule-seconds. The rectangle thus has an area of (\hbar %).

- (\hbar) (c) = (%) (@).
- (\hbar) = (%) (@) (c)⁻¹.
- (\hbar) (%) = (@) (%)² / (c).

The value of (@) here is an energy of 10^{-26} J. Notice that squaring (%) boosts it to an order of magnitude. Thus the value of (@) shifts by an order of magnitude from 10^{-26} J to 10^{-25} J since all other components are constant. The basic ratio between (@) and (c) has only shifted by a decimal point and is still just basically an infinite string of 3's. This reveals that there is a fundamental relationship between these three ratios.

Scale:

The third major component of our notation is a technique for recording scale. We find that phenomena seem to occur at different scales in the universe, ranging from the extremely small Planck scale up to the vast reaches of intergalactic space. Planck's Constant (\hbar) is our ruler for the small scale, and the Light Speed Constant (c) is our ruler for the large scale. However, we need a mechanism for sliding up and down the scale. Mathematics provides this in the form of rules for generating self similar figures with exact or approximate scaling invariance. Structures in the physical world can only scale in a quasi-fractal manner, because the physical world is

quantum in nature and not continuous. Each level of creation has a limit, and there are crossover points where one type of structure or level of creation gives way to another. For example, if you draw a Koch curve on a piece of paper with your computer printer, you will soon reach a point where the chemical structure of paper and ink is too gross to handle the finer and finer resolution of the curve's crinkles. If we go below the Planck scale, we can no longer use the ordinary rules of physics to study creations. Subatomic structures, atomic structures, molecular structures, planetary structures, galactic structures, and intergalactic structures all have certain similarities, but also have certain important differences. These differences are caused by the limitations imposed by the physical constants out of which physical things are constructed.

Observer Physics holds that the fundamental building blocks of the universe are not the fundamental particles, such as photons, protons, electrons, and quarks, but the constant relationships among the units M (Mass in kilograms), L (Length in meters), and T (Time in seconds) within the framework of "Real Space" geometry built from a fundamental unit of $L = b = 1$ meter, plus the constant ratio (π) and the scaling operator (%) that give rise to these phenomena. The particles and their behaviors are the expressions of these underlying relationships. The units for kilograms and seconds may seem arbitrary, but they fall out naturally as the result of the choice of the 1-meter macroscopic quantum magnetic flux constant (b) of a nucleon. This distance unit pairs together with the microscopic quantum magnetic flux constant (Φ_0) to give an elegant formula for the Proton.

$$* \quad M_p = \pi b e / c.$$

$$* \quad M_p = \alpha b \Phi_0 / \kappa.$$

$$* \quad \mu_N = \hbar c / O_0$$

The first version shows a Proton as Pi times the Magnetic Meter Unit (b) times the ratio of the Quantum Electric Charge Constant to Light Speed (e / c). The second version shows that this is equivalent to the Fine Structure Constant (α) times the Magnetic Meter Unit times the ratio of the Quantum Magnetic Flux (Φ_0) Constant to the Coulomb Constant (κ). The third version shows the Nuclear Magneton formula rewritten in terms of the Proton Mass Formula. It becomes the Quantum Factor ($\hbar c$) divided by the circumference of the unit circle, where the radius is the Magnetic Meter Unit (b). These formulas show that matter is basically an electromagnetic

structure governed by the fine structure constant and the geometry of spheres and circles. These simple and elegant formulas are keys to the fundamental structure of all matter.

The above formulas are not exact. The ratio of mass calculated from the formula (1.67895685233x10⁻²⁷ kg) to the current experimental value for Proton Mass (1.67262171x10⁻²⁷ kg) is approximately 1.00378755237. The ratio of the standard value for the Nuclear Magneton to the value calculated from the ratio of the Quantum Factor to the Unit Circumference is 1.0037875575. The discrepancy is the same within the range of uncertainty because the two formulas are essentially the same.

* $\mu_N = \hbar c / O_o = \hbar c / 2\pi b$

* $\mu_N = e \hbar / 2 M_p$

* $M_p = \pi b e / c$

We bring the formula within the range of uncertainty by multiplying it by a power series based on the Scaling Ratio of [(%) / (π b)] = 1.00658424209 on my calculator using values to that precision. We know that this ratio sits in the Nuclear Magneton:

* $\mu_N = \hbar c / 2\pi b = (\%)(@) / 2\pi b$

We also know that (%) is the Dimensional Shift Scaling Operator and that Heisenberg Uncertainty allows it to slip and slide up and down the power scale. Let's use ~ for the Scaling Ratio. If we multiply by the following sequence of factors, we get accuracy to seven places in the decimal, which is in the range of uncertainty. Each factor is some root of the Scaling Factor.

* $M_p = (\pi b e c^{-1}) / [\sqrt{\sim}] [\sqrt{\sqrt{\sqrt{\sim}}}] [\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sim}}}}}] [\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sim}}}}}}}] [\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sim}}}}}}}}}] [\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sim}}}}}}}}}}}] \dots$

The iterations of the square root factors are: 1, 4, 7, 8, 8, 9, 10, 11, 12, (18, 18, 18, 18, 18, 18, 18)

$\pi = 3.1415926535898$

$b = 1 \text{ m.}$

$e = 1.60217653 \times 10^{-19} \text{ C}$ (A Coulomb is the equivalent of kg/s.)

$c = 2.99792458 \times 10^8 \text{ m/s}$

$\% = 3.16227766016 \text{ m}$

Using the formula : $1.67262171127 \times 10^{-27} \text{ kg,}$

Experimental value: $1.67262171(29) \times 10^{-27} \text{ kg.}$

This matches the experimental value to within .127 of the last digit, and it can be brought as close as you like but need not be so accurate, because protons shuffle

around with neutrons and have slightly varying masses in nuclei. The formula makes sense, including the use of the Scaling Ratio. The remaining issue is to account for why the particular roots are needed, although with this method it is clearly possible to approximate any value to any desired precision simply by choosing factors that are closer and closer to unity. As we approach the borderline of total precision we have problems with the instruments we use for measurement, so results will vary slightly according to technique. A curious feature of the Scaling Factor is that when we take successive square roots of it, the numbers in the decimals very quickly resemble a binary sequence in reverse: 1025, 512, 256, 128, 64, 32, 16, 8, 4, 2, 1, .5, .25, . . . Even from the beginning you can see the sequence: 65, 32, 16, 8, 4, 2, 1, .5 So you can see the fractal structure runs through this number on many levels. In fact, every decimal converges on this Halving Sequence. In the list below the *'s represent factors that cover the tiny gap.

	[# of √'s of ~]	[Factor]	[Resulting <i>Mp</i>]
$(\pi b e / c)$ -----	1.67895690473x10 ⁻²⁷ kg		1.67895690473
~ -----	1.00658424209	00	
√~ -----	1.00328671978	01	* 1.67345672142
√√~ -----	1.00164201178	02	
√√√~ -----	1.00082066914	03	
√√√√~ -----	1.00041025041	04	* 1.67277046665
√√√√√~ -----	1.00020510417	05	
√√√√√√~ -----	1.00010254682	06	
√√√√√√√~ -----	1.00005127209	07	* 1.67268470460
√√√√√√√√~ -----	1.00001281777	08	** 1.67264182524
√√√√√√√√√~ -----	1.00000640886	09	* 1.67263110558
√√√√√√√√√√~ -----	1.00000320442	10	* 1.67262574578
√√√√√√√√√√√~ -----	1.00000160220	11	* 1.67262306590
√√√√√√√√√√√√~ -----	1.00000080109	12	* 1.67262172597
√√√√√√√√√√√√√~ -----	1.00000040054	13	
√√√√√√√√√√√√√√~ -----	1.00000020026	14	
√√√√√√√√√√√√√√√~ -----	1.00000010012	15	
√√√√√√√√√√√√√√√√~ --	1.00000005005	16	
√√√√√√√√√√√√√√√√√~	1.00000002502	17	
√√√√√√√√√√√√√√√√√√~	1.00000000125	18	7*'s 1.67262171127

In Scientific Notation we use our base-ten number system in a clever way to navigate along the various scales of creation. We simply express the scale as a power of ten.

By changing the value of the exponent we can shift the scale in any direction we like. The fundamental ratio stays the same and only the scale shifts. Once we can do this, we can run down the rabbit hole of implosion into the Quantum Factor and find out what is down there in Wonderland. Or we can magnify it with our magical zoom lens and look at the details. The Scaling Factor is a handy tool. The procedure we used is somewhat analogous to the way logarithms to base 10 are calculated. We could simply use for our scaling adjuster the pure number ratio $(\% / b)^2$ which is 10. Then we take successive square roots that will also be numbers between 1 and 2.

$$(1.00225114828)(1.00112494139)(1.00014054851)(1.00000439184)(1.00000219591)(1.00000054897) \\ = (1.00378747316) = 10^{.00152897834}$$

* $M_p = 1.67262189 \times 10^{-27}$ kg. (This is also well within the uncertainty range and can be made even more accurate.)

The only difference between using $[(\%) / (\pi b)]$ and $(\% / b)^2$ is that the inclusion of pi shifts the curve so that it starts out closer to the target. Mathematically speaking the base we work in does not matter and you can map from one to another. But from the physical side we find that the two values of $(\%)$ and (b) are hard coded into the constant relationships.

A PHI spiral, and logarithmic spirals (loxodromes) in general, $r = a e^{[k\theta]}$, go on indefinitely getting smaller and smaller and bigger and bigger, depending on which way you go. The tangent and radius maintain a constant angle.

$$* \quad r = a \varphi^{[(2 / \pi)\theta]}$$

Here r is a radius in polar coordinates, a is any constant not zero, and θ is the angle of rotation. The Fibonacci series turned into a spiral is nature's handy way of imitating the PHI spiral in the quantum world. A General such series can start from any two numbers (not both 0) and approaches the PHI ratio between successive members of the series. It is not necessary to start with any particular numbers. However, our number system is based on 10, and PHI is an irrational number.

The good news is that 10 is the product of 2 times 5. So it is easy to shift back and forth from PHI to powers of ten using the $(\%_0)$ pure number ratio.

$$* \quad (\sqrt{2}) (2\varphi - 1) = \%_0.$$

Working with powers of PHI gives irrational numbers. But every even power of $(\%_0)$ is an exact power of 10. Every odd power of $(\%_0)$ is the diagonal of the tripled unit

square ($\% = \sqrt{10}$) times some power of 10. Any number (x) times ($\%$) gives a number that is identical to the same number (x) divided by ($\%$) except that its scale is raised by one higher power of 10. What makes this important in physics is that the pure number ratio ($\%$) and the ($\%$) meter version. show up all over the place in the dimensional and dimensionless constants of physics. For example, we have already demonstrated how ($\%$) is a component of the ubiquitous Quantum Factor ($\hbar c$). And the Quantum Factor itself is buried in the Fine Structure Constant (α), a pure number quantum ratio that governs the quantum calculation of ALL electromagnetic interactions. (It is also in the Fermi Coupling Constant.)

$$* \quad (\alpha) = e^2 \kappa / (\hbar c) = 1 / 137.04.$$

Since everything we experience involves the electromagnetic interactions of our sensory organs with the physical world, that puts ($\%$) right at the core of things. It is the mathematical key to how we project our beliefs into a physical space. Curiously this would probably have remained unnoticed without the adoption of SI units which are based on 10 and thus very convenient for working in Scientific Notation.

This Scaling Operator also shows up in the mathematical series that generates the Rydberg number and in related constants such as the Hartree energy [$E_h = Me (c \alpha)^2$]. The Rydberg constant (approximately $R = 1.097 \times 10^7 \text{ m}^{-1}$) is used in the calculation of spectral lines of hydrogen and thus relates directly to the structure of electron orbits. This constant, like (α), is a composite one, defined as follows in terms of constants when we take the proton nucleus to be infinitely massive:

$$\begin{aligned} * \quad R_\infty &= (Me e^2 \kappa \alpha / 4\pi \hbar^2), \quad \text{or} \\ * \quad R_\infty &= (e^2 / 4\pi \epsilon_0)^2 (Me / 4\pi \hbar^3 c) \quad \text{or} \\ * \quad R_\infty &= (\alpha^2 Me c / 4\pi \hbar) \end{aligned}$$

Here (Me) is the mass of the electron. The Rydberg constant contains Pi plus 4 of the five basic physical constants and has ($\%$) lurking in the Quantum Factor. Rydberg's original formula for hydrogen spectral lines was like this:

$$* \quad (1 / \lambda) = R ((1/n_1^2) - (1/n_2^2))$$

Here λ is the wavelength, R is the Rydberg constant, and $n_2 > n_1$, both being positive integers. The theoretical formula composed of constants comes within .1% of the experimental value for hydrogen. There is a simple formula that generates a series

that gives a very close approximation to the ratio for the Rydberg constant:

$$* \quad (n)(m+n) = 1. \quad (\text{Where } m \text{ is a positive integer and } n \text{ is a positive real.})$$

When we substitute $m = 9$, we get a decimal that looks very close to a scaled version of the Rydberg number times the ratio of the electron mass:

$$* \quad (0.1097722)(9.1097722) = 1.$$

Here are the first ten results for $(m+n)$ in the series.

$$1.618034 \quad (\text{PHI})$$

$$2.41421 \quad ([m+n] = ((\sqrt{2}) + 1), [n] = ((\sqrt{2}) - 1))$$

$$3.30377$$

$$4.236 \quad ((\sqrt{5}) + 2)$$

$$5.19258$$

$$6.16227766 \quad ((\%) + 3)$$

$$7.14$$

$$8.1231$$

$$9.10977 \quad (\text{Where } n \text{ is very close to the Rydberg ratio component})$$

$$10.099$$

Using $(\%)$ as a Scaling Operator we can treat all the powers of 10 in Scientific Notation as powers of $(\%)$ and then focus in on what is happening with the ratios and the units. For studying the microscopic world $(\%)$ can be used like a magnifying glass. For example, we can rewrite our equation for the Quantum Factor as follows once we recognize that $(\%)$ in physics has the units of meters:

$$* \quad (\hbar)(c)(b)^{-52}(\%)^{51} = 1 \text{ J.} \quad (\text{Where } b = 1 \text{ meter} = \sqrt{(1 \text{ Wb})})$$

However, the value of (b) is a constant of physics as the Proton formula shows!

$$* \quad M_p = \pi b (e / c).$$

Here (M_p) is the rest mass of a Proton and approximately equals 1.67×10^{-27} kg.).

The value of (b) is constant because all the other components of this elegant formula are constants of physics or geometry. That the METER is a CONSTANT of physics is determined by the structure of the fundamental unit of matter that we call the PROTON!

Since all the other components of the Quantum Factor $(\hbar c)$ equation are constants of physics and/or geometry, that means the JOULE is also a

constant of physics and not merely just an arbitrary unit of energy.

Whether this came about by accident or by design, I still do not know. There it is!! (But hang on. There is more to it, because the spatial constant (%) has a kind of quantum flexibility because of its Scaling property.)

First take a look at the standard theoretical definition of an Ampere and wonder about it: “The current in two long parallel wires of negligible cross section and ONE METER apart in vacuum, which gives rise to a magnetic force per unit length on each wire of $2 \cdot 10^{-7} \text{ N / m}$.” (Quoted from a standard physics text by Radin and Folk.)

A Weber is the ratio of Joules to Amperes. A Joule is a mass multiplied by a velocity squared or a Newton-Meter.

$$* \quad (\text{N m}) (\text{N / m})^{-1} = \text{m}^2.$$

That means a Weber is simply ONE SQUARE METER of area such as defined in the definition of an Ampere with respect to the square meter of space that is being affected by a magnetic force.

$$* \quad 1 \text{ Wb} = b^2$$

It is not just empty space, but awareness warped by a magnetic force.

We can also reinterpret the Quantum Factor as follows:

$$* \quad (\hbar) (c) (b)^{-52} (\%)^{52} = (\%) (1 \text{ J}).$$

We are magnifying the Quantum Factor from way down at the bottom of the scale right up to human scale where we can look at it. That (b^{52}) is quite a bomber. What we see is a Joule of energy spread out over a distance. This is perhaps somewhat analogous to a gravitational potential distributing a force over a height. We can adjust the space and the energy to whatever scenario is comfortable. For example,

$$* \quad (\hbar) (c) (b)^{52} / (\%)^{51} = (\%)^2 (1 \text{ J}).$$

$$* \quad (\hbar) (c) (b)^{52} / (\%)^{51} = (10 \text{ J-Wb})$$

$$* \quad (\pi / \epsilon_0 b) (\pi e S_s / A_s b)^2 = @ = 10^{-26} \text{ J}. \quad \text{Thus,}$$

$$* \quad (\pi \% / \epsilon_0 b) (\pi e S_s / A_s b)^2 = \hbar c.$$

(S_s / A_s) is the ratio of a sphere's volume to its area using b as the radius. What this shows is that the Quantum Factor is really just some energy interacting with some amount of quantized space. The size of the space interval is arbitrary here, but it is still quantized in scaling chunks of $(\%)$. The energy is also quantized. This is the inescapable result of the way these constants intertwine and the fact that they seem to be really invariable whatever else may happen. This leads to the well-known condition of Heisenberg uncertainty, but with a new quantum flavor to the space and the energy. Certainty is gained only by the Observer making a decision concerning his viewpoint. Compare the classic Heisenberg Uncertainty statement with the basic Quantum Factor formula we presented.

$$* \quad \Delta(p) \Delta(d) \geq (\hbar) \quad (\text{This is the classic Heisenberg Uncertainty Statement.})$$

$$* \quad \Delta_q(P) (b)^{-2n} (\%)^{2n-1} (c) \geq (\hbar) (c)$$

$$* \quad \Delta_q(J) (b)^{-2n} (\%)^{2n-1} \geq (\hbar) (c)$$

In the classic Heisenberg presentation (p) is a variable momentum and (d) a variable spatial interval. The deltas indicate a range of change in value. Neither one is quantized. Planck's Constant merely forces the two variables to play at a certain distance from zero when they interact. My Quantum Factor formula with $(\%)$ is different in that it narrows the field by showing that the space is quantized by the selected value of the exponent (n) and the momentum of (P) or the energy of (J) therefore must be correspondingly quantized. The little "q" subscript on the Δ tells us that the change in energy must be quantized. The value of n in the exponents theoretically can be any integer, but in practice has a fundamental quantum limit.

Baranski's research at Princeton showed that human perception is fundamentally quantized. The human physiology is a quantum mechanical device. The threshold for perception may often be relatively in the macroscopic realm compared to Planck scale phenomena or even nano-scale phenomena. It might even be at the level of a meter. Two people interacting generally do not get closer than about 1 meter unless they are becoming intimate or are forced by over-crowded social circumstances. An average human living space per person in a dwelling is probably around 10 m^2 . (These conjectures need some research!)

The question of whether there is any lower limit to the size of $(\%)^{2n-1}$ is effectively answered by the experience that the mass-energy of the universe is large but finite.

It seems reasonable that if the scale of (%) were to be taken below the threshold for the corresponding total energy of the universe, there would be a rebound that would cause the energy of an entire universe to explode from that singularity. (This might not be too difficult to accomplish if you really believe it is possible.) On the other hand, energy is definitely quantized because it depends on particles of matter. The smallest stable particles forming stable matter that interacts to any degree energetically are the proton, electron, quarks, and neutrinos. But the smallest stable and “isolable” component of matter is the electron neutrino (ν_e) with a mass of ($M\nu$) Photons express energy only through frequency ($\hbar \nu$) and a kind of momentum, but have no rest mass.

$$* \quad M\nu = \hbar (\% c)^{-1} = 1.111 \times 10^{-42} \text{ kg.}$$

$$* \quad E\nu = M\nu c^2 = 10 \times 10^{-27} \text{ J} = 10^{-26} \text{ J or about } 6.24 \times 10^{-8} \text{ eV.}$$

At this stage recognition is growing that neutrinos have mass, and the heaviest (tau) neutrino is probably between .05 and .3 eV. Thus my calculation for the electron neutrino may be right on target or within an order or two of magnitude.

Armed with this theoretical mass for the electron neutrino, we can give a very elegant quantum formula for the relationship of mass and energy. The “rest energy” of the electron neutrino would be the ultimate energy quantum.

$$* \quad E\nu \% = \hbar c \quad (\text{For the electron neutrino})$$

Experimental results will allow us to refine this formula. For example, the Fine Structure Constant might get involved ($\hbar c \alpha$), or ($E\nu \% \alpha$), and that would shift the Fundamental Neutrino Energy Quantum by several orders of magnitude. In the **Observer Physics** papers I calculated that the fundamental boson interaction (what I call Bu^2) is described by at least three equivalent expressions. I derived each expression by a completely different approach. (For a summary see my article, “The Planck Mass and the Cosmic Movie Projector”.)

$$* \quad Bu^2 = \kappa e^2 / G$$

$$* \quad Bu^2 = Ss / \pi \kappa^2 \epsilon_0$$

$$* \quad Bu^2 = (\hbar c \alpha) / G$$

Here (κ) is the Coulomb Constant, (G) is the Gravitational Constant, and (Ss) is the volume of a sphere with radius (b). The first version is derived from an analysis of the Millikan oil drop experiment that determined the quantum of Elementary Electrical Charge. The second version is derived from a study of the Vacuum

Permittivity Constant. The third formula is derived from examining the behavior of gravity in black hole conditions, and we know that neutrinos interact in the physical world mostly via gravity because they lack charge. Compare this formula with the theoretical electron neutrino mass given above. Within the next few years ongoing experiments should narrow in on the mass of the electron neutrino. Then we will be able to determine with more certainty the exact value of the smallest quantum of energy.

The Unitary Boson “Particle” (*Bu*) by itself is unstable, but it represents the Planck Mass of 1.86×10^{-9} kg. The physical universe comes from this little seed resting in the Vacuum State.

Any mass or energy has to be defined by an Observer taking a viewpoint that interacts with and resists something. Thus ultimately the existence or non-existence of some mass or energy is determined not by the object but by the Observer’s assumed viewpoint. Undefined Awareness has no particular size or location. The Observer can create both future and past. By suddenly expanding the viewpoint of his consciousness an Observer can cause his material universe to implode. By suddenly shrinking the viewpoint of his consciousness he can cause his universe to explode. Thus there is no “escape” velocity. The only way to make something seem to go away is ignorance and pretense. But these just hide things temporarily from consciousness. Awareness always has any creation easily outpaced wherever it might go because awareness in its essential nature is undefined and therefore exists outside the boundaries of any dimension. It can thus transit the universe in a flash.

Based on these discoveries I have formulated a simple Four-Step mathematical procedure that describes how an Observer may create any kind of universe he likes. As with any construction process a clear space makes a good starting point. Begin with a complete tabula rasa, a clean slate of pure nothingness. Then set up your rules according to a procedure so that the whole system works as an integrated whole, and you are ready to start building. I describe the process in detail in the **Observer Physics** papers under the title: “Snow White and the Seven Quantum Dwarves”. There could be any number of amazing universes waiting to be explored. But we have hardly gotten started on this one, so there is a lot to do. Or you can recognize that it all comes out of emptiness and just let it go at that and watch the show.

The Rules for Creating Universes

0. The Observer begins with a triplet of undefined primitives, one of which is himself. These will play in a universe of nothingness. In our universe we chose Time (Change), Length (Space), and Mass (Observer Resistance) as our primitives. Mathematically we express the emptiness as an endless string of 0's. The true nature of the Observer is pure light (or we can call it Pure Awareness) that has no Mass. From the viewpoint of Light-Awareness there also is no Time or Space.

1. The primitives will form invariant relationships of geometry in the Observer's Mind Space and invariant relationships of physical structure in the Observer's World Space. Both are fundamentally nothing. Once you have established your small set of fundamental physical invariants as relationships among the primitives, use factors from the constants of geometry to shift each physical constant to an exact power of 10 while maintaining the dimensional units of each physical constant unchanged. For example, in our universe we can transform the speed of light (3×10^8 m/s) into (10^8 m/s) if we multiply it by a factor made entirely of constants from geometry that equal the pure number $1/3$. An easy way is to divide the volume of a unit sphere by the area of a unit sphere times the spatial constant (b). For these calculations we use the radius as the unit for a sphere rather than the diameter. For example, the circumference of a unit circle is $2 \pi r$. We set $r = b$, the spatial constant of 1 meter, so our unit figures have specific sizes in physical space even though they still do not represent anything solid. They are still only abstract possibilities.

2. Identify all the fundamental physical constants that contain mass units and organize them into the various combinations such that all the units cancel out. Pay no attention to ratios and scales in this operation. This procedure generates a set of pure number ratios and scales expressed in terms of the physical constants. For example, in our universe we can divide Planck's Constant (\hbar) by the Electric Charge Constant (e) times (%) squared and get a dimensionless constant. The Magnetic Flux Quantum (Φ_0) divided by the spatial constants (%)² or (b)² would be an example.

3. Substitute the power-of-ten versions for each of the physical constants derived in step (1) into the combinations derived in step (2). Thus each pure dimensionless number in step (2) becomes expressed in terms of powers of ten.

4. Total up the exponents of the powers of ten expressions and set the total equal to

the factor $[\pi \text{ times } (\%) \text{ squared divided by the area of a unit circle}]$ taken to the power of your total: $[\pi \%^2 / Ao]^n$, where $[Ao]$ is a circular area with radius (b) and n is the exponential power that the total string of factors generates. (Just add up the exponents of all the factors in the string.)

This procedure gives you an equation for each possible combination of physical constants expressed totally in terms of the constants of geometry, that is, some power of the Scaling Factor expression $[\pi \%^2 / Ao] = 10$. Since you already have a power-of-ten version for each physical constant, you can obviously write each combination as a power of ten. The Scaling Factor can match that at any power and it happens to be a constant in both geometry and physics and links between the Observer's Mind and his World.

Suppose you then want to manifest a proton to get your material universe started. It is frozen in the vacuum of nothingness (000000000000) as merely a possibility. The Scaling Factor expression can be set at any power and will insert a 1 somewhere into the field of 0's. Taking it to the 0th power gives it the value of unity, so start there. You can choose one of the power-of-ten formulas from step (4) that suits your needs. They all coexist as possibilities. Each is some string of factors that equals some power of the Scaling Factor. This means the ratio of the string of factors to the Scaling Factor at the chosen power is 1. This is your unity.

Then rearrange the factors of your chosen string, grouping them so that the constants that define a proton are put into one set of brackets. Then shift all the remaining factors over to the side of the equation where the Scaling Factor is and neaten them up a bit. For our example we find that a proton equals the permittivity constant times the Scaling Factor to the -18th power times the Scaling Operator cubed times the area of a unit sphere squared divided by the circumference of a unit circle times the volume of a unit sphere. Thus the mass of this particle (1.67×10^{-27} kg) turns out to be the permittivity constant of a vacuum times a bunch of empty bubbles based on the constant of space (b) used as the unit radius of the bubbles. The Scaling Operator adjusts the scale. The permittivity allows a certain amount of mass per volume of space. The empty bubbles match the volume of space and adjust the ratio of the permittivity to the correct value for a proton, neutron, or hydrogen atom to appear. Like magic the particle leaps out of the vacuum of nothingness simply because we created the possibility of mass to exist in space. How much the mass turns out to be is determined by the way the bubbles can fit together with the permittivity and the other physical constants that can cooperate to form a mass. Thus only certain types

