

The Sagitta Key

Unlocking the Hidden Secrets of the
Greatest Equation Ever

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To the Johnsons

Contents

1	Exploring Euler's Identity: $e^{i\pi} = -1$	3
2	A Closer Look at Imaginary Growth	7
3	Packing the Eulerian Tool Sphere	13
3.1	Establishing Laws	14
3.2	Bo's 5th Law	16
3.3	Eulerian Diagrams	16
3.3.1	The Eulerian Precessional Chart	17
3.3.2	The Dome/Flagpole Model of Trigonometric Identities	17
3.3.3	The Chart of Euler's Equation	17
3.4	The Law of Dimension	18
3.5	Mattie's Law	19
3.6	The Schrödinger and Planck's Equations	20
3.7	The Johnson Senior 3rd Law	20
3.8	Johnson's Eulerian FTOC	21
3.9	The Sagitta Key: Bo's 2nd Law	22

List of Figures

- 2.1 Defining real and imaginary growth. This image was adapted from an image found on the website Better Explained by Kalid Azad.[?][?] . 9
- 2.2 The trigonometric relationships present in the unit circle. **Image courtesy of Wikipedia. From the article List of trigonometric identities.Author:Steven G. Johnson[?] 12

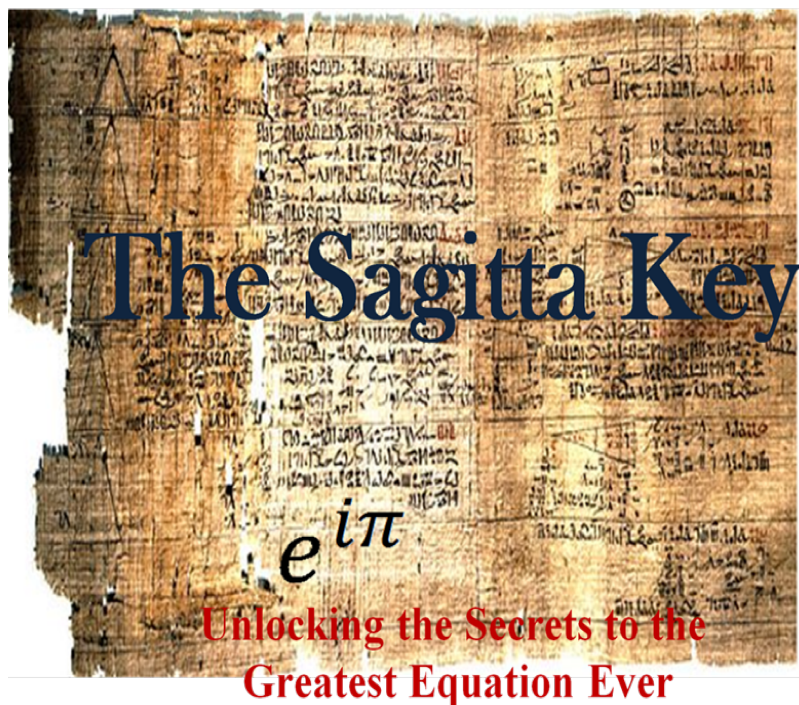
Preface

This is a very brief preview of my new book the Sagitta Key of some excerpted chapters and excerpts from some chapters.

Willie Johnson Jr.
August 30, 2014

Acknowledgments

Several of the theories presented in this book are based upon my first book, *The Gyroscopic Force Theory, Introducing Tovacian Chemistry*.



Wille Johnson Jr.

Chapter 1

Exploring Euler's Identity: $e^{i\pi} = -1$

I have sung the praises of Euler's equation. But I bragged about how it is the identity, $e^{i\pi} = -1$, that is the star. What makes it so special? Now of course the value of $e^{i\theta} = \cos \theta + i \sin \theta$ is dependent upon the value of θ chosen. So if we start at $\theta = 0$ then the sine is zero and the cosine is 1. We therefore wind up with a final value of 1. Unity. A fundamental number and constant of nature. If we really wanted to delve deeper into the inner workings of this equation we could invoke the collapse of the wave function and the first postulate of quantum mechanics. (Euler's equation is the ultimate wave equation) The wavefunction must satisfy certain mathematical conditions due to its probabilistic interpretation. For the case of a single particle, the probability of finding it somewhere is 1, therefore, via normalization,

$$\int_{-\infty}^{\infty} \Psi^*(\mathbf{r}, t) \Psi(\mathbf{r}, t) d\tau = 1$$

So quantum mechanics is all about getting Psi, Ψ and its conjugate, which are quaternions, to swing around or walk across the unit circle and meet back at 1. Too simplistic? We shall see. More on this later.

So by allowing $\theta = 0$ we get 1 *and* the first postulate of quantum mechanics? If that's true then it would seem that it is $e^{i0\pi}$ that is the true superstar.

Yes, it is true that , $e^{i0\pi}$ is quite impressive. But let's continue. Let's see what we get when we allow $\theta = \frac{\pi}{2}$. At half of π radians, we are at 90 degrees. So the cosine is now zero and the sine is 1. So the final value is $1 \cdot i = i$ where $e^{\frac{i\pi}{2}} = i$. And viola; the mysterious enigmatic ubiquitous little mathematical creature, i , is born along with the accompanying complex numbers. We have been taught that i is purely imaginary, in the literal sense, because it is impossible to generate a real number from taking the square root of -1 . Well, yes and no. In terms of real and imaginary numbers, this is true - by definition. But make no mistake, i is also real in a physical sense . It makes its presence known in the physical world. It is not just a numerical contrivance invented to make our computations easier to manipulate. Numerology you say? We shall see.

So again, we see another impressive rendering of e on display. We just created i and the imaginary numbers! What can possibly top that? Well let's see. At π radians we are at 180 degrees so the sine is once again zero and the cosine is negative one. This yields a final value of -1 . Now you could say, "OK, big deal. We already created 1. You just flipped 1 from one side to the other and created its opposite. I'm not impressed." And nor should you be - if that was all that happened. But with that "flip" we created a world of wonder that transcends all boundaries, be they mathematical, physical, or dimensional. With that one flip we unified the world of the cosine, the world of the lateral, the world of the rectangular with, the world of the arc, the world of the curvature, the world of the rotational.

We created the world of the precessional.

Still not impressed? Think of it like this:

$e^{i0\pi} = 1$ is teenage boy,

$e^{\frac{i\pi}{2}} = i$ is teenage girl

$e^{i\pi} = -1$ is puberty,

Up until the identity came along the cosine acted on its own going back and forth on its merry rectilinear way. It traveled the radius and couldn't care less what i and the sine were doing. Same with i and the sine. They were perfectly content to travel along their curving path having no inclination to go the linear route. But then one day they met along the tangent. The identity, played cupid, shot his arrow (more on that later), and

$$\alpha\beta = -\cos\theta + \varepsilon\sin\theta \quad (1.0.1)$$

was born. This is the Euler's version of the mathematical expressions of quaternions. Metaphorically speaking, the cosine and sine fell head over heels in love, married, and were blessed with a prodigious number of offspring, all of whom grew up to be Hamilton's quaternions, i.e.,

$$i^2 = j^2 = k^2 = ijk = -1 = e^{i\pi}. \quad (1.0.2)$$

The identity, $e^{i\pi} = -1$ governs the basic rules of Hamilton's quaternions. The identity sets and governs all the rules of scalars, vectors, trigonometry, and complex numbers. It unifies the rules of Hamilton's quaternions with the rules of trigonometry and calculus.

In short $e^{i\pi} = -1$ is the unifying equation of all that is physical with all that is mathematical.

Euler's identity, stirs things up. It's an instigator. An initiator. A mover and shaker. It gets the juices flowing and then mixes them. It is a live wire. A jokester, a joker, a prankster.

It's Odin, Thor, and Loki all rolled into one. Takes absolute delight in robbing Peter to Pay Paul. Its both sinner and saint. Both anabolic and catabolic. It is both the straw that stirs the drink and the one that breaks the camel back. It is literally what makes the world go round. Think of it like this. Euler's identity, is the boss who constantly instructs his cosine foreman, e , and his sine foreman, i (whose nickname is ϵ), on how to herd the four units, mass, charge, length, and time, back and forth along unity. Euler's identity, $e^{i\pi} = -1$, is the chief traffic cop as well as the traffic lights that govern the flow of traffic along the infinite radii and singular circumference of the unit circle. Without $e^{i\pi} = -1$, we encounter massive traffic jams or fatal traffic accidents. No traffic, no physical processes, no life.

Chapter 2

A Closer Look at Imaginary Growth

What exactly is e ?

Well, in the first chapter we stated what e was:

$$\begin{aligned} e^x &= 1 + \frac{x^1}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \frac{x^5}{5!} \dots \\ &= 1 + x + \frac{x^2}{2} + \frac{x^3}{6} + \frac{x^4}{24} + \frac{x^5}{120} \dots = \sum_{n=0}^{\infty} \end{aligned}$$

But e is extremely versatile and has a myriad of different "looks". Mathematically e is defined as

$$e = \lim_{x \rightarrow \infty} \left(1 + \frac{100\%}{n} \right)^n \quad (2.0.1)$$

Yes we know what the text books say but what is it?

Euler's constant, e , represents the mathematical process of starting at 1 and growing continuously at 100% interest for 1 unit of time.

Did you catch that? It is a process. Not a single stagnant constant. It represents smooth *continuous* growth. It extends far far beyond being simply some single number.

Euler's constant, e , is an entire system of circumnavigation distilled within one single number.

It is an entire system representing continuous growth. e^x is a compact instruction manual that instructs us to start at 1 and grow continuously at 100% for x number of seconds. This takes us back to our description of e within the Taylor series. We do not start out at 1 and build our way up to e . e is initially manifest as 1 and builds to a maximum of 2.731.... At an origin of zero, e doesn't equal 1; e is 1.

We can think of Euler's equation as a formula wherein it instructs e to grab a radius of 1 (always a radius of 1), and rotate it to a certain position on the unit circle or to take 1 and grow it at a continuous rate along the cosine until it reaches the sine and then grow the sine up to the circumference. Euler's equation is always all about e trying to grow 1 at a continuous rate. e is all about growth. Part of that function is manifest in it being taken to an imaginary power. Here is where that sublime simplicity and yet almost inscrutable complexity of the formula comes into play wherein we have this seamless melding of e , real numbers, and imaginary exponents. Azad captures this rather cleverly :

"When I see " 3^4 " I think of it like this:

- 3 is the end result of growing instantly (using e) at a rate of $\ln(3)$. In other words:
 $3 = e^{\ln(3)}$.
- 3^4 is the same as growing to 3, but then growing for $4x$ as long. So $3^4 = e^{(\ln(3) \cdot 4)} = 81$.

Instead of seeing numbers on their own, you can think of them as something e had to "grow to". Real numbers, like 3, give an interest rate of $\ln(3) = 1.1$, and that's what e "collects" as it's going along, growing continuously."

Khad Azad[?]

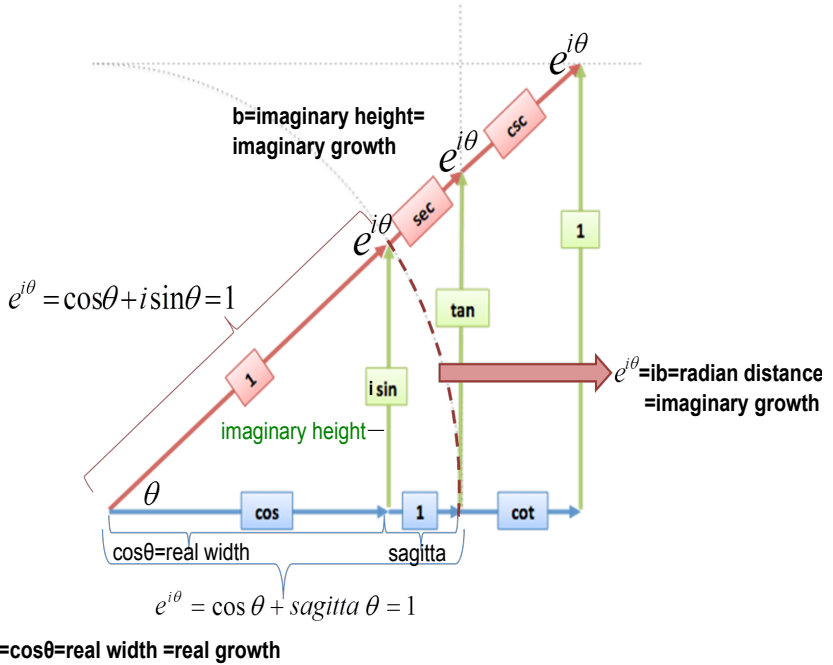


Figure 2.1: Defining real and imaginary growth.

This image was adapted from an image found on the website *Better Explained* by Kalid Azad.[?]/[?]

Regular growth pushes a number along a radius. Regular growth, as e , pushes a number along the cosine in the same, real direction, along with it. Imaginary growth abruptly changes direction 90 degrees and pulls upwards along the sine rotating e in the process. Real growth, real interest along the cosine, abruptly comes to a halt and imaginary growth takes over proceeding up the sine. i acts as the "accelerator." i acts on e and pulls it up the sine. Euler's equation combines real and imaginary growth simultaneously. e grows the real part and i rotates e around the circumference. The real part, a , means e grows 1 at 100% for a seconds and the imagi-

nary part says e gets rotated for b seconds. So any and every point can be represented on the unit circle by Euler's equation $e^{ix} = \cos \theta + i \sin \theta$. Of course this means they are to be added orthogonally, which requires the use of the Pythagorean theorem yielding

$$1^2 = \text{hypotenuse}^2 = \cos^2 \theta + i \sin^2 \theta. \quad (2.0.2)$$

This was all established in previous chapters and is nothing really new. But referring once again to Figure 7.1 we encounter the rather curious situation where the cosine runs collinear along with a radius. The graph clearly shows that the radius, of 1, is composed of the $\cos \theta$ and a residual portion or "remainder of x " (*ROX*). It is undeniably true that $\cos \theta + \text{ROX} = 1$. But we have just shown and proven that $\cos \theta + i \sin \theta = 1$, which is the hypotenuse. Therefore, it must be the case that $\text{ROX} = i \sin \theta$. What is the *ROX* mathematically equal to? Very simply $\text{ROX} = (1 - \cos \theta)$. No fancy analysis needed. *ROX* is simply what remains after removing the cosine segment from a radius of 1.

Every radius is one in the unit circle. Subtract the cosine from it and whatever is left is the ROX or in trigonometric terms the ROX is versine.

And just to confirm this we calculated that $\text{ROX} = (1 - \cos \theta)$. The mathematical definition of the versine is $\text{versine} = (1 - \cos \theta)$. So the radius minus the cosine is the versine. The versine has been called the versed sine. It has also been called the sagitta. What are the implications of the sagitta? Get ready for earthquake number 3:

In addition to there being a vertical sine there is also a lateral sine. This lateral sine is named the versine or the sagitta.

Now if you have coaxed your brain into even considering that there might be a possibility of the existence of a lateral sine then your brain is now contemplating all kinds of new and

different trig relationships. If it hasn't then you are probably questioning my sanity. Rest assured the math is sound. The versine is a mathematical fact. The conclusions logical. Review what I've stated. If you are completely objective you will see that there must exist a lateral sine in the form of the versine.

We must stress this point again: Euler's equation combines real and imaginary growth simultaneously. Euler's equation combines both discrete (real along the cosine) and continuous (imaginary along the sine) processes simultaneously. This interpretation will have far reaching implications in later chapters.

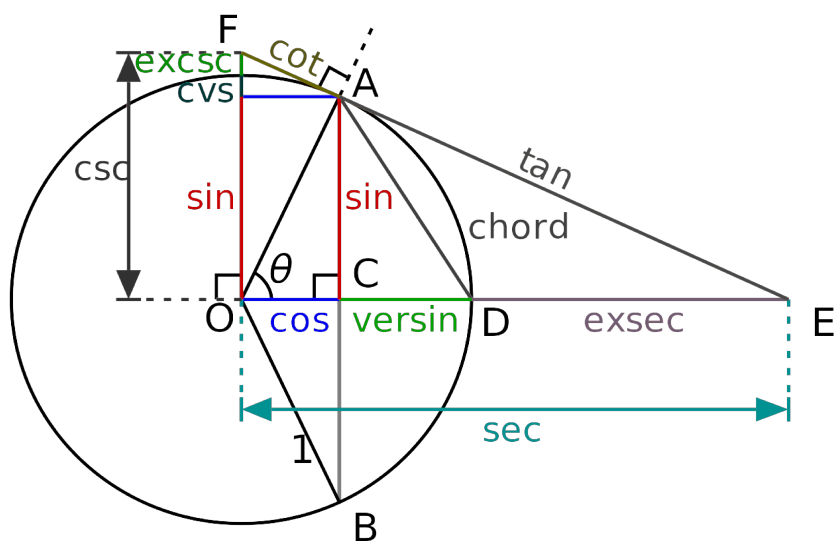


Figure 2.2: The trigonometric relationships present in the unit circle.

***Image courtesy of Wikipedia. From the article List of trigonometric identities. Author: Steven G. Johnson[?]*

Chapter 3

Packing the Eulerian Tool Sphere

The Studley Tool Box. This tool box is one of the finest collection of woodworking tools in the world. There is no finer example of form follows function. A masterpiece in both economy and design. It is the epitome of efficiency and elegance, all packed within something, although ornate, many would think as being utterly mundane. A box. Just about everything you need to create a woodworking masterpiece is packed in that tool chest. It's economy of space is breathtaking. The workmanship superb. Now, why am I raving over a tool box of all things? Well the Egyptians got it. And the Masons following their lead also began to practice it and Studley took it to the limit. They all understood that there is both a beauty and permanence in things well built. But you need the proper tools for the proper job. So we are going to build our own mathematical tool box replete with all the mathematical tools you will need to construct something as simple as buying a candy bar to trading financial derivatives to computing the energy levels and location of an atom of vanadium as it passes through the sun's corona to the intricacies of DNA transcription and translation. These tools

will aid you in forging a path through and upon whatever physical or biological or mathematical conundrum you might encounter.

Now instead of a chest we well start with a sphere. And to that sphere we will add a single circular disk having a circumference of a great circle. The diameter of that sphere is R and its surface area, $4\pi R$, forms the Impedance of Space. That space is an enstrophytic space, the so called Dark Energy of Space. It is composed of a $2ijk$ "volume" suffused with the enstrophy, $\Im$. And the path around that great circle is Bo's 5th law $e^{i\theta} = e^{-eF\theta} = e^{\Im\theta}$. It is at this point that we shall begin packing our sphere with all the invaluable tools we will require to build the universe.

3.1 Establishing Laws

First, let's briefly discuss the establishments of laws. In the field of physical science a law is not a law until it has been tested exhaustively and found to hold under all circumstances. It starts out as a hypothesis, morphs into a theory, and gets tested via experiment into law. You have probably noted that I have stated several laws, seemingly, somewhat arbitrarily. These are laws that I have personally derived and for the most part, have not provided a detailed derivation or justification of their existence. The operative word here is derived. No they have not been exhaustively tested by experiment. No they do not have the imprimatur of the established scientific community. No they are not listed in any standard text books. These laws are new and will suffer the slings and arrows that any new theory must. And that is as it should be. These derived laws should and must be tested.

But these "laws" are not so much scientific laws but mathematical laws. They were derived mathematically. Algebraically. They are mathematically sound. They adhere to all the rules of the algebra

from which they were created, and thus form laws of algebra.

The Law of Dimensions is inviolate. Once Mother Nature agreed to express her laws of nature in the language and rules of mathematics she was locked into a Faustian bargain. She could not just pick and choose what course her physical units could take. At that point she lost control and the Rule of Numbers took over. If $F = ma$ then $F = ma$ in all its combinations and permutations. That's why $F = (m/t)c$, a permutation of $F = ma$, a permutation I daresay few have ever seen, must be true. Physicists say you can't have electron tunneling. Physically impossible classically, so they say, we must resort to the magic of QM. The Rule of Numbers says, no magic needed. If the electron is indeed tunneling then the numbers allow it to do so. Indeed, the numbers *force* it to do so. Somewhere. Somehow. Some way. We might not know the how's or why's of it but remain secure in the rock solid knowledge that somehow the numbers make it so. What numbers? In this instance, Clenthia's Law where $F = Vi/c$. We cannot state this enough. Numbers are not just static glyphs. They do "stuff". And the "stuff" they do is codified in these algebraic laws.

It is at this point physicists grab their heads and shake them in dismay with wails of numerology and their favorite (but hackneyed), "not even wrong". Yet many of the same scientists have devoted their entire careers to a discipline based exclusively upon the "worship" of numbers such as operators and probabilities. This discipline forms one of the twin pillars of all of science and yet is literally based upon pure guess, best guess, great hack, which is based exclusively upon the study of numbers. Not units. Not physicals things but numbers. Tensors. Probabilities. Upon Ψ , which by definition, has no physical meaning. Ψ is just this "something" that when we square it we get a pure number. And that number seems to follow around whatever it is we are investigating. The closer the number is to 1 the more we are sure we are actually fol-

lowing what we think and hope we are following. Why this fraction "tags" along with whatever we are "observing" is another best guess. But classically we can clearly see what Ψ is and why it "tags" along with what we are observing. Ψ is η . We are trying to keep track of ρ . η always "tags" along with ρ . That's why we have the $\rho\eta = jk = i$. So Ψ always "tags" along with ρ which means Ψ always tags along with whatever we choose to observe. Simple enough classically but QM resorts to casting us upon a roiling sea of probabilities waves.

Hold fast to your lifelines. This malestrom of QM logic is brutal and will suck you in and overwhelm you in an instant if you allow just an inkling of it to seep into your common sense logic. Follow the science. Not the scientists.

3.2 Bo's 5th Law

Now the very first tool we will pack in our spherical tool "box" will be of course Euler's equation $e^{i\theta}$. We have shown it packs all the mathematical tools you will ever need to mathematically construct any mathematical argument you wish. But unpacking it can be quite a challenge. So instead of just packing the inscrutable introverted $e^{i\theta}$ we are going to pack its more extroverted form. It's more expressive form. It's more intrusive form. The form that puts i front and center. That form is Bo's 5th law where $e^{i\theta} = e^{-eF\theta} = e^{\Im\theta}$. That double ijk space we spoke of earlier is the space of i . The space of enstrophy. The space of $\Im$. That space is the solvent that dissolves and mixes the physical units of the universe.

3.3 Eulerian Diagrams

Navigating our way through this space requires adhering to some rules. We can consolidate those rules into 3 diagrams; our precessional chart, our dome/flagpole model of the trigonometric identities, and our chart of Euler's equation.

3.3.1 The Eulerian Precessional Chart

This chart is basic to our understanding of tracking precessional units. All is precession. Anything and everything that moves, or doesn't move for that matter, must obey some aspect of this chart. It is essentially a 3-D representation of the wave equation. Where the wave equation may be much more abstruse, particularly in the use of partials in 3 dimensions, this chart lays it all out simply and succinctly in our favorite mathematical language, algebra. This chart is the basis of electromagnetic theory and the behavior of quaternions. It's simple in design but seismic in its import towards establishing the precessional characteristics of precessing particles.

3.3.2 The Dome/Flagpole Model of Trigonometric Identities

Life is change. Calculus calculates change, therefore calculus is the mathematics of life. Calculus is also trigonometry. The dome/flagpole model of trigonometry provides all of the trigonometric relationships you will ever need to construct any argument of calculus you may ever wish to advance. The idea that calculus is nothing but trigonometry often gets lost when integral signs and partials are flying all over the place. This chart keeps us firmly grounded. It is through this chart that we acquired a full appreciation of the sagitta. Indeed, it is because of this chart and its revelations of the behavior of the sagitta that we got our first glimpse into the true classical inter-workings of QM.

3.3.3 The Chart of Euler's Equation

This chart is the mother lode. It is jammed packed with all kinds of invaluable information. Particle formation, the rudiments of calculus, the rudiments of QM, ionization energy, atomic energy levels, Newton's gravitational force law, Coulombs law, Ohm's law, electromagnetism, electron spin,

precession. There is so much packed into this chart. It is a must have. The tool box would be incomplete without it. It shows the compacted, normally introverted $e^{i\theta}$ in all its extroverted glory.

3.4 The Law of Dimension

Armed with an arena comprised of the precessional chart, the dome/flagpole model, and the Euler's equation chart in conjunction with Bo's 5th law we are now ready to actually let the equation do what it does; run the universe. In order to keep track of what it's doing we shall rely on a few other laws. The next invaluable law is the Law of Dimensions. The law of Dimensions is not a true law in the sense of physical standards. *It will not pass all tests. It will fail in the strictest sense. The Law of Dimensions cannot compute constants.* For example the Law of Dimensions allows us to algebraically derive PE from $E = mars$ with ease. But it fails in trying to directly derive $KE = 1/2(PE)$. There is no way we can derive that factor of $1/2$. That has to be determined by experiment. So there will undoubtedly be cases where the dimensionally derived equation will *not* be the correct equation and will thus technically fail in terms of being a law.

So why include it and why continue calling it a law? Because even though it may not produce the actual correct equation 100% of the time it will unfailingly produce , what we shall call, the "unity form" of the equation 100% of the time. The Law of Dimensions will always produce an equation in the form *correct equation = (factor)[1x(unity form equation)]*. That factor has to be determined by experiment.

So if we change our expectations from the Law of Dimensions computing the actual equation to its always computing the unity form of the equation then it does indeed become a law. You can rest assured that with the law of Dimensions it will usually place you directly in your seat in this *ijk* arena. But even when it doesn't, it will at least place you in the right

aisle. All you have to do from there is to go down the aisle checking seat numbers until you find your seat.

One of the invaluable services this law does is that it will not allow you to drift too far afield of the true physics you are investigating. It's job is not to tell you why. It can, however, certainly show you how. How? Just follow the algebra. But what about the physics behind it? That's up to you as a scientist to figure out. But that's not too hard either. As goes the algebra so too must go the physics. The algebra of quaternions run the show. Not the theories that we create while trying to force the quaternions to obey those theories.

The law of Dimensions is another one of those invaluable tools we just cannot do without. It is the absolute base. The absolute foundation upon which all of science rests. No units no science. No rules of unit interaction no change. No change, no life. We can't say that without the Law of Dimensions there would be no change or no life, but without *kin* of it it would be virtually impossible to decipher the world, the cosmos, the universe in which we live.

3.5 Mattie's Law

Having packed the Law of Dimensions into the sphere we are still a bit apprehensive. There is a huge number of units in all kinds of algebraic arrangements. It seems almost impossible to keep track of all these different units. That might be true except remember, anything and everything that is physical can be described by one or a combination of four units. Those units are *mass, charge, length, and time*. That's it. Four units comprise the entire universe. But you might counter with, Ok, I can see time paring with mass (radioactive decay), or charge (amperage) or length (velocity) but how do you get from charge to mass? How are they connected? They are two entirely different physical entities. This is where Mattie's Law comes in.

$$\alpha\hbar = q^2 R = m_e c r_p.$$

It unifies mass and charge. It allows us to pass seamlessly from the world of electromagnetism into the world of gravitation. If we want unfettered access to and from all neighborhoods of our *ijk* space then Mattie's law is the vehicle of choice. And yes. The R of Mattie's law is the same R that provides the diameter of our sphere.

3.6 The Schrödinger and Planck's Equations

To the sphere we will add the Schrödinger equation

$$E\Psi = i\hbar \frac{d}{dt}\Psi = -\frac{\hbar^2}{2m} \frac{d^2}{dx^2}\Psi + U\Psi = TDSE$$

and Planck equation,

$$E = h\nu.$$

These provide us with a rock solid base of energy and methods by which we may calculate the behavior of a particle from its energy. These are extremely useful but not indispensable. We can derive these two equations from Bo's 5th law and Mattie's Law dimensionally. Indeed we derived both the Schrödinger equation and Planck's equation in earlier chapters. These two equations, however, give our computations context and direction.

3.7 The Johnson Senior 3rd Law

$$\begin{aligned} F_{Johnson} &= \left[2\pi \text{ radians}_{\omega} X \left(\frac{2\pi \text{ radians}_{\Omega}}{t} \right) \right] v \\ &\equiv ma \end{aligned}$$

The Johnson Senior 3rd Law allows us to navigate along the circumference. It allows us to dwell within a realm of

matter, $\rho\eta$, that we have heretofore had little knowledge of. It allows us to properly use the quaternion form of Euler's equation, $\alpha\beta = -\cos\theta + i\sin\theta$. The Johnson Senior 3rd law ties directly into the Schrödinger equation.

3.8 Johnson's Eulerian FTOC

We now have most of the major tools locked securely in place, compactly packed within our tool "box" sphere. Now having such a disparate collection tools locked up in such a confined space requires rules of interaction, otherwise sheer chaos and tool damage will definitely occur. Without such rules it would be akin to throwing a running power saw into a box of chisels. Disaster. Rules are needed to avoid such disasters and the ultimate rule is is the Law of Dimensions. But the next invaluable rule for computing change is Johnson's Eulerian FTOC. Again, change is life and calculus calculates change so calculus calculates life. The sum total of calculus is distilled within $e^{i\theta}$. But operationally it is summed up in this previous quote:

We may now alter our terminology and state, as h goes to zero the conjugate of h goes to F . The letter F is the Greek letter Wau or Digamma, which represents the double point ICR of $\pm$ zero and ± 1 .

$$\lim_{\substack{h \rightarrow 0 \\ F \leftarrow -h}} f(x) = L$$

where

$$-h = \frac{1}{h} = \text{the conjugate of } h$$

This "recalibration" of calculus is invaluable. It is this reformulation of the limit which allows us to finally dispense with the probabilistic basis of QM and place it firmly within

the confines of classical physics. Calculus, at the end of the day is still just trigonometry which takes us back to our dome/flagpole model.

3.9 The Sagitta Key: Bo's 2nd Law

We have saved this particular tool for last; Bo's 2nd Law. We have raved over the wonders of $e^{i\theta}$. Have gone into exhaustive and rigorous detail concerning $e^{i\theta}$ powers. It is without a doubt one of the two greatest equations known to man. It is still difficult to declare that $e^{i\theta}$ is a greater equation, in terms of influence, than the equation $1 + 1 = 2$. But coming in at a close third is the expanded version of Euler's identity, Bo's 2nd Law.

Bo's 2nd law defines unity or Wau in terms of the physical constants. Any and every physical constant and any and every mathematical operation is distilled within these versions of Euler's equation, including time. There is nothing, be it physical, chemical, mathematical, or biological, that cannot be derived from these forms of the equation.

Let's state Bo's 2nd law in its full form:

$$\begin{aligned}
 & e^{i\pi} \\
 & = ijk \\
 & = i^2 = j^2 = k^2 \\
 & = -1 \frac{q^2 k \hbar}{\alpha m_e^2 c^3 r_p^2} \\
 & = -1 \frac{q^2 k}{\alpha m_e^2 G} \\
 & = -1 \frac{4\gamma^2 k}{\alpha G} \\
 & = -1 \frac{4}{\alpha \Sigma} \\
 & = -1[F] = -1[Wau] \\
 & = -1[*\Psi\Psi] \\
 & = -1[unity] \\
 & = -1[1] \\
 & = -1[\Phi - \phi] \\
 & = -1[cosine + sagitta] \\
 & = -1 \\
 & = The Sagitta Key.
 \end{aligned} \tag{3.9.1}$$

The above description was stated earlier in one of the eight articles listed in the Postulates of QM chapter. Many readers, no doubt, viewed this as being either an endless list of constants signifying algebraic gibberish or as just more overblown hyperbole. Well, I should hope by now that the reader is convinced that there has not been any overblown hyperbole and whatever we state we validate with facts bolstered by the sheer power and infallibility of the algebraic rules of quaternions.

There is no need to take someone else's word for it. Try it. You were provided with a "cache" of units when we

derived R . You should really see for yourself if

$$\frac{q^2 k \hbar}{\alpha m_e^2 c^3 r_p^2} \quad (3.9.2)$$

doesn't reduce to 1. Leave the actual magnitude of the constants for last. First, just see if the units do or do not cancel. Then for the acid test see if the magnitudes do or do not cancel. There are two sections in the appendix that go over the derivation and simplification of this constant if things get too muddled.

Now let's stop and think about what this equation is saying:

All of the constants and units of nature are distilled within 1. Or better yet, all of the constants and units of nature are distilled within a double ICR consisting of $F \cdot \pm 0 \cdot ijk$.

Brain freeze should be setting in about right now. The implication of all this is staggering, that implication being that everything

-EVERYTHING-

is packaged into 1. But staying on point, we are forced to ask, yet again, *where did the units go!* This is reminiscent of computing probabilities where all of a sudden the units disappeared. But in this case they didn't disappear. They canceled each other out. They are still there but are folded in and upon each other so cleverly and so compactly that their units cancel each other out, much like the forward and backward motions of the two sets of waves in a standing wave. Waves are there but the effect is a null effect, not a nullification of the waves themselves.

Bo's second law can be written so as to produce 1, -1 or a product of the two as conjugates. In this expanded form we have elected to cast the law as a product of conjugates.

Yes, it's shown as being equal to negative -1 instead of 1, but again at the ICR conjugates become indistinguishable. Also it may well manifest as the negative cosine of 1. But it is also a positive 1 sagitta. We have commented repeatedly about the sagitta and cosine going to zero. When they go to zero the units do not miraculously go to zero. *Everything that is at the circumference and in between along the radius, in all their unitary splendor, must be present in the origin as well.* The origin must contain all the mathematical machinery, infrastructure and physical units to grow it's primordial "charges" into a physical creatures comprised of physical units. These physical units do not just disappear or reappear out of thin air. We have said that the Eulerian approach is unremittingly causal. Unremittingly classical. Things do not just stop and disappear at zero. Things are just getting started at zero and are about to make an appearance in full unit regalia. Units in means units out. This is the Law of Conservation of Mass and Momentum in a nutshell, especially momentum since all is precession. And since e grows 1 then e aids in the dissemination of the units from the origin to the outer reaches of our spherical universe. We have also stated that yank in equals yank out. Yank is also a conserved quantity. Note that

$$yank = Ei = \frac{Fq}{qt} = \frac{F}{t} = \left(\frac{m}{t}\right)a \quad (3.9.3)$$

This once again indicates that the quantity m/t or $\rho\eta$ operates as a third state of matter and obeys all of the Newtonian laws of physics. And since all is precession then all is vorticity η . But $\eta^2 = \Im$. Which leads us to $*\Psi\Psi = 1$ since $\Psi = \eta$. So all our vorticity can be neatly packaged into 1. But we must also have a way of extracting vorticity out of 1 and that's where i, Φ, ϕ and e come into play. The interplay of 1 and -1 at the origin becomes interchangeable. Remember, e grows 1 so e acts like a lateral i , allowing 1 to reach its full unitary potential at the circumference. Again, this shouldn't be too big of a surprises since we have constantly stated that both e

and i are quaternions and that $ei\pi \equiv ijk$.

We now begin to see why Euler's identity is such a powerful equation. F contains all that is physical and it is the job of Euler's identity to extract any needed information from F . As we have stated before Euler's identity is the Sagitta Key. Bo's 2nd Law codifies that fact. We even begin to see a slight connection between the addition of $1 + 1 = 2$ and Euler's identity via the Euler equation diagram.

Let's go over what Bo's 2nd Law contains. It is astoundingly compact. It is a Studley Tool Box in its own right. But i is needed to unpack it. It contains:

1. First and foremost Euler's identity
2. The Sagitta Key. Indeed, it *is* the Sagitta Key.
3. Hamilton's rules of quaternions.
4. $-\alpha\beta = -\cos\theta = \varepsilon\sin\theta$.
5. Mattie's Law
6. The algebraic means for unifying Newton's gravitational force law and Coulomb's law.
7. All the constants of nature.
8. $F = \textit{unity}$ contains all the constants of nature.
9. 4 is a dimensionless constant of nature and equals $\alpha\Sigma$.
10. Σ is a dimensionless constant of nature and equals $4/\alpha$.
11. α , the fine structure constant is a dimensionless constant of nature and is equal to $4/\Sigma$.

The only thing this equation is missing is a direct statement of Johnson's Eulerian FTOC and even that we can dimensionally make our way to given its presentation of conjugates. It is a breathtaking display of the power of the Law of Dimensions. If no single scientific fact doesn't convince you that the

universe is causal then the existence of Bo's 2nd law should. The Eulerian approach finds it impossible to entertain the thought that the distillation of

$$\frac{q^2 k \hbar}{\alpha m_e^2 c^3 r_p^2}$$

down to 1 can be based upon random events.

And so there you have it. The Eulerian Spherical Tool Box. There is enough physics and mathematics in this small compactly packed sphere to supply you with all the math or physics you will ever need to solve any scientific problem be it biological, chemical, or physical. Bo's 2nd Law is the Sagitta Key and this key unlocks all the secrets of both calculus and $\Psi\Psi$. It is the key to F and thus the key to all.