PUTTING CONSCIOUSNESS INTO THE EQUATIONS OF SCIENCE: THE THIRD FORM OF REALITY (GIMMEL) AND THE "TRUE" UNITS (TRIADIC ROTATIONAL UNITS OF EQUIVALENCE) OF QUANTUM MEASUREMENT

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PUTTING CONSCIOUSNESS INTO THE EQUATIONS OF SCIENCE: ABSTRACT

We apply the empirical findings of chemistry and physics and mathematical equations, including new derivations to extend quantum-to-molecular level analyses in a 9-dimensional spin model. Whereas the current physics involving 3 dimensions of space in a moment in time (3S-1t) can explain a great deal, there are some contradictions and unsolved problems that can only be resolved by applying a 9-dimensional spin model.

In this paper, we demonstrate the empirical necessity for a third mass-less, energy-less substance or process besides mass and energy. This third substance has not been previously defined and contains what we have called "gimmel": We demonstrate that no subatomic particle can exist without gimmel, yet gimmel is not measurable using the usual physical techniques of solely applying mass and energy. Mathematically and geometrically, atoms composed of quanta, and compounds composed of atoms, cannot be stable without gimmel.

We examine gimmel at the level of atoms and the elements, but we postulate that this distinction of third content exists at every level from the subatomic, such as in elementary particles like electrons and quarks, through to the cosmological such as dark matter and dark energy. This third substance, gimmel, is key to maintaining stability and symmetry of subatomic particles, of atoms of the elements, of molecules and compound chemicals. Without gimmel, these substances could not maintain stability in our physical existence and would be ephemeral and transitory.

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INTRODUCTORY SUMMARY PERSPECTIVE ON TRUE AND GIMMEL (PART 1)

We introduce the concepts of Triadic Rotational Units of Equivalence (TRUE or TRUE Units) and of the requirement for a third substance or process, 'gimmel'. This work appears to be of great importance because of its groundbreaking implications. [1] Importantly, the demonstration of gimmel is an extension of the 'Triadic Dimensional-Distinction Vortical Paradigm' (TDVP) [2-6]model, as well as part of the nine dimensional triadic concept. [7] However, the results appear to be startling and, with respect, like TDVP itself, reflect their own paradigm shift. [8]Moreover, this work is an exploration of the fundamental Nature of Reality allowing our searches for scientific and spiritual knowledge to be merged into one serious, combined effort. This work is an illustration of the missing link.

Quantization and TRUE

In TDVP, we apply quantized phenomena existing in a multi-dimensional domain. [9] This consists of space and time, embedded in one or more additional dimensional domains. But, in conventional mathematics, there is a fiction: the fiction of dimensionless objects. [1] That had been simply a convenient mathematical expedient prior to discovering that physical phenomena are quantized. But this is no longer appropriate. If the substance of reality is quantized, the quantum necessarily occupies a finite 3-dimensional volume, not a point. This quantum volume defines the lower limit in size, and by setting it equal to 1, we establish a standard of measurement so that all substances are measurable in integer multiples of this unit. This allows us to proceed with our new form of mathematical analysis, the 'calculus of dimensional distinctions' (CoDD) [10], and treat all phenomena as finite, non-zero distinctions. Replacing the dimensionless points of the calculus of conventional mathematical physics with distinctions of finite unitary volume, the elementary particles of the physical universe must be integer multiples of these unitary volumes: We then relate the integers of quantum reality to the integers of number theory, and explore the deep relationship between mathematics and reality.

Equivalence unit derivations

This model requires the definition of a new, truly basic unit for describing elementary particles. This is because in a quantized reality, all particles must be integral multiples of the smallest possible, most basic quantum unit. We call these units "Triadic Rotational Units of Equivalence" or TRUE units. TRUE units cannot be derived from our usual 3S-1t perspective (3 dimensions of space in one moment [the present] in time) because theoretical nomenclature like the conventional 'half spin' in fermions does not lead to integral solutions. One cannot have, e.g. half a quantum unit, or half an atom. Mathematically, measurements of all fundamental particles and the third substance of reality have to involve integers.

Mathematical features

In order to properly describe a quantized reality, we must apply the mathematics of Diophantine equations. Diophantine equations require whole number solutions —integers. In current theoretical physics, Planck's quantum of action is the smallest integral measure and is substantial in terms of both mass/energy and angular momentum. But that approach results in fractional results not found in nature.

In our model, we incorporate unitary volume in TRUE units and consequently, all TRUE analysis equivalence calculations result in cubed integers. We apply three specific Diophantine calculation procedures to define *gimmel*, the third form of the substance of reality. [11 1 12 7]

1. The first applies the mechanism of Close's dimensional extrapolation [13] to define the rotation and orthogonal projection from one dimensional domain into another, in the plane of the projection. This means it involves integers squared as in the *Pythagorean Theorem* [14] allowing extrapolations through *9 dimensions*. [8]

2. The second involves the addition of integers cubed, representing the combination of elementary quanta. Based on *Fermat's Last Theorem* for m=3, $X^3 + Y^3 \neq Z^3$, there cannot be any cubic volumetric combination with two components that are stable. [15-17] This means mathematically, that a nucleus comprised of protons and neutrons with orbiting electrons simply cannot produce stable atoms. The quantum entities must combine in quantum equivalence units (TRUE) to be integral and symmetric. [1]

3. We have shown that, while based on Fermat's Last Theorem, there can be no integer solutions for the Diophantine equations in TRUE units, involving $X^3 + Y^3 = Z^3$ describing the combination of two quantum particles, there *are* integer solutions for the equation describing the combination of three quantum particles [1]. In addition, we show that enduring stability cannot be achieved without three components, namely mass, energy and something else—the third substance (which we call) "gimmel" [1]. This fact is discovered when applying the appropriate equation derived from the generalized Diophantine equation for combining quantum particles: $\Sigma^{n}_{i=1} (X_n)^m = Z^m$ called *"Close's Conveyance equation"*, $(X_1)^3 + (X_2)^3 + (X_3)^3 = Z^3$ for triplets. [1] Moreover, these Diophantine calculations only work mathematically and geometrically when applied to the 3S-1t observable portion of a 9-dimensional reality model and are therefore easily replicable. [4; 6; 8]

The 9-dimensional finite spin requirement is not surprising because elsewhere the authors have

demonstrated mathematically that our finite reality has to consist specifically of 9 spinning dimensions—not 8 or 5 or 4 or 10 or 11 or 26. [18] [e] Moreover, these dimensions must be spinning. The 'strings' in the various String Theories generally involve the 'curling' or 'folding' into extra dimensions, and therefore do not work. [19-23]. We have already demonstrated the relevance of this 9-D finite spin model with several pertinent derivations, including:

- the derivation of a Cabibbo spinning mixing angle [24-26],
- the derivation of intrinsic electron spin and angular momentum,
- the shape of the electron which in 3S-1t is symmetrical but non-spherical,
- the disappearing electron cloud, and
- deriving a 9-D mathematical thought experiment plus with weak universality [4; 9; 26-29].

This validation of the 9-dimensional finite spin model was specifically proposed as a key aspect of a metaparadigmatic model developed by the authors called the Neppe-Close Triadic Dimensional Distinction Vortical Paradigm (TDVP). [4; 30-32]

Analysis of these data in the framework of the mathematics and geometry of TDVP in 3S-1t provides us with a way to find the true *quantum unit* of measurement. The empirically measured and statistically determined inertial masses of the three most basic elementary entities believed to make up what we perceive in 3S-1t as matter, i.e. electrons, up-quarks and down-quarks, are approximately 0.51, 2.0 and 4.8 MeV/c^2, respectively. The values for up and down quarks are derived statistically from millions of terabytes of data obtained from high-energy particle collisions engineered in specially built colliders.

Specific Equivalence units derivations

We demonstrate integers as gimmel allocations for specific particles. This is based on empirical conveyance equation solutions for electrons, and the different quarks making up protons and neutrons. We cannot have a quarter of any particle in nature. Quarks, protons, neutrons, electrons and atoms all must be integers, not fractions: Empirical quantization is applied using mathematical integers and formulae. This requires recognition of multiple dimensions, not artificial concepts such as "half-spin" when applying 3S-1t.

The principles

We propose that mass-energy and what we assume this gimmel to be, namely, some aspect of 'consciousness' are unitary major components for the stability of atoms [f], elements, molecules, and, indeed, all of our stable world and our cosmos. Gimmel is necessarily linked together to

[e] The spin is through 8 dimensions because the first dimension involves zero spin. There are 9 demonstrable finite dimensions.

[f] We're limited in English terminology: We could refer to the life sustaining elements as "stable" but that is *relative* only to the ephemeral unstable elements or isotopes of Hadron Collider particles. Clearly, these elements can be demonstrated by applying 3S-1t (our usual experience of 3 spatial dimensions at the present moment in time) measures, but we postulate it's only because of gimmel, as well. Perhaps we should call all including TRUE units "super-stable" also called "superstable".

form a whole. In fact, it is part of that whole: We argue that we cannot have mass without energy because they are interconvertible, so much so that in our TRUE scoring they are together scored as a single measure. But we cannot have mass-energy without gimmel. [g] Using this concept, nothing can exist without this third component: Like a hand without a shoulder, they are more than linked; they're entirely tethered together. Without gimmel, mathematically, the elements of the Periodic Table, including those that are crucial to life, are unstable. The requirement of a third form (gimmel) allows for stability. We apply the minimal equivalence units are defined by applying basic relativity and quantum principles to multi-dimensional spinning elementary particles. We call these Triadic Rotational Units of Equivalence, or TRUE units.

Hypotheses

1. The elements known to be vital for organic life, like oxygen, carbon, nitrogen, sulfur, calcium and magnesium, should have higher proportions of gimmel, the quantum-organizing factor.
2. Gimmel and TRUE units applied sub-atomically, should reveal mathematical patterns reflecting the fundamental nature of reality, with specific predictable mathematical patterns.
3. Water should contain higher amounts of gimmel to TRUE than almost any other stable, symmetrical molecule. It should, for example, contain more gimmel proportions than hydrogen sulfide.
4. The noble, inert gases that are very common in the cosmos, namely Helium and Neon, should exhibit high amounts of gimmel to TRUE.
5. Stability, symmetry and reactivity of elements and compounds are based not only on gimmel proportions, and on the equality or not of protons, electrons and neutrons, but also on their quantum shells, numbers of electrons in the outer shells making up a model for valence that is predictable.
6. The patterns of gimmel should be from the quantum level, all the way through to the cosmological [12]. It should include DNA and RNA [1]. This hypothesis is important, but detailed empirical analyses are extraordinarily complex and painstaking.

Broad findings

Hypotheses 1 to 5 above were examined, and the postulated data supported.

Equivalents

The usual measures are mass-energy in units of MeV/c^2 converted to units of Mass/Volume

[g] Effectively, we do not have *mass and energy* as the only *contents*, just as we do not have *space and time as extents* of dimensions alone. *We always have the third component*: Space, Time and 'extent of Consciousness' (C_e); and mass energy and gimmel—which we postulate (and mathematically have provisionally calculated) may have links with the infinite and contain entirely 'consciousness content' (C_c) expressed as *specific meaning.*

(Normalized Average) where electrons become =1, up quarks = 4 and down quarks =9. Protons have 2 up quarks u1, u2 and 1 down quark d1. Neutrons have 1 up quark and 2 down quarks. Ultimately these gimmel amounts are combined with Mass/energy equivalents to obtain the total in TRUE units (triadic rotational equivalence units) and volumetrically, we've called the consequent cube MREV (minimal rotational equivalent volumes).
All the elements of life are found to contain equal numbers of protons, neutrons and electrons and this works out in unitary calculations as a symmetrical multiple of *108 cubed* in TRUE units. The elements of life were postulated to be oxygen, carbon, nitrogen, sulfur, calcium and magnesium and these all show these properties. This was demonstrated. [h]

Table 1A: Perspective of elementary particles with their equivalence scores

Elementary Particle	Particle	Mass/ Energy	ג Gimmel	Total TRUE Units	Combined Particle
e	electron	1	105	106	Electron =106
u1	proton	4	2	6	
u2	proton	4	4	8	
d1	proton	9	1	10	Proton= 24
u3	neutron	4	5	9	
d2	neutron	9	3	12	
d3	neutron	9	6	15	Neutron =38

We now combine these elementary particles into their contents , protons and neutrons as well as those same electrons. This time we also mention charge and also minimal rotational equivalent volumes.

Table 1B: Neptrons (electrons, protons, neutrons) converted to gimmel, TRUE unit and MREV scores [i]

Particle	Charge	Mass/ Energy	ג Gimmel	Total TRUE Units	MREV
Electrons (e)	- 3	1	105	106	1,191,016
Protons (P^+)	+ 3	17	7	24	13,824
Neutrons (N^0)	0	22	16	38	54,872
Totals	**0**	**40**	**128**	**168**	**$(108)^3$**

This $(108)^3$ turns out to be very important because all the fundamental life providing elements,

[h] The Tables are numbered consecutively by Part. This is Part 1 so Table 1A, 1B etc.
[i] Neptrons refer to the composite term for the main components of the atom, namely neutrons, electrons and protons together. We developed this term in 2015 [1] because there appears to be no composite term for the components of the atom.

are multiples of $(108)^3$. We have also shown that the inert noble gases helium and neon show the same stable properties as the life supporting elements, however, their valence makes them non-reactive and thus they are not involved in biological processes supporting organic life.

Additionally, we found that silicon has the properties of these elements of life because it, too, shows it's a multiple of 108 cubed with equal P, N and E. This is discussed as a further testable hypothesis.

Moreover, certain atomic radicals and molecules are demonstrated to fill the gaps in missing multiples of $(108)^3$. We also look briefly at how some of these relate to life.

Stability based on TRUE units

The simple terms 'stable or unstable' are insufficient to portray differences in the molecules, atoms and subatomic particles that make up our cosmos. We name and describe several decreasing hierarchies of stability:

The stable ones with the empirically derived examples are:

- Hydrostable (for Hydrogen),
- Superstable (for the basic life elements like oxygen, nitrogen, carbon, calcium, magnesium, sulfur),
- Hyperstable (for the inert gases Helium and Neon),
- Dynamically Stable or Life Permostable (for chemicals such as sodium, chloride and phosphorus),
- Protostable or existent permostable (for chemicals that exist naturally such as trace elements like copper and zinc, as well as relatively rare elements like beryllium and medically relevant ones like lithium).

Those that are unstable can be:

- Naturally unstable (such as certain isotopes) and/or
- Artificially unstable (such as those produced in atomic colliders).

Major consequences

The following summarizes the key consequences of examining atomic reality within the fabric of gimmel and TRUE:

1. Traditionally, we have applied Newtonian-Leibnizian infinitesimal calculus as a convenience in mathematics. But this approximation of infinitesimals is incorrect in quantized reality. Given the Planckian quantum units, which are integral, it is integers that are critical in measuring finite reality as everything is quantized.
2. This is why we converted *mass-energy* to unitary equivalents. This is why we apply Diophantine equations, with three terms on the left side because three symmetric cubes

can combine symmetrically and may be very stable if the cube root of the result on the right is an integer. This specifically involves using the Conveyance Equation in a 9-dimensional Diophantine model. Nine dimensions are specifically indicated by dimensional extrapolation, pure number theory and, importantly, a new Calculus, the Calculus of Dimensional Distinctions (CoDD). The CoDD defines all mathematical operations in terms of distinctions that are integral, to accommodate the finite components of quantized reality.

3. Atomic materialism is refuted because protons plus neutrons plus electrons alone, or quarks plus electrons alone cannot form the stable integral combinations that we call atoms and molecules. There has to be a third substance. [1] Without extra TRUE units of "gimmel", volumetrically atoms cannot exist as stable combinations of integer multiples of TRUE units.
4. Pertinently, valence incorporates *both* the number of open spaces *and* electrons in the outer shell of an atom, and the figure applied depends on which is the smaller. These numbers of spaces available and electrons in outer shell give indications of reactivity and will affect the abundance or lack thereof of elements and their reactivity properties.
5. It appears that one can apply mathematical Diophantine Conveyance equation calculations to establish the properties of a chemical and the less the ratio of gimmel to TRUE, the less the reactivity, symmetry and stability.
6. The concept of integral equivalents is unique and linked with expanding our experiential 3S-1t to an existing finite 9D spin reality.
7. In another study, the ratio of Gimmel to TRUE units was the same as the volumetric measures of dark matter with dark energy to the proportion of the cosmos. 12
8. With the re-analysis of shells and electrons, and particularly the outer shells, new concepts of Valence are applied.
9. When these Valence concepts are added to Gimmel and TRUE calculations, the Periodic Classification of the Elements can be understood possibly better than before.

Likely postulations that need confirmation

1. Geometrically, the shells in atoms reflect volume *and* correspond to energy levels.
2. These concepts are not limited to just elements and apply at every level to compound entities.
3. Molecules are not just the sum of atoms. The combined equivalence of atoms in molecules can be calculated based on gimmel, mass-energy equivalences and TRUE. For example, using just the presence of the atoms and taking into account the covalent bonding of water and hydrogen sulfide, they could superficially have the same activity

and similar applications. But empirically we know this not to be so. This is demonstrated by the more appropriate calculation of Hydrogen-hydroxide (H-OH) (=water) compared with H-H=S (H_2S) (=hydrogen sulfide): H_2S calculates out at a lower gimmel /TRUE ratio and is not a cube root, indicating that it is asymmetric.

4. We postulate that gimmel is strongly linked with meaning: A meaningful consciousness that is tethered with the mass/ energy in the 9-dimensional domain. Consciousness is a strong gimmel candidate because there appears none other.

Speculations

1. The whole is more than sum of the parts because gimmel contributes to stability, yet cannot be directly observed or measured.
2. This new way of analyzing particles suggests that all compound structures, however complex, and whatever their size, are quantum systems. Historically, John Von Neumann demonstrated in his seminal 1932 work *"Mathematical Foundations of Quantum Mechanics"* including with his Dirac–von Neumann axioms that there is a rigid mathematical framework for quantum mechanics and that this can extend to the macro-world [33].
3. It's possible that gimmel reflects what particle physicists have hypothesized as "gluons" [34], the "glue" holding atoms together. [1]
4. There is "something rather than nothing": Missing from the current Standard Reductionist Physical paradigms is this third substance/ process (gimmel). Consciousness appears to be the common aspect, and we regard "gimmel" as predominantly reflecting meaningful consciousness even at that subatomic level.
5. Einstein's speed of light, c, might involve a different constant in each dimensional domain beyond the three of space in the present moment. This because, c involves a reciprocal relative to squared. We are dealing with 9 proved finite spinning dimensions: We do not know the exact allocation of these dimensions, but have postulated they may be multidimensional and consciousness.
    - More than one dimension of time would imply the speed of light would be relative.
    - Moreover, ultimately given there is a third substance, gimmel, and a new theory of everything needs to include gimmel as well. This is where consciousness is put into the equations of physics.
    - Importantly, space- related constants, like the speed of light, as well as the extent and content of consciousness, might involve different relative concepts depending on the frameworks of the specific dimensions ("dimensional domains") involved.

After this introduction, we now examine this data in more detail.

A NEW PARADIGM DESCRIBING THE NATURE OF REALITY AND WHAT IT IMPLIES FOR THE FUTURE OF SCIENCE: PREFACE (PART 2)

Towards a *"theory of everything"*

Many physicists, including Einstein, Pauli and Hawking have dreamt of a 'theory of everything'. But to this point, their dreams have not been fulfilled. The reason is simple. *You can't have a theory of everything if you doggedly exclude a major part of Reality from your theory.* That major part of Reality excluded by contemporary reductionist science has two components, consciousness and infinity.

In this paper, we focus on the first concept, consciousness, in the context of that component of reality that we call the "finite" because that involves discrete quantized integral components that can be analyzed according to the principles of dimensionality.

Based on empirical findings in chemistry and also involving collider data and mathematical applications, our work extends Theoretical Physics. This extension is because this involves 9 dimensional spin models not just the 3 dimensions of space in a moment in (3S-1t) which is the basis of most current theorizing. Whereas 3S-1t can explain a great deal, our work has shown there are limits to some solutions that can only be solved by applying a 9-dimensional spin model. Because this involves going beyond the experiential 3S-1t to 9D finite spin, examination of life, and consciousness components, a new science Dimensional Biopsychophysics has developed.

For many years, we have insisted that the dream of a theory of everything is never going to be realized until we find a way to put consciousness into the equations of science. Close found the way to do this-using a new mathematical tool called the Calculus of Distinctions. The calculus of distinctions is critical not the traditional Newtonian-Leibnizian infinitesimal calculus, because empirically, this is what we should be applying as everything quantal is integral. We do not just tend towards zero. In reality, in the finite, we stop at the minimum being quantal, not at the tendency towards the zero of Newtonian calculus. The inspiration came to Close in a dream in 1986, and he published it in 1990 in a book entitled "Infinite Continuity" [35]. But then, and even today, most scientists are unwilling to invest the considerable effort to learn this whole new system of mathematical logic. Therefore this is accessible only to a few. In this paper we discuss this further.

Historical basis of TDVP

Since 1989, we have been determined to find a better way to explain putting the fundamental reality of Consciousness into the equations of science. In 1996, the mathematician and

physicist, Edward Close PhD published the book *"Transcendental Physics"* [36], in an effort to make his 1990 work more accessible [35]. It still reached a few more scientists interested in the merging of science and spirituality. One who shared Close's vision, and became his research partner for the past seven years, was the neuroscientist Fellow of the Royal Society (SAf), Vernon Neppe, MD, PhD. Together Drs. Close and Neppe developed a comprehensive framework, a paradigm for the science of the future. We call it the Triadic Dimensional Distinction Vortical Paradigm (TDVP). It was first published as *"Reality Begins with Consciousness"* in 2012 [37], and has been reviewed by more than 300 scientists and philosophers worldwide. We've also published a number of technical papers, and recently, we've found a way to explain the revelations of the Calculus of Distinctions of 1989, 1996 and 2011, in a more accessible way [10; 38]. This paper does that, and in the process, we believe, it does much more.

The fundamental questions

This paper provides the answer to two important questions:

1. Why is there something rather than nothing? And:
2. What is missing from the current scientific paradigm?

The answer to both questions can be summed up in one word: Consciousness. Without consciousness there could be no physical universe; and yet, there is no place in the current paradigm for consciousness. The clues that consciousness is the answer to the first question are plain in both relativity and quantum physics, but most mainstream scientists, steeped in reductionist materialism, are blind to those clues, and their belief – it is not even a valid scientific hypothesis – that the universe could exist without some primary form of the consciousness manifest in sentient life, is stubbornly maintained and the clues are ignored. This implies that there are both finite and infinite aspects to reality.

Many of the key scientists of the past were deeply spiritual (for example, Georg Cantor, Albert Einstein, Isaac Newton, Wolfgang Pauli and Max Planck) but they did not dare to introduce consciousness into the equations of science. The model of TDVP attempts to unify science and spirituality, and emphasizes the tethering of consciousness [5; 6]. This clearly fits this science-spirituality dichotomy. But the materialistic belief system widely taught in our educational institutions today brings otherwise rational people to scoff at, and ridicule, any mention of any form of intelligence superior to their own. This egotistical position of mainstream scientists is justified in their minds by the successes of materialistic science. But those successes lie almost entirely in the realm of explaining superficial physical mechanisms. Deeper and ultimately much more important questions about the meaning and purpose of manifest physical reality, life and conscious awareness, are beyond their reach. Those questions, of paramount importance to

humanity, are within reach of meaningful analysis when consciousness is included in the equations of science. The purpose of this paper is to show how this is done.

In this world of human experience, we will never truly understand the Nature of Reality until our searches for scientific and spiritual knowledge are merged into one serious, combined effort. Once this happens on a global scale, we maintain that humanity will experience an explosion of new knowledge and understanding far beyond anything experienced so far in the current era of recorded history. In this paper, we show how consciousness is describable in the equations of quantum physics and relativity, and a few of the explanatory revelations produced as a result. And, we regard this is only the tip of the iceberg!

JUMPING BEYOND THE CURRENT REALITY (PART 3)

In 1714, the German polymath Gottfried Wilhelm Leibniz stated that the most important question of all is: "*Why is there something rather than nothing?*"[1] Science proceeds from the assumption that there *is something, something that we perceive as the physical universe.* In order to investigate this *something* that we appear to be immersed in, we go about trying to weigh and measure the substances it is made of and look for consistent structures and patterns in it that can be described mathematically. We call such mathematical descriptions "Laws of Nature".

Towards a new system of units

To find the laws governing the relationships between different features of physical reality, we have to define a system of units with which to weigh and measure those features. Historically, units of measurement have been chosen somewhat arbitrarily. For example, the units of the so-called English Imperial System were based on the practice of measuring things with what one always had at hand: parts of the human body. A horse was so many "hands" high; one could measure rope or cloth by "inching" along its length with a joint of one's thumb or finger. Short horizontal distances were measured in multiples of the length of one's foot, or the distance from the tip of one's nose to one's thumb on a laterally extended arm, and a mile was 1000 paces, when a pace consisted of two steps. Since not all people are the same size, measurements obtained this way are somewhat variably inaccurate. Consequently, units were eventually standardized so that the measurements of a given object, carefully obtained by anyone, should always be the same. But, even though units of measurement were standardized in many countries, the basic unit was not necessarily the same from one country to the next.

As physical science advanced, the need for international standards grew, and the international system of units (SI) based on invariant physical constants occurring in nature, with larger units being multiples of ten s the smallest unit, was developed. The number base of 10 was chosen because it was already used almost worldwide. It was a natural outcome of counting on one's fingers, and starting over after every count of ten. Science generally uses SI units now for two reasons:

1. All but three countries of the 196 countries on the planet (the US, Liberia and Burma) use the SI metric system as their primary system of measurement. This is significant, even though the UK still uses a mixture of the two systems, as does the US and a few other countries to a lesser extent.

2. Computations are simplified when all units are related by multiples or factors of 10, eliminating the odd fractions relating inches, feet and miles, ounces and pounds, pints quarts and gallons, etc. in the English system.

Consciousness, dimensions, TDVP, distinctions and reality

Why are we pointing this out? In the process of developing the TDVP model, we find a need now to define a new unit of measurement based on discoveries of quantum physics and relativity. The purpose of this paper is to explain why a new basic unit is needed and how it is derived. It may seem to come as a surprise, that in the process, we provide an answer for Leibniz's "*most important question*", and introduce new science.

Beyond seeking practical applications that improve the quality of life, the motivation behind our efforts in science, religion and philosophy is the desire to know and understand the true nature of reality. Science, as we know it, is the science developed during the past 800 years. This is a very short compared to the length of life has existed on this planet: less than two ten-millionths of the apparent age of the Earth. This science seeks to understand the reality experienced through the physical senses in terms of the measurable parameters of matter, energy, space, and time. It is only in the past century, that based on a number of clues from relativity and quantum physics, we have recognized that science is incomplete. And it may be only in the past decade, that we have identified an urgent need to include the conscious actions of the observer in the equations of science. This is why we argue that Consciousness is truly the missing link in the current scientific paradigm.

In a universe where consciousness is an integral part of reality, meaningful structure is no accident. Conscious entities are able to recognize meaningful order and patterns in the reality they experience and interact with certain aspects of it to enhance and perpetuate existing meaningful patterns and structures that are beneficial to their existence and growth, creating negative entropy in the process. Could it be that consciousness is and *always has been* present in some form, even in the very most basic structure of reality, as quantum experiments seem to indicate? If so, we may have the answer to Leibniz's question. If consciousness is an integral part of reality, continually creating meaningful structure at the quantum level, there must be a way to include it in our scientific paradigm and the mathematics that describes it.

The Neppe-Close TDVP model [8], and particularly Close's Calculus of Distinctions [10; 38] and his Dimensional Extrapolation [3], plus the re-application of critically important largely ignored principles of number theory including Diophantine Equations and with Close's Conveyance Expression, reflect serious efforts to upgrade the mathematics of the physical sciences [9] to

include the direct and indirect involvement of consciousness [39]. If successful, there is reason to believe that this new paradigm will provide a comprehensive framework within which all the branches of science can be expanded to include phenomena heretofore excluded from scientific investigation.

THE ROLE OF MATHEMATICS IN INVESTIGATING THE NATURE OF REALITY (PART 4)

Mathematical Platonism:

Some scientists, when thinking about the nature of reality, make a distinction between the Platonic [40] and Aristotelian worldviews [41] : The Platonic view, a revision of which we ascribe to, is that the universe is the physical manifestation of a partly hidden, deeply mathematical reality; while the Aristotelian view is that mathematics is simply an invention of the human mind, developed as a tool used to process direct observations and measurements of the material universe. Michael Rowan-Robinson, Professor of Astrophysics at Imperial College, London, has articulately expressed his belief in the Aristotelian view in his well-written presentation of current observational cosmology, "*The Nine Numbers of the Cosmos*" [42.] :

[The] "Platonic view, that the universe is a manifestation of some kind of ideal, mathematical form, is very fashionable today. Some of its proponents are so astounded by this insight that they are driven to a mystical interpretation. This deep mathematical structure is God, or the mind of God, or is evidence for a creator. But, why isn't this insight, that the universe is deeply mathematical, sufficient in itself? The additional mystical interpretation doesn't seem to add anything. There is, anyway, an alternative to this Platonic view, namely that we should think of mathematics as simply an invention of the human mind, which we use as a tool to model our limited perceptions of the universe… This Aristotelian view, which I share, sees the universe as something we try to characterize, measure, describe."

Mathematical Platonism [43] incorporates three theses: The existence, abstractness and independence of mathematical objects. This means that had there not been any intelligent agents, or had their language, thought, or practices been different, there would still have been mathematical objects. Platonism must be distinguished from the view of Plato in history. 'Platonism' is simply inspired by Plato's famous theory of abstract and eternal Forms and Platonism is quite independent of its original historical inspiration. [43]. But the Mathematical Platonism we describe is broader than the purely metaphysical 'Platonism' because we attempt in our models to incorporate mathematics directly into science recognizing that we can not only apply it empirically but use the equations of consciousness as part of the model.

Platonism entails that reality extends far beyond the physical world and includes objects which aren't part of the causal and spatiotemporal order studied by the physical sciences. Mathematical Platonism argues beyond naturalistic theories of knowledge. If philosophical analysis revealed mathematics to have some strange and surprising consequences, it would be unattractive simply to reject mathematics. With respect, the mathematics we present below are far beyond

naturalistic mathematics, and extends to empirical particle physics and postulates beyond that. Therefore, Mathematical Platonism is very powerful as presented below.

As proponents of the Triadic Rotational Vortical Distinction Paradigm (TDVP), Drs. Vernon Neppe and Edward Close differ markedly from Rowan-Robinson. TDVP aligns to some extent with the Platonic worldview, except that is applied not only philosophically, but mainly based on empirical inductive and deductive reasoning and applying feasibility as a method of the Philosophy of Science. [41; 44] We are not therefore 'astounded' that the universe is deeply mathematical, - we expected it. And we are not 'driven' to 'mystical interpretation'; we see it as natural, satisfying, and more to the point, explanatory. It explains many things that the materialistic Aristotelian worldview cannot. It is the materialistic Aristotelians who are astounded, and see speculation concerning a conscious substrate as 'mystical'. The insight is 'sufficient in itself', only if we choose not to look any farther. It doesn't seem to add anything only if you are content to ignore the clues in relativity and quantum physics that cry out for explanation. It doesn't seem to occur to materialistic scientists steeped in Cartesian dualism that if there were not some kind of (Platonic, if you must) deeper reality, their mathematical descriptions would not work. The challenge to science is to explore the deeper reality. *Reality is 'mystical' only if you don't seek to understand it.*

Mathematics is not just an abstract human artifact. Far from it, the deep logic of mathematics is invariant because it actually reflects the true underlying logical structure of reality. The basic axioms and theorems of mathematics remain unchanged when dimensional transformations are applied. Thus the logic of mathematics is a prime example of invariance.

The only thing that is an artifact of the human mind is the notation developed to convey the mathematic and dimensional logic underlying reality. While it seems that we may invent whatever mathematical procedures we wish, the same invariant mathematical laws would be discovered by any sentient being. They would then be expressed in whatever symbolic language might be applicable.

All mathematical reasoning and description is based on the conscious drawing of distinctions, starting with the distinction of self from other, which then allows the drawing of three types of distinctions in the "other": distinctions of extent, content and impact, which are measurable, contain meaning and purpose, and impact on other objects. This reflects the very basic form of mathematical logic which Close developed and we've now amplified, the Calculus of Distinctions [10]. It is combined with Euclidean and hyper-dimensional geometry, requires a nine-dimensional reality containing the basic "stuff" of the universe, and provides the framework for

describing the elementary particles that appear to be the building blocks of the physical universe. This is the logical extension of very important work started by Hermann Minkowski, Albert Einstein, Georg Cantor, Theodor Kaluza, Oskar Klein, and others, who made significant progress explaining physical phenomena in the framework of multidimensional geometry [36; 8.]

The third form

Based on the natural structure of number theory and mathematical invariants relating to dimensional domains, we developed TDVP as a paradigm that describes reality as consisting of the substances of mass and energy interacting within nine finite dimensions embedded within infinite domains containing a potentially infinite number of finite logical patterns. Based on clues from relativity and quantum physics, these domains contain the logical organizing structure that guides the evolution of a stable universe. We hypothesize that the infinite substrate may constitute consciousness itself with space and embedded within it, and mass energy also being contained within this infinite consciousness container (which we call "gimmel") [12].

The brilliant physicist Wolfgang Pauli worked on developing five- and six-dimensional models until 1953, but didn't publish his findings because he was bothered by the appearance of what he called "…rather unphysical *shadow* particles."[5] Since Pauli's , science has discovered that just over 95% of the substance of reality consists of some sort of "shadow stuff", presently called "dark energy" and "dark matter" [45-48]and, not directly detectable through the physical senses or extensions of them. [12]

The mathematics and dimensionometry of TDVP indicate that a third form of the "stuff" of reality is actually necessary in the sub-atomic structure of reality for there to be any stable elements in the physical universe; i.e. in order for there to be something rather than nothing.

The logic of TDVP also suggests that this third form of substance may be imbued with the qualities we associate with consciousness. It is interesting to note that late in his life, Pauli, who was regarded as the most brilliant mind of his day by many physicists, including no less brilliant minds than Albert Einstein and Max Born, dreamt of "unifying matter and spirit within the world of physics."[5]

The untestable models of contemporary physics

In mainstream physical science, some progress is being made in multi-dimensional concepts. This is so with the acceptance of time as a fourth dimension, and the concept of multiple "curled- up", or "folded" "space-like" and "-like" dimensions of various string theories, which, unfortunately, remain untestable [19-22; 49]. Progress in developing testable multidimensional

models with consciousness components has been hindered by the acceptance in the academic community of Materialistic Monism which excludes consciousness from the paradigm of physical science and has promoted an increasingly materialistic trend in scientific thinking in recent years. Also, formal education has become institutionalized and has prevented most mainstream physicists from looking outside the box of materialism for the link between consciousness and the physical universe, i.e. between the dimensionometric domains of mind and matter. In the established scientific disciplines, students who ask about the 'higher intelligence' spoken of by former scientists like Newton, Planck and Einstein, are often ridiculed by egotistic professors, and told that such 'mystical' concepts have no place in science.

TDVP and its pertinence

Guided by the mathematical structure of number theory, Euclidean and non-Euclidean geometry, particle physics data, and new mathematical tools created for the purpose of including the direct interaction of conscious entities with objective reality at the quantum level, we have developed TDVP, a model of reality that includes spinning elementary distinctions existing in nine finite dimensions embedded in a conscious substrate that contains all of the logical patterns, reflected and/or potentially reflected in the structure of the physical universe. Within the theoretical framework of TDVP, we are able to explain a number of phenomena that have remained inexplicable in the standard model of particle physics for decades, including the stability of the triadic combination of quarks [1,] the intrinsic spin [28] of Fermions [24; 50], the Cabibbo mixing angle [26], and the step-by-step development of the structures of the Elements of the Periodic Table [1].

TDVP is a paradigm shift that explains why there is something rather than nothing. And, it expands the "Standard Model" of physics [3; 51] to include a new theoretical basis for the biological, psychological and life sciences, as well as for little-understood and rare phenomena like remote viewing, out-of-body experiences (OBEs) and other so-called paranormal or *psi* phenomena. [52] [9] It even provides for a better understanding of spiritual experiences that have been occasionally documented to impinge upon physical reality under certain conditions.

Not surprisingly, TDVP also requires a significant expansion of our understanding of mathematics in general. In 1986, Close realized that George Spencer Brown's Calculus of Indications, presented in "Laws of Form" [53], re-uniting for the first time, imaginary numbers with symbolic logic, and thus re-aligning the algebras of logic with mathematics, was the first step toward integrating number theory, geometry and mathematical physics into a

comprehensive logical framework capable of describing and explaining physical, chemical, biological, neurological, psychological, and even spiritual phenomena.

We adapted Brown's Laws of Form, creating the Calculus of Distinctions (CoD), a comprehensive logical tool for dealing with the functions of consciousness, and applied it to some long-standing cosmological puzzles. Some of the results were published in "Infinite Continuity, a Theory Unifying Relativity and Quantum Physics" [35] in 1990, and in "Transcendental Physics, Integrating the search for Truth" [36]. By introducing appropriate additional notational structure, the Calculus of Distinctions was refined to become the Calculus of Dimensional Distinctions (CoDD) in 2003 [38]. From 2008 to the present, we amplified this mathematical tool, recognizing it as the logical basis integrating all mathematics and applications to physical and spiritual reality has been systematically applied to develop the mathematical basis of TDVP. [10]

THE ILLUSION OF ONLY MATERIAL REALITY (PART 5)

Clues from relativity and quantum physics suggest that the time-honored idea that matter, energy, space, and time exist separately is incorrect. It appears that the macroscopic forms of matter, space and time we perceive through our physical senses are subtle illusions, although, as Einstein said about reality, *"Reality is merely an illusion, albeit a very persistent one."* [54] TDVP is built upon, and an extension of, the monumental works of a number of intellectual giants like Pythagoras, Fermat, Leibniz, Poincare, Cantor, Gödel, and Minkowski; but most especially, it is built upon on the deep insights of Max Planck and Albert Einstein.

Max Planck said: *"As a man who has devoted his whole life to the most clear-headed science, to the study of matter, I can tell you as the result of my research about atoms this much: There is no matter as such! ALL matter originates and exists only by virtue of a force. We must assume behind this force the existence of a conscious and intelligent Mind. This Mind is the matrix of all matter."* [55]

And, Albert Einstein said: "*Space time is not necessarily something to which one can ascribe a separate existence*." [56] And *"I want to know how God created this world. I am not interested in this or that phenomenon, in the spectrum of this or that element. I want to know his thoughts. The rest are details." (p202)* [57] [58]. Einstein further noted: "*Raffinert ist der Herr Gott, aber Bohaft ist er nicht!*" ("The Lord God is clever, but he is not malicious.") Taken together, these two statements reveal that Einstein's science was rooted in a deeply spiritual understanding of reality. It appears that he believed that the universe, as a manifestation of God's thoughts, is very complex, but understandable.

These statements, from two of the most brilliant scientists who spent their entire lives studying physical reality, reveal the important conclusion that the common perceptions of matter, energy, space, and time, conveyed to our brains by the physical senses, are subtle illusions! And both of them conclude that the reality behind these subtle illusions is *a conscious, intelligent linkage*.

It has long been known that the appearance of *solid matter* is an illusion, in the sense that there appears to be far more empty space than substance in an atom. But now we learn that the matter of sub-atomic particles and the "empty" space around them are also illusory. This is, however, consistent with quantum physics experiments that bear out the conclusion resulting from the resolution of the EPR paradox [59] with the empirical demonstration of John Bell's inequality [60-62] by experimental physicist Alain Aspect [63] and many others [61; 64] that the particles and/or waves of the objective physical reality perceived through our senses cannot be said to exist as localized objects until they impact irreversibly on a series of receptors constituting a distinct observation

or measurement by a conscious entity.

We must be clear, however, that the linkage to consciousness does not validate subjective solipsist theories like that of Bishop Berkeley [65; 66 67 8] as one might think; rather, it reveals a deeper, multi-dimensional reality, only partially revealed by the physical senses. It suggests that *reality is like a fathomless, dynamic ocean that we can't see except for the white caps. The difference is that the particles and waves, analogous to the white caps, only appear in response to our conscious interaction with the ocean of the deeper reality.*

Agreeing with Einstein, TDVP seeks to reveal that all things are, in fact connected to, and part of that deeper ocean of reality, only momentarily appearing to be separated from it [6]. This apparent separation, perpetuated by the conscious drawing of the distinction of 'self' from 'other' and the drawing of distinctions in self and other, allows us to interact with and draw distinctions in the 'other'. TDVP posits that, although ostensibly separate in the 3S-1t world of our physical perceptions (3 dimensions of space in one moment [the present] in time), we are never truly separated from the whole of reality, but remain connected at deeply embedded multi-dimensional levels.

There are some in the current mainstream of science who *do* see the universe as deeply mathematical, but even those scientists seem to shy away from including consciousness in their equations. The Swedish physicist, Max Tegmark, concludes that the ultimate nature of reality is *mathematical structure* [68]. In reaching this conclusion, however, he strips mathematical description of any intent or purpose: "*A mathematical structure is an abstract set of entities with relations between them. The entities have no 'baggage': they have no properties whatsoever except these relations.*" [68 (p. 231)] In other words, he still does what most mainstream materialistic scientists do: he throws the baby out with the bath water.

It is critically important to separate science from fantasy and wishful thinking, but consciousness is an extremely important part of reality and should not be excluded from the equations of science just because it complicates the picture.

The role of TDVP

From the broader viewpoint of TDVP, it is not surprising that mainstream science, focused as it is on the limiting philosophy of reductionist materialism, has lost touch with its metaphysical roots, and thus cannot explain how it is that a large part of reality is not available to us for direct observation, but makes its existence known only indirectly through quantum phenomena like non-locality and quantum entanglement, as well as the near light-speed vortical spin of

fermions[7]; [69] [28; 70] and the effects of so-called dark matter and dark energy [7; 12; 69] in the rotation of spiral galaxies [45]

TDVP also answers the real need to explain why we sometimes catch glimpses of a broader reality in rare extra-corporeal (out-of-body) experiences and other documented *psi* phenomena. The current mainstream scientific paradigm cannot explain so-called anomalous phenomena and the "missing" portions of reality because there is no place in its formulation for phenomena that may involve more than matter and energy interacting in three-dimensions of space and one dimension of time. TDVP, on the other hand, reveals a multi-dimensional reality and the need to recognize a third form of reality, not measurable as mass or energy, in the equations of science. As we shall see, TDVP provides a theoretical basis for a much deeper understanding of reality, as well as providing the appropriate tools for exploring it.

Refutation of atomic materialism

In other publications, we have refuted materialism at the atomic level mathematically [1]. This is because protons plus neutrons plus electrons alone, or quarks plus electrons alone cannot form the stable integral combinations that we call atoms and molecules. There has to be a third substance. [1] Without extra TRUE units of "gimmel", volumetrically atoms cannot exist as stable combinations of integer multiples of TRUE units. [11]

Effectively, this means that our current perception of any atom or element without gimmel, the mass-less, energy-less third substance, most likely linked with consciousness, will not provide an atom that can exist for any length of time, which is why the pure Standard Model of reductionist materialist Physics has to be incorrect. [1] Moreover, although we're dealing with gimmel here, even without applying gimmel calculations, the mathematical derivation cannot result in stable atoms even when applied either volumetrically or based on mass calculations. [1] Effectively, the quantal concept of the atom existing in a universe of pure materialism is simply incorrect because without a third substance it cannot be an integer. [1, 11]

DO WE LIVE IN AN ACCIDENTAL UNIVERSE OF RANDOM COINCIDENCES? (PART 6)

Dividing the world of our experiences into the internal or subjective and the external, assumed to be completely independent of any form of consciousness as the current scientific paradigm does, alienates consciousness from the 'real' world of the physical universe and leads to an endless chain of irresolvable paradoxes. Consciousness remains left out of the equations of mathematics and physics.

Alternate realities

The prevalence of this attitude among scientists is expressed very well by MIT physicist and science writer Alan Lightman in his 2014 book *"The Accidental Universe"*. We know that if any one of a number of cosmological parameters were only a minimally different, there would be no chance for life as we know it. In talking about the apparent 'fine-tuning' of the physical universe, Lightman points out that *"Intelligent Design is an answer to fine-tuning that does not appeal to most scientists."* (p. 12) [71r] However, when confronted with the observer-related non-locality of Bohr's solution to the EPR paradox [72], many scientists have preferred the "multiverse theory", devised to preserve the ostensible Cartesian duality of a separate mind and body, except that the "mind" for them does not have relevance or exist, and the preference is to keep consciousness completely out of the picture of 'scientific objectivity'. The "multiverse" has also been called the "alternate universes", meta-universe and parallel universes. Technically, with some linguistic and descriptive variations, they usually refer to as hypothetical sets of infinite or finite possible universes including our current 3S-1t human living experiences.

In the multiverse theory, there are many, many parallel universes. Just how many there are is unknown and unknowable, because your consciousness only exists in this one, and unfortunately you cannot experience any of the other universes. Thus, just like the spate of string theories, there is no hope of proving or disproving such a theory. Even though these scientists pride themselves in being 'hard-nosed' objective scientists (read: *materialists*), it doesn't seem to bother them that string theory and the multiverse theory cannot be tested.

These models together comprise everything that exists relating to the entirety of space, time and matter and energy, plus the laws and constants in physics and biology that describe them. These constants likely vary with each "world", and amongst the variations are describing probabilities. These superficially appear theoretical models that sound possibly feasible but they have their difficulties. At best, these models can only be internally consistent (reflecting ostensibly feasible possibilities) and thus, applying Popperian falsifiability, do not even qualify as

scientific hypotheses [73]. Variations occur for example, in Tegmark's model, the limitations are set mathematically. [68; 74]

LFAF: Multidimensional approaches

These models could qualify scientifically using the Neppe-Close model of Lower Dimensional Feasibility, Absent Falsification" (LFAF) [41] if they were feasible, but there are some problems, such as lack of dimensional definitions, category errors, internal contradictions of knowledge that are not taken into account, and definitions of the finite and infinite. We must be careful not to throw the baby out with the bath water and LFAF is directly involved with the study of multiple dimensions beyond the 3S-1t domain of the world revealed by our physical senses. [6; 75] [5] The difficulty with these models is not so much what is conceptualized as what is ignored and left out; and what is ignored are aspects that we regard as key features of reality, namely additional dimensions, including dimensions of time and consciousness. The most basic axioms and theorems of pure number theory, confirmed by the calculus of dimensional distinctions [10], point to the existence of at least *nine finite dimensional domains,* sequentially embedded in groups of three. There is compelling evidence from relativity and quantum experimental data that the dimensions of each of these additional triadic dimensional domains, encompassing the 3S-1t domain, have progressively much more complex qualities than the dimensions of the domain available to us through the physical senses.

Calculus of distinctions and LFAF

The current standard model theories appear to make the category error of equating space and time, on the other hand, the TDVP model of a reality of at least nine-dimensions has clarified phenomena not explained by the current standard model, promises to explain more, and even more importantly, promises to unify all of our understanding of reality under one consistent paradigm. We make these comments not as pure speculations but as important pieces of the jigsaw puzzle of science. It does this by applying the Calculus of Distinctions (CoD) to clarify the relationship of dimensional measures to mass and energy, which in CoD reflect content. Therefore, although the current standard model paradigm might be feasible scientifically applying LFAF, it is difficult to fit their jigsaw pieces together when, at least in most varieties of the standard model, there are contradictions of category errors, and infinity is not incorporated in them.

Careful analyses with LFAF

Therefore, just because the theoretical concepts are feasible, the models have to show internal consistency and take into account all pieces of the jigsaw puzzle of reality. We believe that not only are many pieces missing because they take into account only 3S-1t, if the remaining

further dimensions (e. g. our demonstrated 9-dimensional spin model) are ignored, some of those jigsaw puzzle pieces would simply not fit together.

To generalize is difficult, because each model is sometimes slightly or sometimes grossly different. However, a legitimate theory must be internally consistent taking everything into account. The limitation to the current models of physics and perceptions of multiple 3S-1t existences might involve incomplete knowledge because such factors as psi, non-locality, altered states of consciousness are not properly taken into account, and sometimes, not at all.

SUPPORT FOR THE HYPOTHESIS OF A 9-DIMENSIONAL SPIN FINITE REALITY MODEL (PART 7)

Validity of 9-D spin

The validity and predictive power of a 9-dimensional spin finite reality model is now well-established by the previous work of Close and Neppe [26] [9]. This predominantly relates to the first major discovery associated with the Neppe-Close Triadic Dimensional Vortical Paradigm (TDVP): derivation of the *exact* value of the Cabibbo angle from 9-dimensional spin model principles, but is also substantiated by additional supporting discoveries and data. The 9-D model is also necessary and important in the derivation of TRUE (Triadic Rotational Units of Equivalence) units and the third substance, gimmel.

Consequently, it is appropriate to discuss briefly the support for the 9-dimensional finite spin model here. The Cabibbo mixing angle is an empirically derived theoretical mixing angle in particle Physics that could not be derived from the prevalent current Standard Model of Particle Physics. Consequently, the reason why the strange empirical Cabibbo angle value of around 13.04 degrees perplexed scientists for 50 years [25] might have been because apparently, no-one had tested a 9-D spin hypothesis before. Our work in 2012 provided a solution. [24; 26]

Close and Neppe applied well-defined physics, with well substantiated empirical data, including well-defined constants such as the Bohr radius (radius of the hydrogen atom), speed of light, Planck's constant, rest mass of the electron, its radius and charge, the Coulomb constant, π and added well-defined equations and principles, such as the Lorentz correction, the principle of conservation of angular momentum, kinetic energy equation, De Broglie's wave equation, Coulomb's equation, the centrifugal force equation, the wave length of a rotating body and calculations of magnetic moment. These applications allowed for a detailed mathematical derivation of the mixing angle of elementary particle fermions, exemplified by a Cabibbo-like mixing angle in elementary particles, with the empirical calculation in quarks already having been found to have been the 13.04 degrees±0.05 and our derived figure being 13.032 degrees. [24] Furthermore, a thought experiment replication that we did found the figure to be 13.0392 degrees. [76]

The authors also applied these principles to fermion rotation and intrinsic spin [28; 70] utilizing the basic concepts of a unified space-time-consciousness theory of finite reality from the Neppe-Close Triadic Dimensional distinction Vortical Paradigm (TDdVP) [5]. This included applying two new mathematical techniques that we have developed as part of this TDVP model, namely

dimensional extrapolation across rotating dimensions, and the principles of the calculus of distinctions. [10]

We have shown how only a 9-dimensional vortical (spin) model produces a legitimate derivation. These results can easily be replicated by applying the relatively simple mathematics to the dynamic rotation of elementary particles as nine-dimensional objects.

However, both the Standard Model of Particle Physics and the various String Theories with folding dimensions and none of which involve 9-dimensional spin, fail. This result can only be derived by applying the dynamic rotation of elementary particles as nine-dimensional objects: Results using any other dimensional models with any number of dimensions besides 9 are falsified, although exponents of 9 (e.g. 81 dimensions) are not directly falsified.

Deriving the Cabibbo mixing angle mathematically supports a component of the broader TDVP hypothesis, namely that finite reality consists of a 9-dimensional vortical (spinning) model. As sentient beings, we may be able to distinguish only part of our finite reality, reflecting only our subjective 3S-1t experience of three spatial dimensions, in the present part of one time dimension. Nevertheless, those 4 dimensions could reflect part of the feasibility of the larger 9-dimensional spin (vortical) unified finite reality of the essential substrates, including mass/energy measurement of subatomic particles. This may produce results that are incomplete, based on the overt experiencing of three dimensions of space within a moment of time. [26] Yet, some dimensions may be hidden from us in our restricted 3S-1t subjective reality and we might get a more complete picture from mathematical analysis of particles spinning in 9D.

Our 9D spin findings, because of their breadth, have generated several novel ideas for testing and application. The authors have proposed that the essential substance of finite reality manifests as various dimensionally related combinations of matter, energy and consciousness in 9 finite dimensions. On-going research includes analyzing the third substance of reality we have called "gimmel". [1] We propose that this third mass-less, energy-less substance is most likely related to consciousness, and that it is appropriate to examine this hypothesis in this paper. Although the TDVP hypothesis of a 9-dimensional finite reality is strongly supported by our findings, the relevant mathematical derivations do not explicitly reveal the nature of specific qualities of the dimensional substrates of Space, Time and gimmel as the postulated substance of consciousness.

The TDVP model and the multiverse

Our TDVP model of "life-tracks" has some superficial similarities to the multiverse because it recognizes that in the continuous infinite different experiential realities may exist. The

universes are not parallel or alternate. They are very real in that they are dynamically existing, but they are covert and in the physical reality are limited to single individual choices. [8 77]. Effectively, Consciousness is part of the equation of the measurable extent of reality just as space and time is. These make up numerous quantized finite dimensions, and these in turn, are embedded in an infinite continuity. Moreover, the content of Consciousness is as legitimate as mass and energy, not something to be excluded.

Therefore, the major difference in TDVP compared with the more classical broad ideas of parallel existences, is the critical inclusion of consciousness as part of that objective reality. The jigsaw feasibility puzzle here is producing testable results and explaining observations that the current materialistic paradigm cannot explain. Individual consciousness and a unification of realities (what we call Unified Monism) allow for the development of events that could change because of freedom of choice creating branches of a tree that may register in 3S-1t reality. These trees are tiny components of an infinite forest. So these do not reflect everything that exists. What exists is a reality that is molded and exhibits an infinite continuity and is dynamic and modifiable. In the classical multiverse, this is a finite series of events that happen, or parallel worlds, or transfinite realities. [77] The infinite is not perceived as an infinite continuity as in the TDVP concept of the infinite.

In this paper, we take the time to explain exactly how we put consciousness into the equations as part of objective reality, and show how doing so explains many things inexplicable in the current materialistic paradigm.

UNIFYING QUANTUM PHYSICS AND RELATIVITY (PART 8)

The full unification of quantum physics and relativity is brought about in TDVP by applying the tools of CoDD and Dimensional Extrapolation[21] to the mathematical expressions of three well-established features of reality, recognized in the current scientific paradigm:

1. quantization of mass and energy as two forms of the same essential substance of reality;
2. introduction of time as a fourth dimension; and
3. the limitation of the velocity of rotational acceleration to light speed, **c**.

In these processes, the need for a more basic unit of quantization is identified, and when it is defined, the reason there is something rather than nothing becomes clear.

Einstein recognized that mass and energy are interchangeable forms of the physical substance of the universe, and discovered that their mathematical equivalence is expressed by the equation $E=mc^2$.

Applying TDVP

In TDVP, accepting the relativistic relationship of mass and energy at the quantum level, we proceed, based on Planck's discovery of quanta, to describe quantized mass and energy as the content of quantized dimensional distinctions of extent. This allows us to apply the CoDD to quantum phenomena as quantum distinctions and *describe reality at the quantum level as integer multiples of minimal equivalence units*. This replaces the assumption of conventional mathematical physics that mass and energy can exist as dimensionless points analogous to mathematical singularities.

The assumption of dimensionless physical objects works for most calculations in practical applications because our units of measurement are so extremely large, compared to the actual size of elementary quanta. Therefore, the quanta *appear* to be existing as mathematical singularities, i.e. dimensionless points: The electron mass, e.g., is about $1x10^{-30}$ kg, with a radius of about $3x10^{-15}$ meter. [28; 70] Point masses and point charges, etc., are simply convenient fictions for macro-scale calculations. The calculus of Leibniz and Newton works beautifully for this as a convenient fiction. [10] This is because Newtonian calculus incorporates the fiction mathematically: It assumes that the numerical value of a function describing the volume of a physical feature of reality, like a photon or an electron, can become a specific discrete finite entity. This occurs as the value of a real variable, like the measure of distance or time, approaches zero asymptotically (i.e. infinitely closely). This is a mathematical description of a non-quantized reality. But we exist in a *quantized* reality, so such a description remains a fiction. [10]

Planck discovered that *the reality we exist in is actually a quantized reality*. This means that there is a "bottom" to physical reality; it is not infinitely divisible, and thus *the calculus of Newton and Leibniz does not apply at the quantum level.* This might be one reason scientists applying Newtonian calculus to quantum mechanics declare that quantum reality is 'weird'. The appropriate mathematical description of physical reality at the quantum level is provided by the calculus of distinctions. In CoD, the relationships between the measurable minimum finite distinctions of elementary particles are defined by integral solutions of the appropriate Diophantine equations. *The mathematics of quanta is the mathematics of integers because quanta are not subdivided, by definition: They are positive numbers.*

In TDVP we find that, for quantized phenomena, existing in a multi-dimensional domain consisting of space and time, embedded in one or more additional dimensional domains, the fiction of dimensionless objects, a convenient mathematical expedient when we did not know that physical phenomena are quantized, is no longer appropriate. We can proceed with a new form of mathematical analysis, the *calculus of dimensional distinctions (CoDD)* [10]*,* and treat all phenomena as finite, non-zero distinctions. *Replacing the dimensionless points of conventional mathematical physics with distinctions of finite unitary volume, we can equate these unitary volumes of the elementary particles of the physical universe with integers. We can then relate the integers of quantum reality to the integers of number theory and explore the deep relationship between mathematics and reality.*

In TDVP, we have also developed the procedure of Dimensional Extrapolation using dimensional invariants to move beyond three dimensions of space and one of time. Within the multi-dimensional domains defined in this way, mass and energy are measures of distinctions of content. If there are other dimensions beyond the three of space and one of time that are available to our physical senses, how are they different, and do they contain additional distinctions of content? If so, how is such content different from mass and energy? We know that mass and energy are two forms of the same thing. If there are other forms, what is the basic "stuff" that makes up the universe? Is it necessarily a combination of mass and energy, or is it something else? For the sake of parsimony, let's begin by assuming that the substance of reality, whatever it is, is multi-dimensional and uniform at the quantum level, and that mass and energy are the most easily measurable forms of it in the 3S-1t domain. *This allows us to relate the unitary measure of inertial mass and its energy equivalent to a unitary volume, and provides a multi-dimensional framework to explore the possibility that the "stuff" of reality may exist in more than two forms.*

Of spin and symmetry

The smallest distinct objects making up the portion of reality apprehended by the physical senses in 3S-1t, that which we call "physical reality", are spinning because of asymmetry and the force of the natural universal expansion that occurs as long as there is no external resistance.

If there were no additional dimensions and/or features to restore symmetry, and no limit to the acceleration of rotational velocity, physical particles would contract to nothingness, any finite universe would expand rapidly to maximum entropy as predicted by the second law of thermodynamics for finite systems. But, due to the relativistic limit of light speed on the accelerated rotational velocity of elementary particles in 3S-1t, the quantized content of the most elementary particle *must* conform to the smallest possible symmetric volume, because contraction to a smaller volume would accelerate the rotational velocity of the localized particle to light speed in 3S-1t, making its mass (inertial resistance) infinite. That minimal volume occupied by the most elementary of particles is the finite quantum distinction replacing the infinitesimal of Newton/Leibniz calculus, and it provides the logical volumetric equivalence unit upon which to base all measurements of the substance of reality.

We can define this minimal volume as the unitary volume of spatial extent, and its content as the unitary quantity of mass and energy. The mass/energy relationship (**$E=mc^2$**) is linear, since in the 3S-1t context, **c^2** is a constant, allowing us to define unitary mass and unitary energy as the quantity of each that can occupy the finite rotational unitary volume. This fits nicely with what we know about elementary particles: All elementary particles behave in the same way prior to impacting on a receptor when encountering restricting physical structures like apertures or slits. [78-81]

Combining unitary volumes

A particle of unitary mass occupying a unitary volume could be an *electron*, and a particle of unitary energy occupying a unitary volume before expansion as radiant energy, could be a *photon*. Einstein explained this equivalence between electrons and photons and Planck's constant in a paper published in 1905. [82, 83]

This brings us to a very interesting problem: What happens when we combine multiples of the unitary volumes of mass/energy to form more complex particles? How do we obtain protons and neutrons to form the stable elemental structures of the physical universe?

When we view the spinning elementary particles of the 3S-1t physical universe from the perspective of a nine-dimensional reality, we can begin to understand how Planck was quite correct when he said *"there is no matter as such"*. What we call matter, measured as mass, is

not really "material" at the quantum level. What is it then that we are measuring when we weigh a physical object? The real measurement of mass is not weight, which varies with relative velocity and location and can be zero without any loss of substance; it is *inertia*, the *resistance* to motion. The illusion of solid matter arises from the fact that elementary particles resist accelerating forces due to the fact that they are spinning like tiny gyroscopes, and they resist any force acting to move them out of their planes of rotation. [50] An elementary particle spinning symmetrically in three, six, or nine orthogonal planes of rotation resists lateral movement equally in all directions, and the measurement of that resistance is interpreted as mass. [50]

In theory, an asymmetrically spinning dimensional domain, i.e. an object spinning in any number of orthogonal planes other than three, or a multiple of three, should result in the conversion of angular momentum into lateral movement in the direction of least inertial resistance. Some have claimed experimental evidence that an object affected by asymmetrical inertial spinning in two different planes will move laterally because of this transformation of angular momentum into linear motion. We have not substantiated these claims, but in theory, a symmetrical object spinning in four dimensions will move laterally because of the asymmetry of the spinning dimensional domain. [50]

Elementary quanta of mass and energy, the two known forms of the substance of the physical universe, embedded in a nine-dimensional domain, form stable structures only under precisely symmetric dimensionometric spin conditions because the angular momenta of elementary quanta spinning asymmetrically are converted into strong divergent linear forces causing the rapid decay of vortical structure and patterns. *Without symmetric spinning conditions, no physical universe could exist because of the second law of thermodynamics which dictates that any finite physical system always decays toward maximum entropy, i.e. total disorder, lacking structure of any kind.* [50]

If our universe were composed of random debris from an explosion originating from a mathematical singularity, because of the continuous operation of the second law of thermodynamics in an expanding debris field, simple particles accidentally formed by random mass/energy encounter, would decay before a new random encounter could occur and form a more complex combination. The number of random encounters would decrease as the debris field expands because there would be increasingly less debris in any given volume of space. If our physical universe is embedded in the nine-dimensional reality described by TDVP, it should, in theory, escape this fate of dissolution. While it may change and evolve, its form, and even the way it evolves, it will always reflect the intrinsic logical order and patterns of the substrate of reality within which it is embedded, TDVP is based on the hypothesis that logical

structure is the natural state of reality, not chaos. This hypothesis is supported by the fact that there is order and logic in the universe in spite of the second law of thermodynamics. If this is correct, we have *the answer* to the question Leibniz regarded as the first and most important metaphysical question of all: *We can explain why there is something instead of nothing.*

UNIFYING PARTICLE PHYSICS AND TDVP (PART 9)

Quantum physics, especially the resolution of the Einstein-Podolsky-Rosen (EPR) paradox [59; 63], tells us that reality at the quantum level is like an all-encompassing interwoven multi-dimensional tapestry. However, because of the extreme smallness of the quantized structure—far smaller than we are able to see directly, even with the best technological extensions of our physical senses—we are directly aware only of the broad-brush features that seem to exist as separate objects.

We have tried repeatedly, over the history of modern science, to identify the most basic building blocks of physical reality, starting with large structures like cells, molecules and atoms, proceeding to smaller and smaller objects, only to have them slip through the finer and finer-scale net of our search. Relativity and quantum physics tell us, however, that there is an end to this, a limit to this infinite descent of spinning particles, a bottom to our search: the smallest possible particle, *the minimum quantum equivalence unit*.

Applying TDVP

TDVP suggests that the forms of physical reality are reflections of the intrinsic logical patterns existing behind the reality perceived through our physical senses in 3S-1t. The form of this logical structure, much like the conceptualized blueprint of a building in the mind of an architect, is conveyed to the 3S-1T domain of the physical universe through the dimensionometric structure of a spinning nine-dimensional finite universe, in the form of the "conveyance equations". The force causing spinning motions in the finite distinctions of physical reality is the continuous force of universal expansion. The fact that expansion is uniform and continuing, perhaps even accelerating, indicates that there is nothing outside the universe to impede or alter uniform expansion [84-86]. It has been demonstrated in numerous experiments since Einstein proposed the speed of light as the limit to acceleration, that, in the observable 3S-1t physical universe, the maximum expansion velocity between two farthermost separated points in a quantized 3S-1T reality is light speed, a speed determined by the mass/energy ratio in the observable universe: $c = \sqrt{(E/m)}$.

The mathematical expression of the conveyance of logical structure can be derived by application of the CoDD [10] and Dimensional Extrapolation (DE) [13]. These mathematical logical techniques (CoDD, DE) would be applied to the elementary distinctions of extent and content revealed by the empirical data obtained in particle colliders, under the integer requirement of quantization. Particle collider data provides us with an indirect glimpse of the origin of the elementary structures that makes up the limited portion of reality observable in 3S-1t. Using particle collider data and the mathematical principles of quantum physics and relativity, we now

derive the equations describing the combination of elementary particles to form stable sub-atomic structures. Because we exist in a quantized reality, these equations will be Diophantine equations, i.e. equations with integer solutions. We call the general mathematical expression summarizing these equations the *Conveyance Expression* because it contains within it the mathematical relationships that convey and limit the logical structure of the substrate of reality through the sequentially embedded nine-dimensional domains of finite distinction to the 3S-1t domain of physical observation and measurement.

Within the framework of the current Standard Model of particle physics, the basic concepts of quantum physics and relativity are applied to the particle collider data to yield numerical values of the physical characteristics of the sub-atomic particles perceived to be the building blocks of the observable universe, including photons, electrons, neutrons and protons, in units of MeV/c^2. Analysis of these data in the framework of the mathematics and geometry of TDVP in 3S-1t provides us with a way to find the true quantum unit of measurement. The empirically measured and statistically determined inertial masses of the three most basic elementary entities believed to make up what we perceive in 3S-1t as matter, i.e. electrons, up-quarks and down-quarks, are approximately 0.51, 2.4 and 4.8 MeV/c^2, respectively. The values for up and down quarks are derived statistically from millions of terabytes of data obtained from high-energy particle collisions engineered in specially built colliders.

It is obvious from these data that the conventional unit: MeV/c^2 is not the basic quantum unit, because the data expressed in these units contain fractions of MeV/c^2 units. Max Planck discovered that energy and matter occur only in integer multiples of a specific finite unit of quantum action, not fractions of units. Therefore, the masses of the electron, up-quark and down-quark should be integer multiples of the basic quantum unit of mass/energy equivalence. Since the masses are fractional in MeV/c^2 units, one MeV/c^2 must be a multiple of a yet smaller truly *quantum* unit.

Except for the electron, the data for the mass/energy of the elementary particles, up and down quarks, in Table 1 below, are presented as ranges of values because the mass/energy values of elementary particles are statistically determined as statistical moments from particle collider detector and collector data. The quantum mass/energy values are derived from raw data using statistical methods, so the ranges thus represent the quantum values with approximate confidence limits. Quantum particles detected in high-energy colliders are classified either as

bosons, with Bose–Einstein statistical distribution [j], or fermions, obeying the Pauli Exclusion Principle [k], with Fermi–Dirac statistical distribution [l] in collider data. Both of these quantum distributions approach the Maxwell–Boltzmann statistical distribution [m] in the limit of high temperature and low particle density.

In this discussion, we are primarily concerned with the basic building blocks of the physical universe, the up- and down-*quarks*, which are fermions, and photons, which are *bosons*.

There is always some measurement error in experimental data, and even with the advances in technological precision from the first "atom smasher", the Cockcroft-Walton particle accelerator in 1932, to the Large Hadron Collider (LHC) today, *some measurement error is still unavoidable due to the extreme smallness of the phenomena and the indirect and delicate methods of measurement required in the interpretation of the data.* The electron mass is considered to be one of the most fundamental constants of physics, and because of its importance in physical chemistry and electronics, great effort has been spent to determine its inertial mass very accurately at 0. 511 MeV/c2.

Our model here is based on physics data *relative to 3S-1t*. This is important because 9-dimensional spin data should generate different theoretical models. For example, Einstein's search for a cosmological constant [87], led to his later expressing dismay about what he regarded as the biggest error of his career. [88-91] Yet, despite the expanding universe [85; 86], this might, indeed, not have been an error, but correct if conceptualized dynamically, *relative* to the appropriate dimensional *frameworks*. His cosmological constant needed to be expressed in the appropriate context *relative* to those four space-time dimensions. Similarly, the existence of 9-D spin might imply that fundamental equations such as $E=Mc^2$ would be relative to 3S-1t, but if there were, for example, multidimensional Time, a speculation with strong supporting evidence[8], could be that the speed of light c would have to be expressed relatively, and this might lead to questions about relative superluminal velocity [92]. Applying a further concept, the presence of gimmel, may allow an extension of this correct relative 3S-1t equation to include

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[j] **Bose–Einstein quantum statistics** describes the distribution of a large number of identical particles with *integer* spin that *do not* obey the Pauli Exclusion Principle (bosons), over a set of discrete energy states, at thermodynamic equilibrium.

[k] **The Pauli Exclusion Principle** states that two identical fermions (particles with half-integer spin) cannot occupy the same quantum state simultaneously.

[l] **Fermi–Dirac quantum statistics** describes the distribution of a large number of identical particles that obey the Pauli Exclusion Principle (fermions), over a range of energy states in a finite, closed system.

[m] **Maxwell–Boltzmann statistics** is the application of classical probability theory and statistical methods to describe the average distribution of non-interacting particles in thermal equilibrium, in a range of energy states, and is applicable when the temperature is high enough or the particle density is low enough to render quantum effects negligible.

the third substance within the fundamental theory of everything. [93] [94] We speculate that Einstein's speed of light, c, though invariant in 3S-1t, might involve a different constant in each dimensional domain beyond the three of space in the present moment in time. This is because c involves a reciprocal relative to time squared. We are dealing with 9 proved finite spinning dimensions: We do not know the exact allocation of these dimensions, but have postulated there may be multidimensional time and consciousness.

1. If there were more than one dimension of time, the speed of light would be relative to those time dimensions. This would mean that the speed of light might be much more complex and relative to the different dimensions of time.

2. Moreover, ultimately given there is a third substance, gimmel, and a new theory of everything needs to include gimmel as well. This is where consciousness is put into the equations of physics. This might complicate any fundamental formula of putting equations into physics.

3. Importantly, space-time related constants, like the speed of light, as well as the extent and content of consciousness, might involve different relative concepts depending on the frameworks of the specific dimensions ("dimensional domains") involved.

EMPIRICAL EXPLORATION OF THE THIRD SUBSTANCE, GIMMEL IN PARTICLE PHYSICS (PART 10)

The integer values in Table One are obtained by assuming that the electron has the least mass of any elementary particle, and is the smallest sub-atomic particle. The photon, which behaves like a boson, is not listed here because it only exists within sub-atomic structure in a transitory manner, and we are primarily interested here in the stable building blocks of atomic structure. Normalizing the electron's mass to unity and determining the average masses of the up- and down-quarks as multiples of that unit, we have the normalized masses of the electron, up- and down-quarks.

Using the latest available collider data, the mass/energy averages for the up- and down- quarks are 2. 01 MeV/c2 and 4. 79 MeV/c2 respectively. Dividing by 0. 511 and rounding the nearest integer value, we have the normalized mass/energy equivalence for the electron, up- and down-quarks, as 1, 4 and 9 respectively. Using these normalized values, we can investigate how the finite distinctions they represent can combine to form protons, neutrons and the progressively more complex physical structures that make up the Elements of the Periodic Table.

The fact that the detected mass of the proton is nearly 100 times more than the combined mass of two up-quarks and one down-quark is explained, in part, in the Standard Model by the assumed presence of other subatomic particles such as gluons and/or bosons in the space around the quarks, although they are not detectable until "teased" into existence by high-energy collisions.

TABLE 10 A: Fermions

The Most Common Subatomic Particles comprising the physical universe

Particle	Symbol	Spin	Charge	Mass (Raw Data In MeV/c^2)	Mass/Volume (Normalized Average) [n]
Electron	e	1/2	-1	0. 511	1
Up quark	u	3/2	$+\frac{2}{3}$	1. 87 – 2. 15	4
Down Quark	d	3/2	$-\frac{1}{3}$	4. 63 – 4. 95	9
Proton	P^+	1/2	+1	740 -1140**	1035**

Note that 2 x 2/3= 4/3 for two up quarks -1/3 for down quarks = +1 = proton charge.

[n] "Normalized" in this case means changing the average mass to the nearest integer value. This is justified on the grounds that the actual values must be integer multiples of the basic unit of quantized mass.

Similarly, 2/3 for one up quark – 2/3 for two down quarks = 0 = neutron charge.

This quantal level data might also be reflecting the underlying logical structure of reality and speculate that it might be paralleled by the so-called "dark matter" and "dark energy" detected on the macro scale of galaxies that make up about 95% of the observable universe, because preliminary calculations indicate a connection between this unknown dark matter and energy and the stability of the atomic structure of the universe. [12] The TDVP model recognizes that reality is a unit and there is no difference in laws between the microcosm and even cosmological findings.

The smallest finite unit of volume is the smallest possible distinction of extent that can be occupied by an accelerated spinning vortical object. This distinction of extent has a finite value because of the limit placed on the rotational velocity of any object possessing inertial mass by the light-speed limit of relativity.

As our basic unit volume, we will assign it the numerical value of 1. We can also define the minimal quantal unit of measurement for mass and energy by setting its value at the limiting volume equal to 1 (unity), thus avoiding fractional results in measurements of quark mass, energy and volume. We need to do this because the value of mass-energy equivalence in the currently used MeV/c^2 units is based on SI units chosen for convenience: SI units are arbitrarily based on easily measurable distances and quantities. What we are establishing is a truly *quantum* unit. Our quantum unit is somewhat similar to the 'natural' units sometimes used in quantum physics and cosmology, that are based on setting the speed of light, c, equal to 1, and ħ (called h-bar) the reduced Planck's constant equal to 1. These 'natural' units were developed for ease in working with extremely large and extremely small numbers in the same equations, not to define the smallest possible quantum unit as we are doing.

Does this mean that there are actually particles below the spatial size or subatomic level of quarks? Not necessarily. It only means that the mass/energy and volumes of quarks are multiples of the unitary mass/energy and volume of the smallest finite distinction. Additionally, these results do not necessarily reflect spatial finite location; they could speculatively even reflect a continuity that is found in the infinite, not a discreteness in location. We could refer to this as part of the "sub-quantum" but the location in space and time might be different relative to different dimensional domains. Therefore, we're just using "sub-atomic" descriptively not for the definite level of the location. In order to understand how this works, we take a closer look at what happens when two or more subatomic particles combine.

In the 3S-1T domain of the physical universe, while we may conceptualize space, time, matter, and energy as separate aspects of reality, *we never find one of them existing alone without the others.* As Einstein stated, space has no meaning without matter, matter and energy are just two forms of the same thing, and time is meaningful only in relation to the dynamic interaction of spatially extended matter and energy. [54; 57; 58] Clearly, if the goal is to gain an understanding of the true nature of reality, the usefulness of any observation or measurement is maximized and will be most meaningful if it includes all of the known parameters of reality. The minimal quantized distinction described above, from which we define new quantum units of observation and measurement, should therefore include not just space and mass, but space, time, mass, and energy. In the extended mathematical framework of TDVP, we have determined mathematically that it should include nine finite dimensions of extent and three forms of content [9]. The dimensionometric mathematics of TDVP indicates that reality consists of three kinds of dimensions (extent) and three kinds of substance (content). The three kinds of dimensions are space-like, time-like and (we suggest) *consciousness-like*, while the three kinds of substance are matter, energy and another form of the stuff of reality, heretofore unrecognized by science, an essential conscious organizing aspect of reality, a primary form of consciousness.

For the present discussion and derivation of true quantum units, it is not necessary to identify the third kind of dimensional extent as consciousness-like, or the third form of content as consciousness itself. However, the likelihood that this is true is proposed here as a feasible hypothesis. TDVP was developed based on the hypothesis that consciousness is an integral part of reality and should be included in the equations of physics. Also, we consider TDVP to be a paradigm shift, primarily because of the inclusion of consciousness, and if the third form is neither mass nor energy, a quantized form of the conscious substrate is the logical candidate. But many scientists regard this as very controversial, so it is for this reason that *we emphasize the fact that what follows does not depend upon the hypothesis that consciousness is the third form of the stuff of reality, but primarily upon the logic of mathematical, geometrical and physical considerations*.

ELEMENTARY PARTICLES AND UNITS OF MEASUREMENT: APPLYING THE CONVEYANCE EQUATION (PART 11)

In order to see how the minimal quantum extent and content of our smallest possible elementary distinction relates to known elementary particles, we develop equations that can be used to describe the combination of up- and down-quarks to form the proton and neutron of the Hydrogen atom.

We choose the Hydrogen atom to start with because it is the simplest, most stable, and most abundant, even though very reactive, known element in the universe. If all forms of substance are quantized, then in order for quarks to combine in stable structures, they must satisfy certain integer equations reflecting the quantization of matter and energy. We call those Diophantine (integer) equations the equations of Dimensional Extrapolation, because they convey the logical structure of reality into the space-time domain of our 3S-1t experience. We will show why stability depends on the integer equation representing the combination of two or more particles to form a third particle. This family of Diophantine equations is represented mathematically by the expression $\Sigma^{n}_{i=1} (X_n)^m = Z^m$

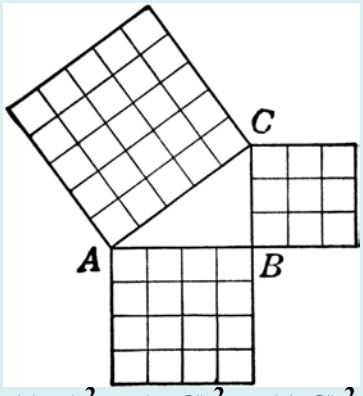
The Pythagorean Theorem equation, the Fermat's Last Theorem equation, and other important equations are contained within this general expression. We mention this fact here because these theorems play key roles in the geometry and mathematics of Dimensional Extrapolation and the combination of elementary particles to form stable physical structures. Because the various forms of this expression as **m** varies from 3 to 9 conveys the geometry of 9-dimensional reality to our observational domain of 3S-1t, we call this expression the "Close Conveyance Expression", and individual equations of the expression "Close Conveyance Equations".

When **n = m** = 2, the expression yields the equation

$$\mathbf{(X_1)^2 + (X_2)^2 = Z^2}$$

which, when related to areas, describes the addition of two square areas, A_1 and A_2 with sides equal to X_1 and X_2 respectively, to form a third area, A_3, with sides equal to Z. When these squares are arranged in a plane with two corners of each square coinciding with corners of the other squares to form a right triangle, as shown below, we have a geometric representation of the familiar Pythagorean Theorem demonstrating that the sum of the squares of the sides of any right triangle is equal to the square of the third side (the hypotenuse) of that triangle.

The Pythagorean Theorem



$$(AB)^2 + (BC)^2 = (AC)^2$$

We use this simple equation in Dimensional Extrapolation [13] to define the rotation and orthogonal projection from one dimensional domain into another, in the plane of the projection. There are an infinite number of solutions for this equation, one for every conceivable right triangle, but in a quantized reality, we are only concerned with the integer solutions. Considering the Pythagorean equation as a Diophantine equation, we find that there exists an infinite sub-set of solutions with AB = X_1, BC = X_2 and AC = Z equal to integers. Members of this subset, e.g. (3, 4, 5), (5, 12, 13), (8, 15, 17), etc. i.e., ($3^2 + 4^2 = 5^2$, $5^2 + 12^2 = 13^2$, $8^2 + 15^2 = 17^2$, …) are called "Pythagorean triplets".

When **n = 2** and **m = 3**, the expression becomes the equation

$$\mathbf{(X_1)^3 + (X_2)^3 = Z^3.}$$

When we define $\mathbf{X_1}$, $\mathbf{X_2}$ and **Z** as measures of volumes, just as we defined them as measures of areas when **n = m** = 2, we can apply this equation to quantal volumes in a three-dimensional domain. Using the minimal quantal volume as the unit of measurement, and setting it equal to one, we have a Diophantine equation related to our hypothetical elementary particle with minimal spinning volume containing uniform substance: if it is spherical, we can set its radius equal to $\mathbf{r_1}$, and if there is a second uniform spinning particle rotating at maximum velocity, with radius $\mathbf{r_2}$, we can describe the combination of the two particles by the expression $\mathbf{4/3\pi(r_1)^3 + 4/3\pi(r_2)^3}$. If this combination produces a third spinning spherical object we have:

$$\mathbf{4/3\pi(r_1)^3 + 4/3\pi(r_2)^3 = 4/3\pi(r_3)^3,}$$

where $\mathbf{r_3}$ is the radius of the new particle. Dividing through by $\mathbf{4/3\pi}$, we have:

$\mathbf{(r_1)^3 + (r_2)^3 = (r_3)^3,}$ which is a Diophantine equation of the form of the Fermat equation,

$\mathbf{X^m + Y^m = Z^m}$ when **m** =3**.**

Notice that the factor, **4/3π** cancels out, indicating that this equation is obtained regardless of the shape of the particles, as long as the shape and substance is the same for all three particles. This is an important fact because we found in investigating the Cabibbo angle that the electron, while symmetrical, is not necessarily spherical. [28; 70; 95] Note also, that the maximum rotational velocity and angular momentum will be different for particles with different radii, because the inertial mass of each particle will depend upon its total volume. In a quantized reality, the radii must be integer multiples of the minimum quantum length. Since this equation is of the same form as Fermat's equation, *Fermat's Last Theorem* tells us that if $\mathbf{r_1}$ and $\mathbf{r_2}$ are integers, $\mathbf{r_3}$ cannot be an integer. This means that the right-hand side of this equation, representing the combination of two quantum particles, cannot be a symmetric quantum particle. But, because Planck's principle of quantized energy and mass tells us that no particle can contain fractions of mass and/or energy units, the right-hand side of the equation represents an unstable asymmetric spinning particle. The combined high-velocity angular momentum of the new particle will cause it to spiral wildly and fly apart. This may lead us to wonder how it is that there are stable particles in the universe, and why there is any physical universe at all. Again, we are faced with Leibniz's most important question: why is there something instead of nothing?

The answer turns out to be relatively simple, but is hidden from us by the limitations of our methods of thinking and observation if we allow them to be wholly dependent upon our physical sense organs. For example, we think of a sphere as the most perfect symmetrical object; but this is an illusion. Spherical objects can exist in a Newton-Leibniz world, but we actually exist in a Planck-Einstein world. In the real world, revealed by Planck and Einstein, the most perfectly spherical object in three dimensions is a regular polyhedron. (polyhedron = multi-sided three-dimensional form; regular; all sides are of equal length.) The most easily visualized is the cube, which is most precisely defined geometrically as a six-sided regular polyhedron. [96] In the Newton-Leibniz world, the number of sides of a regular polynomial could increase indefinitely. If we imagine the number of sides increasing without limit while the total volume approaches a finite limit, the object appears to become a sphere. But in the quantized world of Planck and Einstein, the number of sides possible is limited, because of the finite size of the smallest possible unit of measurement (which we are defining here) is relative to the size of the object. And because the "shape" factor cancels in the Conveyance Equation for n = 3, Fermat's Last Theorem tells us that, regardless of the number of sides, *no two regular polyhedrons composed of unitary quantum volumes can combine to form a third regular polyhedron composed of unitary quantum volumes.*

To help understand the physical implications of this, suppose our true quantum unit exists in the shape of a cube. Using it as a literal building block, we can maintain particle symmetry by constructing larger cubes, combining our basic building blocks as follows: a cube with two blocks on each side contains 8 blocks; a cube with three blocks on each side contains 27 blocks; a cube with four blocks on each side contains 64 blocks, each being the cubic exponent of the number of blocks on each side. Fermat's Last Theorem tells us that if we stack the blocks of any two such symmetric forms together, attempting to keep the number of blocks on all sides the same, the resulting stack of blocks will always be at least one block short, or one or more blocks over the number needed to form a perfect cube. *Recall that if these blocks are elementary particles, they are spinning with very high rates of angular velocity, and the spinning object resulting from combining two symmetric objects composed of unitary quantum volumes will be asymmetric, causing its increasing angular momentum to throw off any extra blocks until it reaches a stable, symmetrically spinning form.*

This requirement of symmetry for physical stability creates the intrinsic dimensionometric structure of reality that is reflected in the three-dimensional Conveyance Expression. We are interested in the 3-D conveyance equation because experimental observation and measurements are limited to quantum time slices (T = 1) in three dimensions, indicating no movement in time. It turns out that there *can* be stable structures, because when **n = m** =3, the Conveyance Expression yields the equation:

$$\mathbf{(X_1)^3 + (X_2)^3 + (X_3)^3 = Z^3,}$$

which **does** have integer solutions. The first one (with the smallest integer values) is:

$$\mathbf{3^3 + 4^3 + 5^3 = 6^3}$$

It is important to recognize the *implications* of $\mathbf{\Sigma^n_{i=1}\,(X_n)^m = Z^m}$. When **n**, **m**, the $\mathbf{X_i}$ and **Z** are *integers,* an exact Diophantine expression of the *form* of the logical structure of the substrate of reality as it is communicated to the 3S-1t domain. For this reason, we call it the ***Conveyance Expression***. It should be clear that the Diophantine equations yielded by this expression are appropriate for the mathematical analysis of the combination of unitary quantum particles. When the Diophantine expressions it yields are equations with *integer* solutions, they represent stable combinations of quantum equivalence units, and when they do not have integer solutions, the expressions are *inequalities* representing asymmetric, and therefore, *unstable* structures.

In the quantized nine-dimensional domains of TDVP, the variables of the Conveyance Equations are necessarily integers, making them Diophantine equations, because only the integer solutions represent quantized combinations. When **n = m = 2**, we have the Pythagorean

Theorem equation for which the integer solutions are the "Pythagorean Triples". When **n = 3** and **m = 2**, the Conveyance Equation yields the inequality of Fermat's Last Theorem, excluding binomial combinations from the stable structures that elementary particles may form. On the other hand, the Diophantine Conveyance Expression when **n = m = 3**, integer solutions produce in some instances trinomial combinations of elementary particles that *will* form stable structures. *This explains why there is something rather than nothing, and why quarks are only found in combinations of three.*

Embedded within multiple hyper-dimensional domains (more than three dimensions) are three dimensions of space and three dimensions of time that are temporarily contracted during observations, and condensed into the distinctions of spinning energy (energy vortices) that form the structure of what we perceive as the physical universe. In the humanly observable domain of 3S-1t, this spectrum ranges from the photon, which is perceived as pure energy, to the electron, with a tiny amount of inertial mass (0. 51 MeV/c^2 ≈ 1 x10^{-47} kg.) to quarks ranging from the "up" quark at about 2. 4 MeV/c^2, to the "top" quark at about 1. 7 x10^5 MeV/c^2, to the Hydrogen atom at about 1x10^9 MeV/c^2 (1.67 x10^{-27}kg.), to the heaviest known element, Copernicum (named after Nicolaus Copernicus) at 1.86 x10^{-24} kg [o]. So the heaviest atom has about 10^{23} times, that is, about 100,000,000,000,000,000,000,000 times heavier than the inertial mass of the lightest particle, the electron.

All of the Elements of the Periodic Table are made up of stable vortical distinctions that are known as fermions, "particles" with an intrinsic angular spin of 1/2, or they are made up of combinations of fermions. Table 10**,** above, lists the fermions that make up the Hydrogen atom and their parameters of spin, charge and mass based on experimental data. The top and bottom quarks and the charm and strange quarks are ephemeral unstable particles so are not part of the calculations, and nor are neutrinos or any "anti-particles". Our focus here is on stable particles that make up the observable universe.

Neils Bohr's solution of the EPR paradox following Bell's theorem [59], validated by the Aspect experiment [63] and many subsequent experiments refined to rule out other possible explanations, tells us that newly formed fermions do not exist as localized particles until they impact irreversibly on a receiver constituting an observation or measurement. In the TDVP unified view of reality, every stable elementary particle, every distinct entity in the whole range of fermions and composite particles composed of fermions, is drawn from the discrete transfinite

[o] Cn and atomic number 112 was created in 1996. It is an extremely radioactive synthetic element that can only be created in a laboratory. The most stable known isotope is copernicium-285 [97].

embedded within the continuous infinity of reality when it is registered as a finite distinction in an observation or measurement. Our limitations of observation and measurement and the dimensional structure of reality result in our perception of fermions as separate objects with different combinations of inertial mass and energy.

What determines the unique mix that makes up each type of observed particle? To answer this question, we must continue our investigation of the rotation of the minimum quantal units across the four dimensions of space, time and the additional dimensions revealed by the mathematics of TDVP.

One of the most important invariant relationships between dimensional domains is the fact that *each **n**-dimensional domain is embedded in an **n+1** dimensional domain.* This means that all distinctions of extent, from the ninth-dimensional domain down, and the distinctions of content within them, are inextricably linked by virtue of being sequentially embedded. Because of this intrinsic linkage, the structure of any distinction with finite extent and content, from the smallest particle to the largest object in the universe, reflects patterns existing in the logical structure of the substrate of reality. Such a distinct object will always have in its content, combinations of the forms reflecting those patterns. In a quantized reality, the dimensionometric forms of such objects will be symmetric and a multiple of the smallest unit of measurement.

Stable vortical forms and true quantal units

Chemists trained in the current paradigm think of the combination of elementary particles and elements as forming atoms and molecules by the physical bonding of their structures, and model these combinations in tinker-toy fashion with plastic or wooden spherical objects connected by single or double cylindrical spokes. This is helpful for visualizing molecular compounds in terms of their constituents prior to combining, but that is not necessarily what actually happens.

Inside a stable organic molecule, volumetrically symmetric atoms are not simply attached; their sub-atomic spinning vortical “particles” combine, forming a new vortical object. Elementary particles are rapidly spinning symmetric vortical objects and when three of them combine in proportions that satisfy the three-dimensional Conveyance Equation, they do not simply stick together - they combine to form a new, dimensionally stable, symmetrically-spinning object.

Because they are spinning in more than one plane, these objects are best conceived of as closed vortical solitions.[p]

The triadic combinations of elementary vortical objects, like up- and down-quarks, form new vortical objects called protons and neutrons, the combinations of electrons, protons and neutrons form new vortical objects called elements. And the triadic combinations of volumetrically symmetric elements form new vortical objects called organic molecules. *Thus, the dimensional forms of symmetrically-spinning objects formed by the combining of smaller vortical objects form closed vortices in 3S-1t with new physical and chemical characteristics, depending upon both their internal and external structure.* We apply the volume of the smallest possible quantized vortical object as the basic unit of measurement, the true quantal unit. The substance of all particles is then measurable in whole-number multiples of this unit.

[p] In mathematics and physics, a solition is a self-reinforcing solitary wave (a wave packet or pulse) that maintains its shape while it propagates at a constant velocity. Solitions are caused by a cancellation of nonlinear and dispersive effects in the medium: The term "dispersive effects" refers to a property of certain systems where the speed of the waves varies according to frequency. Solitions are the solutions of a widespread class of weakly nonlinear dispersive partial differential equations describing physical systems. [98]

THE TRUE UNIT: TRIADIC ROTATIONAL UNITS OF EQUIVALENCE (TRUE) AND THE THIRD FORM OF REALITY: GIMMEL; APPLYING THE CONVEYANCE EQUATION (PART 12)

The true quantum unit of mass/energy, as defined above, is very useful in dimensional extrapolation processes and as the basic measurement unit of phenomenological distinctions in the calculus of distinctions. It is the smallest possible measurable discrete quantity of the universal substance of reality. Every elementary particle is therefore composed of a whole number of these true quantum units of the universal substance. Quantum mechanical phenomena that defy explanation in terms of classical physics concepts, are explicable if they are symmetrical vortical structures spinning at near light-speed angular velocities in the mathematically required nine dimensional domain of quantized reality.

The electron is measurable as one single true quantum unit of mass/energy equivalence in the 3S-1t dimensional domain of observable reality, but as we shall see, the electron is not identical with one true quantum unit. We have found that it must be much more to exist as part of a stable atom. All other stable non-radiating sub-atomic entities are measurable in multiples of these sub-quantal units also. These are units of measurement, not sub-quantal entities existing as independent phenomena. Until impacting on a receptor in an irreversible way, gimmel, the substance of these units, is a mass-less, energy-less third substance which is required for stable atomic and sub-atomic structure.

When we choose to measure the substance of a quantum distinction, the effects of spinning in the three planes of space register as inertia or mass, and spin in the time-like dimensional planes manifests as energy because time is non-existent without movement, and any movement of mass relative to an observer is measured by that observer as kinetic energy. Spinning in the additional planes of reality *containing* the space and time domains, requires a third form of the stuff of reality, in addition to, but not registering as, either mass or energy, to complete the minimum quantum volume required for the stability of that distinct object.

Because this third form of the stuff of reality is unknown in current science, we need an appropriate symbol to represent it. Every letter in the English and Greek alphabets has been used, some for multiple subjects, as a symbol for something in math and science, so we have gone to possibly the historically oldest maintained alphabet, Hebrew, at an estimated 3100 years, but likely older. [q] We have represented that potential third form of reality here with the

[q] Hebrew is the oldest continuously enduring language and regarded as the "holy language". As this third substance has a postulated possibly mystical significance, the name gimmel, as the third letter of the Hebrew alphabet, may be appropriate.

third letter of the Hebrew alphabet, ג (*Gimmel*), and we will call this unitary measure of the three forms of reality the ***T**riadic **R**otational **U**nit of **E**quivalence*, or **TRUE** Unit.

The mix of the three equivalent forms of the substance of reality, (**mass, energy,** and **gimmel)** *needed to maintain symmetric stability*, present in any given 3S-1t measurement, can be determined by a symmetric three-dimensional conveyance equation: We found above that the smallest set of integer values that satisfies the three-dimensional form of the conveyance equation is the set 3, 4, 5 and 6. So the Diophantine equation $\mathbf{3^3 + 4^3 + 5^3 = 6^3}$ describes the addition of three volumes with integer radii 3, 4, and 5 to form a symmetric volume with the integer radius r = 6.

When $\mathbf{n = m = 3}$, the Conveyance Equation $\mathbf{\Sigma^n_{i=1} (X_n)^m = Z^m}$ yields:

$$\mathbf{(X_1)^3 + (X_2)^3 + (X_3)^3 = Z^3}$$

The integer solutions of this Diophantine equation, the conveyance equation with in TRUE units represent the possible combinations of three symmetric vortical distinctions forming a fourth three-dimensional symmetric vortical distinction.

The primary level of symmetric stability – quarks and the conveyance equation

Because of Planck's discovery that energy only occurs in integer multiples of a very small quantum, and Einstein's discovery of the equivalence of matter and energy, ($E = mc^2$) we know that the substance of the universe is quantized. With the appropriate *integer* values for $\mathbf{X_1}$, $\mathbf{X_2}$, $\mathbf{X_3}$, and **Z**, in **TRUE** units, the three-dimensional conveyance equation $\mathbf{(X_1)^3 + (X_2)^3 + (X_3)^3 = Z^3}$ represents the stable combination of three quarks to form a Proton or Neutron. There are many integer solutions for this equation and historically, methods for solving it were first developed by Leonhard Euler [99].

Applying mathematics empirically

Our approach is empirical mathematical testing: We start with the smallest integer solution of this Conveyance Equation, $\mathbf{3^3 + 4^3 + 5^3 = 6^3}$, and see if it can describe the combination of mass/energy and gimmel consistent with particle collider data.

In order to test the mathematical hypothesis that the combination of the volume and content of three quarks to form protons and neutrons can be adequately described using the Diophantine conveyance equations, we can start by using the simplest 3-D conveyance equation solution of $\mathbf{3^3 + 4^3 + 5^3 = 6^3}$. If this equation doesn't fit the empirical data, we need to establish what does work.

When we use the smallest integer solution, $\mathbf{3^3 + 4^3 + 5^3 = 6^3}$, to the 3-D conveyance equation to attempt to find the appropriate values of ג for the Proton, we obtain negative values for ג for the first up-quark and the down-quark and zero for the second up-quark. It is conceivable that some quarks may contain no ג units, but negative values are a problem. They cannot be allowed because a negative number of total ג units would produce an entity with fewer total observable TRUE units in 3S-1t than the sum of mass/energy units of that entity, violating the conservation of mass and energy, destroying the particle's equilibrium and identity.

We now compare two tables showing hypothesized TRUE and gimmel in the proton and then the neutron. We apply a trial and error approach, knowing that we need positive integers and ultimately quantal volumetric figures, where the cube roots are integral. For consistency in a quantized reality, charge has also been normalized in these tables.

In Table 2P1, we attempt to use the smallest integer solution of the conveyance equation to describe the combination of two up-quarks and one down-quarks in a *proton*, but some of the quarks have negative ג units.

In Table 2N1, we attempt to use the smallest integer solution of the conveyance equation to describe the combination of one up-quark and two down-quarks in a *neutron*, all of the quarks have negative ג units.

This means the data in Table 2P1 and 2N1 for the proton and neutron are empirically incorrect: This is impossible.

The table numbering is complex here [r]

Table 12A-P1: Trial Combination of Two Up-Quarks and One Down-Quark, i.e. The Proton, applying minimal TRUE Units

Particle	Charge*	Mass/Energy	ג	Total TRUE Units	MREV**s
$\mathbf{u_1}$	+ 2	4	**-1**	3	27
$\mathbf{u_2}$	+ 2	4	**0**	4	64
d	- 1	9	**-4**	5	125
Total	**+ 3**	**17**	**-5**	**12**	**$216=6^3$**

[r] The numbering here as a convenience. It involves the part e.g. Part 12 and the first table so 12A. But in the instances of testing it has a suffix. So here Table 12A – P1 has the –P1 referring to the first in the test sequence of Protons so P1. Because this might not work out, the next would be Table 12A- P2. This allows convenience for those observing the mathematical test sequence only.

[s] Minimum Rotational Equivalent Volume (MREV): This is a term we apply so we can reflect cubes as required in quantal volumes.

And the neutron:

Table 12B-N1: Trial Combination of One Up-Quark and Two Down-Quarks in TRUE Units as in the neutron (N^0)

Particle	Charge	Mass/Energy	ג	Total TRUE Units	MREV
u	+ 2	4	-1	3	27
d_1	- 1	9	-5	4	64
d_2	- 1	9	-4	5	125
Totals	**0**	**22**	**-10**	**12**	**$216=6^3$**

In conformance with Bohr's solution of the EPR paradox (the Copenhagen interpretation of quantum mechanics [100]), newly formed elementary entities do not exist as localized particles in 3S-1t until a 3S-1t measurement or observation is made. We propose that this is only possible if *all* TRUE units are undetectable in 3S-1t, before observation and measurement. This means that they exist in the substrate underlying all dimensional domains and will manifest as either mass/energy, or ג units, to exhibit the logical patterns of the substrate in observable symmetrically stable 3S-1t forms. In this way, the encompassing substrate, the additional five plus dimensions of the nine-dimensional structure of reality, organizes the 3S-1t world that we experience through the physical senses and their extensions into discrete forms.

The mathematical distribution of TRUE units cannot result in the appearance of negative ג units in the internal structure of an entity. A triadic entity with negative total ג units is not possible because a negative number of total ג units would violate the conservation of mass and energy, destroying the particle's equilibrium and identity. Why? Because analogous to the axiom 'nature abhors a vacuum', a result of the second law of thermodynamics, just as the electrons of an incomplete shell rush around the entire volume of the shell trying to fill it, negative ג units would cause TRUE units of the mass/energy of the particle to fill the void and the measurable mass/energy of the particle would no longer be that of a proton or neutron, and conservation of mass/energy in 3S-1t would be violated because the measured mass/energy equivalence would be changed and the proton or neutron would become unstable.

Attempting to use the smallest integer solution, (3, 4, 5, 6) of the Conveyance Equation to find the appropriate values of ג for both the proton and neutron, we obtain negative total ג unit values. This would change the particle's measurable mass/energy identity and violate conservation of mass and energy, so this solution of the conveyance equation will not work and we continue to look for an appropriate solution. The next numerically smallest integer solution

for the Conveyance Equation is $\mathbf{1^3 + 6^3 + 8^3 = 9^3}$, but, using it also results in negative values of gimmel.

Therefore, the smallest integer solution of the conveyance equation that produces no negative values of ג and also no zeroes for the Proton is $\mathbf{6^3 + 8^3 + 10^3 = 12^3}$.

Using this solution, we have the electrically and symmetrically stable Proton. This would mean if we adequate figures for the Neutron (and the Electron) then our calculations would be viable for symmetrical, stable particles. [t]

Table 12A-P2: The Proton (P^+) Solution

Particle*	Charge	Mass/Energy	ג	Total TRUE Units	MREV
$\mathbf{u_1}$	+ 2	4	2	6	216
$\mathbf{u_2}$	+ 2	4	4	8	512
$\mathbf{d_1}$	- 1	9	1	10	1,000
Total	**+ 3**	**17**	**7**	**24**	$\mathbf{1728=12^3}$

Nature, reflecting the patterns of the dimensional substrate, does not have to rely upon random particle encounters to build complex structural forms. Compound structures are formed within the mathematical organization of the Conveyance Equation, and useful building blocks have a significant level of stability in 3S-1t for protons to combine with other compound particles and create structures sufficiently complex to support life. To see how other structures arise from quarks, protons and electrons, we need to know how protons, neutrons and electrons relate to the Conveyance Equation: $\mathbf{(X_1)^3 + (X_2)^3 + (X_3)^3 = Z^3}$. If the total number of TRUE units in the proton is equal to the integer $\mathbf{X_1}$, the number of TRUE units in the neutron = $\mathbf{X_2}$, the number of TRUE units in the electron = $\mathbf{X_3}$, then the resulting compound entity, will be stable in the 3S-1T domain of physical observations.

[t] Up-quarks are designated u, and down-quarks as d: u_1 and u_2 in the proton, have the same number of TRUE units of mass and energy, and therefore will register as up-quarks in the collider data, but have different numbers of TRUE units of equivalent volume participating as ג to produce the volumetrically symmetric, and therefore stable, (and also vary in spin proportions of 0.5) We could refer to u_1 and u_2 using another method of particle description commonly employed in physics, namely distinction by color, as in chromodynamics theory (QCD). We would have little difficulty, e.g., saying that because the stable quarks in the proton come in threes and they could be referred to as 'green' for u_1 and 'yellow' for u_2 which have the same mass and energy in collider data but have different third substance gimmel values and are therefore different in the combination. With this scheme, it is clearly indicated that stable quarks are in fact triadic, occurring only in threes in the proton. The d_1 for the down-quark could be another color, e.g., 'orange'. The converse applies to the neutron, which is still triadic with three stable quarks but this time what is referred to as 2 down-quarks would be the d2 and d3 and the colors could be "blue" and "red" but again reflecting the mass-energy collider data of down-quarks, plus say a "purple" for u3, the third up-quark.

We know that the 24 TRUE-unit Proton must combine with an electron to form a Hydrogen atom, and with other protons, electrons and neutrons to form the other elements. In order to find the smallest solution of the conveyance equation that can include the 24 TRUE units of the proton, we may start by trying the solutions we've used so far.

24 is a multiple of 2, 3, 4, 6, and 8, any one of which can be a factor of $\mathbf{X_1}$ in the conveyance equation solutions we've used so far. Up to this point we've only used the first two of the smallest primitive integer solutions of the equation: $\mathbf{3^3 + 4^3 + 5^3 = 6^3}$ and $\mathbf{1^3 + 6^3 + 8^3 = 9^3}$. (A primitive Diophantine solution is defined as one without a common factor in all terms.) We have also tried to use $\mathbf{6^3 + 8^3 + 10^3 = 12^3}$, an integer solution obtained by multiplying all of the terms of the smallest primitive solution by 2. The first 36 integer solutions of the conveyance equation $\mathbf{(X_1)^3 + (X_2)^3 + (X_3)^3 = Z^3}$ are listed below in ascending order. Primitive solutions are in bold in Table 3.

Table 12C: The First 36 Conveyance Equation Integer Solutions for n=m=3.

$\mathbf{3^3 + 4^3 + 5^3 = 6^3}$	$\mathbf{1^3 + 6^3 + 8^3 = 9^3}$	$6^3 + 8^3 + 10^3 = 12^3$
$2^3 + 12^3 + 16^3 = 18^3$	$\mathbf{3^3 + 10^3 + 18^3 = 19^3}$	$\mathbf{7^3 + 14^3 + 17^3 = 20^3}$
$12^3 + 16^3 + 20^3 = 24^3$	$\mathbf{4^3 + 17^3 + 22^3 = 25^3}$	$3^3 + 18^3 + 24^3 = 27^3$
$\mathbf{18^3 + 19^3 + 21^3 = 28^3}$	$\mathbf{11^3 + 15^3 + 27^3 = 29^3}$	$15^3 + 20^3 + 25^3 = 30^3$
$4^3 + 24^3 + 32^3 = 36^3$	$18^3 + 24^3 + 30^3 = 36^3$	$\mathbf{2^3 + 17^3 + 40^3 = 41^3}$
$\mathbf{6^3 + 32^3 + 33^3 = 41^3}$	$\mathbf{16^3 + 23^3 + 41^3 = 44^3}$	$5^3 + 30^3 + 40^3 = 45^3$
$3^3 + 36^3 + 37^3 = 46^3$	$27^3 + 30^3 + 37^3 = 46^3$	$24^3 + 32^3 + 40^3 = 48^3$
$8^3 + 34^3 + 44^3 = 50^3$	$\mathbf{29^3 + 34^3 + 44^3 = 53^3}$	$\mathbf{12^3 + 19^3 + 53^3 = 54^3}$
$\mathbf{36^3 + 38^3 + 42^3 = 56^3}$	$15^3 + 42^3 + 49^3 = 58^3$	$21^3 + 42^3 + 51^3 = 60^3$
$30^3 + 40^3 + 50^3 = 60^3$	$7^3 + 42^3 + 56^3 = 63^3$	$\mathbf{22^3 + 51^3 + 54^3 = 67^3}$
$\mathbf{36^3 + 38^3 + 61^3 = 69^3}$	$\mathbf{7^3 + 54^3 + 57^3 = 70^3}$	$\mathbf{14^3 + 23^3 + 70^3 = 71^3}$
$34^3 + 39^3 + 65^3 = 72^3$	$38^3 + 43^3 + 66^3 = 75^3$	$31^3 + 33^3 + 72^3 = 76^3$

The numbers appearing in the totals in the tables describing quarks, protons, neutrons and atoms are the smallest possible non-negative integers consistent with the empirical data and the requirement for symmetry that the sum of the three totals cubed must equal an integer cubed. Thus, we can calculate the number of ג units involved, and the totals of TRUE units required by the conveyance equation to yield results consistent with empirical particle collider data. Note that the TRUE units in these tables, consistent with 3S-1t observation, are measurements of three-dimensional objects in multiples of the unitary linear measure of their volumes, and their minimal rotational equivalence volumes (MREV), listed in the last column, are equal to the TRUE unit values cubed.

As indicated, negative values for ג cannot occur because of the conservation of mass and energy as negatives would destroy the mass/energy/ג balance and turn the quarks into unstable combinations which would decay quickly. Note that unstable quarks, e.g. top, charm or bottom quarks, will likely fall into specific unstable series of conveyance Diophantine equations. But this is a subject for further research. For now, we must find the smallest *unique* conveyance equation solution for each combination of sub-atomic particles. Nature is parsimonious, and we must never make a mathematical description or demonstration any more complicated than it has to be. The correct unique solution can be found for each triadic sub-atomic particle by starting with the smallest integer solution of the conveyance equation and moving up the integer scale by trial and error, until no negative values are obtained. Also, a solution with the total for any term equal to zero cannot be allowed, because, in that case, there would be no solution as the resulting Diophantine equation and the Fermat inequality would apply. Using the solution $6^3 + 8^3 + 10^3 = 12^3$, the first attempt to find the TRUE unit configuration of the neutron is shown below:

Table 12B-N2: The Neutron (N^0) Solution

***Trial Combination* of One Up-Quark and Two Down-Quarks in TRUE Units**

Particle	Charge	Mass/Energy	ג	Total TRUE Units	MREV
$\mathbf{u_1}$	+ 2	4	2	6	216
$\mathbf{d_1}$	- 1	9	-1	8	512
$\mathbf{d_2}$	- 1	9	1	10	1000
Totals	**0**	**22**	**2**	**24**	**$1728=12^3$**

Since this solution still produces a negative value of ג for d1, we must move to the next larger solution to represent the Neutron. The smallest unique Conveyance Equation solution with no negative or zero values of ג for the stable Neutron is 93 + 123 + 153= 183

These TRUE unit numbers give us a stable neutron; but now we have another problem: None of the solutions with a term equal to 24 have a second term equal to 36. Nor do any of the solutions listed have two terms with the ratio 24/36 =2/3. This is a problem because it means that atoms with equal numbers of protons and neutrons could not be stable because they would not satisfy any of the solutions of the conveyance equation, and we know that the element Helium, and other elements are stable combinations with equal numbers of protons and neutrons.

Table 12B-N3 Trial of Quark Combinations for the Neutron (N^0)

Particle	Charge	Mass/Energy	ג	Total TRUE Units	MREV
u_3	+ 2	4	5	9	729
d_2	- 1	9	3	12	1,728
d_3	- 1	9	6	15	3,375
Totals	**0**	**22**	**14**	**36**	**$5{,}832=18^3$**

We now apply the stable proton and neutron to the smallest element with both neutrons (hydrogen does not have a neutron) and protons. To describe a stable neutron, proton, electron combination, the conveyance equation solution would have to be either $4^3 + 24^3 + 32^3 = 36^3$, $18^3 + 24^3 + 30^3 = 36^3$, or some other combination of the integers 24 and 36. For example: looking at the TRUE-units analysis of Helium, with protons consisting of 24 TRUE units and neutrons consisting of 36 TRUE units, we have:

Table 12D-He1: Attempt to Construct a Helium Atom with $P^+ = 24$ and $N^0 = 36$

Particle	Charge	Mass/Energy	ג	Total TRUE Units	MREV
2e	- 6	2	78	80	512,000
$2P^+$	+ 6	34	14	48	110,592
$2N^0$	0	44	28	72	373,248
Totals	**0**	**80**	**120**	**200**	**$995{,}840=(99.861\ldots)^3$**

The number of TRUE units making up the electron is unknown at this point. This value was chosen because it is the integer value that produced a total MREV nearest to a cube, as it must be for a stable Helium atom. So these figures for protons or neutrons or electrons must be incorrect with us applying the derived figures: We have found that the smallest integer value in TRUE units that can satisfy the conveyance equation to produce a stable proton is 24, and the smallest integer value in TRUE units that can produce a stable neutron is 36. But, if the proton consists of 24 TRUE units and the neutron consists of 36 TRUE units, or multiples of these integers, atoms with equal numbers of protons and neutrons, like Helium, cannot combine to satisfy the conveyance equation. This would contradict the empirical fact that stable Helium atoms do exist, so, following the law of parsimony, i.e. using the smallest possible integers, we have to seek another integer solution of the conveyance equation for the neutron.

Table 12B-N4 The trial that works of Quark Combinations for the Neutron N^0

Particle	Charge	Mass/Energy	ג	Total TRUE Units	MREV
u_3	+ 2	4	3	7	343
d_2	- 1	9	5	14	2,744
d_3	- 1	9	8	17	4,913
Totals	**0**	**22**	**16**	**38**	**$8{,}000=20^3$**

Next, we need to see if this quark combination for the neutron combined with protons and electrons will yield stable atomic structures. Using these values for P^+ and N^0, the first integer solution of the conveyance equation containing the values $X_1 = 24$ and $X_2 = 38$, or multiples of them, is obtained by multiplying both sides of the primitive solution $12^3 + 19^3 + 53^3 = 54^3$ by 2, yielding the integer solution $24^3 + 38^3 + 106^3 = 108^3$.

Note that we have different kinds of quarks with different ratios of mass/energy to gimmel: There are three different kinds (or colors) of up-quarks u1, u2, u3 with u3 in the neutron being different from the u1 and u2 in the proton. Similarly, d1 in the down quark of the proton, is different from the d2 and d3 in the neutron. Therefore, each up quark and each down quark is triadic. They logically come in threes fitting the integer solutions to the conveyance equation.

Table 12D-He2: Helium Atom with $P^+ = 24$ and $N^0 = 38$

Particle	Charge	Mass/Energy	ג	Total TRUE Units	MREV
2e	- 6	2	210	212*	9,528,128
$2P^+$	+ 6	34	14	48	110,592
$2N^0$	0	44	32	76	438,976
Totals	**0**	**80**	**256**	**336**	**$10{,}077{,}696=216^3$**

With the TRUE units determined for protons and neutrons, the Helium atom is stable only if the total number of TRUE units for the electron is 106.

Besides the TRUE units that appear as mass/energy in given elementary particles, because of the embedded nature (dimensional tethering) of dimensional domains in TDVP, there must be a minimum number of ג units associated with each particle for stability. Consistent with up- and down-quark decay from the strange quark, the stabilization requirement of an integer solution for the conveyance equation, and the additional TRUE units of ג needed for particle stability, the following Table 4A describes the electron, proton and neutron in TRUE units, with up

quarks composed of a total of 24 TRUE units, down quarks composed of a total of 38 TRUE units and electrons composed of a total of 106 TRUE units. $106^3+24^3+38^3=108^3$

It therefore represents the normalized mass/energy, minimum ג and total volumes for stable electrons, protons and neutrons, the building blocks of the physical universe.

Whether mass, energy or gimmel (ג), upon measurement, each TRUE unit of the substance of reality occupies the same volume, i.e. the minimal volume for an elementary particle as a spinning object, as required by relativity and defined in TDVP as the basic unit of volume is consistently the same for any electrons (106 with 105 gimmel), protons (24 with 7 gimmel) and neutrons (38 with 16 gimmel).

Each TRUE unit is capable of contributing to the structure of physical reality as **m**, **E** or ג to form a stable particle, according to the logical pattern in the substrate reflected in the Conveyance Equation, and the relative volume of each particle (in the three dimensions of space) is equal to the total number of TRUE units cubed times the shape factor.

Table 12E1: The Building Blocks of the Elements in TRUE Units

Particle	Charge	Mass/ Energy	ג	Total TRUE Units	Volume
e	- 3	1	105	106	1,191,016
P^+	+ 3	17	7	24	13,824
N^0	0	22	16	38	54,872

As noted before, the shape factor of any regular form always cancels out of the conveyance equation. (As demonstrated above for the sphere, the shape factor, **4/3π,** occurs in all terms of the equation, and thus can be cancelled by dividing both sides of the equation by **4/3π**.) *Thus the same equation is obtained regardless of the shape of the particles, as long as the shape and substance is the same for all three particles).* For this reason, the right-hand column in these tables contains *cubed integer amounts* representing the *Minimum Relative Equivalence Volume (MREV)* for each particle making up the combination of sub-atomic particles.

The TRUE unit values for these elementary particles are uniquely determined by conditions necessary for the existence of a stable universe. The values for up- and down-quarks are the necessary values for the proton and neutron, as determined above, and the number of ג units and the total TRUE units for the electron are determined by calculating the ג units necessary to form

stable atoms like the Helium atom. They also determine the smallest possible stable atoms, Hydrogen H1, Deuterium H2 and Tritium H3, as shown below.

Atoms are semi-stable structures composed of electrons, protons and neutrons. They are not as stable as protons and neutrons, but they are generally more stable than molecules. Some molecules, like H_2O, are more stable than others ostensibly because of higher gimmel content, but all of the factors that contribute to stability must be considered, especially symmetry.

HYDROGEN AND THE ELEMENTS OF THE PERIODIC TABLE: APPLYING GIMMEL (PART 13)

The Hydrogen atom is unique among the natural elements in that it has only two mass/energy components, the electron and proton. Thus, because Fermat's Last Theorem prohibits the symmetrical combination of two symmetrical particles; they cannot combine to form stable structures like the combination of quarks to form the proton and neutron. The electron, with a small fraction of the mass of the proton, is drawn by electric charge to whirl around the proton, seeking stability. *This means that the Hydrogen atom, the elemental building block of the universe, composed only of the mass and energy of an electron and a proton, is inherently unstable.* So why is it that we have any stable structures at all; why is there a universe? As Leibniz queried: "*why is there something rather than nothing*"?

One of the $\mathbf{X_n}$ integers must be 24 to represent the TRUE unit value of the proton, and one must be 38 to represent the TRUE unit value of the neutron. Among the integer solutions of the **m = n = 3** conveyance equation listed above there are no primitive solutions with 24 and 38 as solution integers. But we can multiply the primitive solution $\mathbf{12^3 + 19^3 + 53^3 = 54^3}$ by **2** to get $\mathbf{24^3 + 38^3 + 106^3 = 108^3}$. Since there are no smaller integer solutions with 24 and 38 as terms in the left side of the equation, we can try the solution that provided a stable Helium atom: $\mathbf{24^3 + 38^3 + 106^3 = 108^3}$.

Since the Proton required 17 mass/energy units and 7 ג units, adding up to 24 Total TRUE units, to achieve triadic stability (see Tables describing the Proton), to achieve the same level of stability as the proton and neutron, the Hydrogen atom must have a third component. This satisfies the conveyance equation and produces a stable Hydrogen atom with a total volume of 108^3.

Using these calculations to represent the Hydrogen atom, we have:

Table 13A-H1 TRUE-Unit Analysis for Hydrogen 1 (Protium), Valence = 1*

Particle	Charge	Mass/Energy	ג	Total TRUE Units	Volume
e	- 3	1	105	106	1,191,016
P^+	+ 3	17	7	24	13,824
ד	0	0	38	38	54,872
Totals	**0**	**18**	**150**	**168**	**1,259,712=108^3**

By definition, the valence and the number of valence electrons is the same number for Hydrogen.

At this point, we are uncertain if this is the same third substance we have called gimmel, or could it be a fourth substance which we might call daled that is substituting for the TRUE units of the electron. We therefore provisionally call it Daled, the fourth letter of the Hebrew alphabet knowing that daled might turn out to be synonymous with gimmel ג . Differentiation at this point might be academic whether gimmel or daled are, in effect, the same, but it is critical to have this dichotomy at present. We could postulate that the Daled is just simply Gimmel ג again and write it in our tables as C ג ("C-gimmel") consisting of 38 units of that third form of the 'stuff' of reality. This way we recognize it is not measurable as mass or energy. The substitute for the lack of neutrons in Hydrogen-1 (Protium) is then in the form of gimmel or daled. This way, the fact that Hydrogen is stable and ubiquitous in the universe is explained and Hydrogen goes from an unstable compound to the compound with the most gimmel/daled of all the elements. For convenience, we're just labeling this ג.

However, this gives the Hydrogen atom far the most gimmel /daled. If that third and fourth (or further third) substance has substantial consciousness, this chemical hydrogen should be the major component in our cosmos in regard to something as opposed to nothing. And, as we know, Hydrogen is by far the most abundant and by far the most reactive element in the cosmos[101].

Yet, without the ג units needed by Hydrogen to achieve stability, the universe as we experience it could not exist. The TRUE units of the two symmetrically stable entities found in the Hydrogen atom, the electron and proton, could not combine to form a third symmetrically stable entity (Fermat's Last Theorem). Because they could not combine symmetrically, they would spiral and be easily separated by any external force. Even if they could adhere to other particles, the resulting universe would be very boring. All multiples of such a building block would have the same chemical characteristics. With the input of the appropriate number of ג units, however, Hydrogen exists as a basic building block of symmetrically stable forms in the 3S–1t observable domain of the physical universe we experience.

In 3S-1t, TRUE units can manifest as mass, energy or ג, in order to form symmetrically stable particles and the 168 total TRUE units of the Hydrogen 1 atom may be arranged in another stable structural form, observed as the simple combination of one electron, one proton and one neutron, known as Deuterium, an isotope of Hydrogen (an atom with the same chemical properties).

Hydrogen 2 (H2) (also called Heavy Hydrogen) is held together by electrical charge and 128 ג units, 22 less than the H1 atom. This means that H2 is not as stable as H1. But it still means that satisfying the conveyance equation we should be dealing with a somewhat stable element even if it is an isotope.

TABLE 13A- H2 TRUE-Unit Analysis for Hydrogen 2 (Deuterium), Valence = 1*

Particle	Charge	Mass/Energy	ג	Total TRUE Units	Volume
e	-3	1	105	106	1,191,016
P^+	+3	17	7	24	13,824
N^0	0	22	16	38	54,872
Totals	**0**	**40**	**128**	**168**	**$(108)^3$**

What about other isotopes of H1? Is it possible that the TRUE units of a Hydrogen atom or a Deuterium atom can combine with one or more additional neutrons to form stable isotopes? Hydrogen 3 (H3), known as Tritium, is a second isotope of Hydrogen. Its form in TRUE units is represented below.

We see that H3 is an asymmetric structure. One electron, one proton and two neutrons, brought together by attractive forces, cannot combine volumetrically to form a symmetrically stable structure, and as a result, it is unstable and there are very few H3 atoms.

TABLE 13A- H3 TRUE-Unit Analysis for Hydrogen 3 (Tritium), Valence = *-1 + 2 = 1*

Particle	Charge	Mass/Energy	ג	Total TRUE Units	Volume
e	- 3	1	105	106	1,191,016
P^+	+ 3	17	7	24	13,824
$2N^0$	0	44	32	76	438,976
Totals	**0**	**62**	**144**	**206**	**$(118.018\ldots)^3$ ***

Looking at the TRUE unit structure for H1, H2 and H3, we see that all three are bonded by electrical charge, but H1 has volumetric stability and 150 ג units holding it together; H2 has volumetric stability, more mass/energy units and fewer ג units than H1; and H3 has more mass/energy units and ג units, but no volumetric stability.

This explains why H1 is the most abundant, H2 less abundant, and H3 correspondingly less stable. The atomic weights of the elements of the periodic table, in *"amu"* (atomic mass units),

are actually the mean values of atomic masses calculated from a great number of samples. The accepted mean atomic weight for Hydrogen to four significant figures is 1.008. This includes H1 and all isotopes of Hydrogen. If all hydrogen atoms were H1 atoms, this number would be exactly 1. H1 is by far the most stable, and therefore, most abundant, of the Hydrogen family, making up more than 99. 99% of all Hydrogen in the universe. [112] Other H isotopes make up the remaining 0.01%, mostly H2, with H3 and other isotopes heavier than H2 occurring only rarely in trace amounts.

THE NINE-DIMENSIONAL FINITE SPIN MODEL (PART 14)

We have demonstrated that a 9-dimensional model is mathematically justified, and we have, inter alia:

- derived the equivalent of a spinning Cabibbo mixing angle [24-26 50] ;
- replicated this derivation by a thought experiment [76];
- demonstrated the need for 9-D in intrinsic angular momentum and electron intrinsic spin [28 50]
- explained the disappearing electron cloud [95] and we have demonstrated that
- either the electron shape is symmetrical but non-spherical, or the speed of light may be exceeded in extra dimensions without detection in 3S-1t [70]

A finite quantized 9-dimensional spin model explains previously unexplained phenomena, and reveals the existence of a third form of the substance of reality, (gimmel) creating and sustaining structural stability in an otherwise chaotic decaying universe. And a finite quantized 9-dimensional spin model requires triadic rotational equivalence units (TRUE) to describe it with mathematical and geometric consistency.

A 9D-spin model is mathematically consistent with the existence of the three finite, quantified dimensions of space, measured in integers, three dimensions of time, *measurable* in imaginary numbers, and three additional, subtly all-encompassing dimensions containing the other dimensional domains and their contents of mass and energy, but also containing the third form of content, gimmel, likely linked significantly with consciousness, which can be represented quantitatively by the mathematical inclusiveness of complex numbers. A further encompassing level of hyper-dimensionality is a discrete, transfinite domain which incorporates all nine dimensions and their contents.

The conveyance equation used to describe the combination of elementary particles observed in 3S-1t naturally consists of linear measurement integers cubed because the volumes of three-dimensional objects are described mathematically and geometrically as shape factors times the linear measures of the objects cubed. Note that, at least in theory, higher dimensional conveyance equations ($m > 3$) can be used to describe hyper-dimensional phenomena mathematically. The meta-mathematical calculus of distinctions has been designed by Close to handle the logical structure of multi-dimensional reality.

STABILITY AND PARTICLE BONDING (PART 15)

In this TRUE unit analysis of Hydrogen and its isotopes, we can identify the four forces that affect the stability of structures composed of protons, neutrons and electrons, holding together the entities that make up the physical universe. We postulate that they are, in order of strength:

- Dimensionometric tethering involves the space-like inclusion of each n-dimensional domain within the next higher (n + 1) dimensional domain, effectively linking ג (gimmel) with the mass/energy of subatomic particles. This linkage ensures the stability and symmetry of elementary particles, atoms and molecules in 3S-1t through the powerful binding forces of 9-dimensional rotation.
- the attractive forces of electrical charge,
- magnetism and
- gravity.

The first of these four mechanisms of symmetric stability is the organizing force of the transfinite substrate, mediated mathematically and dimensionometrically by the conveyance equation to produce *ordropy* (formerly called extropy or negative entropy). The last three are products of the resistance to the ordropy of 9D-spin and the dissipative force of universal expansion.

With regard to organizing tethering, structures with more ג units are more strongly connected with the nine-dimensional structure of the substrate of reality. Moreover, if the collection of elementary particles cannot combine to form a symmetric structure in accordance with the FLT restriction and an integer solution of the Conveyance Equation, the collection of particles will not stay together long, even if attracted together by gravity, magnetism and opposite charge to become electrically neutral. The stronger forces of rotational expansion and the impacts of external forces will cause such structures to spiral and fly apart.

It may seem odd that the ratio of ג units to mass/energy units for the electron in these three atomic structures is so much greater than for the other elementary particles. But, as we revealed above, these numbers are not arbitrary. Instead, they are dictated by the quantum nature of our ostensible experiential 3S-1t reality, and the integer solutions of the Diophantine equations of the Conveyance Expression.

In earlier publications, we have integrated units of ג, mass and energy through application of the principles of the Special Theory of Relativity and Quantum Mechanics, showing that they are equivalent in TRUE units. Thus, it should be expected that the volume the electron occupies in

each orbital shell contributes more to the number of TRUE units for the electron in contrast with the other particles occupying less volumetric equivalence.

Note that atomic and sub-atomic structures are spinning like vortical solitions connecting the dimensional domains. The stability of an atom is less than that of electrons, protons and neutrons. The stability of an atom depends upon whether its components can combine volumetrically, the attraction of the opposite electric charges of spinning electrons and protons, nuclear symmetric stability made possible by the existence of gimmel, and the symmetry created by their high rate of rotation, or vortical spin.

It is, en passant, interesting that electrons are relatively far removed from the atomic nucleus. Conventional particle physics has always argued that weak electromagnetic forces hold the electron together, but this work suggests that with 9-D spin and far greater gimmel, that the overriding component may well be the role of the proportion of gimmel linked with the physical mass-energy components of electrons in our 9-D reality. This would make much more sense and in fact that might be what so-called "weak forces" are all about. We just need to understand that particle reality is not just 3S-1t but a 9 dimensional spinning reality. The impact of the ג units in 3S-1t observations reflects the logic of the (hypothesized) conscious substrate, so thinking of ג as units of that third form of the substance of reality, including consciousness, working through the equations of the Conveyance Expression is justifiable, and comparing the ratio of ג units to mass/energy units for elementary particles, elements, molecules and compounds provides a relative measure of ostensible consciousness in all physical structures.

Finally, including protons, neutrons and electrons as building blocks, and using the models of H1 (Protium) and heavy hydrogen with a neutron (deuterium) H2, the entire periodic table of elements can be calculated with their physical and chemical characteristics significantly explained in terms of their structure in TRUE units.

In the conventional description of the combining of elements and molecules to form new entities, two basic types of bonding are identified: covalent and ionic. Covalent bonding is also described as atoms sharing outer shell (valence) electrons. Ionic bonding occurs when ions of opposite electrical charge, are drawn together. An atom is called an ion when it has a different number of electrons than protons, and an atom with more electrons than protons is called a negative ion (anion), and with fewer, it is called a positive ion (cation). These two types of bonding seem simple enough, but it appears that there are more complex compound types of bonding that require additional descriptions and visual representations: There is polar covalent bonding, non-polar and hybrid bonding. There are Hydrogen bonds, metallic bonds, and Van

der Waals bonds. We will not spend time discussing all of the types of bonding described in the current paradigm here, because TRUE unit analysis provides us with an almost entirely different way of understanding how particles combine, but we should be aware that these variations will impact potentially on the analysis of different compounds.

Looking at the TRUE-unit structure of quarks, Hydrogen, Deuterium and Tritium, we see that the way the sub-atomic components are combined determines the symmetry and stability of the resulting compound entity. When three elementary particles combine, like the three quarks of a proton or neutron, with the necessary units of ג, to form integral TRUE unit solutions, they are combined *volumetrically*, forming a new symmetrically stable structure. This type of combination is the most stable. There are no electrons to be stripped off and such a compound particle can only be broken apart under extreme conditions, like the extreme heat and pressure in the heart of a star, or the ultra-high-energy collisions of a particle collider.

In H1, all of the TRUE units of the sub-atomic particles, the electron and proton, with their quarks, have combined and re-organized to form a new symmetric structure. Thanks to the stabilizing ג units they have combined volumetrically to form a symmetrically stable and electrically neutral entity, the Hydrogen atom. So instead of being inherently unstable, as it would be if only composed of one electron and one proton, with the necessary units of ג, the Hydrogen atom is very stable. However, because it has only one electron in its outer shell, which has room for two electrons, it is not nearly as stable as the proton and neutron bonding of quarks. H2 is volumetrically stable, but has a lower ג-to-mass/energy ratio than H1, making it still less stable. H3 could not combine volumetrically because it is composed of four sub-atomic entities, not three (FLT again) so it is asymmetric and even less stable, held together only by the attraction of equal and opposite electrical charge. This is an example of an atom with unequal numbers of protons and neutrons and every one of these is less stable than those with equal protons, neutrons and electrons: When we analyze that subset, these are the potential atoms that are associated with either:

1. life, or
2. with frequent occurrence in the cosmos, such as inert gases like Helium and Neon [101]. However, in this instance, we propose that the absence of outer shells may make them very stable [12], but produces an almost complete inability to combine precluding their being life elements [1]

Table 15A-He3: Helium Atom with $P^+ = 24$ and $N^0 = 38$

HELIUM: Number of Valence Electrons = - 2 + 2 = 0 (Inert)

Particle	Charge	Mass/Energy	ג	Total TRUE Units	Volume
2e	- 6	2	210	212*	9,528,128
$2P^+$	+ 6	34	14	48	110,592
$2N^0$	0	44	32	76	438,976
Totals	**0**	**80**	**256**	**336**	**$(2x108)^3$**

Using TRUE-unit analysis, we can investigate every possible combination of H1 atoms and neutrons and determine which combinations are the most stable. After Tritium, the next stable combination of TRUE units, Helium, involves 336 TRUE units.

Why is this not called "quadrium", a third isotope of Hydrogen? It is a new element because it has two electrons filling its outer (and only) shell, so that it is not easily attached to other atoms.

Importantly we're already seeing a pattern: a multiple of 108 cubed for the total volumetric equivalent of Helium. We can hypothesize that empirically all stable atoms of life and inert gases that are distributed in the 3S-1t cosmos, should be a multiple of the 108 cubed: 108 is 3 cubed (=27), reflecting 3D volume, multiplied by four (=two squared), reflecting the 2D nature of the planes of rotation.

We hypothesize first that what we know empirically are the elements of life namely oxygen, carbon, nitrogen, sulfur, magnesium and calcium should show specific life properties including symmetry, stability and high gimmel to TRUE ratio.

Furthermore, we could propose that the noble, inert gases Helium and Neon because of their abundance should show the same stability features in terms of a similar high gimmel to TRUE ratio. But we could not initially predict this until the analyses in this paper.

Of course, we know that hydrogen should have extraordinary symmetry and stability and would expect it to have the most gimmel because it is far the most abundant element in the cosmos plus a fundamental life-sustaining element.

We would expect that some surprises may occur in our analyses. Silicon turns out to be life-sustaining: This is not predicted but after analysis making perfect sense. And we know that Phosphorus, Sodium and Chlorine are very much involved in life processes but not as fundamentally so as the elements above. So we were curious as to their gimmel and valence calculations.

These analyses are below. In this paper, we will find that the empirical analysis confirms this hypothesis which theoretically makes sense as well based on our hypothesis that mathematics does not occur just for calculation but as an intimate and integral (pun deliberate!) part of life and cosmological existence. Moreover, we hypothesize that when the cube root of the Volumetric equivalence score is not an integer, such atoms, molecules and compounds are less stable and less symmetrical (we know that as in these chemicals, neutrons ≠ protons so they cannot be symmetrical).

New elements arise when a unique new combination of TRUE units, constructed using multiples of the basic building blocks of electrons, protons and neutrons is formed. The next element is the combination of the inert atom, Helium, with the asymmetric atom, H3 to form Lithium.

Table 15B LITHIUM, Valence Electrons = 3 - 2 = 1

Particle	Charge	Mass/Energy	ג	Total TRUE Units	Volume
3e	- 9	3	315	318	32,157,432
$3P^+$	+ 9	51	21	72	373,248
$4N^0$	0	88	64	152	3,511,808
Totals	**0**	**142**	**400**	**542**	**$(330.32\ldots)^3$ ***

Since the total volume is not an integer cubed, Lithium, like Tritium, is volumetrically asymmetric. It has a stronger electrical bond than H3 and more ג units connecting it with the multi-dimensional substrate for added stability, but it is less stable because it is asymmetric. Theoretically, Lithium should crave an atom like Hydrogen 1. This would produce a stable bonding Lithium hydride if the bonding were covalent. However, such bonding is ionic, not directly mechanically related to spin, and therefore this is why we do not see much lithium hydride in the cosmos and as a useful compound in living organisms.

Therefore, analyses of molecules involve TRUE stability tendencies but these must be calculated anew applying each TRUE calculations for each chemical radical (like –OH, or H^+). These compounds must exhibit stability to remain viable for long periods and this stability can be calculated based on their gimmel contents and shells along with their chemical bonding. Molecules exhibit different levels of stability just as there are with the elements themselves.

Stability based on TRUE units:
Clearly there are different levels of stability and symmetry for TRUE unit analyses.

Table 15C: Degrees of stability of atoms and molecules using TRUE analyses

Term	Examples	Property	Ratio of Gimmel to TRUE	Chemical relevance
STABLE	Natural substances	Generic for stability	High ratio	Elements, molecules, compounds
Hydrostable	Hydrogen	Extra gimmel/daled	Hydrogen very high; high ratio	No neutron
Superstable	Nitrogen, oxygen, S, P, Ca, Ma, Si, water	Elements and life-supporting molecules		N=P=E Readily combine with each other
Hyperstable	Helium, neon	Inert gases	High ratio	Atoms with full outer shells.
Dynamically Stable = Life permostable	RNA, DNA, Organic compounds	Major Vehicles of Life, Solitions	High ratio	Naturally regenerative
Protostable / existent permostable.	Metals and metallic compounds	Exist on earth naturally	Inconsistent but low ratio Semi-stable	N≠P P=E elements
UNSTABLE				
Naturally Unstable	Naturally occurring Isotopes	Volatile	Low ratio	N≠P P=E or P≠E
Artificially Unstable	Higgs boson, muons, Neutrino, antimatter	Collider induced, Interactive	Unknown Probably extremely low	Interaction with particles produces little or no chemical change

We cannot just have a dichotomy of "stable" / "unstable" that we use in colloquial English. Current terminology such as stable and unstable is insufficient to portray differences in the molecules, atoms and subatomic particles that make up our cosmos. The stability levels vary:

We describe decreasing hierarchies of stability: Hydrostable, Superstable, Hyperstable, Protostable, Naturally unstable and Artificially unstable.

Hydrostable refers to elements with more gimmel/ daled instead of a neutron. This is unique for Hydrogen as the most prevalent element in the cosmos and the most reactive one in the elements of life. It does not have a neutron and instead has more "gimmel" equivalent. But we don't know that this is the same "gimmel" so we call it "daled". This is needed for its properties and we contrast that with helium.

We introduce the concept of "superstability" [1] pertinent for elements of life: *Superstable* occurs where N=P=E readily combine *life elements* (e.g. N , O , S, Ca, Mg, Si). *Hyperstable* is where N=P=E but inert (e.g. He, Ne): "hyperstability" is for the inert gases with equal protons and neutrons like He, Ne) and complete electron shells.

Permostable refers to natural elements on earth where N≠P and the elements are not integral. There are in between elements such as sodium and magnesium, chlorine and iodine are reactive but do not fit the equal N, E, P requirement and do not exhibit any integral cubes. They exhibit lesser stability and are stable. But they can become more stable as compounds.

"Permostable" (permanent stable) is for those elements and chemicals that are persistent not transient: But these have degrees of permostability and life reactivity so the one would be *"life permostable"* like sodium, and the other does not naturally interact with life though may sometimes be trace elements or used for medication (*"existent permostable"*). One major difference would be dependent on proportion of gimmel to TRUE.

Dynamically stable is for critical but complex compounds (e.g. DNA, RNA, organic compounds).

Finally, there is "unstable" like isotopes for those that are ephemeral, impermanent, momentary or fleeting such as H3, but which still exists naturally. Then there are the artificial unstable groups such as those produced only in collider data like the Higgs boson. (Table 15C stability)

Naturally unstable: By contrast, elements that are ephemeral and volatile are asymmetric and unstable because their TRUE values are not integral: They are natural isotopes occurring in low ratio. We must distinguish from *Artificially unstable:* relates to particles developed artificially in colliders (e.g. Higgs Boson, neutrinos, muons) from LHC data.

THE TERTIARY LEVEL OF SYMMETRIC STABILITY – MOLECULAR BONDING (PART 16)

We've seen how quarks combine in very stable symmetric triads of TRUE units and how atoms form stable or semi-stable vortices, spinning structures consisting of stable triads of protons, neutrons and electrons. A third level of stable and semi-stable structures occurs as molecules are formed from more complex combinations of elemental atoms.

The Role of Valence

The number of electrons in the outer shell of an atom determines the observable identifying chemical characteristics of an element and with which other elements it can combine. Valence is a measure of reactivity, and is defined as the available spaces for electrons in the outermost shell of an atom, or the number of electrons available in the outer shell, whichever is smaller. Due to the quantized attractive force of electrical charges, arising from quantized angular momentum and spin, electrons are attracted to the oppositely charged protons in the nucleus of an atom. Electrons, having a mass of 1/17th of the effective mass of the protons, are also pulled by gravity into orbit around the protons of an atom, forming specific finite nested concentric dimensional domains called "shells" enclosing the atom. Valence affects the relative abundance of elements and compounds by determining whether they can combine with other elements and molecules, and with which ones.

Table 16A: TRUE size for each shell maxima

Shell # = Quantum No. *n*	Maximum number of electrons (= $2n^2$)	TRUE maximum ($2n^2$ x106)	Examples of maximum Outer shell elements	Atomic number (Noble gases)
Shell #1	2	212	Helium	2
Shell #2	8	848	Neon	10
Shell #3	18	1908	Argon	18
Shell #4	32	3392	Krypton	36
Shell #5	50	5300	Xenon	54
Shell# 6	72	7632	Radon	86

Using TRUE unit analysis, we find that, as a consequence of the size of the atom and the electron in TRUE units, the first shell has a volume of 212 TRUE units, the exact volume of two electrons. The second shell, with a larger diameter, has a volume of 848 TRUE units, and thus can contain 848/106 = 8 electrons. The maximum number of electrons that each shell can

accommodate can be found by determining the volumetric equivalence of each shell in TRUE units. The maximum number of electrons in shells 1 through 6, respectively, is 2, 8, 18, 32, 50, and 72. Therefore the TRUE size for each shell is as per **Table 9**.

As more complex atomic structures are formed by the addition of more of the building blocks, the finite volumes of the electron shells are filled with electrons, one after the other.

Atoms combine to form stable or semi-stable molecules in mathematically predictable ways, depending on the number of electrons in their outer-most shells. If an atom, even though electrically neutral and symmetrically stable, has room for one or more electrons in its outer shell, it can combine with another atom with that number of electrons in its outer shell to form a new structure.

An H1 should theoretically potentially be able to naturally combine with both positive and negative valence elements. This should make it particularly versatile but in reality it seems to combine with negative valences e.g. H^+ and $0H^-$ to H_2O = water. But we do not see H^- combining with cations.

For example, an H^1 Hydrogen atom, which has one electron in its two-electron-capacity shell, can combine with $Lithium^+$, which has its first shell filled, and one electron in its second shell. Yet in another example of electron bonding, two Hydrogen atoms, with a combined two electron deficiency in the outer shells, can bond with one Oxygen atom which has two electrons in its outer shell.

The first compound, Lithium Hydride, is never found in nature, while the second, H_2O, is the most abundant compound in nature. Why?

We are now in a position to explain things with TRUE unit analysis that are not fully understood or well explained by the Standard Model of atomic structure. For example, why are some elements and compounds more abundant in nature than others? Why is the simple valence-bonded compound Lithium Hydride never found in nature, and is very unstable and yet reactive with other substances. In contrast, Hydrogen Hydroxide (water), an only slightly more complex compound, is very abundant in nature?

The current paradigm tries to explain compound bonding in terms of outer shell electrons, largely ignoring the rest of the atom. With TRUE-unit analysis, we see that when bonding occurs, some compounds are able to form symmetric structures, while others are not. Lithium Hydride is not able to do so. The reasons for this involve the total TRUE units of the whole structure, including the other electron shells and the nucleus, not just the outer electron shell.

To illustrate this point, we can compare the TRUE unit analyses for LiH and H_2O.

Table 16B2 Lithium Hydride, Valence = 10 - 4 = 6

Atoms	Particles	Charge	Mass/ Energy	ג	Total TRUE Units	Volume
Li+H	4e	-12	4	420	424	76,225,024
	$4P^+$	+12	68	28	96	884,736
	$4N^0$+C ג	0	88	102	190	6,859,000
Totals	**0**	**0**	**160**	**512**	**672**	**83,968,760= $(437.89\ldots)^3$**

Lithium hydride is never found in nature; water is, of course, critically important and abundant, the most necessary life sustaining molecule. We would expect the gimmel score of water to be extremely high, if not the highest of any molecule. This turns out to be so when applying the compounds we have analyzed. Clearly, we would propose that water is a multiple of 108 cubed.

Table 16C1 H_2O, Water, Valence = 10 - 10 = 0

Atoms	Particles	Mass/ Energy	ג	Total TRUE Units	Volume
2(H)+O	10e	10	1050	1060	1,191,016,000
	$10P^+$	170	70	240	13,824,000
	$8N^0$+2Cג	176	216	392	54,872,000
	Totals	**356**	**1,336**	**1,692**	**1,259,712,000 = $(1,080)^3$ =$(10x108)^3$**

Comparing the TRUE analysis for LiH with H_2O, we can readily see why H_2O is more stable, and consequently more abundant in nature. LiH is strongly electrically bonded, but symmetrically unstable, indicated by the fact that the total volume of H_2S is not a cube, and has a valence of +2, while H_2O is even more strongly bonded electrically, volumetrically stable, and has a stable outer electron shell with a valence of zero. H_2O also has 824 more units of ג connecting it more firmly with the multi-dimensional substrate. Importantly, the lack of cations with Hydrogen combinations in nature, relate to the general inability to form stable combinations.

It is also instructive to compare H_2O with H_2S because both are triadic (combinations of three atoms) and they are electrically balanced. Why are they so different?

This is explained by the difference in atomic structure: Oxygen has 8 protons and 8 electrons while Sulfur has 16 of each. The outer shell of the Oxygen atom (shell #2) lacks 2 electrons, while the outer shell of Sulfur atom (shell #3) has room for 12. When an Oxygen atom combines with 2 Hydrogen atoms, there are no openings for additional electrons to form other compound molecules, thus the valance of water is zero, while H_2S has 10 openings. In terms of TRUE analysis, molecules are to atoms as atoms are to sub-atomic particles, as elementary particles are to quarks and electrons, as quarks and electrons are to TRUE units.

Table 16D H_2S, Hydrogen Sulfide, Valence = - 28 + 18 = 10

Atoms	Particles	Mass/Energy	ג	Total TRUE Units	Volume
2(H)+S*	18e	18	1890	1908	6,946,005,312
	$18P^+$	306	126	432	80,621,568
	$18N^0+2C_3$	396	376	772	460,099,648
	Totals	**720**	**2,392**	**3,112**	**7,486,726,528** Cube root is 1956.27… This is not integer

Gimmel to TRUE ratio for Hydrogen sulfide is 76.87%.

If one were just to try additively, it appears that Hydrogen Sulfide could also be symmetric for gimmel and would have as high a figure as water: This would be puzzling because why is it then not a key substance. But it turns out on calculation that as would be expected based on their empirical chemical properties, whereas H_2O is symmetric in TRUE units, H_2S is not! In addition, the ratio of gimmel to the total TRUE for water is 1336/1692 = 0.79 compared to 0.77 for H_2S.

MORE QUESTIONS ANSWERED ON THE ELEMENTS, TRUE AND GIMMEL (PART 17)

One of the things that continues to motivate us to expend considerable effort applying the TRUE analysis to the elements of the Periodic Table, their isotopes, and chemical compounds, is the way it produces explanations of known observable phenomena for which there is no explanation in the current paradigm, like the intrinsic spin of fermions, the unique value of the Cabibbo particle mixing angle, and why quarks are only found in combinations of three in the natural elements. In this section we will answer the following additional heretofore unanswered questions:

- Why do atoms have electron shells surrounding their nuclei?
- The simplest of all atoms, the Hydrogen atom, with one electron and one proton, is stable and abundant in nature with no neutrons; so why does the next simplest atom, with two electrons and two protons, and every other atom, have neutrons?

TRUE Units, Gimmel And Atomic Structure

TRUE analysis has been developed analytically, based on the hypothesis that the observable universe is made up of forms that may *appear* to be categorically different, but that are in fact, manifestations of a single existential substance, obeying discoverable mathematical and geometrical laws. These laws including the axioms and principles known in the current scientific paradigm as the 'laws of physics' are describable, testable and can be validated or falsified using the calculus of distinctions. The calculus of distinctions (CoD) is a proto-mathematical system of symbolic logic developed by Close in1986 and published in 1990. [35] The CoD allows the inclusion of the organizing action of consciousness in the equations of science. Developed and expanded from George Spencer Brown's calculus of indications, [53] the CoD is not restricted to binary logic or conventional set theory, and is designed to operate on finite multi-dimensional forms as distinctions of *extent*, quantum substance as distinctions of *content* and mathematical and or logical transformations as distinctions of impact and intent.

In the same way points are contained within a line, a line is contained within a plane, and a plane is contained within a volumetric domain, the 3S-1t manifest forms of reality, energy, mass and gimmel, are contained within the substrate of reality, which we will call 'daled'. We have chosen the fourth letter of the Hebrew alphabet, because it comes after gimmel. Without the organization of gimmel in 3S-1t, we would have no indication that the primary form of substance (Daled) exists. In the mathematically consistent 9D domain of space, time and

consciousness, Daled exists as the logical *primary substrate*, *ground, or unmanifest foundation* from which all things are formed in accordance with universal logic.

In our 3S-1t domain of observation, contained within a mathematically describable 9D triadic reality, the substance of reality manifests in three forms: energy, mass and a third form needed to preserve symmetry: gimmel. Energy and mass are directly measurable as motion and inertia (resistance to motion), while gimmel manifests as the organizing factor, providing symmetry in accordance with the conveyance equation derived above. The stable combination of elementary particles is described both mathematically and geometrically by the Diophantine (integer) form of the conveyance equation, where the unitary measure is the mass/energy equivalent of the electron (the TRUE unit). Atomic structure is a product of this quantization of the substance of reality in multiples of TRUE.

The electron/photon is the first structured manifestation of daled as mass/energy and gimmel in 3S-1t. As determined analytically above, the electron has unitary mass/energy, measurable as one TRUE unit, and 105 TRUE units of gimmel. When the mass of the electron is converted to energy, the result is a finite amount of radiant energy propagated as an electromagnetic wave interacting with the finite forms of atomic structure as a photon, as demonstrated in Einstein's *photoelectric effect*. [83]

The unmanifest substance of reality (daled) would immediately expand in all directions to infinity if there were no resisting structure to prevent it or slow it down, and since the finite universe appears to have been expanding for more than 13 billion years, the substance of reality has been and may be effectively infinitely abundant at the sub-atomic level. Quantization of the substance into the triad of inertial mass, energy and gimmel, as it expands in 3D space is consistent with the conscious drawing of finite distinctions as described by the mathematical and geometrical logic of the calculus of distinctions. It is interesting to note that the primary dimensionometric form of quantized reality described by the calculus of distinctions is that of nested domains. In 3D, this consists of concentric spheres.

George Spencer Brown commented on this primary form of logical structure in "Laws of Form". Commenting on the self-informed expressions of multi-dimensional forms, he said: "*Such an expression is thus informed in the sense of having its own form within it, and at the same time informed in the sense of remembering what has happened to it in the past*." [53] He continued: "*Let us consider, for a moment, the world as described by the physicist. It consists of a number of fundamental particles, which, if shot through their own space, appear as waves, and are thus of the same laminated structure as pearls or onions …We have already arrived,*

even at this stage, at a remarkable and striking precursor of the wave properties of material particles." [53] [u]

Brown also says: *"I break off the account at the point where, as we enter the third dimension of representation, the connection with the basic ideas of the physical world begin to come more strongly into view."* This observation supports one of the basic hypotheses of TDVP, that mathematical logic reflects the underlying logical structure of reality. So it comes as no surprise to us that the form of the mathematical logic designed to describe the conscious drawing of distinctions in a multi-dimensional reality reflects the quantized structure of atoms existing in the observable 3S-1t universe. The atoms that make up the universe are in turn made up of triads of electrons, protons and neutrons, those protons and neutrons are made up of triads of quarks, and the atom is made up of triads of TRUE units of the three forms of the content substance or process of reality, mass, energy and gimmel.

The generalized conveyance equation, $\mathbf{\Sigma^{n}_{i=1}\ (X_n)^m = Z^m}$, expresses the combination of n particles that are symmetric in m dimensions. In three dimensions, the conveyance equation becomes $\mathbf{\Sigma^{n}_{i=1}\ (X_n)^3 = Z^3}$. For n = 2, this equation has no integer solutions, because of Fermat's Last Theorem. When n = 3, however, the conveyance equation becomes: $\mathbf{(X_1)^3 + (X_2)^3 + (X_3)^3 = Z^3}$ **.**

This equation has integer solutions. First, we found a unique integer solution for this equation where $\mathbf{X_1}$, $\mathbf{X_2}$ and $\mathbf{X_3}$ are the number of triadic rotational units of equivalence (TRUE) making up mass/energy quarks and gimmel to form stable protons and neutrons and in the nucleus of an atom. Then different unique integer solutions of this conveyance equation were found with new values of $\mathbf{X_1}$, $\mathbf{X_2}$ and $\mathbf{X_3}$ for each element, determining the number of TRUE units making up the protons, neutrons of the stable elements, and the electrons occupying the concentric shells encompassing the atoms. Finally, integer solutions of this equation also yield the number of TRUE units comprising stable combinations of atoms that form chemical compounds.

Why does Helium need neutrons?

In Dr. David Stewart's brilliant work integrating science and spirituality, *"The Chemistry of Essential Oils Made Simple"* [102], he notes that *"theoretically, the next simplest possible atom [after Hydrogen] would be two electrons orbiting around two protons …This would be Helium.*

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[u] From Brown's Chapter 11 in Laws of Form is the chapter on calculus of indications equations of the second degree, where imaginary forms come into the picture. [53]

...However, [this] is not how helium usually occurs in nature ... For some unknown reason, nature does not like Helium without neutrons."

To understand why the Hydrogen atom can be stable without neutrons while Helium cannot, we have to combine TRUE analysis with the Pauli Exclusion Principle which says that two fermions (particles with half-integer spin) of the same kind, e.g. electrons, protons or neutrons, cannot occupy the same quantum state simultaneously. There are four parameters called quantum numbers that define the quantum state of a particle, elementary or compound:

1. ***n-*** Principal quantum number (shell number): relative distance from the nucleus
- Identifies the shell or energy level in the structure of an atom or compound
- The maximum number of electrons in the n^{th} shell is $\mathbf{2n^2}$. [103]

2. ***l-*** Subshell, or sublevel quantum number
- Identifies the sublevel in ***n***; each energy level has ***n*** sublevels. (See the discussion of shells, sublevels, and orbitals below).

3. ***m-*** Magnetic quantum number
- Describes the **orbital** within each sublevel;
- Each sublevel has orbitals, each orbital can contain only 2 electrons.

4. ***S*** -Spin number
- Describes the spin of the electrons in an orbital
- We have determined that fermions can have either integer spin (1) or half (½) integer spin, relative to how many dimensional planes they are spinning in. [9; 27; 28; 32] Two electrons in the same orbital must have opposite spin directions.
- Possible spin directions are clockwise or counterclockwise.

Shells, Sublevels, and Orbitals

Definition: In the current particle physics paradigm, the term 'orbital' is used primarily to describe a space within an atom occupied by a pair of electrons. In the context of our discussion of the TRUE analysis using the calculus of distinctions to describe the 9D spin model of TDVP, it is a multi-dimensional distinction of content. For our purposes in this discussion, the term orbital refers to the multi-dimensional domain occupied by a given structural particle, elementary or compound.

The descriptions of shells, sublevels, and orbitals and how they relate to each other is often complex and confusing in physics text books and references. The following step by step description is offered for two purposes:

1. Clarifying the most commonly used terminology and
2. Explaining how TRUE analysis relates to and extends the current understanding of atomic structure.

Shell #1 has no sublevels, and can contain only 2 electrons in 1 orbital. [103]

Shell #2 has 2 sublevels: sublevel 1, called 2s, which has 1 orbital that can contain 2 electrons, and sublevel 2, or 2p, with 3 orbitals each of which can contain 2 electrons

Shell #3 has 3 sublevels: sublevel 1, called 3s, which has 1 orbital that can contain 2 electrons; sublevel 2, or 3p, with 3 orbitals each of which can contain 2 electrons; and sublevel 3, called 3d, which has 5 orbitals each of which can contain 2 electrons

Shell #4 has 4 sublevels: sublevel 1, called 4s, which has 1 orbital that can contain 2 electrons; sublevel 2, or 4p, with 3 orbitals each of which can contain 2 electrons; sublevel 3, called 4d, which has 5 orbitals each of which can contain 2 electrons; and sublevel 4, called 4f, which has 7 orbitals each of which can contain 2 electrons

In general, the sublevels within the shells of atomic structure have progressively more orbitals each of which contains increasing pairs of 2 electrons (1, 3, 5, 7) in the last orbital.

- s has 1 orbital; Shell #1 can contain 1x2 = 2 electrons
- p has 3 orbitals; Shell #2 can contain 1x2 + 3x2 = 8 electrons
- d has 5 orbitals; Shell #3 can contain 1x2 + 3x2 + 5x2 = 18 electrons
- f has 7 orbitals; Shell # can contain 1x2 + 3x2 + 5x2 + 7x2 = 32 electrons

The Pauli Exclusion Principle

The most common, well-known application of the Pauli Exclusion Principle is to electrons. The *Dictionary of Physical Chemistry* [104] describes it as: "The principle that no two electrons in an atom can have all four quantum numbers the same." But goes on to say: *"It was first formulated in 1925 by Wolfgang Pauli and more generally applies to the quantum states of all elementary particles with half-integral spin."* [104] It is the second, generalized definition that we want to focus on with relation to Hydrogen, Helium and other stable atoms, because the Pauli Exclusion Principle applies to all Hydrostable to Protostable entities from fermions to DNA. Importantly, the Pauli Exclusion Principle applies to all Hydrostable to Protostable entities from fermions to DNA. When we combine the Pauli Exclusion Principle with TRUE analysis, we can answer the

question: *"why is the Hydrogen atom stable without neutrons, while the Helium atom (and all more complex atoms) must have neutrons?"*

To answer this question we must determine the quantum numbers**, n, l, m,** and **s** for Hydrogen and Helium. To determine the quantum numbers for Hydrogen and Helium, we must solve the Schrödinger wave equation [105; 106] Because of the importance of these solutions of the Schrödinger wave equation for developing detailed descriptions of the elements of the Periodic Table, they have been derived many times by virtually every serious student of quantum physics, so we need not include the mathematical details here.

Because it appears that all of the elements of the Periodic Table are built up of combinations of Hydrogen and Helium, quantum physicists, Erwin Schrödinger [105; 106], Neils Bohr [72] and Werner Heisenberg [107] called this process the *Aufbau* process. ('Aufbau' is a German word meaning 'buildup': auf = upon, bauen = to build.)

Note that we must apply integer constraints to solve the Schrödinger wave equation for two reasons:

1. because mass and energy are quantized in 3S-1t; and,
2. because solutions to the wave equation are mathematically possible *if and only if* the constant appearing in the derivative providing a solution is restricted to the integer values **n** = 1,2,3,…

In other words, like the conveyance equation, the Schrödinger wave equation must be solved as a Diophantine equation because the physical reality it describes is quantized.
As a Diophantine equation, the Schrödinger wave equation, with appropriate parameters, completely describes the quantum state of an elementary or compound particle/wave. Converting all measurements of content and extent (mass/energy and volume) to Triadic Rotational Units of Equivalence (TRUE) makes the integer value of **n** in a solution of the wave equation for a given electron *equal to the radius of the orbital* occupied by that electron. With the radii of successive orbital shells, we can calculate the volume of the shell occupied by a given electron. Because this volume is calculated in TRUE units, it is equivalent to the energy level of the electron. Since neither H nor He has more than two electrons, and as we demonstrated above, the first shell has a volume that will hold exactly two electrons with a volume of 106 TRUE units each, **n** = 1 for both H and He, and with **n** known, we can determine ***l*** and **m**.

It took quantum physicists many years, obtaining and studying experimental data, to discover the mathematical rules governing the way these quantum numbers occur in the natural

elements. Here, we derive them directly from TRUE analysis of the Schrödinger wave equation. Solutions of the wave equation are obtained by separating the wave function into the product of three factors yielding integer values of **n**, ***l*** and **m**.

1. For each value of **n = 1, 2, 3, …** , the integer values of ***l*** and **m** are as follows:
2. ***l*** = **0, 1, 2, . . . , *n-1***
3. ***m* = - *l*,-*l*+1,-*l*+2,…, +*l***
   Where, for electrons in orbit around the nucleus of an atom, in TRUE units, **n** identifies the shell and energy level of the electron, ***l*** is the angular momentum of the orbital electron, and **m** is the magnetic moment created by the orbital movement of the electron as a charged particle.
4. ***s*:** After **n,** ***l*** and **m** are determined for a given particle, the spin number, or intrinsic spin of the particle, as noted above, depends upon in how many dimensional planes the particle is spinning.

A particle spinning in 3 orthogonal planes (3 spin dimensions), e.g., will have **s** = +1/2. In this case, the total rotation needed to complete one revolution is 180 degrees less than 360 degrees, and the spin number is +180/360 = **+ 1/2**. (We designate it as *positive* because the particle appears to have gained one-half rotation.) If one revolution is completed only after rotation of 180 degrees more than 360 degrees, we designate **s** as **- ½** because it appears to have lost 180 degrees. In either case, the particle is a fermion, and will obey the Pauli Exclusion Principle. If the total angular rotation needed to complete one revolution is 360 degrees, the particle is a boson. The dependence of this distinction between +1/2 fermions, -1/2 fermions and bosons upon number of spin dimensions can be visualized with a thought experiment or demonstrated by rotating a marked sphere or a Rubik's cube.[76]

If the particles are fermions, the pair occupying a given orbital will have the values +1/2 and -1/2, obeying the Pauli Exclusion Principle stating that no two fermions can occupy the same orbital. This is the Pauli Exclusion Principle stated in geometric terms related to orbiting electrons. More generally, this means that no two electrons, protons, neutrons, or more complex fermions can have the same four quantum numbers.

There is one, *and only one* set of quantum numbers, **n, *l*, m, and s,** that uniquely identifies a given type of particle in nature. This applies to both elementary particles like quarks and electrons, and to compound particle structures like protons, neutrons, atoms and molecules. For Hydrogen and Helium atoms, the smallest and second smallest compound particle structures, we have:

Hydrogen - One Electron

In the Aufbau process of progressively constructing the atoms of the Periodic Table, we start with the smallest possible value of **n**, i.e. **n=1**. Following the rules given above, for Hydrogen, **n = 1, *l* = 0** and **m = 0.**

The quantum spin number is the intrinsic spin of the electron. In the 9D spin model, an electron, composed of 106 TRUE units, 1 measurable unit of mass/energy equivalence and 105 stabilizing units of gimmel, is spinning in all 9 dimensions, which produces an intrinsic spin of 180 degrees, i.e., one half of one revolution in the 3S-1t domain of physical observation. Since there is only one electron, we take the spin number as **+1/2**.

Helium - Two Electrons

First Electron, n = 1, *l* = 0, m = 0, and s = +1/2

The first electron in Helium has exactly the same quantum numbers as the first electron in Hydrogen. But, Helium has 2 electrons, and since they are fermions, they cannot occupy the same orbital if they have the same quantum numbers. So the Helium atom, to be electrically stable, must be 'built up' of 2 electrons and 2 protons.

Second Electron: **n = 1**, ***l* = 0**, **m = 0**, and **s = -1/2**

But Helium without Neutrons, i.e. $2e + 2P^{+}$, cannot form a symmetrically stable structure, as we see in the TRUE analysis in the table below.

Table 17A1- He from Table 4C4: Helium without Neutrons, Valence = -2 + 2 = 0

He	Charge	Mass/Energy	ג	Total TRUE Units	Volume
2e	- 9	2	210	212	9,528,128
$2P^{+}$	+ 9	34	14	48	110,592
Totals	**0**	**36**	**224**	**260**	**$(212.917\ldots)^{3}$ ***

The electrical charge of this configuration is zero, promoting a measure of stability, but the whole compound structure has an asymmetric volume in 3S, which would cause it to decay rapidly, because the force of unbalanced angular momentum would cause it to fly apart, after which, the elementary particles could regroup, combine with gimmel from the substrate to form two stable Hydrogen atoms.

Table 17A2 from 4C-H4: Helium Atom with $P^+ = 24$ and $N^0 = 38$ Valence = - 2 + 2 = 0 (Inert)

Particle	Charge	Mass/Energy	ג	Total TRUE Units	Volume
2e	- 6	2	210	212*	9,528,128
$2P^+$	+ 6	34	14	48	110,592
$2N^0$	0	44	32	76	438,976
Totals	**0**	**80**	**256**	**336**	**$(2x108)^3$**

If, however, they can combine with uncharged mass/energy in the form of two neutrons, a stable compound structure is formed. That structure is called Helium. See the table showing the TRUE analysis for Helium below.

The Helium atom has electron-shell stability because the first and only shell is full, while the Hydrogen atom does not, allowing it to combine with other elements to form compounds. As shown below, Helium with neutrons, $2e + 2P^+ + 2N^0$ is volumetrically symmetric and electron-shell stable, and is, therefore, the form of Helium most often found in nature. Hydrogen is unique: It is the only element with no neutrons and a valence of -1. Because of this, a high ratio of gimmel to mass/energy is required for the atom to be stable. But the high ratio of gimmel stabilizing the H atom is also available to interact with other valence compatible elements without affecting the measurable mass/energy of H or the other elements. This overabundance of gimmel allows conformance with the conveyance equation to assure stability in new combinations. Helium, on the other hand, has 2 neutrons, a valence of zero, and a lower ratio of gimmel. (0.76 for He, compared to 0.89 for H1.)

What we learn from this is that the Aufbau process does not just build new, more complex atoms from the structures of already existing stable elementary and compound particles. While compound particles that decay naturally, or are blown apart by external forces, may combine with other particles to form new stable compound particles, the natural elements of the Periodic Table exist as progressively more complex stable entities because they are linked dimensionometrically to the universal substrate. The expansion of the universal substance, Daled, into the 3S-1t physical universe is organized into stable combinations of mass, energy and gimmel in accordance with Fermat's Last Theorem, the conveyance equation and the quantum number rules outlined above.

This is consistent with the Copenhagen interpretation of quantum mechanics which resolved the EPR paradox by recognizing that particles created in a sub-atomic reaction have no separate

existence in 3S-1t until they are observed or measured completing the loop of individualized consciousness back to the logical structure of the universal substrate. So we have a nine-dimensional reality that is unified in the sense that all elements measurable in three-dimensional space are formed and informed by the primary logic of reality. It seems appropriate to replace the term Aufbau with 'Einbau'; Ein = unity, bauen = to build, thus: 'built in'.

In summary, the answer to the question *'Why does Helium need Neutrons, when Hydrogen does not?'* is provided by a deeper understanding of reality as a nine-dimensional whole comprised of three forms of the universal substance: mass, energy and gimmel, that are interchangeable in the universal substrate, but appear in the observable 3S-1t physical universe organized into stable finite structures according to the mathematically precise rules and formulae described in this paper.

The next natural element after Lithium is Beryllium. Since it is asymmetric and has two valence electrons, it is much less stable than Hydrogen and Helium.

Table 17B Beryllium, Valence = 10 - 4 = 6

Particle	Charge	Mass/Energy	ג	Total TRUE Units	MREV
4e	- 12	4	420	424	76,225,024
$4P^+$	+ 12	68	28	96	884,736
$5N^0$	0	110	80	190	6,859,000
Totals	**0**	**182**	**528** [v]	**710**	**$(437.8976\ldots)^3$**

We continue by examining Boron, as the next in the sequence of increasingly complex elements. We see that Boron is also asymmetric with valence electrons and is therefore not as stable as Hydrogen or Helium.

Table 17C BORON, Valence = 10 - 5 = 5

Particle	Charge	Mass/Energy	ג	Total TRUE Units	MREV
5e	- 15	5	525	530	148,877,000
$5P^+$	+ 15	85	35	120	1,728,000
$6N^0$	0	132	96	228	11,852,352
Totals	0	**222**	**656**	**878**	**162,457,352= $(545.648\ldots)^3$**

[v] This derivation of 528 for beryllium gimmel units may reflect a remarkable coincidence. Dr. Len Horowitz has written a book on the number 528 [108], which reflects the "miracle frequency" (MI of the Solfeggio musical scale) apparently preferred by nature and "masterful musicians". Why would the gimmel of the asymmetric element, beryllium reflect this number of gimmel units? This may well be completely unrelated (hence the footnote). Nevertheless, in the interests of science, we list this.

But the next element, Carbon, is more stable, being volumetrically symmetric. Carbon and the next two atoms, Nitrogen and Oxygen are the most stable and abundant elements after Hydrogen and Helium, and since they are not electron-shell stable, they readily combine with Hydrogen to form natural organic compounds. This establishes Hydrogen, Carbon, Nitrogen and Oxygen as the main building blocks of life, making up between 92% and 96% of living matter. [101]

As we proceed with the TRUE unit analysis, we note that the other elements and compounds necessary for life and the manifestation of consciousness in sentient beings are produced in abundance by the organizing action of the *third form* as ג units, and the conveyance equation.

Carbon C, Nitrogen N and Oxygen O are listed next in the Periodic Table. Inspection of these tables reveal meaningful mathematical patterns inherent in the elements of the Periodic Table, some of which are not apparent without TRUE analysis.

Similarly, we could include Sulfur S, Magnesium Mg, and Calcium Ca as fundamental elements of life. All score the same proportionate number of TRUE relative to their mass / energy and other than Hydrogen which is unique, they exhibit the highest proportion of gimmel. One that could be debated would be phosphorus, because phosphate PO_4 is fundamental but elemental phosphorus is not.

Moreover, the cube root of their volumetric MREV score (making it linear to more easily analyze) are all multiples of 108.

Table 17D CARBON, Valence = 10 - 6 = 4

Particle	Charge	Mass/Energy	ג	Total TRUE Units	MREV
6e	- 18	6	630	636	257,259,456
$6P^+$	+ 18	102	42	144	2,985,984
$6N^0$	0	132	96	228	11,852,352
Totals	0	**140**	**768**	**1,008**	**272,097,792 = $(6x108)^3$**

Carbon is the most fundamental organic compound and as expected it is symmetrical and stable and its gimmel ratio is 76.19% and a multiple of 108 cubed.

Table 17E NITROGEN, Valence = 10 - 7 = 3

Particle	Charge	Energy/Mass	ג	Total TRUE Units	MREV
7e	- 21	7	735	742	408,518,488
$7P^+$	+ 21	119	49	168	4,741,632
$7N^0$	0	154	112	266	18,821,096
Totals	0	**280**	**896**	**1,176**	**432,081,216 $=756^3=$ $(7x108)^3$**

Oxygen, fits here, but will be used in a later Table as it will be shown later to facilitate the Phosphorus discussion.

It shows similar properties and scores exactly the same gimmel ratio as the fundamental life-sustaining elements, carbon and nitrogen above of 76.19% as well as Magnesium, Calcium (which we also tabulate later with the phosphorus discussion) Sulfur, plus Helium and Neon and surprisingly (as below) Silicon.

Oxygen has an MREV of $(8x108)^3$

We now look at a very volatile element, Fluorine, and we find it to be volumetrically asymmetric and thus very reactive.

Table 17F FLUORINE, Valence Electrons = 10 - 9 = 1

Particle	Charge	Mass/Energy	ג	Total TRUE Units	MREV
9e	- 27	9	945	954	868,250,664
$9P^+$	+ 27	153	63	216	10,077,696
$10N^0$	0	220	160	380	54,872,000
Totals	0	**382**	**1,168**	**1,550**	**$(977,218…)^3$**

And we analyze Neon, as another example of an inert gas, stable, symmetric and inert because there are no openings in its electron shells.

Table 17G NEON, Valence = 10 - 10 = 0 (Inert)

Particle	Charge	Mass/Energy	ג	Total TRUE Units	Volume
10e	- 30	10	1050	1060	1,191,016,000
$10P^+$	+ 30	170	70	240	13,824,000
$10N^0$	0	220	160	380	54,872,000
Totals	0	**400**	**1,280**	**1,680**	**$1,259,712,000=1080^3$**

Hydrogen, Carbon, Nitrogen, and Oxygen, the basic elements of organic life -*thanks to the presence of ג in their atomic structure* - are volumetrically symmetric and have available valence electrons. Similarly, Calcium and Magnesium exhibit these properties as well as, as indicated, Sulfur (see the various Tables).

Yet Helium and Neon are also symmetric, but are not among the basic elements of organic life because they are inert and therefore unable to readily combine with Hydrogen.

All of the other elements analyzed so far, are asymmetric and less abundant in nature, except for Silicon (Si) below.

It is no accident that the reactive, volumetrically symmetric elements are important building blocks of natural organic compounds, and that complex combinations of them manifest life and consciousness.

Sodium is very reactive, but asymmetric with more neutrons than protons.

Table 17H SODIUM, Valence = - 10 +11 = 1

Particle	Charge	Mass/ Energy	ג	Total TRUE Units	Volume
11e	- 33	11	1,155	1,166	1,585,242,296
$11P^{+}$	+ 33	187	77	264	18,399,744
$12N^{0}$	0	264	192	456	94,818,816
Totals	0	**462**	**1,424**	**1,886**	**$(1,193.\ 12\ldots)^{3}$**

Contrast Sodium with 11 electrons and protons, but 12 neutrons with Magnesium which is what we call "superstable": Magnesium is an element of life with equal protons, neutrons and electrons, and a larger amount of gimmel than sodium.

Table 17 I MAGNESIUM, Valence = – 10 +12 = 2

Particle	Charge	Mass/Energy	ג	Total TRUE Units	Volume
12e	- 36	12	1,260	1,272	2,058,075,648
$12P^{+}$	+ 36	204	84	288	23,887,872
$12N^{0}$	0	264	192	456	94,818,816
Totals	0	**480**	**1,536**	**2,016**	**$(12X108)^{3}$**

Aluminum is next with 13 electrons, and asymmetric. It is prevalent certainly but it is not related to life elements. In this instance, we could call it an example of "existent protostable" per Table 5.[w]

Table 17J ALUMINIUM*, Valence = – 10 + 13 = 3

Particle	Charge	Mass/ Energy	ג	Total TRUE Units	Volume
13e	- 39	13	1,365	1,378	2,616,662,152
$13P^{+}$	+ 39	221	91	312	30,371,328
$14N^{0}$	0	308	224	532	150,568,768
Totals	0	**542**	**1,680**	**2,222**	**$(1,409.057\ldots)^3$**

Now comes a strange, apparent paradox. The element Silicon by all its properties should be an element of life based on its proton, electron and neutron contents and the equivalent amounts of Gimmel to TRUE as there are with the other life sustaining superstable elements. *A testable hypothesis is that Silicon should be a life-sustaining fundamental element!*

Table 17K SILICON, Valence = -10 +14 = 4

Particle	Charge	Mass/ Energy	ג	Total TRUE Units	Volume
14e	- 42	14	1,470	1,484	3,268,147,904
$14P^{+}$	+ 42	238	98	336	37,933,056
$14N^{0}$	0	308	224	532	150,568,768
Totals	0	**560**	**1,792**	**2,352**	**$1,512^3=(14x108)^3$**

Ratio of gimmel to TRUE is 76.19%.

We now examine Oxygen, Calcium, Phosphorus, Phosphate and Calcium Phosphate. These are instructive in examining valences and molecules plus radicals.

The question comes up about how phosphate is so fundamental in many chemical reactions involving particularly energy. We use calcium phosphate as a basic phosphate molecule there, though it is likely that complex compounds such as Adenosine triphosphate (ATP) may ultimately be pertinent.

[w] It is our position that this is the correct spelling, consistent with metal nomenclature, however, being American, we tend to pronounce it 'Aluminum'.

We begin with examining the most fundamental life-sustaining element, the one that is most necessary for life on Earth. Clearly, Oxygen should have and does have all the properties of Superstable Elements.

Table 17L1 OXYGEN, Valence = 10 - 8 = 2

Particle	Charge	Mass/Energy	ג	Total TRUE Units	MREV
8e	- 24	8	840	848	609,800,192
$8P^{+}$	+ 24	136	56	192	7,077,888
$8N^{0}$	0	176	128	304	28,094,464
Totals	0	**320**	**1,024**	**1,344**	**644,972,544 $=(8x108)^3$**

Ratio of gimmel to TRUE is 76.19%.

Next we examine the phosphorus element. It can be seen that phosphorus does not have equal protons and neutrons and thus, based on gimmel/ TRUE analysis, would not to be directly linked with the Life Elements properties. The ratio of gimmel to TRUE is 75.68% for phosphorus.

Table 17M1 Phosphorus: Valence = -10 + 15 = 5

Particle	Charge	Mass/ Energy	ג	Total TRUE Units	Volume
15e	- 45	15	1,575	1,590	4,019,670,000
$15P^{+}$	+ 45	255	105	360	46,656,000
$16N^{0}$	0	352	256	608	224,755,712
Totals	0	**622**	**1,936**	**2,558**	**4,291,081,712 = $(1625.008\ldots)^3$**

We now follow with the phosphorus and oxygen combination making up Phosphate.

It can be seen that phosphorus does not have equal protons and neutrons and thus, based on gimmel/ TRUE analysis, not to be directly linked with the Life Elements properties.

Ratio of gimmel to TRUE is 75.68% for phosphorus.

Table 17M2 Phosphate Radical, Valence = -8 + 5 = - 3

PO_4	Charge	Mass/ Energy	ג	Total TRUE Units	Volume
47e	- 141	47	4,935	4,982	123,654,854,168
47P$^+$	+ 141	1,343	329	1,672	4,674,216,448
48N^0	0	1,056	768	1,824	6,068,404,224
Totals	0	**2,446**	**6,032**	**8,478**	**134,397,474,840 (5122.28…)^3**

Ratio of gimmel to TRUE is 71.18%

We now look at elemental Calcium, which demonstrates it is a life-sustaining element because it has the correct gimmel and neptrons.

Table 17N1 CALCIUM, Valence = - 18 + 20 = 2

Ca	Charge	Mass/ Energy	ג	Total TRUE Units	Volume
20e	- 60	20	2,100	2,120	9,528,128,000
20P$^+$	+ 60	340	140	480	110,592,000
20N^0	0	440	320	760	438,976,000
Totals	0	**800**	**2,560**	**3,360**	**10,077,696,000 (20x108)^3**

Ratio of gimmel to TRUE is 76.19%.

We do this as arbitrarily we are moving to a combination with the phosphate molecule, producing calcium phosphate.

The valences of radicals and compounds are most easily calculated by adding the valences of their components. Thus the valence of PO_4 is equal to the valence of P plus 4 times the valence of O: +5 -8 = -3, and $Ca_3P_2O_8$ = 3x2 + 2x(-3) = 0.

By inspection of these TRUE analysis tables we can see that life-supporting atoms and compounds are always stable, either because they are symmetric in TRUE, or because they are non-reactive with zero valence.

Valences of compounds, ions and radicals can also be determined by understanding that electron shell volumes correspond to energy levels. Since TRUE units, representing perfect symmetry, incorporate the triad of volume, mass/energy and gimmel, thinking of electron shells in terms of electron energy levels makes sense. The larger the shell or sub-shell volume, the

more mass/energy/gimmel it can hold. Stable spinning particle combinations must have shells and sub-levels that are balanced by pairs of electrons spinning in opposite directions. This is so, because if two electrons spinning in the same direction combine, their angular momentum (energy) is added and they create a larger volumetric shell. If they are spinning in opposite directions, they can occupy a sub-shell of eight, consisting of four balanced pairs of electrons. This explains the Pauli Exclusion Principle.

Table 17N2 Calcium Phosphate, Valence = 6 – 6 = 0

$Ca_3P_2O_8$	Charge	Mass/ Energy	ג	Total TRUE Units	Volume
154e	- 462	154	16,170	16,324	4,349,904,860,224
154P$^+$	+ 462	2,618	1,078	3,696	50,488,897,536
156N^0	0	3,432	2,496	5,928	20,831,693,882
Totals	0	**6204**	**19,744**	**25,948**	**4,421,225,451,642 (16,412.73…)^3**

Ratio of gimmel to TRUE is 76.09%

The proportionate amount of gimmel to TRUE in the stable calcium phosphate is more at 76.09% as compared with the Phosphate radical alone at 71.15%. So Calcium phosphate as expected is more stable than Phosphate alone. Phosphorus being elemental is at 75.68%. For symmetric stable elements like oxygen and calcium, the ratio is slightly more at 76.19%. This illustrates that we cannot just predict that Phosphate containing the symmetric stable oxygen as well will have more gimmel than Phosphorus. We must take into account valences as well, and calculate each figure individually.

Table 17O SULFUR, Valence = -10 + 16 = 6

Particle	Charge	Mass/ Energy	ג	Total TRUE Units	Volume
16e	- 48	16	1,680	1,696	4,878,401,536
16P$^+$	+ 48	272	112	**384**	56,623,104
16N^0	0	352	256	608	224,755,712
Totals	0	**640**	**2,048**	**2,688**	**5,159,780,352 = 16x(108)^3**

Interestingly, both Silicon and Carbon are superstable with a valence of 4, prompting some to speculate that under favorable conditions, Silicon might combine with Nitrogen and Oxygen to produce Silicon-based life forms. Supporting this hypothesis, it is claimed that there appear to

be ‘Silicon-based’ life forms in aquatic creatures! It is certainly an extremely abundant element of earth [109].

Sulfur and possibly radicals like Phosphate as well as are important to life as we know it. One speculative chemical is the “methane-like CH_4” silicon equivalent SiH_4 (Silane). [110] It could possibly also turn out to be important to Silicon-based life forms somewhere in the cosmos [110], applying this same hypothesis. Whether or not this could happen, these elements are important and even *necessary* for life on Earth as we know it. While not abundant in the human body, they are abundant, along with the life permostable abundant and trace existent permostable heavier, metallic elements in our life-supporting environment, Planet Earth. [1; 111]

In the Periodic Table, Fluorine and Chlorine appear to be similar to Carbon and Silicon, and might be expected to combine with other elements under conditions on some other planet to form life-supporting structures. But our Tables show that they are asymmetric, with less gimmel to TRUE, and more neutrons than protons. Therefore, these are reactive elements, but not elements of life. And Fluoride, though used as a trace element like several “protostable” elements can be harmful in too high a dose. Chloride is important in Life reactivity, just as sodium is, and is “dynamically stable”. Sodium chloride is, of course, important as a stable compound, but it is not symmetrical like the life elements and compounds. [x]

Table 17P 1 CHLORINE, Valence = -10 + 17 = 7

Particle	Charge	Mass/ Energy	ג	Total TRUE Units	Volume
17e	- 51	17	1, 785	1, 802	5,851,461,608
17P$^+$	+ 51	289	119	408	67,917,312
18N^0	0	396	288	684	320,013,504
Totals	0	**702**	**2,192**	**2,894**	**6,239,392,424 = (1840.97)^3**

Clearly, we can analyze all of the elements and the virtually endless molecular forms existing in the observable universe in terms of TRUE units, with the potential of explaining more real phenomena, anomalous empirical data and details not explained by the current paradigm. Dr. Close particularly has personally spent thousands of hours to date exploring this fascinating new paradigm created by putting consciousness into the equations of science.

[x] Valence relates to position on the Periodic Table of the Elements. E.g. The first shell has 2, then 8 etc. This differs from ‘charge’.

We close by summarizing the TRUE analyses presented so far. The table below summarizes some of the TRUE-unit properties of elements of the Periodic Table from Hydrogen through Sulfur. Inspection of this table reveals meaningful mathematical patterns inherent in the elements of the Periodic Table, some of which are not apparent without TRUE analysis.

Inspection of the Table 17Q1 also reveals that the regularity of volumetrically symmetric elements appears to have gaps in it because there are no elements to fill the 3x108, 4x108, 5x108, 9x108, 11x108, and 13x108 positions in the table. But these gaps can be filled if we expand our definition of the Periodic Table. If we think of the TRUE units of mass, energy and ג as the primary building blocks of the universe, electrons, protons and neutrons as the secondary level of building blocks, and molecules as the tertiary level of building blocks, this table becomes a list of all of the building blocks of the universe, not just elements.

Inspection of Table 17 also reveals that the regularity of volumetrically symmetric elements appears to have gaps in it because there are no elements to fill the 3x108, 4x108, 5x108, 9x108, 11x108, and 13x108 positions in the table. [y]

But these gaps can be filled if we expand our definition of the Periodic Table. If we think of the TRUE units of mass, energy and ג as the primary building blocks of the universe, electrons, protons and neutrons as the secondary level of building blocks, and molecules as the tertiary level of building blocks, this table becomes a list of all of the building blocks of the universe, not just elements.

If we think of the TRUE units of mass, energy and ג as the primary building blocks of the universe, electrons, protons and neutrons as the secondary level of building blocks, and molecules as the tertiary level of building blocks, this is reflected in Table 17Q, a list of all of the building blocks of the universe, not just elements.

y

Lithium	512 =4x128	672	+1	76%	$(330.32)^3$
Beryllium	528	710	+2	74.4%	(437. 89)3
Boron	656	878	+3	74.7%	(545. 65)3
Fluorine	1, 168	1, 550	+1	75. 4%	$(977.22)^3$
Sodium	1, 424	1, 886	+1	75. 5%	(1,193. 12)3
Aluminium	1, 680	2, 222	+3	75. 6%	(1, 409. 06)3

TABLE 17Q: SUMMARY OF TRUE UNIT ANALYSES OF THE ELEMENTS SHOWING THE GAPS [1 z,]

Compound	ג Units	Total TRUE	Valence	ג % [aa] Units	TRUE Volume	Comments and Abundance rank # [bb]
Hydrogen [cc]	150	168	**-2+1=-1**	89.3%	$(1x108)^3$	***Critical Element*** [dd] ***#1*** [ee]
Deuterium H2	128	168	-1	76.2%	108^3	***Isotope; rare***
Tritium H3	144	206	-1	70%	$(118.02)^3$	***Isotope; very rare***
Helium	256	336	-2+2=0	76.2%	$(2x108)^3$	***Inert Element*** [ff] ***#2***
Lithium	400	542	-2+3=1	73.8%	$(330.32…)^3$	*Asymmetric #45*
Beryllium	528	710	-2+4=2	74.4%	$(437.89…)^3$	*Asymmetric #44*
Boron	656	878	-2+5=3	74.7%	$(545.64…)^3$	*Asymmetric #61*
GAP					$(3x108)^3$	**GAP**
GAP					$(4x108)^3$	**GAP**
GAP					$(5x108)^3$	**GAP**
Carbon	768	1008	-2+6=4	76.2%	$(6x108)^3$	***Organic element #4***
Nitrogen	896	1176	-2+7=5	76.2%	$(7x108)^3$	***Life element #7***
Oxygen	1024	1344	-2+8=6	76.2%	$(8x108)^3$	***Life element #3***
GAP					$(9x108)^3$	**GAP**
Neon	1280	1680	-10 + 10 = 0	76.2%	$(10x108)^3$	***Inert element #5***
GAP					$(11x108)^3$	**GAP**
Magnesium	1536	2016	–10 +12= +2	76.2%	$(12 x108)^3$	***Life element #9***
GAP					$(13x108)^3$	**GAP**
Silicon	1792	2352	-10 +14 = +4	76.2%	$(14x108)^3$	***Postulated Life? #8***
GAP unknown					$(15x108)^3$	**GAP undiscovered yet**
Phosphorus	1,936	2,558	+5	75.7%	$(1625.008.)^3$	*Asymmetric* #18
Sulfur	2,048= 16x128	2,688	+6	76.2%	$(16x108)^3$	***Life element #10***
GAP unknown					$(17x108)^3$	**GAP undiscovered yet**
Chlorine	2,192	2,894	+7	75.6%	$(1840.97)^3$	*Asymmetric #23*

[z] Amplified from the Thirteenth Conundrum. [1]

[aa] This is the ratio of the gimmel to the TRUE units.

[bb] Abundance rank obtained from "Abundance of all Elements of the Periodic Table" based on the Wolfram Research site [112]. We're using these figures as several variations exist ranging from abundance proportion on Earth to the whole cosmos. Remarkably, the top 10 on the list are life-sustaining elements, plus inert noble gases He and Ne, but include, too, iron which, therefore, is also analyzed.

[cc] This analysis is on Hydrogen 1, not isotopes like heavy deuterium H2 or H3 tritium, though these have also been analyzed.

[dd] Hydrogen is unique without a neutron and therefore with 'daled' vertically ד has much more gimmell : 38 for daled (0 MEUs). 150/168 = 89.2%. Volumetrically 108^3 = 1,259,712. Hydrogen is the highest gimmel proportion then the life elements.

[ee] Abundance %[112]: H 75.6 %; He 23%; 0 1%; C 0.5%; Ne 0.13%; Fe 0.11%; N 0-.1%; Si 0.07%; Mg 0.06%; S 0.05%, Ar 0.02%; Ca 0.007%. These percentages correspond with the Planck Probe figures pertinent in the analysis of gimmel::TRUE vs Dark matter/ energy :: Cosmos. [47; 48 12]. Whereas Wolfram [112] lists 2 significant figures, the Planck proportion for Hydrogen is 75.6%. [47; 48 12]

[ff] Gimmel : 105 for 1 electron (1 mass/energy unit MEU), 7 for 1 proton (17 MEUs), and neutrons are 16 for gimmel; 22 MEUs).

- The TRUE volume of every element with volumetric symmetry is a multiple of the volume 108^3.
- All symmetric elements have three components in common: The number of gimmel units it takes to give them volumetric stability. This is the number of electrons they possess times 128, which reflects the number of gimmel units in Deuterium. Deuterium is appropriate here as "heavy hydrogen" (H2), with the first neutrons in the periodic table analysis, which can be applied as the fundamental comparison element because although being an isotope, it has the first Proton, Electron and Neutron (Tables 13A and portrayed with others in 17P). Of course, the very rare isotope, Tritium (H3), which contains two neutrons, would be expected to be unstable and asymmetric and irrelevant, and it is.
- This is as opposed to regular "light hydrogen" (Protium, H1) which is our common hydrogen, fundamental to all life, and the most abundant element in the universe. H1 has no neutron and therefore has daled units instead making it unique and creating a far higher proportion of gimmel plus daled than any other element. The daled may be equivalent to gimmel but we don't know: It's portrayed differently because it uniquely replaces a neutron's mass-energy in hydrogen; as opposed to the gimmel in the Tables which are horizontally tabulated next to the mass-energy of electrons, protons and neutrons. That Hydrogen 1 element has a gimmel (technically gimmel-daled) content of 89.3% as opposed to Hydrogen 2 with its neutron where the gimmel percent is 76.2% as predicted for all the other elements of life (carbon, oxygen, nitrogen; sulfur; calcium, magnesium; as well as the inert stable abundant gases, helium and neon; plus the strange case of silicon.)

The percentage of TRUE units of gimmel in them is the same, 76.2%, with the exception of Hydrogen, which has a gimmel content of 89.3%. This very high proportion underlines the role of daled units instead of the Neutron in the formation of a stable universe.

FILLING IN THE GAPS OF VOLUMETRIC STABILITY (PART 18)

The first clue to identifying the symmetric entity that fills a given gap in the sequence of TRUE-unit volumetric symmetry (Table 17Q) is its location relative to the other symmetric forms in the table. The compound that fills a given gap can only be formed from combinations of symmetric atoms and/or compounds that are smaller than it in total TRUE units.

For example, the $(3x108)^3$ gap can only be filled by a compound entity composed of Helium [TRUE volume = $(2x108)^3$] and Hydrogen or Deuterium [TRUE volume = $(1x108)^3$].

The tables below identify symmetrical molecular entities that fill the gaps and complete the Periodic Table of Building Blocks. Table 18B1 is extracted from Table 18A and contains the extra generally unstable compounds and radicals that fill the gaps in the multiples of 108^3.

TABLE 18A: TRUE-UNIT SYMMETRIC MOLECULAR COMPOUNDS: FILLING IN THE GAPS.

Compound	Units x	Total TRUE	Valence	Percent Units x	TRUE Volume	Comments
Helium Hydride HeH	384	504	+1	76. 2%	$(3x108)^3$	***Super acid*** Not found in Nature
Lithium Hydride Li and H2 (Deuterium)	512	672	+2	76. 2%	$(4x108)^3$	Rare in Nature Very Reactive
$(He)_2H$	640	826	+3	76. 2%	$(5x108)^3$	Produced in Nuclear Fusion
Hydroxide HO	1, 174	1, 512	-1	77. 6%	$(9x108)^3$	Building Block of Amino Acids
H_2N	1, 174	1, 512	-1	77. 6%	$(9x108)^3$	Common in Amino Acids
CH_3	1, 174	1, 512	-1	77. 6%	$(9x108)^3$	Common in Organic Compounds
H_2O	1, 336	1, 692	0	78. 8%	$(10x108)^3$	Water
H_4N	1, 496	1, 848	+1	80. 9%	$(11x108)^3$	Ammonium Ion
C_2H	1, 686	2, 184	+3	77. 2%	$(13x108)^3$	Major Component of Cysteine Amino Acid

While filling the gaps in the sequence of $(n\ x108)^3$ symmetric structures in the Periodic Table, we find that there may be two or more compounds with the exact TRUE volume capable of

filling the gaps, increasing in number as n increases. We also discover that, after n = 9, there are symmetric compounds equal in TRUE volume to some elements. H_2O, for example, has a TRUE volume of $(10x108)^3$, the same TRUE volume as the inert gas Neon. The TRUE-unit analyses for the compounds are displayed in the Tables below.

TABLE 18: TRUE UNIT ANALYSES OF GAP COMPOUNDS

TABLE 18B 1 He; Helium Hydride, Valence = - 2 + 3 = +1

Compound	Particles	Mass/ Energy	ג	Total TRUE Units	Volume
He + H	3e	3	315	318	32, 157, 432
	$3P^+$	51	21	72	373, 248
	$3N^0$	66	48	114	1, 481, 544
	Totals	**120**	**384**	**504**	**34, 012, 224=$(324)^3$ = $(3x108)^3$**

The proportion of Gimmel to TRUE is high at 76.19% for Helium Hydride. The TRUE-unit analyses continue below for other compounds that fill the gap. We now examine two other variants of Helium hydride $(He)_2H$.

Given that Helium and Hydrogen are very stable compounds, we would expect Helium and hydrogen combinations to be stable and they are.

TABLE 18B 2 HE: $(He)_2H$, Valence = - 2 + 5 = +3

Atoms	Particles	Mass/ Energy	ג	Total TRUE Units	Volume
$(He)_2H$	5e	5	525	530	148, 877, 000
	$5P^+$	85	35	120	1, 728, 000
	$5N^0$	110	80	190	6, 859, 000
	Totals	**186**	**640**	**826**	**157, 464, 000=$(540)^3$ = $(5x108)^3$**

The proportion of Gimmel to TRUE is high at 77.48% for $(He)_2H$.

We now move onto the next level of the atomic table. This time lithium should not be a multiple of 108 cubed as lithium is not a life-stable element. Yet lithium (deuterium) hydride formed from Lithium and Deuterium (H2) is a symmetrically stable gap compound at $(4x108)^3$. Moreover, the proportion of Gimmel to TRUE is high at 76.19% for lithium hydride.

TABLE 18C: TRUE UNIT ANALYSES OF Lithium (Deuterium) Hydride as a GAP COMPOUNDS, Valence = - 2 + 4 = +2

Atoms	Particles	Mass/ Energy	ג	Total TRUE Units	Volume
Li + H2	4e	4	420	424	76, 225, 024
	$4P^{+}$	68	28	96	884, 736
	$4N^{0}$	88	64	152	3, 511, 808
	Totals	**160**	**512**	**672**	**80,621, 568=$(432)^3$ = $(4x108)^3$**

Possibly the most important and stable compound that exists and is critically important for life is water. How does water as hydrogen hydroxide fit into the gap profiles? Clearly we would hypothesize that it fits and, indeed, it does.

First we look at the hydroxyl radical, OH, formed from O and H1, because it is symmetrically stable and fills the $(9x108)^3$ gap.

TABLE 18D 2: DERIVING WATER: The Hydroxyl Ion, Valence = - 10 + 9 = -1

Atoms	Particles	Mass/ Energy	ג	Total TRUE Units	Volume
H_1+O	9e	9	945	954	868, 250, 664
	$9P^{+}$	153	63	216	10, 077, 696
	$1C8+גN^{0}$	176	166	342	40, 001, 688
	Totals	**338**	**1, 174**	**1, 512**	**918, 330, 048=$(972)^3$ = $(9x108)^3$**

The proportion of Gimmel to TRUE is high at 77.64% for this radical that is part of water. We compare this now with water, which is as expected, also a multiple of 108 cubed. Remarkably the proportion of Gimmel to TRUE in Water is the highest of any compound we calculate at *78.95%!* This affirms our hypothesis of Water being the highest of any of our stable symmetrical compounds.

We would expect Water to be high, even higher than the Hydroxyl radical. But it is interesting that hydroxyl is a symmetric, stable radical as expected (and, indeed, as required for water to show its stability.

TABLE 18D 3: H_2O, Water, Valence = -2 -8 + 10 = 0

Atoms	Particles	Mass/ Energy	ג	Total TRUE Units	Volume
2(H)+O*	10e	10	1050	1060	1, 191, 016, 000
	$10P^+$	170	70	240	13, 824, 000
	$8N^0+2C_ג$	176	216	392	54, 872, 000
	Totals	**356**	**1, 336**	**1, 692**	**1, 259, 712, 000 $(10x108)^3$**

We now examine several other radicals that fill the gaps in the Periodic table and are multiples of 108 cubed. We examine H_2N, NH_4 ammonium, then CH_3, and C_2H.

TABLE 18 E -1: NH_4 ammonium, Valence = 11 -2 – 8 = +1

Atoms	Particles	Mass/ Energy	ג	Total TRUE Units	Volume
4H1+ N	11e	11	1, 155	1, 166	1, 585, 242, 296
	$11P^+$	187	77	264	18, 399, 744
	$4C7+גN^0$	154	264	418	73, 034, 632
	Totals	**352**	**1, 496**	**1, 848**	**1, 676, 676, 672=$(11x108)^3$**

It is certainly remarkable that the gimmel/TRUE ratio of ammonium is 80.95%, the highest of any radical we've analyzed!

We now look at some other radicals, but this time including CH_3 which is another gap compound multiple of 10 cubed and another radical, C_2H.

TABLE 18E -2 : H_2N, Valence = - 2 + 9 = +7

Atoms	Particles	Mass/ Energy	ג	Total TRUE Units	Volume
2H + N	9e	9	945	954	868, 250, 664
	$9P^+$	153	63	216	10, 077, 696
	$9N^0$	176	166	342	40, 001, 688
	Totals	**338**	**1, 174**	**1, 512**	**918, 330, 048=$(972)^3$ = $(9x108)^3$**

The proportion of Gimmel to TRUE is high at 77.64% for H_2N as expected for this structure.

Even more so, the proportion of Gimmel to TRUE is extremely high for the ammonium radical at 80.95%. We would expect ammonium to be extraordinarily reactive, and indeed it is. Of course, ammonium radical is not stable itself, and it interacts with other chemicals.

TABLE 18F 1: CH_3, Valence = - 10 + 9 = -1

Atoms	Particles	Mass/ Energy	ג	Total TRUE Units	Volume
C + 3H	9e	9	945	954	868, 250, 664
	$9P^+$	153	63	216	10, 077, 696
	$9N^0$	176	166	342	40, 001, 688
	Totals	**338**	**1, 174**	**1, 512**	**918, 330, 048=$(972)^3$ = $(9x108)^3$**

The proportion of Gimmel to TRUE is the typical high for a radical with many hydrogens plus a life-sustaining element at 77.64%.

TABLE 18 G 1: C_2H, Valence = 13 -2 – 8 = +3

Atoms	Particles	Mass/Energy	ג	Total TRUE Units	Volume
2C + H	13e	13	1, 365	1, 378	2, 616, 662, 152
	$13P^+$	221	91	312	30, 371, 328
	$C12+גN^0$	264	230	494	120, 553, 784
	Totals	**498**	**1, 686**	**2, 184**	**2, 767, 587, 264=$(1, 404)^3$ =$(13x108)^3$**

The proportion of Gimmel to TRUE is the typical high for a radical with only one hydrogen at 77.19%.

Importantly, the two fundamental building blocks of our physical 3S-1t life are DNA[gg] and RNA. The calculations are complex because of the number of neptrons involved. The elements constituting DNA and RNA are all multiples of 108 cubed, as expected. Therefore the cube

[gg] DNA= Deoxyribonucleic acid. RNA= Ribonucleic acid. The abbreviations might be better known than their long-hand names.

roots remain integers. These chemicals are stable and symmetric. It is interesting that OH, H_2N, and CH_3 are components of amino acids that are building blocks of DNA and RNA and they fit into the multiple of 108 cubed prototype as expected. C_2H also fits this prototype.

We now briefly examine Fe, iron, as it is in the top 10 abundant elements, and also, very important in life. Some would argue it is so fundamental it should be on the "essential for life" list. We know it to be asymmetric, and elemental iron itself might not be pertinent. Yet, when in used combination it should be stable. So we would expect some special property for iron.

TABLE 18H 1: Deriving elemental IRON: Fe, Valence = -26 + 28 = 2

Atoms	Particles	Mass/ Energy	ג	Total TRUE Units	Volume
Fe^0	26 e^-	26	2730	2756	20933297216
	$26P^+$	442	182	624	242970624
	$30N^0$	660	480	1140	1481544000
	Totals	**1128**	**3392**	**4520**	**22657811840= $(6096.395)^3$**

The gimmel to TRUE ratio is 3392/4520 = 0.7504 = 75.04%. This, as expected, based on Neptrons has a low proportion of gimmel. However, it has the most gimmel of any of the top twenty most abundant elements. [112] We also tabulate Ferrous ionic iron (Fe^{2+}) because it's so important in life, for example, as a component of hemoglobin.

TABLE 18H2: DERIVING FERROUS IRON: Fe2+, Valence = -26 + 28 = 2

Atoms	Particles	Mass/ Energy	ג	Total TRUE Units	Volume
Fe^{++}	26 e^-	26	2730	2756	20933297216
	$26P^+$	442	182	624	242970624
	$30N^0$	660	480	1140	1481544000
	Totals	**1128**	**3392**	**4520**	**22657811840= $(6096.395)^3$**

We would predict that Ferrous iron should contain even more gimmel than elemental Fe^0 . Moreover, we would hypothesize that Ferric iron Fe^{3+} should have less than gimmel than Ferrous Fe^{2+}.

The analysis is likely far more complex, however, because iron, Fe^0, as an element may not be too relevant. By contrast, ferrous iron, the most stable and abundant type, becomes critically important as a bioavailable substance of life. But the figures in these Tables (18 J1 and 18J2), as expected, are identical because the tables are reflecting iron with a valence of two, therefore Fe^{2+} .

All known forms of life require ferrous iron. And it almost always physiologically requires a combination into complex compounds, such as carboxyhaemoglobin. Consequently, even an analysis of Fe^{2+} may be simplistic, and like DNA and RNA, we would have to wait for an analysis of compounds such as carboxyhaemoglobin.

Ferric Fe^{3+} iron may be relevant in oxidative processes and rusting, but not for life compounds, so we would expect far less of a contribution to TRUE unit analyses. Clearly here, Ferrous Fe^{2+} reflects the same score as Fe^0 in these tables, as above. Because elemental iron is tabulated based on the valence of Fe^{2+}.

FURTHER IMPLICATIONS: QUANTIZED REALITY AND APPLYING CLOSE'S CALCULUS OF DISTINCTIONS VERSUS THE CALCULUS OF NEWTON (PART 19)

Our unified reality

Prior to this research, the conventional view had been that the quantal reality was very different from the macroscopic reality. In this and related work, we have shown we have one reality as the microcosm does not fundamentally differ from the macrocosm. In general, there is no mathematical or dimensionometric difference between the 'microcosm' of elementary particles and the macrocosms of molecules, human beings, planets, solar systems, and galaxies. *Every structure in the universe, including the entire universe itself, is a quantum structure obeying the same laws of space, time and consciousness*

Our quantized reality: The Calculus of Distinctions versus Newtonian Calculus.

Applying the process of rotation and unitary projection from dimension to dimension in Euclidean space, we find that the mathematical structure of basic number theory requires the existence of nine finite orthogonal dimensions embedded successively in an infinitely continuous substrate.

We utilize the logic of the Calculus of Dimensional Distinctions [10], an application and extension of George Spencer Brown's Laws of Form [53]. In this paper, we demonstrate that LHC particle-collider mass/energy data for electrons, protons and neutrons, can be considered as spinning "distinctions of content". These occupy unitary "distinctions of extent".

In the 3S-1t dimensional domain of our physical observations, we find that the light-speed limitation of Einstein's special relativity and Planck's quantization of mass and energy define a minimal unitary quantized distinction. [55; 83; 88; 89; 113; 114] This minimal mass/energy, space-time distinction is the smallest possible finite building block of the 3S-1t universe. As such, the Calculus of Dimensional Distinctions [10] replaces the infinitesimal of the differential calculus of Newton and Leibniz [10] in the mathematical analysis of physical reality. The Calculus of Dimensional Distinctions provides us with the tool needed to extend the work of Minkowski, Einstein, Kaluza, Klein, Pauli, and others such as Rauscher [115], who have attempted to use multi-dimensional analysis to integrate and explain the laws of physics. [13; 115; 116]

The process of rotation and unitary orthogonal projection from one dimension to the next in Euclidean space utilizes an extension of the Pythagorean Theorem. Generalization of the Pythagorean Theorem equation to three dimensions and application to the minimal quantized distinctions of extent and content produces a set of Diophantine expressions that perfectly describe the combination of elementary particles.

Integer solutions of these equations represent stable, symmetric combinations of elementary particles. But when there are no integer solutions, the expressions are inequalities representing unstable combinations that decay quickly.

Fermat's Last Theorem and why three not two particles are required

Fermat's Last Theorem [15-17] applied to the Diophantine equation describing the combination of *two elementary* particles tells us that there are no integer solutions, and thus no stable combinations. The equation for the combination of three particles, on the other hand, does have integer solutions. This explains why three quarks, not two, combine to form protons and neutrons. This explains why we need a third substance, which by definition is mass-less and energy-less, and which we call gimmel and, we postulate, involves a significant amount of "consciousness", because there is no other legitimate option.

SUMMARY AND CONCLUSION GIMMEL, TRUE AND THE STRUCTURE OF REALITY (PART 20)

Stability and the third forms

In essence, application of the equation describing the combination of *three particles* to particle-collider mass/energy data expressed as multiples of the minimal unit, reveals that, in order for stable combinations to form, in addition to the volumetrically equivalent forms of mass and energy, there has to be a third equivalent form that does not register in physical measurements as mass or energy. Representing the third equivalent form with the symbol ג (pronounced "gimmel") in the equations describing the combination of three particles as integer multiples of the minimal unit, we are able to calculate the unique number of mass/energy units and ג units needed to produce the stable protons and neutrons of the atoms that make up the physical universe, i.e., the elements of the Periodic Table.

We introduced another theoretical symbol, ד daled, which may well be the same ג gimmel, but involved as the third substance equivalent replacement for the absence of a neutron in the common form of Hydrogen (Hydrogen 1, Protium). The postulated compensating ד daled may or may not turn out to be exactly equivalent to gimmel.

Meaningful relevance

Analyzing the new information provided by the third form of the "stuff" of the physical universe, we find interesting patterns in the structure of the elements. For example, Carbon, Nitrogen, Oxygen, Sulfur, Magnesium, Calcium and Silicon, as well as the inert noble gases, Helium and Neon, have the exact same percentage of gimmel units.

We do not regard this exact ratio in elements that play a major role in life-supporting organisms as accidental. Without the presence of ג units, no stable structures could form and there would be no physical universe. This means that ג TRUE units had to be present from the formation of the first elementary particle, guiding the formation of the physical universe to produce structures capable of supporting life. This supports the hypothesis that logical structure, meaning, purpose and life systems are not emergent epiphenomena, but intrinsic features of reality. And given that helium and neon are noble gases that are stable and symmetric, we would expect them to be cosmologically very abundant and they are: But given that there are no reactive electrons in their shells, they should not reflect part of the stability of life.

The place of TDVP

TDVP provides a "mechanism" explaining why there is something rather than nothing. In TDVP, the form and structure of reality is determined by the intrinsic logic of nine-dimensional

reality, without requiring any transfer of mass or energy. TRUE units and gimmel is a critical extension of this research, allowing us to validate hypotheses and explain some unexplained and poorly understood observations and data.

Purpose and 9-D spin reality

These results strongly suggest that, in a finite nine-dimensional spin reality, stable structures are apparently purposefully formed for use as vehicles through which the extent of a structured substrate, likely associated with consciousness, may require continuously tethered linkage with space-time reality. Moreover, gimmel reflects a content like mass and energy and these are, we postulate, cosmologically linked [12] as well as in fundamental structures like the elements [1].

Finally, TRUE analysis reveals the mathematical patterns underlying reality. This has apparently never been detected before because we've normalized the basis of descriptive measurement to integer multiples of the smallest possible unitary equivalence unit. Logical patterns in the primary structure of reality are exposed, rather than remaining hidden behind multiple arbitrary, non-commensurate mathematical procedures as they have been in the current paradigm. The fundamental unitary equivalence unit, i.e. the triadic rotational unit of equivalence (TRUE) that we have derived, consistently describes the combination of quarks to form protons and neutrons, and the combination of electrons, protons and neutrons to form atoms and all stable compound objects in the universe, from molecules to galaxies.

Hypotheses answered substantially:

- The elements known to be vital for organic life, like oxygen, carbon, nitrogen, sulfur, calcium and magnesium, should have higher proportions of gimmel, the quantum-organizing factor: *They do.*
- Gimmel and TRUE units applied sub-atomically, should reveal mathematical patterns reflecting the fundamental nature of reality, with specific predictable mathematical patterns. *They do.*
- Water should contain higher amounts of gimmel to TRUE than almost any other stable, symmetrical molecule. It does. It should, for example, contain more gimmel proportions than hydrogen sulfide. *It does.*
- The noble, inert gases that are very common in the cosmos, namely Helium and Neon, should exhibit high amounts of gimmel to TRUE. *They do.*
- Stability, symmetry and reactivity of elements and compounds are based not only on gimmel proportions, and on the equality or not of protons, electrons and neutrons, but also on their quantum shells, numbers of electrons in the outer shells making up a model for valence that is predictable. *Correct.*
- The patterns of gimmel should be from the quantum level, all the way through to the cosmological [12]. It should include DNA and RNA [1]. This hypothesis is important, but

detailed empirical analyses are extraordinarily complex and painstaking. *Pending.*

Directions to further investigate and hypotheses to further evaluate

Several questions present themselves for further evaluation and testing. These are examples of the broad spectrum of questions based on our preliminary findings:

Compounds including molecules, radicals, and elements:

1. Why is the unstable Lithium Hydride (with Deuterium) a GAP exception compound? Lithium is not linked to 108 cubed: This makes the hydride a unique exceptional molecule.
2. Does the very high absolute gimmel score in iron have relevance relating to its role in life?
3. Why is Hydrogen Sulfide not a multiple of 108 cubed?
4. Why do the properties of H_2S vary compared with water?
5. Why does the Ammonium radical show such a high gimmel score?
6. Is Silicon, Si, with similar properties to C, O, N, S, Ca and Mg, legitimate as a life element?
7. Is the ostensible 528 units of gimmel that beryllium shows of any relevance?
8. Given that the elements and radicals involved in the formulation of DNA and RNA are hydrostable or hyperstable, are DNA and RNA empirically relevant with regard to gimmel?
9. Is the gimmel to TRUE ratio applicable to link with cosmic dark matter and dark energy?

Gimmel concepts:

1. What role does the infinite play in the concept of gimmel? Does it originate from there?
2. Is gimmel more than a third substance reflecting a matrix content that goes beyond a property, and necessarily is tethered to mass and energy content?
3. Would this matrix be best represented mathematically as a single entity manipulating space, time, mass, energy, and gimmel through a particular set of rules?
4. Do the properties of gimmel vary with mass energy relative to dimensional frameworks such as experiential 3S-1t, the finite 9-D spin or the continuous infinite?
5. Is daled a legitimate separate property or is it just another way to conceptualize gimmel?
6. Is gimmel reflecting meaningful consciousness/ information content? What else is it?
7. Was gimmel always present? Was it there at the finite event horizon or origin event or before? If not, how did stable particles form?
8. Do gimmel properties range from the subatomic to the cosmological?
9. Is gimmel in everything as a necessary part of the content of all things, or is it always tethered to mass and energy through embedded extra-dimensional domains?

Other:

1. Does mathematics reflect a fundamental aspect of nature, or is it just a way to calculate?
2. Is the classification of elements, radicals and molecules pertaining to stability, such as, hydrostable, superstable, hyperstable, permostable, protostable, naturally unstable and artificially unstable, empirically replicable?

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