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An Introduction to Cartesian Interactive Dualism

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Abstract

The noetic model of Cartesian interactive dualism is the first mind-body theory of any kind to explain qualia in physical, rather than just philosophical terms. The formal delineation of the life principle or *élan vital* explains not only the origin of self-organization in complex living systems, providing the basis for the first comprehensive dualist theory, but also is what makes the model empirically testable allowing this volume to make history. The floodgates seem about to open to almost unimaginable advances in the field of consciousness studies. This monograph introduces a comprehensive empirically testable model of dualism-interactionism to legitimize the interactionist model at a level tantamount to any other avenue of epistemological investigation of the mind-body problem.

Keywords: Consciousness, Cartesian dualism**,** Noetic field theory, Qualia, Unified field theory

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PREFACE

"*Those who know that the consensus of many centuries has sanctioned the conception that the earth remains at rest in the middle of the heaven as its center would, I reflected, regard it as an insane pronouncement if I made the opposite assertion that the earth moves*." – Copernicus. A similar erroneous consensus exists today regarding Cartesian dualism. This volume prepares the way for a paradigm shift similar to that engendered by Copernicus' 1543 volume *De revolutionibus orbium coelestium* (On the Revolutions of the

Celestial Spheres). The dominant position among scientists today is based on the mechanistic views of Darwinian naturalism - Empirical science and logical reason provide sufficient tools for answering any question; with no need for the supernatural. Today instead of the Earth being fixed at the center of the universe – the brain is considered the sole source of intelligence. Before Nobelist Sir John Eccles died some scientists said, 'how can you argue with a Nobel Prize winner'; but now articles like [1,2] for example, report Cartesian Dualism as an archaic 'hiss and a byword' with colleagues going so far as to openly mock and laugh out loud at its promoters.

Other than lack of social grace and the inherent open mindedness scientific query is supposed to entail, these critiques are not unjust. If one were to read discourse from the time of Galileo on why heavier objects fall faster, even today one is inclined to readily embrace the elegant logic. Science by definition accepts nothing as fact that has not been empirically demonstrated. A tenuous exception arising from the history of science has been allowed for theory in recent decades. History has shown that viable theories are elegant, have internal logical consistency and are shown to have broad explanatory power over the domain they describe. Hopefully, the reader will notice this to be the case for the new Noetic Theory introduced. Regarding dualism until now, even Sir John Eccles synapse theory, the most highly developed dualist-interactionist model of recent times remained fatally incomplete. Eccles was not able to define his critical concept of the Psychon. He left it as an empty philosophical construct suggesting only its plausibility and probable coupling to brain dendrons as mind-body interaction nodes.

The primary purpose of this monograph is to inextricably change this situation by introducing for the first time in history a viable comprehensive theory of dualism with sufficient foundation for empirical testing; that if proven [3] will lead to numerous profound new consciousness-based technologies [4]. It is said that the nature of consciousness is mankind's oldest and most difficult question. The ultimate form of this query is expressed in the 1st inaugural address given by former US President G.W. Bush: "*Do you not think an angel rides in the whirlwind and directs this storm*?" [5]. This question is also pondered when Hamlet considers if Man and human reason are all there is in what is probably the most famous soliloquy in world literature:

> To be or not to be, that is the question - Whether 'tis nobler in the mind to suffer The slings and arrows of outrageous fortune, Or to take arms against a sea of troubles, And by opposing, end them. To die, to sleep - No more; and by a sleep to say we end The heart-ache and the thousand natural shocks That flesh is heir to - 'tis a consummation Devoutly to be wish'd. To die, to sleep - To sleep, perchance to dream. Ay, there's the rub, For in that sleep of death what dreams may come, When we have shuffled off this mortal coil, Must give us pause. There's the respect That makes calamity of so long life, For who would bear the whips and scorns of time, Th'oppressor's wrong, the proud man's contumely, The pangs of despis'd love, … When he himself might his quietus make With a bare bodkin? who would fardels [*burdens*] bear, To grunt and sweat under a weary life, But that the dread of something after death, The undiscover'd country from whose bourn No traveller returns, puzzles the will, And makes us rather bear those ills we have Than fly to others that we know not of? Thus conscience does make cowards of us all, And thus the native hue of resolution Is sicklied o'er with the pale cast of thought, And … With this regard their currents turn awry, and lose the name of action [6].

Schopenhauer made this comment on Hamlet's soliloquy:

> The essential purport … in Hamlet is … that our state is so wretched that complete non-existence would be decidedly preferable to it. Now if suicide actually offered us this, so that the alternative "to be or not to be" lay before us in the full sense of the words, it could be chosen unconditionally as a highly desirable termination ("a consummation devoutly to be wish'd" [Act III, Sc. I.]). There is something in us, however, which tells us that this is not so, that this is not the end of things, that death is not an absolute annihilation [7].

The second purpose of this volume is to legitimize this question at a level tantamount to any other avenue of epistemological investigation. If Man is the paragon of animals, the apex of a Darwinian evolution, why

is deity or a teleological action principle necessary? It is only the hope for an eternal existence beyond this short temporal strife. God bridges the abyss of nothingness; the terror of nonexistence the Humanist faces. I am a man not unlike Descartes or Kekulé; I diligently practice and sincerely believe Plato's teaching: 'No matter how great one's intelligence, or how vast the extent of one's wisdom, Noetic Insight is beyond this'. Noetic Insight transcends the human condition in coming from the teleological entelechies of the cosmos itself. I have applied life-long diligence to be able to viably utilize transcendence as a tool in scientific endeavor – the utility of an intuition higher than reason. Some have suggested that this scenario is anti-intellectual. This would be true if followed blindly. Transcendence is not to make Mankind lazy or to replace empiricism; it is to make him superbly efficient in the saving of time and resources and as evidenced here to accelerate the process of solving more difficult problems. I have demonstrated so far to myself at least that effort of this type works; that transcendence completes the tools of human epistemology and can thus have great utility as a tool in scientific theory formation as introduced in chapter 5.

Like the field of Consciousness Studies itself this volume is interdisciplinary and covers some aspects of Neurophysiology, Quantum Physics, Cosmology, Philosophy of Mind and theology. Most of the chapters are written at a popular level easily accessible to any erudite reader; but much of the volume is fortunately or unfortunately geared to college graduates and professionals in the field of consciousness studies. The mathematical sections would be most accessible to more advanced scholars with an academic interest in consciousness studies, especially philosophy and physics of mind. It is hoped the book also has value for the general reader who has waited patiently for a glimpse of the conscious universe as seen through 'Gods eyes' and to witness the birth of a formal form of empirical metaphysics that brings theology (transcendence) to an equal footing with other pragmatic endeavors. For theology and science are not mutually exclusive but rather opposite ends of the broad spectrum of human intellectual endeavors.

On a personal note, about a decade ago at a Slovenian conference in Ljubljana organized by Prof. Matjaz Gams (where Pribram and I were the only foreign scientists present); on returning the next morning after I had given a talk on the Noetic theory, two Slovenian scientists rushed up to me and said, 'Professor Amoroso, we were up all night discussing your theory. We know someday it will be taught in all the schools…' This day is approaching.

The volume is timely due to the urgent need for a comprehensive theory for the physics of the Observer and also being in proximity with both the centenary of Nobelist Sir John Eccles birth and Einstein's *Annum mirabilis* noting his dream to find a unified field explaining all life. To most contemporary mind-body researchers Cartesian dualism / interactionism is of little interest, considered archaic and denigrated to the extent of ridicule. The standard cognitive neuro-dynamical or quantum approaches, in contrast to interactive dualism, consider mind equal to brain. In contrast, the author has taken the opportunity to introduce a physically based comprehensive empirically testable dualist model of mind/body interaction for the first time in history that could revolutionize our thinking on the mind-body problem. This makes the volume historically unique as there has never been a dualist or interactionist theory that did not stop at the philosophical/theological level. For example, as mentioned above, the last great dualist of note Nobel Laureate (for discovery of the synapse) Sir John Eccles merely stated that a mental construct called the Psychon attached to the dendron (a bundle of neural dendrites) in the brain. The psychon remained an empty undefined interactionist concept for which Eccles received considerable criticism.

A comprehensive dualist / interactionist model is highly controversial as many researchers believe Cartesian dualism is archaic and untenable. Currently there are about 5 or 6 promoted theories of mind:

1. K. Pribram's Holographic/Holonomic Brain model.
2. J.C. Eccles' and E.H Walker's Synaptic Tunneling (The 1st dualist and the latter quantum).
3. The Hammerof-Penrose Quantum State Reduction at the Microtubule.
4. The AI model of Brain as a Computer and Mind as a Program.
5. The Neural Network approach.
6. Jibu & Yasue's Quantum Brain Dynamics.

The followers of all these schools claim complete comprehensive theories even though most are not empirically testable and only address narrow arenas of the mind field. Virtually all these theories are purely brain theories. The currently dominant cognitive approach asks: "*What processes in the brain give rise to awareness*?" This has led to what is known as the Hard Problem stated as so difficult that it cannot currently be researched; and the easy problems also being nearly untenable.

Noetic science suggests this manner of posing the question represents a category error for philosophy of mind because it excludes any additional or cosmological processes which would include alternatives like dualism / interactionism. I will go so far as to say that that is myopically unscientific. The proper way of phrasing the question, which Cartesian Dualism does is: "*What processes give rise to consciousness*?" With this change, as demonstrated in this volume, the hard problem disappears and a truly comprehensive empirically testable theory of awareness appears; with the ability to integrate the valid components of all the other models. One cannot claim consciousness is discovered before empirical 'proof'; but explanatory power and internal consistency of the Noetic Theory provide prescient indicators of the model's viability.

For example, the author's noetic model is the first theory of any kind to explain qualia in physical terms. Formal delineation of the life principle or *élan vital* explains not only the origin of self-organization in living systems providing the basis for the first comprehensive dualist theory but also is what makes the model empirically testable and can lead to dissolution of the 1st person-3rd person barrier. Floodgates are about to open to almost unimaginable advances in the field of Consciousness Studies. The physical basis of mind leads to profound new medical technologies, telecerebroscopes and other interesting toys… making very timely a volume to vanguard such a revolution. Simplistically, all this is possible by utilizing a new anthropic cosmology and a completed form of ontological de Broglie-Bohm quantum theory.

Today there is no Inquisition like that threatening Galileo with death or internment. The contemporary punishment is ostracism, lack of tenure or denial of funding. No death warrant like that imposed on Salmon Rushdie for his "Satanic Verses" is anticipated here, however it will be interesting to see how long it takes to remove some form of *bend sinister* from the dualist's literary escutcheon. It took afterall 15 years to perform the simple experiment demonstrating Einstein's photoelectric effect for light quanta. Scientists thought it was absurd!

If one credits Plato (one of the three ancient Greeks who laid the philosophical foundations of Western culture) rather than Descartes, it could seem pertinent to suggest this book has taken 2,400+ years to produce from the ideas first inception. Plato taught that noetic insight (transcendent) was the highest form of knowing. Cartesian Dualism has been argued for four centuries from theological and philosophical points of view; but until now there has never been a work capable of bringing dualism to a footing tantamount to other scientific models of consciousness.

It is said to have taken nearly 150 years for the Copernican heliocentric revolution to reach general acceptance; will that be the case here? For the 1st 75 years heliocentricity was ignored as nonsense; then finally another 75 years to accept Galileo's observations. It is hoped that with the asymptotic increase and dissemination of information in our technical times, that somehow this will not be the case because the wonders that await, I believe, will pale all else that has heretofore occurred in the history of Mankind. And the medical breakthroughs, we need them now…

R.L. Amoroso

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Chapter 1

CONSCIOUSNESS: THE PHILOSOPHICAL FOUNDATIONS OF NOETIC FIELD THEORY

1. Introduction

For Consciousness there are two main schools of thought, the theological and the scientific, with philosophy exploring the gap. Theology for the most part has been willing to let sleeping dogs lie; but there is a growing movement to scientifically understand Consciousness (Awareness) started initially because of problems related to the role of the observer in empirical measurement. The scope of the question is broader now: Man's place in the cosmos, the basis of evolution, what is life, why are we here, are we alone, is there life after death, is there free agency, is creation *ex nihilo*?

This chapter delineates a seminal philosophical foundation for Noetic Field Theory: The Quantification of Mind (NFT). If brain is insufficient for consciousness NFT must provide a cosmology of mind with an inherent teleological action principle driving evolution in Self-Organized Living Systems (SOLS). The currently popular naturalistic Big Bang scenario does not provide this structure. NFT is different from Cartesian Dualism and Eccles Interactionism in that the separable substance of mind is a physically real form of matter tantamount to the Spirit of God, *élan vital* or the Unitary Field of Physics.

This volume is not a venue for expending a grand effort to dispel critics; that may take time or the performance of empirical tests (which the new paradigm does provide). But rather provide an opportunity to finally present the basis for a comprehensive model of dualism on firm ground leveling the field with other models. However, as an exercise let's take a moment to briefly answer one typical criticism as put forward by Paul Churchland to demonstrate that while we choose not to engage in point-by-point arguments of critics in this venue answers to all questions are available: 'If mind is a distinct substance, how is it that every case of brain damage produces a commensurate decrease in mental faculty?' [1] Simplistically the answer speaks to the nature of reality and interactionism itself – Metaphorically, an automobile driver's vision is impaired through a clouded windshield or smudged glasses, where driver equals mind and windshield or glasses equal brain, i.e. the brain is a lens or transducer of external reality not the seat of awareness. When Einstein said all of Physics is based on two measuring rods - that of extension and duration, he concluded that this tempered the abilities of an observer because the observer is imbedded in and comprised of these same substances observed.

In order for NFT to quantify a cosmology of mind, a framework for defining the physical basis of consciousness is derived in terms of the complementarity inherent in the anthropic cosmology of a *continuous-state* Holographic Anthropic Multiverse (HAM)[1] [2], i.e. if mind does not emerge from the brain, then there must be an associated cosmology with an inherent mind stuff indicative of an *élan vital* or life principle. This cosmic life principle is equated with the Unitary Field of physics postulated in NFT to have an exchange particle called the noeon[2] which becomes associated with information and processing in neurons, microtubules, synapses and other arenas of quantum brain dynamics where 'consciousness'

[1] HAM Cosmology – While we would rather not further proliferate the lineage of cosmological modeling nomenclature, current terms ranging from Einstein's Static, Steady State, Big Bang to various current forms of Anthropic Holographic Multiverses have proven inadequate for the needs of NFT.

[2] The phenomenological exchange particle of the electromagnetic filed is the photon, graviton for gravitation etc.. but the noeon has additional ontological topological properties allowing violation of the quantum uncertainty principle [2].

couples to biological structure and biochemical species by way of an enhanced definition of Eccles original philosophical concept of the Psychon[3]. Novel ideas involving the cosmological Noumenon[4] and brain Holoscape are presented, including a basic mathematical formalism for the new noetic action principle called 'the noetic effect'.

Consciousness has been a quixotic term of myriad meanings in both general and technical usage where great divergences still exist between the plethora of theories [3,4]. Mind modeling is apparently related more to the nature of the intellectual or experimental probe rather than the actual substrate. One is reminded of complementarity and the participatory nature of quantum wave collapse: the kind of question asked determines the kind of measurement made, which in turn qualifies the aspect of reality apprehended. Furthermore, one might ask whether consciousness has a prior cause or if there is some critical condition or degree of complexification that must be met for its evanescence into biological systems? More to the point, is an 'it' involved? These are questions we intend to answer.

Neurophysiologists and cognitive theorists, query whether mind is a matter of the function of neural networks generating computation or forms of gravitationally mediated Bose-Einstein pumping in cytoskeletal microtubules or synapses. Philosophers cerebrate versions of monism, idealism, dualism, materialism or myriads of other subtle and often myopic nomenclatural concatenations and permutations of these disparate categories. Physicists conjecture the consequence of superstrings, M-Branes, D-Branes and P-Branes, twistors in sheaf cohomology, or recently functors of category theory [4,5] dredging up vacuum zeropoint energy, quantum tunneling and nonlocal bits of teleported EPR potentia or symmetry rules that modulate gravitational collapse of the wave function by a required minimal conscious mass.

This wrangle with ontology, particularly the qualia of experience, known as the "hard problem" [6] gives some inkling of the difficulty in pinning down what has been called an evolutionary fluke, or derivative property of 'wetware' with no other value, according to some stubborn classicists, save vexation. Still, we have it, or rather it has us: it is a phenomenon evidenced by reportable mental states, which are in themselves concepts wrought by the very mind under investigation. Somehow we process information without understanding fully just what informs us. No wonder consciousness is considered the oldest and most difficult problem facing human epistemology.

According to Bohm and Hiley [7] the idea of active information applies both objectively and subjectively. They go on to say "in this context our proposals to use the concept of active information at the quantum level does not seem unnatural". They then refer to the electron interference pattern from a double slit experiment and argue that as "the particle reaches certain points in front of the slits it is 'informed' by the guiding action of a quantum potential to accelerate or decelerate accordingly." The fact that a particle moving under its own energy is being 'guided' by the information in the unified quantum field suggests that an electron or other elementary particle has a complex and subtle inner structure [8]. This notion of an inchoate fine structure goes against the tradition of scientific reductionism and gauge theory - matter should get simpler as we go down to more reduced levels.

Ironically, according to NFT mind is not reducible to brain as popular opinion suggests, and thence reduction of brain to matter becomes meaningless in this context because of the increasing complexity at lower levels. To say that the most elementary levels are more complex sounds like an oxymoron - complex simplicity? or perhaps complicity is more apropos. Perhaps complexity remains uniform in the context of continuous reduction as we are finding out in the case of fractals [9] This is no worse a transition than faced by the early atomists. Atomic structure is now found to be very rich and complex with hundreds of particles discovered. The question now might be - what is the most fundamental form of complexity in relation to

[3] Psychon - Eccles named fundamental neural units in the cerebrum dendrons - bundles of nerve dendrites. He proposed that each dendron links with a mental unit he called the psychon. During thought psychons act on dendrons increasing the probability of neural firing, during perception the reverse process takes place.

[4] Noumenon- or thing in itself, an object independent of mind as opposed to phenomena which are apprehended, see http://en.wikipedia.org/wiki/Noumenon.

awareness? This is the question we will answer by developing a principle of the *least-unit of awareness*, as it relates to the cosmology of the conscious universe which is itself a form of complex system [10,11]. This meets Chalmers' challenge that a fundamental principle of awareness should be the starting point in developing a viable theory of consciousness [6].

Universal consciousness appears to be the 'mother of complexity' representing a panoply of all complex modalities. A universal system of complementarity between mind as container and consciousness as mental content represents the primary complex system and most fundamental aspect of reality. In terms of this basic premise - *that mind and consciousness represent the most fundamental principle of reality; the complementarity of which produces awareness* - we utilize the following definitional overview of *complexity*, *self-organization* and *consciousness*:

Complexity

The quantitative characterization of complexity theory in a comprehensive manner has only recently begun [12,13], partly because the interdisciplinary girth is still spreading to more and more scientific disciplines. This makes a comprehensive discussion challenging, especially for consciousness researchers who by the nature of the field of inquiry require the broadest and most inclusive classification of complex phenomena to include all the seemingly disparate systems analyzed. In this sense consciousness is synonymous with complex systems theory. Category theory can encompass mathematically such an ubiquity of complexity in a general manner [4]. This is not a flaw or a Gödelian recursion, but a requirement to sufficiently envelop the full universal nature of mind in a complex conscious universe with inherent self-organized teleological principles governing (guiding) its evolution. There is still evolution but it is guided not random as in Darwinian naturalism.

In more generalized scientific sub-disciplines complex behavior arises in physical, chemical and biological systems as well as mathematics and information theory. Here we introduce the primary cosmological manifestation of complexity. We support the basic standard definition of complexity as a 'system of intricate parts such that the analysis of its attributes must rely on not only linear but nonlinear methods as its causal relationships cannot readily be determined by standard reductionist tools that only produce precise Newtonian predictions. According to Badii [14] three fundamental components are required to define complexity:

1) Complexity is the function of both a subject and an object where the subject has the task of modeling the object.
2) The object or its representation must be divided into a hierarchy of elements and sub-elements.
3) Study of the interactions of the subsystems leads to a model that includes the concept of scaling of the inherent hierarchical elements.

Self-Organization and Consciousness

Zero complexity is attributed to entropic randomness which corresponds to the absence of self-organization. Autopoiesis as coined by biologist H. Maturana [15] is a key aspect of complexity as it as it relates to self-organized living systems [16,17]. It refers to the ability of a complex system to produce and maintain itself. This occurs within a hierarchy of scaling functions that mediate the interplay between modalities of the system. Defining consciousness becomes tantamount to defining complexity. What it is has typically depended on the kind of question asked and the level of analysis. Our preliminary working definition of consciousness in terms of complexity theory as the primary self-organized complex system is as follows:

Consciousness is an autopoietic self-organized scale-invariant hierarchical anthropic ordering principle inherent in the physical teleology of the anthropic conscious Multiverse. The ordering principle arises as an energetic parameter of an Einstein-like Unified Field.

Overviews of the Anthropic Multiverse can be found in [2,10,18]. Ultimately a complex autopoietic system may be synonymous with the basic elements defining the conscious universe; the salient difference being one of domain only. The basic element or 'least-unit of awareness [19] has three complementary physical or cosmological components forming a fundamental continuous-state [2] ontology, the very existence of which is synonymous with consciousness. Together these three components form the structural components of mind as a physical noumenon; the phenomenological contents of which represent an ontology of awareness. This is Cartesian-Eccles interactive dualism.

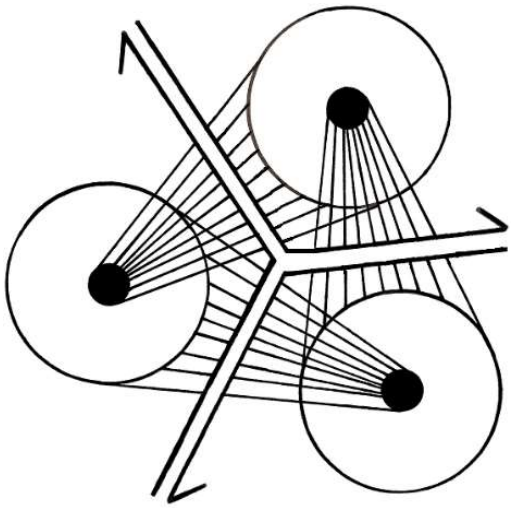

Figure 1. Conceptualization of an isolated HAM least cosmological unit which would not occur in nature showing the continuous-state static and dynamic Casimir boundary conditions around a central Witten Ising model string vertex.

Returning to the discussion from Bohm and Hiley [7] "nature is far more subtle and strange than previously thought...and this inner complexity is not as implausible as may appear at first sight." As an example they cite statistical laws where microscopic individual behavior is seen as much more complex than at the macroscopic level. Crowds are more predictable than the people that make them up. The number of neurons in the brain is of the order of 10^{12} which is probably several orders of magnitude higher for synapses. Is this admittedly large number sufficient for emergence or identity with mind? Wittgenstein [20] suggested that thoughts might reside in the brain like 'jottings. What is stored in our brains is a kind of mnemonic that then could call up the whole thought in much the same way that short hand notes or 'jottings' of a conversation could remind one of the full text. The text would not be stored in the jottings - so should the mind necessarily be stored in the brain?

Bohm and Hiley [7] note that "between the shortest distances now measurable in physics of the order of $10^{-16}\,cm$ and at the shortest distances in which current notions of spacetime probability have meaning of the order of $10^{-33}\,cm$, there is a vast range of scale in which an immense amount of yet undiscovered structure could be contained". Indeed, this range of scale is comparable to that which exists between our own size and that of an elementary particle or a galaxy. However it has been recently demonstrated that by introducing a millimeter scale for the extra spatial dimensions in string theory this gap can be closed completely to the TEV level [21]. We have also found a way of filling this gap by recalculating the Planck

constant in terms of the Noetic least-unit. Moreover, the vacuum is generally regarded as full [22,23] with an immense energy fluctuation revealed for example in the Casimir effect[5]. "*It may be further suggested that ultimately the energy of a particle comes from this source... a very important further implication of the notion of active information is that in a certain sense an entire experiment has to be regarded as a single undivided whole*." The point is that there is plenty of room for any new physics or cosmology needed to describe a NFT of consciousness.

It occurs to us that two factors are of paramount importance in developing a comprehensive theory of awareness;

- First a deeper understanding of events around the Heisenberg matrix designated as the raster of mind [24] which entails both the prespace or subquantum realm as well as brain biochemistry and second, integrating the various mechanisms postulated for brain-mind information processing which has more to do with computability than emergence or identity in the noetic formalism. A *raster,* by the way, is a grid of potentialities - one might imagine a TV screen of pixels, where the energy at the intersection of each tiny square can be represented by a tensor or scalar potential.

- The big question is whether the brains neural net along with its associated quantum mechanical substrate is sufficient, as posed by the cognitive vogue; or is the addition of the teleological 'electron gun' - the noeon holophote action, introduced by the noetic interactionist theory required? In the twenties Kaluza [25] was able to write down the Riemann metric in five dimensions (5D) and meld gravity with the electromagnetic force, to unify gravity and light as spacetime curvature. This was done with a tensor field representing the state vector at each crosshatch on the grid. Another required component of the raster? We believe so and develop a twelve dimensional (12D) form of Kaluza-Klein theory to introduce the teleological or anthropic noetic field into spacetime topology.

What is perceived as the mind depends greatly on the level of analysis. For example, a glass of water might be thought of as a stochastic ensemble of molecules or a thirst quencher. The latter might be considered a hyperspace projection of the former, thirst being a property imbued by the background of the observer at that level. That is, a higher dimensional being would 'know' what thirst is, but a being submerged in the matrix of water molecules would not comprehend what even wetness was. Einstein said that we are composed of the same material as our measuring rods; sufficient reason to satisfy the criteria of Gödel's incompleteness theorem [26]. A pertinent question then, is at what level do properties or qualia inhere? In Hindu philosophy for example [27], the Samkhya see everything arising from itself. In this sense, there are no causes different from the effect. Life begets life, consciousness gives rise to consciousness from its innate ground of being [28]. Scientific accounts must seek explanations beyond this recursion e.g., the reason why morphine induces sleepiness is because of the dormitive power of morphine.

A solution to the mind-body problem that escapes the specter of Gödel's tautology[6] [26,29] is offered here to set in place the required cosmology from which to define the 'least unit of awareness'. We propose a triune model with partial correspondence to Popper's Three Worlds approach [30] of brain/mind that involves:

- The local temporal domain of classical and quantum brain dynamics.

[5] The Casimir effect [19] is the strongest evidence for a covariant polarized Dirac vacuum. This turns out to be an essential factor for noetic cosmology; the reality of a Dirac vacuum leads us beyond the naturalism of the Big Bang into the realm of a continuous-state conscious universe [2].

[6] Extrapolating Gödel's incompleteness principle - A proof demonstrated in terms of a system in itself is inadequate by its recursive nature; an adequate proof must come from *outside* the system (often called a Gödelization).

- An ubiquitous cosmological ordering principle called the noetic field which is mediated by an aspect of the unitary field defined as the noeon, and
- Elemental intelligence, an eternal[7] individual boundary condition which entails fundamental nonlocal and supralocal boundary conditions that include aspects of space and spacetime cast in a higher dimensional absolute space of a post Big Bang cosmology treated in more than the four dimensions of observed phenomenological reality [10, 19].

The noetic model represents a structural - phenomenology that is a physical noumenon housing the corresponding phenomenology.

More particularly we extend and formulate a physical basis for Eccles' philosophic concept of the Psychon [31,32] enabling us to wed the synapse, Pribram's quantum holographic Gabor function [33,34], Jibu & Yasue's Goldstone Bosons [35], and Hameroff -Penrose's microtubules [36,37] in terms of a process called the *Noetic Effect*[8] yielding a comprehensive and empirically testable model of consciousness. The Casimir effect[9] is developed further for application to living systems not to account for spontaneous emission of biophotons [38-40], since these generalized biophotons represent only a more superficial release of extraneous life energy during metabolic activity; but to describe the paramount quantum of conscious action which is mediated by the quantum of the noetic field - an exchange particle called the Noeon. The noeon has a Casimir-like action inherent in the topology of the geodesics (light cone lines) of spacetime cavity-quantum electrodynamics (CQED) and the unitary field of mental action. It is imbedded in the spacetime metric with quark-like confinement. The noetic field is constrained through its holophote action (periodic flashing like a lighthouse) to produce a macroscopic resonance as it arises from a much more fundamental process of complex self-organization in the Anthropic Multiverse which fits the definition of a complex system above.

The noetic formalism, a dualistic-interactionist paradigm, is unabashedly not rooted in Darwinian naturalism (random evolution); but additionally in newly discovered teleological action principles inherent in the cosmology of an Anthropic Multiverse [2,16,41] Any successful new theory must make correspondence to the data or principles of existing 'tested' theory. Thus it is reasonably obvious that evolution exists; but it is not merely a randomized naturalism - Evolution is 'guided' by the ubiquitous teleological action principles inherent in the anthropic multiverse! Inevitably, and unequivocally we believe, mind depends on matter, not the other way round; but profoundly as mystics in both East and West have noted - *all spirit is matter*; and *gravitation is caused by the movement of that spirit*! Here we begin to bring these formerly philosophical assertions into the realm of scientific pragmatism [2]. However, we do not hearken back to the bad old days of an entirely objective reality. We must use quantum theory, albeit in an extended (completed) form, to employ a much deeper sense of complementarity; one that brings us into action modes of the unitary field where gravity and electromagnetism are in correspondence [2,10,42,43]. However, this does imply an additional causal action, one that includes transcendence - which entails a special form of determinism. There is a correspondence principle related to quantum theory in the

[7] Eternal – Timeless domain in causal separation from temporal reality.

[8] The noetic effect is more complex than can be described here in a brief footnote, but in way of introduction this effect is the key complementary action principle inherent in the anthroppic multiverse described by a form of a topological field theory that utilizes a unified Quantum - Electromagnetic- Gravitational field allowing Casimir-like geodesics (boundaries) in the topology of HD spacetime to undergo ontological energyless or non collapse topological switching by the action of intentionality on the mind side; and inherent self-organized autopoietic processing in living systems on the cosmological side. It is scale-invariant and in addition to the mind-body it relates to Dirac's spherical rotation of the electron and and the nature of reality itself.

[9] Casimir effect – The force between two boundary conditions in a volume with a field (here the noetic field) The energy of the field depends on the frequency which in turn depends on the boundary conditions. Changing the position of the boundaries changes the frequency and energy of the field which can be a potential energy per area of the boundaries which leads to a force depending on the boundary conditions. Adapted for mental energy and ombined with the Noetic Effect we will be able to develop a basis for life, thought, qualia and health-disease.

domain where classical theory is analogous to it. This is true whenever there is a paradigm shift from one theory to another, like between Newton's and Einstein's gravity for example. Our task has been to find the correspondence between the standard physical models and consciousness (awareness). Our view is somewhat sympathetic with Willis Harmon's radical epistemology though he seems to favor a more idealist metaphysic [44] in that it includes the phenomenon of consciousness and does not relegate subjectivity merely to a behavioral epiphenomenon.

Most importantly, the noetic theory is empirically testable [2], or alas, refutable. Recall PauIi who was wont to say "it is not even wrong" about ideas that could not be tested. As vacuum quantization proceeds as called for by Penrose [29,45,46], it is suggested that the locus of mind/matter interaction must include not only the currently considered quantum entanglement in the brain holoscape [24]; but also an essential complementarity at the unitary level [10] in order for correspondence to occur with gravity, electromagnetism, quantum theory, cosmology and information theory. We believe that incorporating the nonlocal aspects of the unitary field, not yet adequately articulated beyond any current formalism, is necessary to any model of consciousness.

Pribram's quantum holonomic brain theory [47] and various methods for describing Bose coherence in biological systems [24,48-50], are now sufficiently sophisticated to raise expectations for easing the age old dualistic dilemma. This chapter outlines recent thinking on mind / brain interaction and proposes a radical definition for a *least unit of awareness* [2,19]. This least-unit [2] incorporates a cosmological mechanism for a continuous-state dimensional reduction process [2,10] with an inherent *holophote*[10] action. This inherent mind-body action principle is part of the Noetic Effect. It mediates both entry (every point in spacetime and every atom of the living system) of the *élan vital* or vital anthropic coherence force into the hierarchical complementarity of the self-organized living system but also mentation proceses (qualia) within the holographic Heisenberg raster. This laser-like pump is a continuous Psychon-Noeon – Phenomenon-Noumenon cascade. The mechanism compliments holonomic brain theory since it is possible to integrate all aspects of quantum brain dynamics with it. Wigner's statement that consciousness is related to state reduction or wave collapse is superceded by the ontological energyless noncomputable nature of the noeon pumping mechanism. This applies only with 12D extended modes of de Broglie-Bohm ontological interpretation of quantum theory.

Penrose has suggested that state collapse for living systems is a function of quantum gravity, while others have put forward decoherence as an observer free mechanism for collapsing the wave function and thus actualizing quantum events. However, these mechanisms are postulated in terms of the standard Copenhagen model of quantum theory which even Penrose himself states in a detailed analysis is beyond the capabilities of current quantum and gravitational theory to describe [51]. 'Quantum theory is silent about these issues'. Following in the line of these currently popular views regarding quantum wave collapse Penrose & Hameroff have asked 'what minimum gravitational mass is required by an entity in order to reduce the state vector in order to have consciousness'. This is an expected interpretation if one applies the standard Copenhagen quantum interpretation. But it is a fruitless exercise because as generally known the standard model of quantum theory is not sufficient to describe the additional degrees of freedom existing in biological systems. People are more than a collection of particles on a manifold – which is all that standard quantum theory is able to describe. This was stated emphatically by Bohr when he founded quantum theory – that it couldn't describe biological systems.

In the noetic paradigm even the prion protein (mad cow disease) has a rudimentary mechanical consciousness because the conformational changes that govern its propagation are mediated by the noetic action principle [16,19] which does not require collapse to mediate awareness. The *least-unit of awareness* is the most fundamental principle of the conscious universe inherent to <u>any</u> living system. Quantum collapse

[10] Holophote action is like that of a rotating lighthouse beacon. A noeon flux enters living systems continuously with a periodic beat frequency related to the continuous-state evolution of the topology of spacetime [2].

does occur in the outer husk of classical matter; but in the core coherence rules. Thus the need for the complementarity of the two worlds in order to develop an adequate theory of mind.

Thought which could be called a stream of quale (the feel of awareness) is described in terms of an inherent complementarity associated with the Heisenberg matrix[11] or raster of consciousness as it is imbedded cosmologically in spacetime [24]. Not merely the brain as suggested by the current cognitive vogue where brain equals mind. This so called Heisenberg matrix is a subspace of a HD noumenon of the psychosphere (full domain of an individusls mind) that embodies both the local - temporal dynamic Holonom or holoscape as it is coupled to the temporal brain; and a nonlocal atemporal higher dimensional (HD) domain of elemental intelligence[12]. The noetic field filling the psychosphere is mediated by an exchange particle called the noeon. This putative noeon is both the *élan vital* or spark of life and 'light of the mind'. It is in correspondence with the unitary field. The noetic formalism allows a physical description of qualia [19,52].

2. We Are Publicly Observed but Privately Experienced

One of the key problems of conscious experience is that until now it has been observed, not as an object in the world seen from the outside but as a subjective experience felt from within only. This internal world, or interiority, cannot just arise out of matter; unless the potential for interiority already exists or potentially exists *a priori* in matter. We use the term 'matter' advisedly, in that quantum theory and Einstein's mass energy relation, $E = mc^2$ suppose that matter does not exist as hard little Newtonian nuggets of stuff, but as probabilistic de Broglie matter-wave functions which are bi-local. Crick was right to insist that brain should function like anything else in the universe [53], in that mind should be consistent with the laws of physics. Perhaps this is all that Crick is right about in his 'Astonishing Hypothesis' book. Certainly, he would critically accuse us of appealing to a form of Aristotelian animism by our insertion of an *élan vital*. But we have finally found that the extended laws of physics applied to a 12D string theoretic Dirac polarized vacuum provide machinations sufficient to account for mind in a manner that includes an empirically testable physical form of *élan vital* [2]; a term we use for the sake of history - why not start a riot if one is long overdue.

In the current cognitive approach - mind equals brain. But in our Noetic Field Theory the stochastic quantum foam and zero-point field observed at the Planck scale reside at the cut of the mind / body interaction. Stochasticity, which exists naturally at this level, arises in the wake of unified electro-graviton propagation. Strings are the extension of our relational spacetime which is continuously created, anihilated and recreated in time (the process also produces the arrow of time) [2,10,18,19]. The domain of eternal mind beyond this stochastic barrier is not a probabilistic generator because the choices of intentionality are not random. The core of the mind remains coherent because for the most part it is within the realm of the unitary field. Observed reality is a subspace of the 12D atemporal absolute space. The reason for the higher dimensions (HD) is so that 'our' temporality can 'surf' so to speak on the face of that HD eternity. This is where, in noetic cosmology, the necessary degrees of freedom to describe mind arise from. It is this cosmology from which the principle of the least-unit of awareness can be developed [2,10,19].

Nonlocality is an important aspect of quantum mechanics because it lends itself to the binding problem. This so called 'binding problem' relates to the nature of the unity of experience: if there are so many Newtonian objects - neurons in the brain independently processing bits of information, the question arises as to how all of this separate activity is summated instantaneously to give a solo experience of a "me"

[11] Heizenberg matrix.- The holoscape is the web of brain dendrons in Pribram's holographic brain model. The Heizenberg matrix is the underlying quantum domain that in conjuntion with the holoscape form a raster where the neural information encoded as Gabor holographic logons are processed.

[12] Elemental Intelligence – Domain or portion of individuality that is eternal and exists beyond the temporal realm.

acting. This is where noncomputability[13] enters; the binding problem is here not a problem because of the inherent complementarity of awareness as a microcosm of the conscious universe itself. Since the brain is a natural form of conscious quantum computer, a transducer and data processor only, and not the seat of awareness, there is no binding problem. The mind is a fundamental noumenon - a thing in itself - all this extraneous fluff is so that we, as temporal residents of Plato's cave, can wear a lens darkly and observe the external world (incomplete virtual reality) of our temporal existence!

Is the popular phenomenological view - the standard cognitive model, correct? We don't think so. It is rather the result of a category error in philosophy of mind that has produced the non-researchable hard problem [7]. "What processes in the brain give rise to awareness?" This is a superficial and limited a mode for the proper query of 'what gives rise to awareness'. In the history of science 'hard problems' usually only exist when the underlying principles are not well understood. Noetic cosmology by positing the question in the proper cosmological frame of reference is able to readily dissolve the 1st person 3rd person barrier. One must ask simply 'what processes give rise to awareness?' not what processes in Siberia... as in the allegory where the fool Nasrudin looked for his lost keys in his front yard under a street light because there was more light there when in actuality he had lost them in the back yard. Most have flocked to the safety of the popular cognitive brain model; but is this good science - to tell the universe how to answer the question?

Nor are people merely sophisticated computers; so finding a correct or sufficient algorithm will not allow replication of human awareness in a Turing machine (the electronic computers of today). According to Minsky, mind is what the brain does. However, to say that the mind is a computer raises the issues of 'who' is the user and who built and programmed it. Wang [54] succinctly dismisses parallelism AI by saying that "since the brain is its own user it cannot be a computer." But again, Wang's application is from the cognitive perspective; for in the noetic perspective the mind is the user. One often hears mention that the brain is the most complex entity in the universe. The vast potential of the brain for information processing has acted as a pied piper leading many researchers away on a spurious path of mind-brain identity. Furthermore, it turns out that aspects of the mind are noncomputable, such that there is a physical reality of mind that cannot be represented with sufficient precision to lend itself to mathematical description by current tools. Penrose [29,45] argues that thinking might be noncomputable.

Fortunately, these noncomputable aspects can be described by extended ontological theories. This again represents the complementarity of mind: the semi-classical local aspects interacting with the nonlocal unitary aspects to form a cosmology. A naturally occurring form of noncomputability observed in living systems is manifest by what is called the *vestibular ocular response*. Certain birds sitting on a branch or wire are observed to have their bodies bouncing stochastically in the breeze; but their heads remain perfectly still. A bird's brain cannot compute this. A supercomputer cannot compute this. The better the supercomputer the better the approximation only; the calculation itself is noncomputable...The needed result can only be achieved through the ontology of unitary action.

3. Background Matter and Quantization of Matter

Materialistic reductionism supposes that consciousness must be synonymous with brain. The vogue is to denote these as Neural Correlates of Consciousness for NCC's as such can be found languishing at the bottom of the now nonexistent homuncular regress: NCC's have been finessed well beyond mere mechanics, the so called 'easy' part of the problem of stimulatory / inhibitory action potentials, Hebbian loops, neurotransmitters, allosteric changes in receptors, enzymes and integral protein ion channels, rate changes in uptake mechanisms, alteration of enzyme-substrate binding, cyclic GMP-like messengers and what-not.

[13] Noncomputability – In distinction to Penrose' use of the term here qualia evolve ontologically in violation of the uncertainty principle by what is called topological switching of HD brane topology. See ensuing chapters.

Some researchers promote ion channels as the seat of consciousness [55]. Iteration of autopoietic chemical gradients have been posited as bootstrapping up information. There are ten times as many glial cells as neural cells in the brain for example, providing a huge fractal membrane of processing potential.

Cytoskeletal tubulin oligomers are a hot candidate for the processing locus, because of the general effects of a wide range of non-specific anesthetics on microtubule conformation and the subsequent loss of consciousness; plus the abundance of quantum stochasticity suggests a fertile ground for mental data processing that can't be definitively argued with one way or the other at present. The cytoskeleton, a dynamic network of protein polymers was thought to act only as a sort of muscle system for the internal structure of the cell. But there is more than meets the eye here - the cytoskeleton is macroscopic enough to dampen thermal noise while at the same time small enough to undergo conformational change under the aegis of single photonic events The Casimir radius of a microtubule is sufficient that light Bosons could pass through; as an interface between the nonlocal implicate world of the quantum potential and the billiard ball Newtonian realm. Descartes' pineal gland has been dispersed and nanosized. The microtubule straddles the dualistic divide between *res extensa* and *res cogitans,* being explicitly neither and yet both. A sort of Buridan's ass - which incidentally starved to death finding itself between two equally sized piles of hay and being unable to split the difference.

Can microtubules think? Connectionist theories abound. Boolean lattices, which are known to house logic, is this thinking? are possible by way of binary modes - the protein dimer is in either this conformational shape, or it is in another. Coupling various allosteric forms gives rise to computation - is this thinking? Can deterministic inputs in far from equilibrium systems become concretized as limit cycles of strange attractors: what emerges by way of collapse of limit cycles? Can microtubules concretize reproductive patterns as protein encryption?

After 40 years of dormancy, sites for the integration of the two models are possible:

1) 1. Dipole moment couplings to tubulin conformational states in the microtubules of the cytoskeleton [36,37,49,50,56,57] and
2) 2. Quantum matrices in synaptodendritic ultra structure [31,32,58-60], have intrigued theorists. In addition, quantum dynamics appears to occur in the dipole and spinglass structures of ordered water molecules [35,61,62], DNA entrainment [63,64], and other sites of protein conformational changes.

Since Democritus uttered his aphorism about atoms and the void, classical materialism has rested comfortably. Matter - we kick it, it kicks back. Quantum theory wanders out beyond the pale of particle and field, and speaks of potentialities to exist. Not only that, these are *probabilistic waves* in need of an observer. Reality then, is participatory. Quantum theory is currently an essentially statistical mechanics, describing the indivisibility of the quantum of action, and regrettably giving a leg up for spooky non-local correlates. The Uncertainty limit means that there will always be phenomenological observer ignorance of the full spectrum of realizable potentialities. What lends itself to the case at hand is the uncanny wave/particle nature of *stuff*. It is the dualist's godsend. Some suggest that quantum theory is therefore dualistic [65]; but the dualism required to describe mind is not just a wave particle dualism, but a broader dualism between the phenomenological 4D Copenhagen rendition of quantum theory and a completed 12D ontological form of quantum theory like that suggested by de Broglie or Bohm.

This chapter initially summarizes issues of mind pertinent to the Heisenberg matrix, the domain considered a key for understanding the seat of mind/brain interaction. Here in the mind/brain gap, we invoke a dynamic raster of consciousness operating along lines similar to Pribram's quantum holonomic theory but extended to cosmology.

4. Mind and Matter – The Heisenberg Matrix as Local Raster of Mind

Culbertson [66,67] has proposed an interesting spacetime reductive materialism model (SRM), where awareness is not a localized signal but an extended pattern in spacetime. He employs Einstein's relativity and complex worldliness creating a tangled network. Here consciousness permeates all nature and mind is accounted for by movement of matter. *Matter is sentient.* The material basis of Culbertson's mind is not in isolated particles but in their worldliness. It is these tracings what he terms elementary lines backwards and forwards in time that create awareness. In this sense, *all spacetime events are* potentially related to consciousness.

Pribram's quantum holonomic brain theory [34,47,68] describes what he terms a Heisenberg domain of uncertainty where the causal, linear, Fermi events of the holoscape manifold become acausal and nonlinear. This is the raster of mind. This is the most problematic nexus of any mental theory - how brain states manifest as awareness. According to Pribram, mental events in the holoscape constitute the upper bound of the Heisenberg matrix; now noetic field theory considers the lower complement where matter and energy meet.

If consciousness is hard to pin down, so is matter, within which it is housed. Ironically for the materialists, it is still as difficult to define matter as it seems to be to categorize consciousness - we believe they will be understood mutually. Mass has been a vexing problem in particle physics. What is it? If the photon has mass [67], do quarks, and so on? The development of the Higgs field as a way of accounting for mass is intriguing but may not survive (because Gauge Theory is only an approximation) when the unified field is better understood. Mass is believed to come out of coupling with the net of the Higgs field. A similar notion has been advanced for why we don't see isolated quarks. 'Confinement' means that attempts to observe individual isolated quarks are futile because the energy put into pulling them apart creates new quark triplets.

Clearly there is some correlation between brain states and mind, but to insist this is a one to one correspondence is not proven. Thought according to the cognitive theorists is an emergent function performed solely by brain activity, but as with mathematics, there are many different functions which might not have a one to one fit. For example, the square root of a negative number has two solutions, one of them being an imaginary number. We get two values. This degenerate, or multiplier aspect of mind is evident in the many other external functions of mind, for example, in the way we use tools that extend brain states, i.e., writing, pencils, paper, calculators and books. This amplification or cloning is referred to as the permissive or transmissive function by James [68].

Complex numbers provide an excellent vehicle to demonstrate the interplay of the dimensions of 4-space with those of the deeper 12D noetic space [10]. Penrose [46] uses a special algebra called sheaf cohomology developed by Witten in 1985 to show how the whole Minkowski geometry of physical reality can be described by twistors, which are a special class of dual spinors. The multiplication of complex numbers which have imaginary component provides a metaphor to glimpse how the component harmonics in quantized spacetime are brought to light in reality.

If the Heisenberg matrix is looked at in terms of quantum fuzziness, then the way is open for information processing in neural networks. The hyperstructure is not projected *in toto* into classical reality. Because uncertainty enters into the Heisenberg matrix in phase space, the global states can interfere with one another and must obey the superposition principle. Indeterminism is a property of all Copenhagen quantum systems for which the universal wave function includes in its domain the set of all compact four-dimensional manifolds. Ontological indeterminism suggests that uncertainty is not a product of our ignorance or inability to know differentiated with the prescription 'quantum ignorance' but rather an irreducible fact of nature. But according to noetic theory uncertainty is a limiting function only of that particular regime.

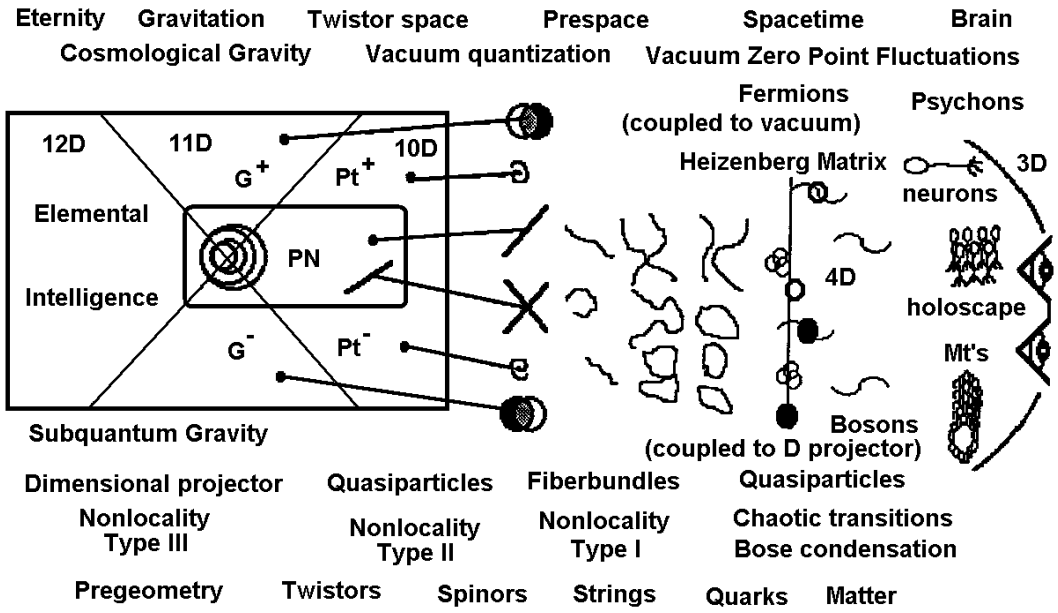

Figure 2. The complex noetic hierarchical structure of the conscious universe beginning at the top macroscopic right in the local brain at the top tier of holoscape and traveling down through the tiers of Heizenberg matrix which is the seat of mind - body interaction. Semi-classical neural network Fermion states undergo quasiparticle transitions Bose coherence as they are transformed into nonlocal domains described by quantum brain dynamics. The rich structure of this complex domain continues into the HD spacetime topology of the Dirac vacuum. The top tier of the Dirac polarized vacuum is 4D Minkowski-Riemann space, the realm described by geometrodynamics, special relativity and the standard Copenhagen interpretation of quantum theory. Next we enter the 3rd nonlocal level which borders and becomes the unitary field. Here is where Einstein's 4D realm our observed phenomenological reality ends. This domain is embedded in a subspace of a higher 12D domain that arises from the absolute space of the multiverse. This deeper realm houses the boundary conditions of elemental intelligence - the timeless realm of an individual.

What noetic theory suggests is that at the prespace level of the Noumenon, *nature is not ontologically indeterminate but deterministic.* The ultimate controlling equations are deterministic even though their local solutions are not. That is, feeding in almost infinitely accurate data will not lead to predictable outcomes from the top down, sensitivity to initial conditions being what it is. Wave functions are not restricted to living things, nor are they 'restricted' or perhaps contained in the local sense. The reason for indeterminism is the four manifold non-classification theorem which is a kind of variant of Gödel's Incompleteness Theorem. The non-classification theorem states that no algorithm exists which will classify all compact four-dimensional manifolds without a boundary. An equation with symbols representing discrete elements cannot be written down. No algorithm establishes the identity of manifolds, and as such the universe might be non-computable in this domain, giving reason enough for dodging the Boolean net of QBD. This is related to the measurement problem that we claim only applies to the regime of the Copenhagen interpretation. An ontological exchange of information is possible at the deeper coherent level of unitarity. This is not an external measurement. One system becomes the other system so states are superposed not destroyed. With this form of superposition all information is jointly available. Noncomputability means the action cannot be performed in the classical domain only; ontologically 'being' solves this dilemma.

According to game theory first described by von Neumann and Morgenstein, then later by Nash, a mixed strategy wins. The mix is between random and bounded behavior. Chaos provides a search technique to bump the system from fixing on suboptimal early 'solutions'. Although the human nervous system utilizes non-relativistic quantum uncertainty at the level of the neural net to randomize in the semi-classical limit, the question remains how the nervous system can access the quantum electro-gravity unitary regime.

Simplistically quantum uncertainty ends before this deeper unitary domain. Relativistic quantum field theory applies there with a new set of transformations beyond the Galilean, Lorentz/Poincairé [18]. These noetic transformations as we call them utilize superluminal boosts [71,72] and other cosmological principles to perform noncomputable energyless transfers of information without collapse of wave functions.

There are two ways QBD might exploit quantum gravity. One has been described by Penrose [45] who suggests that if the brain were in a coherent quantum state it might be able to amplify a signal from the Planck scale, the unruly quantum foam, up to the macroscopic level. Unfortunately, the known amplification of the nervous system falls short by a factor of 100 million. The second possibility is that the universal randomizer uses the inherent fluctuations of QBD in complementarity with the noeon-psychon holophote of the continuous-state conscious universe [10] proposed here. The noetic model is ontological meaning it is energyless and there is no collapse of the wave-function. The switching is topological like the two states of the Necker cube illusion. There is no phenomenological exchange particle as in standard field theory. A system capable of detecting single photons or Bose condensed noeons is a precondition for quantum trafficking. Penrose's conclusion is the result of making a prediction utilizing the standard model already determined to be inadequate to describe mental processes.

5. The Utility of Bose Condensation

Bose condensation might be thought of as bottom-up modeling which can be counterpoised by a top down holoscape. This mattress called the Heisenberg raster, and note the pixel grid idea mentioned above is the meeting *sic* of the mind. For the uninitiated, quantum theory proposes two kinds of particles, namely Fermions and Bosons. Fermions are spin half, make up matter and cannot crowd into one energetic level; because they are proscribed by the Pauli exclusion principle. Electrons would be an example. Bosons on the other hand have integer spins, are force mediators, and many can crowd into one energy level. Photons would be an example, and lasers exploit this ability of photons to stack in single excited states and jump together. Note that under special conditions, that Fermions can behave as a 'group' in the same way as Bosons. Hence Bosonization. Super conductivity Cooper pairs of low temperature metals and helium SQUIDs are a good example of Fermion collective behavior, where individual electrons combine identities into one super Bosonic wavefunction. Analogously, Bose condensation has been employed to account for a kind of 'whole mind wave function'.

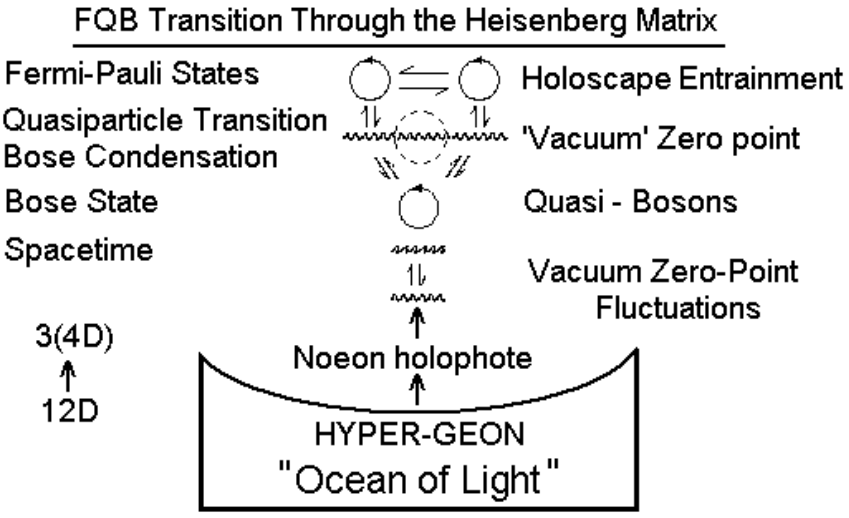

Figure 3. Illustrating the Fermi - Quasiparticle - Bose Transition FQB Transition occurring in the Heisenoerg matrix raster of consciousness. Entrained neuro-dynamic quanta of information are transformed into coherent Bose states through quasiparticle transitions by action of the noeon holophote. Particles exist only above the Fermi level and holes only below. Vacuum boundary conditions allow the spin flip transition. This is the process by which external sensory information is 'transduced' into the coherent noumenon of awareness. How mental quanta - noeons, become psychons as they are coupled to the raster in the local brain.

To clarify Fig 3, what is happening in Einstein-Bose condensation as originated by Fröhlich [48-50], the term Fermi-Quasiparticle-Bose Transition (FQB Transition) has been coined to illustrate vacuum particle dynamics in terms of quantum field theory. Quantum field theory arose from the work of de Broglie and Dirac and allows matter to evolve as fields and particles by being annihilated and created.

Table 1. Mentons - A variety of quanta with possible relationships to the cosmology of mind or conscious interactions in biological systems.

MENTONS: PARTIAL LIST OF PUTATIVE MIND-BRAIN QUANTA		
1. Biophotons	B	Ultraweak electromagnetic emission - all living systems
2. Bose Condensates	B	Coherent ground state integrating memory, perception & psychons
3.Composite Fermions	F	Exchange particles related to the Quantum Hall effect
4. Corticons	B	Quanta of biomolecular vibrational fields in protein filaments
5. Electrons	F	Unit of electric charge with biochemical interactions
6. Exchange Bosons	B	Quanta of vibrational field of water molecules Phonons
7. Excitons	F	Polarization waves of bound electron hole pairs transporting energy
8. Goldstone Bosons	B	Chi, coherent massless spin- 0 quanta related to the vacuum state
9. Gravitons	B	Spin 2 Boson mediating gravitational field, also related to mind
10. Ions	F	Ca, Na, & other charged molecular particles involved in energy flux
11. Magnons	B	Magnetization quantized spin waves
12. Noeons	B	Bosons of mental action, become psychons when coupled to brain, tantamount to unified field / spirit of God
13. Phonons	B	Elastic waves on a lattice that interact with photons & nucleons
14. Plasmons	B	Collective electron waves or charge accumulation
15. Polarons	F	Electron - phonon interaction
16. Psychons	B	Eccles' interactionist unit of mental coupling to brain dendrons
17. Quasiparticles	F	Quasiholes & quasielectrons provide Fermion transition to Bosons

18. Solitons	F	Solitary waves in collision or Block walls separating domains
19. Spinors	F	Quantum units of spin 1/2 elementary Fermi particles
20. Strings	F/B	One dimensional spinor extensions of the Planck scale
21. Twistors	F/B	Spinor pairs corresponding to prespace projective geometries
22. d, m or p-Branes	F/B	p + 1 dimensional volume swept out by superstring propagation according to M-Theory.

In Table 1 the Mentons mediate Bose-Einstein (B) and Fermion-Dirac (F) states of three types (not labeled): 1. Cellular, 2. Extracellular and 3. Transitional - Transitions between states such as Fermi to Bose or transitions between cellular local and extracellular nonlocal. Quasi-particles are one type of transition particle. The quanta of the noetic mental field, the Noeon, may be quantized using the physical unit called the Einstein - which represents a mole of photons. This is one way to physicalize the Eccles Psychon as it relates to qualia when coupled to holoscape dendron sites. But which on the list relate to Qualia? Are these the same ones that act as the *élan vital*? Or relate to classical or quantum brain dynamics? It appears that there are four classes then: 1. Extraneous biophotons, 2. Quanta of the élan vital, 3. Qualia, and 4. Higher level Fermi brain dynamics and quasi-particles. But which quanta on the list actively comprise qualia?

Entrained neurodynamic quanta of information in the holoscape are drawn by the pumping field holophote action through Bose-condensation to the respective vacuum zero points. *Particles* exist only above the Fermi level and *holes* exist only below for the polarized Dirac vacuum [73] (According to relativistic Quantum Field Theory). The ground state of a non-interacting Fermi system is considered to be a foamy 'vacuum which provides the boundary condition for the spin flip FQB Transition (A topological switching called an Ising flip in superstring theory). There are many 'vacuum' states that apply to the Bose particle as it is 'pumped' up or down through the continuous holophote field of mentation and sensory data processing.

Significant theoretical insights have recently described the Quantum Brain Dynamics QBD, a term originating with Umezawa of nanoscale biological structures [31,32,37,57-59]. Aspects of QBD such as biophoton emission and coherence in biological systems often called superradiance [74,75] provides a path for Bose-Einstein condensation [76]and can propagate energy. This occurs when a pulse of sufficient strength self-perpetuates by re-emitting all the energy absorbed, and is termed self-induced transparency [77] in LASER theory. Biophoton emission is a universal natural phenomenon, occurring in all living organisms [38].

6. Five Key Aspects of Holonomic Brains in Noetic Field Theory

The holonomic brain theory provides a top-down model for macroscopic neural processes in the holoscape to couple to QBD [47]. Both processes conjoin at the Heisenberg raster. Eccles' Psychon [31] is additionally tied in with holonomic theory providing the first empirical model for dualism / interactionism with complementarity. Pribram considered the mathematics of Gabor, Fourier and Heisenberg to introduce the holonomic brain theory [34,47,68,78-80]. A parallel development, the concept of coherence in biological systems was introduced by Ricciardi and Umezawa [81] followed by Fröhlich [48-50]. Arthur Young [82,83] proposed the 'quantum of action' as the quintessential ingredient of a cascade that feeds down or out into biological systems by restricting degrees of freedom of the uninhibited photon.

Understand that quantum theory as conceived by Schrödinger is a deterministic description of a probability wave; it still does not deal simultaneously with the superposition of states, nor does it deal with nonlocality directly especially as it operates in biological systems. Wave mechanics results in either/or

outcomes. Cats are either alive or dead. The two visual states of the Necker cube has been invoked in noetic theory to illustrate the 'choice' mechanism necessary for a conscious mind because it is an ontological energyless action called ‘topological switching’ not requiring collapse of the wave function. The Heisenberg matrix, which is deeper in the fabric of spacetime than the classical neurodynamics of the brain, is postulated to house both options - the two topological modes of the Necker cube at once. A duality like Heisenberg’s Potentia. Fröhlich's posthumous paper with Hyland [50] presents a vehicle for the macroscopic integration of quantum phenomena completing the cycle at the holoscape and clarifying his view of the origin of EEG.

The Noeon is introduced as the putative unitary mind field exchange particle. Here you may think you’ve noticed a flaw in the logic of noetic theory – how can there be a field exchange particle and an energyless transform at the same time? This would appear to be a violation of the laws of physics. This is a complex issue beyond the scope of this introduction; so we give a summary here. Feynman considered that there might not be a quantum gravity. Noetic theory postulates that the regime of quantization ends with the boundaries described by the Copenhagen interpretation. As we enter the realm of unitarity where gravitation and electromagnetism become unified as a photon-graviton where spin 2 gravitons and spin 1 photons become, it is currently believed, quadrupole spin 4 noeons of the unified field. As such noeons rather than exchanging energy mediate the coupling of wormholes and curvature of the topology governing the topological switching process which is a noncomputable energyless interaction.

The holonomic brain theory relying heavily on the Fourier relation and the holographic application of Fourier's theorem by Gabor in 1946 has been expanded by Pribram and his collaborators [78] to include a phase space of interaction in the brain, called the holoscape [47]. Integration of holonomic theory and the Bose-Einstein model provide a substrate for explaining recent work on quantum information processing represented as conformational changes of alpha and beta tubulin dimers in microtubule protein structure [57]. This provides a stage for the first application of these concepts to tangible brain material. However, the brain, a Fermi apparatus with Bose interactions, is not the seat of awareness and viewed here as only one of five key aspects required to describe consciousness. Any model of the mind/brain interface must include the complete structure of the psychosphere, at which the current interpretation of quantum theory balks.

A. The Cosmology of the Noetic Psychosphere

The psychosphere represents the total domain of both mind and conscious awareness as it relates to a living entity [24,52,]. It is a structural-phenomenological domain comprised of:

- A physical noumenon - the cosmological structure; and
- The associated phenomenology - the content of mental activity.

The psychosphere is comprised of a 12D hyperstructure [2,4] that includes not only the brain holoscape, but also nonlocal domains of elemental intelligence (in this case supralocal because nonlocality is a temporal subspace associated with the Copenhagen regime of quantum theory; and the domain of elemental intelligence is eternal with a root in causal separation from 4D reality). The psychosphere is the structural-phenomenological sum of all boundary conditions housing the mind. It includes the local complex multi-tiered holoscape of brain activity in complementarity with the standard nonlocal and additional unitary elements of mental activity. The noetic field is not just coupled to the brain but all cells, atoms, molecules and spacetime regions associated with a given living system. It is within this complex domain of the psychosphere that qualia can be described in physical terms [10,18,19,52].

The central tenets of Noetic Field Theory (NFT) suggest that consciousness is a quantifiable condition of cosmology, with both the mind and thought having complementary features in the sense promoted by Bohr; but as well-known Bohr's rendition of quantum theory was too limited to apply to biological systems. It is for this reason that NFT is required to utilize an extension of all standard model of science.

$$M = R_E + R_C = \Psi_M = \psi\left|B\right|b\rangle + \psi_e + \psi_c \text{ or } \left|\Psi_M\right\rangle = \sum_i^{Z^\alpha \bar{Z}_\alpha} N_i \left|\psi_i\right\rangle \quad (1)$$

Equation 1 is a primitive generalization of a mental base state in the 1st term summed over Descartes *res extensa* and *res cogitans*, in the second part a generalization of the three base states comprising the triune nature of the least unit of awareness in noetic cosmology, and the 3rd rendered as a twistor singularity originating in nonlocal projective prespace. The equation shows linear sums for illustration purposes; in reality the expanded equation would have nonlinear characteristics to handle the complex self-organized mental action modalities. An ensuing paper presents a mathematical description of noeon action in terms of the holophote pumping field and includes higher dimensional modes in the light cone of reality [19]. Research avenues for noeon particle isolation are suggested. The mantra of NFT is: If one assumes that qualia is a tensor psychon, the leading light cone singularity is modulated by a phase of the noeon psychon field.

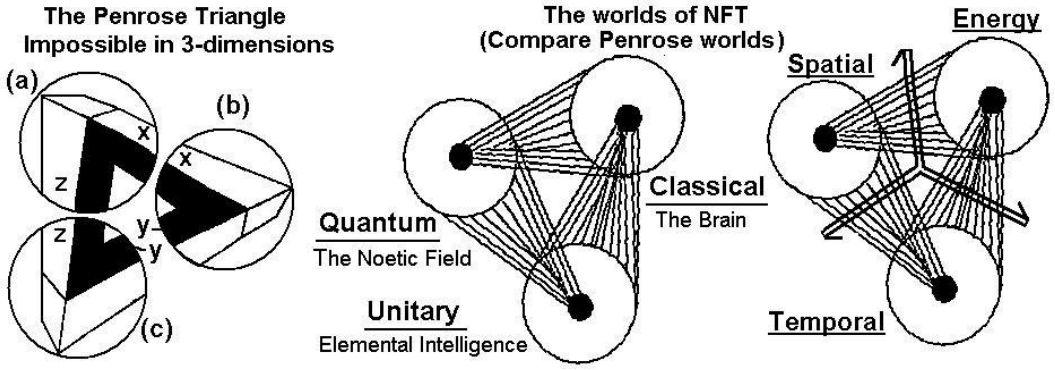

Figure 4. Conceptual views of the basic triune components comprising noetic cosmology. The psychosphere is comprised of these three domains. As is the cosmological principle of the least unit of awareness. Part a illustrates the inseparable nature of the three complementary modes interacting to form the basis for mind-body dualism. Part b illustrates the continuous-state standing wave eternal present emerging into the holoscape of classical brain.

B. The Holoscape of Quantized Information

Germane to Pribram's holonomic brain theory is the Concept of the holoscape, a sub - and trans-neuronal manifold which embodies polarization occurring in dendritic networks [47]. The holoscape is the active manifold of entrained neural processing that couples phenomenal information to the phase space of the Heisenberg matrix below it. Gabor and Fourier relationships describe the activity of information processed in the holoscape -neural ensembles as a Heisenberg raster of mental functioning.

In terms of neural network theory, Pribram uses a six dimensional (6D) hypercube with 64 nodes and 6 connections per node to illustrate the computer network-like aspects of the Heisenberg matrix considered to be one tier of the raster of mental processing in quantum holonomic brain theory. The 6D hyperstructure can also represent brain state correlation with the 6 compactified nonlocal dimensions $M_4 + K_6$ proposed

for the 10D spacetime manifold as in superstring theory, where M_4 represents our 4D reality. The Heizenberg matrix is a complex multi-tiered manifold. One view of the 6D hypercube can be seen in [37]. The Holoscape in Pribram's Quantum Holographic model of mind arises from bundles of neurons (dendrons) forming what he calls a dendritic microprocess described by Gabor functions that carry out processing in the brain. The contours (reminiscent of electromagnet lines of force) forming the holoscape are embodied in the microprocess. Figural representations of neural nets and the holoscape can be seem in [47].

C. Causation

Causation is a challenging term for the physics of consciousness, particularly in complex systems with feedback loops and multifactor inputs. Furthermore, the agency of change in quantum systems is as fundamental as spacetime itself. The quantum concept of causality thus differs from its classical counterpart in that it necessarily links relationships between spacetime events, and thus has a kind of self-referencing aspect. Worse, it is essentially probabilistic at the outset, which makes cause less tangible. Freeman [84,85] claims that chaotic dynamics can create information in the Shannon-Weaver sense. This finds its correlate as the Gabor logon. The logon is a kind of quantum of information first defined by Gabor and later used by Pribram [47] in the holoscape. The question remains as to whether consciousness originates from a kind of qualia recall panexperentialism at the level of the quantum domain. There has been general skepticism of quantum effects having any relevance to such a hot entropic matrix as the brain. When a dissipative structure open system such as the brain is pushed to the limit, a new structure can emerge from the fitness landscape. As such, a new template might emerge from lower order inputs, crystallizing into higher order structures which then superimpose limit cycles back on the chaotic regime.

Fröhlich's original idea was that dynamical equilibrium represented by a limit cycle could be tuned by chemical electrical stimulus and cause the collapse of the limit cycle. The triggered release of energy could then be harnessed to invoke large scale molecular events such as changes in the geography of QBD. A precondition for consciousness is the ordering and storing of information in the face of randomization in the quantum heat bath. The challenge is to see if quantum systems self-organize. Bose-Einstein condensates have the unique property of making coherent wholes by summing the behavior of many component parts which feedback on their elements and create a community. This speaks to the binding problem [84-88] in consciousness where many neurons create a unitary self that doesn't seem reducible to any one part. When cell membranes vibrate sufficiently to be drawn into the Bose-Einstein psychon matrix they are forming a coherent whole which resists degeneration by thermal chaos. That is, something must supply the jiggling and something must supply the ordering - one arises out of the other and then feeds back through the system. If electrical activity of the neuron provides the energy to jiggle molecules which in turn emit photons, then these photons can synchronize jiggling and further photon emissions through superradiance [74]. This is analogous to the pumping of a laser. The shift into the condensed phase depends on this molecular photon interaction. It is here where quantum wholeness radiates out over the entire structure. All this superstructure is built into the self-organized cosmology of living system.

D. Biophotons Versus Noeons: Mentons and the Élan Vital or Random Emission?

Popp [38,39,89] and Simanonok [40] have indicated that living cells emit a weak photon radiation called bio-photons. These biophotons might play a crucial role in cell regulation and consciousness. The quantum state of mind postulated by Noetic Field Theory asks what the basic 'photon of awareness' is. Much effort has been expended to elaborate an alternative pumping mechanism for producing eigenstates high enough

for coherent photon emission in biological systems. For any laser apparatus must be pumped to operate and there are obviously no xenon flash lamps in the parenchyma of the brain. In fact for many years Pribram's detractors said 'if there is a laser in the brain, why doesn't it burn a hole in the skull?' The diode laser provides a more realistic model, wherein the semiconductor is pumped by a nominal electric current. Nevertheless, this is still not the type of device we can expect to find in living tissue. Even so, coherent photon emission has been postulated to occur without a pumping mechanism [74,75] and is called superradiance.

More recently, Oster [90] has shown that the bacteria *Listeria monocytogenes* can harness Brownian motion. According to Libehaber [91] Listeria's scheme for turning random thermal motion into net movement involves an optical thermal ratchet that uses light. The Fröhlich superradiant pumping mechanism which is here called the FQB Transition handles only the phenomena of local Fermi brain dynamics and macroscopic quantum effects [50] of the Heisenberg raster's top tier, the so called holoscape. This deeper pumping mechanism because of its nonlocal interactions is bounded in a higher dimensional complex space; it could be described by HD vacuum quantization [10]. Some are currently working on this problem with newer versions of superstring theory or twistor sheaf cohomology. The finer details of the nonlocal pumping mechanism will be presented in forthcoming works. Quantum recurrence ensures that quantum systems are almost periodic and can be tuned from a larger set. Photons, for example, as integer spin bosons can crowd into one quantum state and thus be stored timelessly as it were, for timed release. This Bosonization is at the heart of drawing up from the deeper prespace. Here we see amplification from 'behind' one underlying chaotic level to create coherence at a subsequent higher or derived level. This analogy is important to discuss as is the parallel drawn with the putative Higgs field even though it may turn out the Higgs mechanism is incorrect because it is derived from Gauge Theory which is only an approximation.

There is a wide spectrum of photonic emission from biological systems much of which is infrared run off from metabolic processes. Most of these biophotons are released weakly into Newtonian space after use; while Mentons, comprised primarily of noeons, which make up the élan vital and quanta of mentation (qualia) are recycled within the nonlocal HD topology of spacetime.

E. The Psychon and Its Associated Qualia

Sir John Eccles, Nobel Laureate for discovering the synapse, defined the term psychon [31,59] as the basic mental unit where mind couples to a dendron in the dendritic microprocess of the holoscape. All mental events such as thoughts, desires, and intentions are composed of psychon units at the top most or most local level of mind/brain interaction. The psychon could be called a sheaf of noeons. "The mind-brain problem reduces to the interaction between a dendron and its psychon" according to Eccles [59]. About one hundred apical dendrites and their branches bundle together as they ascend from lamina V to lamina I in the cerebral cortex. This includes the hundreds of thousands of synapses terminating on them. Dendritic bundles are called. There are approximately 40 million dendron bundles in the cerebral cortex providing an enormous computational potential. Eccles further suggests that the coupling of the mental units to dendrons in the mind-brain interaction is microgranular [31]. Thus, the unitary resolution of our experience of consciousness resolves from a foundation of discrete microscopic points like the dots comprising a magazine photo or more dynamically as film frames that are sequentially illuminated and projected onto a movie screen in much the same way that William James first pictured the flashlight of consciousness illuminating the darkened room of the unconscious. Individual raindrops cohere into a raster by Huygens wave train addition to yield the smoothly perceived rainbow of sentience.

Defining qualia is no simple task. One must first complete the task of presenting a comprehensive theory of consciousness, and then go to the leading edge of that theory to clarify a plethora of complex conditions

before attempting to convey any semblance of understanding of how qualia is represented physically. But having come this far lets begin the attempt!

In terms of the overview of the noetic cosmology of a continuous-state conscious Multiverse presented here so far there exists, as stated a number of times, a triune structural - phenomenological domain defined as the psychosphere or complete set of boundary conditions representing the autopoietic system [15,16]realized as an individual conscious entity. Central to this domain is the localized Heisenberg matrix of the brain holoscape representing the raster resolving the entrained moments of conscious awareness. This plane of awareness is a standing wave of present reality [10] and as such is a self-organized complex system - in essence a microcosm of the entire conscious universe. The continuously evanescing mental state of information is termed qualia or the physical embodiment of mental content that changes or evolves with changes in mentation or intention. In this general framework the noetic formalism assumes symbolically that:

- Qualia are represented by tensor psychons; the leading lightcone singularity of which is modulated by a phase of the noeon psychon field.

7. Mind - Body: A Casimir-Like Role for the Noetic Formalism

Science, physics especially, accepts nothing immeasurable as real. In this section the Psychon is integrated with Pribram's neural wave equation (which is similar to the Schrödinger equation for a particle moving on a manifold with the addition of a term like the de Broglie/Bohm quantum potential for the neural potential [92] and the fundamental noetic equation [93-95] to provide an interactionist solution to the mind-body problem. Because mind is defined as a physical entity in the noetic formalism the putative interaction is open to empirical tests [96,97].

Usage of the term Psychon as the unit of mental experience must be expanded because Eccles left the term mostly undefined as an empty philosophical construct. The phenomenological part of the Psychon unit postulated as quantities of Bose noeons gives physicality and work functions to thought processes and the Noetic Effect. The physical unit called the Einstein (one Mole or Avogadro's number- 6.02×10^{23} of noeons) is adapted for use as a measure of awareness signifying Bosons of the unified field which are probably spin 4 noeons [98]. We define the Noetic Effect as the cosmological complex self-organized mind-body interaction process. This Noetic Effect will one day have profound influence on medicine and psychology [99]. The mathematical method used here to integrate the Eccles Psychon with brain dendrons and the existing holonomic theory of Pribram is a variation of the Lagrange operator of least action utilizing not only the static Casimir effect [41], but a duality between its dynamical counterpart first described by Schwinger [100]. In this context the noetic effect governs energized boundary conditions as described by the Noetic Field Equation $F_N = E / R$ [93-95] which takes the same form as the string tension formalism and can be said to be an alternative derivation of it [94]. F_N is the noetic force, E is the Casimir energy in Einstein's and R is the coherence length of the associated domain.

The thrust of this treatment is to account for the action of spontaneous particle production, in this case Bosons, from the zero-point energy fluctuations of the polarized Dirac vacuum, as noeons, and from the zero 'vacuum' potential as Psychons. These photons, rather non-radiative scattered Bose potentials confined like quarks to the HD topology of the spacetime metric can be constrained in a Gabor-like manner. The Casimir effect was initially used to account for the resonant force between separated parallel uncharged capacitance plates due to an all-pervasive electromagnetic field in the interstice. This Casimir force is one example of a very general phenomenon in which objects impose boundary conditions on the quantized field; but as an extended Bohmian quantum potential (a super quantum potential [7,101] the noeon of the

unified field applies to both quantized and unquantized energy. The ones we are most interested in are the generalization to parallel interfaces between dielectric media as occurring in the holoscape dendrons and topology of spacetime. More recently Schwinger [100,102,103] has proposed a mechanism for the dynamical counterpart of the static Casimir effect based on the precise measurements of coherent sonoluminescence, where dielectric media are accelerated and emit light. In these experiments, a bubble in water, a hole in a dielectric medium, undergoes contraction and expansion in response to a strong acoustic field. Schwinger's Casimir function formalism utilizes a phase space similar to that of the Gabor function [47] to trap a psychon-noeon bundle and channel it into the previously described quasi states in the quantum holoscape where Bose condensates integrate in the Heisenberg matrix.

Sandwiched dipole polarizations account for pulsatile interactions of neurons. The network is composed of overlapping Gabor elementary functions generating a pixel like lattice of spacetime storing and processing information. The notion of perpendicularly arranged dipoles of polarization generated within dendrons [78] is intriguing. By modifying the Casimir effect [41] we can see parallels between the Eccles' Psychon and Gabor relation. Casimir outlined the influence of retardation on London-van der Waals forces between neutral atoms. Instantaneous dipoles account for interactions between electric double layers separated by large distances. The interaction energy of a neutral atom by analogy, here the Psychon noeon sheaf with a perfectly conducting wall and, the holoscape manifold is given by the atomic dipole with its image. Retardation effects are expected when the distance from the wall becomes large, according to Cavity-Quantum Electrodynamics (C-QED). The asymptotic expression of R contains Planck's constant and the static polarizability of the atom as the only quantities. Casimir confined the neutral atom within a perfectly conducting plane wherein the eigenstates of the electromagnetic field are described by Maxwell's equations and treated as if the atom were a quantum particle in a box. The box in our case of dynamic-static complementarity is a system or domain of fundamental least units (a form of sphere packing tiling the spacetime backcloth) that are the continuously changing boundary conditions of the systems dynamics in FQB Translation. The total energy interaction between the wall and the atom is given by [41]

$$\Delta_t E = \Delta_d E + \Delta_e E \quad (2)$$

Second order interactions of the atom with a radiation field give vector potentials which can be manipulated with the Heisenberg method where the electromagnetic field is treated as a matrix [41]. Perturbation of the radiation field by a charge assigns vector potentials as elements of the matrix, and uses a simplified wave equation for the oscillating dipoles. This method has been used to account for atomic spectra of helium Rydberg atoms, macroscopic conductors, long range atom surface interactions, dielectrics and liquid thin films. To understand the origin of the Casimir effect requires QED. It is well known that electromagnetic radiation is quantized photons, and that these emitted photons can interact with atoms. Radiation in free space can be thought of as a superposition of many modes of oscillation within a box of arbitrary size. The energy of each mode can be thought of as a harmonic oscillator and restricted with a set of discrete energy values. The level of spacing between energy states corresponds to one photon so that the emission of a photon is simply a process in which the energy field frequency is increased by one unit. We have experimental work in mind looking at the Aharonov-Bohm effect [104] and quantum Hall effect [105].
The quantum mechanical oscillator has energy gaps given by Planck's constant times the oscillator frequency and must have a minimum, called the zero point energy. These fluctuations become apparent in the Lamb shift due to a change in atomic energy levels attributable to proximity to the atomic nucleus. The force arising from vacuum fluctuations has been measured by Sukenik [106] and found to be modified by proximity to a conducting plate with no electric field applied. Near a conducting plate the number of modes of the radiation field are reduced by the boundary condition such that the electric field at the surface must be zero, so the atomic energy decreases close to the conducting surface leading to an attractive force. The

van der Waal potential between two atoms, which begins as r^6 becomes a potential that varies as r^7 when the atoms are separated by distances greater than several Bohr radii.

A related prediction is that the interaction between a neutral atom and a conducting wall change from an initial r^3 to an r^4 potential when an atom is far enough from the wall. This interaction can attract even neutral atoms to each other due to the quantum fluctuations. Classically the electric dipole moment of a neutral spinless atom is exactly zero but in quantum mechanics only the *expectation value* is zero. Probability allows that there can be a nonzero dipole momentarily. If a photon can propagate fast enough between two atoms their instantaneous dipole can be correlated and the result is an attraction or ordering between the two atoms. For distant atoms photon exchange time cannot be ignored. Sufficiently long intervals destroy the dipole correlation.

The limit, as always is set by the uncertainty principle which relates the lifetime of the excited state of the nonzero dipole energy to its energy. Beyond which neutral atoms can still interact via instantaneous polarization of the quantum vacuum. The vacuum fluctuations can be thought of as oscillators with wavelengths long enough to communicate with both atoms. It is no longer wavelengths that mediate the interaction as the distance increases. This separation introduces a $1/r$ multiplier to the potential r. The retarded force can also be considered a variance in the zero-point energy, a phenomenon evident in the Lamb effect. More importantly, although QED fluctuations for Maxwell's equations within a box can account for the Casimir force, one can handle these Casimir-Polder interactions with standard methods of quantum mechanical perturbation theory without resorting to zero-point energy. In this case, the long-range Casimir forces depend on the exchange of two photons leading to a format to integrate the Psychon with QBD.

Quantization of the radiation field by means of traveling waves with a period L can be written for the vector potential [41]

$$A = \sum_{k,\lambda} cC_k e(K,\lambda) \times \left[AK, \lambda e^{-i(\omega t - kr)} + e^{i(\omega t - kr)} \right] \quad (3)$$

to which the values of the components of the wave vector k are restricted. The elementary charge e is the perturbation parameter arising from the interaction of G of the charged particle with the radiation field. An electron in a stationery state does not radiate. The matrix elements, with G as a perturbation operator, can be written for the zero state consisting of the radiation field and an atom as [41]

$$\Psi'(0;0...) = \Psi(0;0...) + \sum_{n,k,\lambda} \frac{eC_k (e(k,\lambda) p_n;0)}{k_n + k} \Psi(n;0...1_{k\lambda}...). \quad (4)$$

In HAM cosmology [10,11] there is an inherent continuous-state acceleration (an alternative interpretation of the Big Bang expansion/ inflation scenario) occurring as part of the compactification process of our virtual reality.

The electrostatic interaction between neutral atoms A and B is shown in eq. (5)

$$Q = \frac{qAqB}{R^3} - \frac{3\left(qA^R\right)\left(qB^R\right)}{R^5} \quad (5)$$

The second order perturbation energy can readily be shown as [41]

$$\Delta_q E = -\frac{1}{R^6}\sum_{1,m}\frac{(q1^x qm^x)^2 + ((q1^y)^2 + 4(q1^z qm^z)^2)}{hc(k1+km)} \quad (6)$$

As noted, the thrust of this treatment is to account for spontaneous particle production, in this case photons, from the zero point energy fluctuations of the quantized vacuum. Recently Schwinger [100,102,103] has proposed a mechanism for the *dynamical counterpart of the static Casimir effect* based on the precise measurements of coherent sonoluminescence, where dielectric media are accelerated and emit light. The commonality for static and dynamic Casimir effects are probability amplitudes for preserving the photon vacuum state as illustrated in eq. (3) [100].

$$\langle 0t_1 | 0t_2 \rangle = \exp[iW_0] \quad (7)$$

Light emission occurs by the reversible collapse of a cavity in a dielectric medium into a vacuum. Schwinger's starting point is the action W a resultant of scalar electric e and magnetic m fields where X is the spacetime dielectric constant in eq. 8 below [100]

$$W = \int (dX)\left[\frac{1}{2}\varepsilon(X)(\partial_0 A)^2 - \frac{1}{2}\left(\overline{\nabla}A\right)^2 + AJ\right]_e + \int (dX)\left[\frac{1}{2}\left(\partial_0 A\right)^2 - \frac{1}{2}\frac{1}{\varepsilon(X)}\left(\overline{\nabla}A\right)^2 + AJ\right]_m \quad (8)$$

A and J are related by a Green's function which eventually leads to the volume nature of this effect. Conditions under which volume effects dominate surface effects during photon pair production can be formulated by the differential equation [102]

$$\delta W_0 = -T\delta E = \frac{1}{2}Tr\left[\delta_0 \delta\varepsilon\partial_0 G\right], \quad G = \left[\partial_0 \varepsilon\partial_0 - \nabla^2 - i0\right]^{-1}, \quad (9)$$

in which *0* is the toward zero approach from positive values.
The dialectric energy relative to vacuum zero point is derived as [102]

$$E = -V\int \frac{(d\bar{r})(d\bar{k})}{(2\pi)^3}\frac{1}{2}k\left(1 - \frac{1}{(\varepsilon(\bar{r}))^{1/2}}\right) \quad (10)$$

where the Casimir energy is negative for a uniform dialectric medium. The energy relation of the two dielectric regions is proportional to the volumes where $1/e^{1/2}$ demarks the $e > 1$ area from the vacuum.
We propose that The Noetic Effect, through the mediation of the noeon, couples an active psychon to its holoscape dendron, the dielectric medium of the brain. This will release a Casimir energy potential for binding the psychon to a donor acceptor cavity of mixed states akin to that found in spin glasses. The release of the Casimir energy potential parallels the electromagnetic emission of photons or the scattering of photon energy into the oscillating dipole medium during cavity translation. According to Schwinger [102] the average number of photons released for cavity radius R is revealed in the equation

$$N = \frac{4\pi}{3} R^3 \int \frac{(d\bar{k})}{(2\pi)^3} \frac{1}{2} \left(e^{1/2} - 1\right) = \frac{1}{9\pi} (RK)^3 \left(e^{1/2}\right). \quad (11)$$

A key consideration about this relation is the experimental tact that the force is measurable. It is not merely speculation about quantization of zero point energies. Also, finding a likeness between parallel plates and microtubules is not much of a stretch. Arthur Young's suggestion that the photon as the principle of action is synonymous with purposive behavior is relevant to our discussion. This teleological aspect of light derives from the idea of least action, which in turn comes from 'wholes' and first causes. Action is the whole, of which the three parameters mass, length and time are parts. First promulgated in 1976, we see Young's idea as prescient. Young develops a hierarchy where the uncertainty of the photons, or quantum of action, is its capacity to cause something new, i.e., within light is the essence of causality [82,83].

8. Physics Envy - More on the Physical Noumenon

"*The fundamental difficulty in bringing the study of consciousness into science... is the lack of a conceptual framework*" [107]. Stapp further remarks that the way quantum theory is interpreted is the key to the physics of mind-brain. Ernest Rutherford groused that "all science is either physics or stamp collecting". What is needed in physics is a deeper explanation of higher ordered dimensionalities, where various symmetries might be unified. In $SU_{(5)}$ for example a multiplet of particles of colored quarks, electrons and neutrinos can be rotated into one another. This kind of unification takes of the order of 10^{24} electron volts, just a wee bit less than what it takes to get to the Planck length. At this level, subatomic particles can be treated as tiny vibrating strings, strings of vibrating hyperspace. Supergravity set the Fermions among the Bosons, establishing the possibility of putting all particles into one multiplet. Supersymmetry requires a whole new way of calculating with super numbers that defy common sense. The 'sparticles' defined in this fashion can be united in 11-dimensional space. Kaluza-Klein theory, now ramped up to 11-D has enough tensors to accommodate the Yang-Mills and Einstein equations, but still fails to satisfy all the demands of the standard model. We use the F-Theory version of M-theory in 12D.

String theory builds matter directly out of the geometry of spin, which is reminiscent of Plato's notion that matter was conceived from triangles. Penrose tiles have a knack for showing that local effects dislocating a tile has nonlocal effects tiles well removed from the perturbation will also adjust. The heterotic string creates particles in the same way that spacetime curvature creates gravity. As Kaku [108] emphasizes, 'the symmetries of the subatomic realm are but remnants of the symmetry of a higher dimensional space." As it turns out, we would have to wait a long time before we harness enough energy to test string theory experimentally in a particle accelerator; but noetic theory has provided insight for a low energy method [96,97]. EPR had to wait about fifty years for its comeuppance. Our proposal is more modest in that it involves what we imagine as hyperfine structure of the photon in Casimir-like arrangements. We envisage biomaterials, such as crystallized proteins or even DNA [109] which has already yielded to single electron optical fiber-like effects, as a medium for focusing picosecond pulsed lasers: here we can explore superradiance and light cone effects. An underlying transpiration of energy provides the "laser pump" sought for holonomic brain theory and provides the vehicle for integrating all aspects of QBD into one dynamic raster of mental phenomena - The Holonom. Its rigorous mathematical description will allow for subsequent measurement. A deeper understanding of both space and the nature of time [18] will enable us to discover the Psychon-Ouasibose-Noeon holophote transition. A rudimentary transformation in the continuous topological pumping provides [10] a boundary and a fabric for translation.

The Planck length is a local phenomenon closed only for Fermi interactions giving rise to the measurement problem of Heisenberg uncertainty in Copenhagen quantum physics. This is not true for

photons in extended quantum theory. The wave moment of their wave-particle duality allows them to pass through the translating staircase of quark-spinor-string-twistor boundaries. Photons may superpose and fill the boundaries of a cavity. This is the avenue that allows Noeons to be pumped in and out of prespace, and Psychons to be trapped and released from the FQB Transition of QBD. This concept when rigorously defined will have profound implications for the advancement of physics, especially the physics of mind.

9. Final Thoughts

What distinguishes the human mind from AI is the essence of experience and quality of free agency. We would argue that simulating the mind is not the same as the mind, that is, it is not wholly an emergent phenomenon. The contents of mind cannot altogether be investigated by the contents of physiology. Bergson [110] reckoned 'that between the consciousness and the organism there was a relation that no reasoning could have constructed *a priori,* a correspondence which was neither parallelism nor epiphenomenalism, nor anything resembling them. In the dualist interactionist position presented in this paper *intelligence is a physical state with* field properties not born out of neuronal activity, but underpinning it. Penrose [29,45] has postulated a threefold nature of the mind where the mental, physical and Platonic all root in physicality. What we call a triune noumenon consists of:

1) Localized temporal Fermi brain states,
2) The eternal temporal Psychon world transition of conscious thought at the semi-classical limit, and
3) The structural-phenomenological Noumenon of nonlocal-supralocal atemporal connectivity and integration.

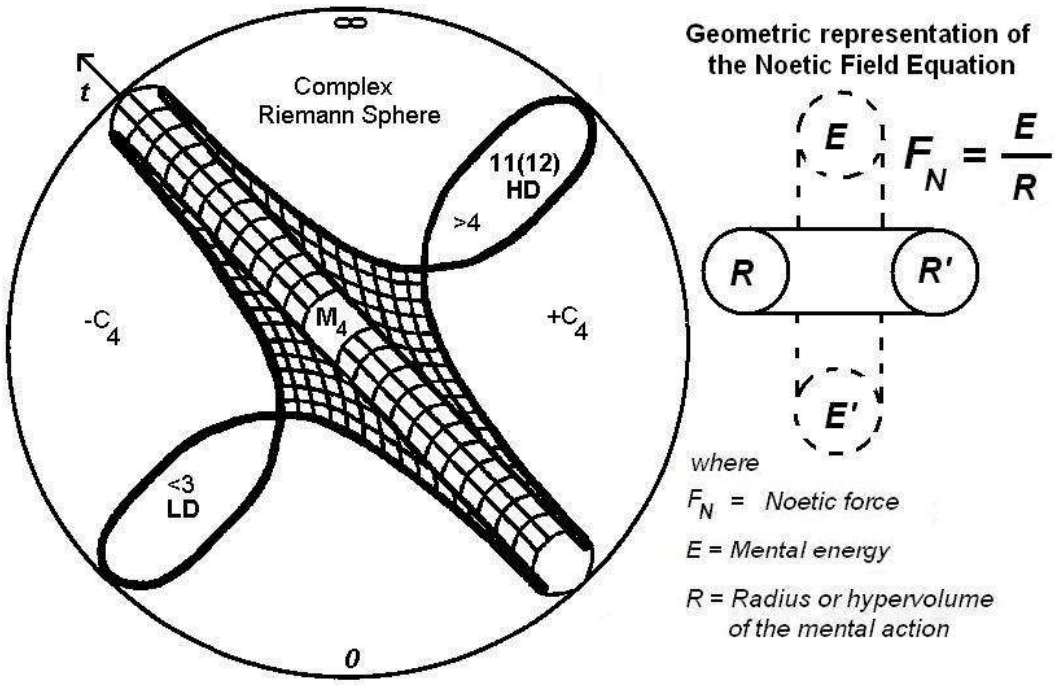

Figure 5. Conceptual representation of the noumenon of consciousness generating the noetic effect of mind - brain interaction a psychotaxic response of noumenal elements on quantum biological processes at the microtubule or other nanoscale structures In this case a snapshot of the psychosphere revealing the holoscape

manifold where a Psychon. which is governed by the conservation laws of the least action principle binds to its dendron. In 2D with scale and dimensionality suppressed. Perceptive readers will note that the loops are a mathematical function called the Folium of Descartes $x^3 + y^3 - 3axy$. This noumenal element is scale invariant and can illustrate both spacetime topology and Heisenburg matrix elements. The background circle represents the bound of elemental intelligence. The central baton a present moment of spacetime extension or local segment in the holoscape raster. The folium loops are noeon energy rotating at the speed of light; one loop oriented toward the future and the other the past so that the present is a virtual reality - a standing wave of the future past; described by the noetic force equation $F_{(N)} = E / R$.

The absolute bound of individual intelligence comes from a hyperstructure with temporal, atemporal, local, nonlocal and supralocal components and is denoted the Psychosphere – the sum total of an individuals domain. The Psychosphere contains the Holonom of immediate consciousness comprised of sensory phenomenology, thought and attention [24].

A few general features in terms of this field model are:

1 Coupling locus,
2. Content - both qualitative and quantitative,
3. Flux dynamics, and
4. External interactions.

In terms of the noetic field and the dynamics of the four qualities of intelligence there are enough parameters to define the complementary aspects of thought in a continuous-state Anthropic Multiverse. This would be a snapshot of the Holonom - the triune aspects of mental function including the mental states originating in the Psychon world, the entrained neurosensory processing of the holoscape and field couplings to the nonlocal domain of the noumenon of intelligence. When Heisenberg collaborated with Pauli back in the fifties with the hope of unifying all of physics Heisenberg leaked information to the press that they had succeeded. Pauli was furious, since they were a long way off from such a boast. Only the details were missing protested Heisenberg. Pauli sent Heisenberg a blank sheet of paper saying "...this is to show the world that I can paint like Titan. Only the technical details are missing."

We realize that by saying that the fundamental stuff of the universe is not matter and energy, but ultimately geometric information, this appears monistic or idealistic. Not so; the psychosphere is a subspace of a conscious Multiverse. Noetic cosmology is squarely in the dualist/interactionist camp of complementarity between mind and body. We believe quantum theory, gravitational theory, electromagnetic theory, cosmology and information theory are all incomplete, and can only be completed with the unification of nonlocal effects in higher dimensions. In the words of Heraclitus: *physis kryptesthai philei* - nature hides itself. An ontology kindred to Bohm's pilot wave concept for hidden variable action will find new life here: the wave function having a physical meaning, guiding particles, not from 3-space, but from nonlocal $N + D$ configuration space or twistor space. More of these details will be forthcoming.

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Heartfelt thanks to longtime friend and colleague Professor Karl Pribram who published the 1st paper of my career, a very early version of this chapter [111]. In his *Afterward* to the collection Karl said: "…a sweeping, imaginative but well reasoned argument. The point of the paper is not whether it is 'correct' in detail, politically correct it certainly is not, but that a hitherto inaccessible panorama of mind/brain relations is becoming explorable". Many thanks also to Prof. Barry Martin who expended considerable effort on an intermediate version where his touches are considered more lucid than mine for my own theory!

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Chapter 2

DEFINING A CONTEXT FOR THE COSMOLOGY OF AWARENESS

It is sensible and prudent…to think about alternatives to the standard model, because the evidence is not all that abundant…and we do know that the standard cosmological model is pointing to another surprise …because (it) traces back to a singularity. - P.J.E Peebles [1]

1. Introduction

We have recently entered one of the periodic transitional phases in the evolution of fundamental theories of physics, giving sufficient pause to reinterpret the general body of empirical data. Recent refinements in observation of cosmic blackbody radiation [2] and various programs of theoretical modeling [3,4] suggest it might be reasonable to explore replacing naturalistic Big Bang cosmology (BBC) with a teleologically based cosmology. BBC contains critical untested assumptions and unresolved logical conflicts suggesting the possibility of developing an alternative to the standard model of cosmology. This scenario has already begun with more and more discussion of a Multiverse; the open question is what kind of Multiiverse do we live in? For a physical Cosmology of Mind Astrophysical parameters must of necessity also be aligned with theological based parameters amenable to Cartesian dualism.

We begin reexamining pillars of BBC, briefly review alternate interpretations, then introduce general parameters for such an Anthropic Continuous-State Holographic Anthropic Multiverse (HAM) cosmology. Reviewing the historical development of physical theory [5] illustrates the fact that two general models, one unitary and the other dualistic, have evolved simultaneously in the scientific literature.

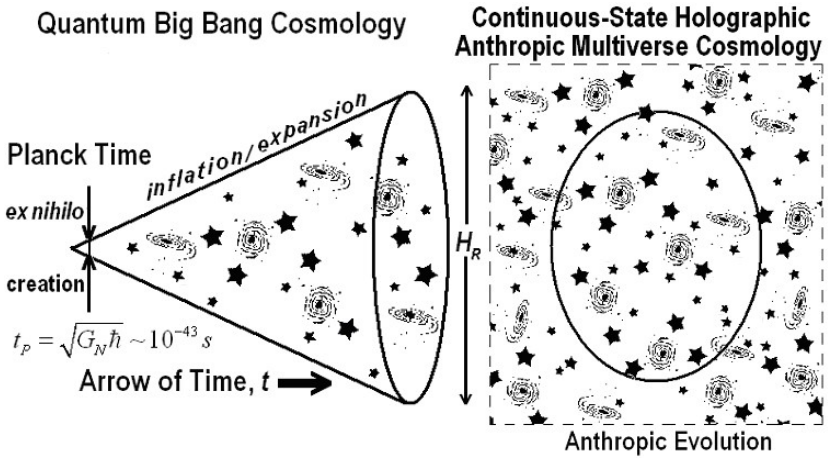

Figure 1. a) Symbolic lightcone view for the origin of the universe from an initial temporal singularity showing spatial inflation/expansion as in Big Bang cosmology. b) View of eternal multiverse cosmology. Planck time $t_P = \sqrt{G_N \hbar} \sim 10^{-43} s$.

Unitary Model

Naturalistic, Darwinian, Newtonian; a classically oriented model aligned with current interpretations of the standard models - i.e. BBC, Bohr's phenomenological interpretation of Quantum Theory, standard Maxwellian electromagnetism and Einstein's General theory of Relativity. Many unanswered questions like what initiated the Big Bang or the breakdown of Maxwell's equations at singularities remain.

Dualistic Model

Includes all conventional wisdom plus extended theory; Bohm, de Broglie, Vigier, & Proca implying a polarizable Dirac vacuum with additional parameters and interactions. Best evidence for a Dirac vacuum is the Casimir effect. Offers plausible explanation for many unanswered questions, for example the Proca equations satisfy problems in electromagnetic theory. Also allows room for teleological causalities driving evolution.

Only in the context of dualistic parallels of *extended theory* can an HAM cosmology be viably presented. The concept of a polarizable Dirac vacuum introduces an additional causal order historically not deemed acceptable in physical theory because it was considered unreasonable that spacetime could contain periodicity or such a high level of symmetry. For example by utilizing extended electromagnetic theory with the Proca equation, Maxwell's equations do not cut-off at the vacuum but are continuous. This leads to a periodic photon mass and an alternative non Doppler interpretation of redshift as a 'tired light' phenomena rather than an expanding universe. As discussed below dual causality and additional vacuum symmetry invites extension of the Wheeler/Feynman [6] absorber theory of radiation to dynamics of spacetime topology itself where the *present state* is comprised of a continuous *future-past* standing wave [7].

The HAM is intended as the next evolutionary step in the progression of modern cosmological modeling stemming from Einstein's 1917 proposal of a Static Universe (ESU) and the banner 1948 development of both the Steady-State Universe (SSU) of Bondi, Gold & Hoyle and the BBC by Gamow, Alpher and Bethe. Although the HAM could be considered a form of ESU or SSU modeling, it is sufficiently different to require a proliferation of nomenclature. For example the HAM has neither inflation or expansion; and HAM cosmology is not confined to the limits of the 3(4)D+ N_c Einstein/Minkowski/ Riemann/Hubble sphere of the current standard BBC and SSU models.

The HAM introduces a revolutionary structural change in the universe. The HAM Multiverse is closed and finite in time – the observed Hubble sphere, and open and infinite in eternity. This means the Hubble sphere represents only an observational limit (by 'tired light', instead of how far Big Bang expansion has gone). The fundamental backcloth of HAM space is an absolute holographic-like space projecting a Multiverse of a potentially infinite number of nested *relational* Hubble-type domains, each with different laws of physics and complete causal separation from our M_4 realm [8]. The additional subspace dimensions N_c [9] hypothesized as compactified in the initial BBC event are not a subspace in HAM space; instead 'our' whole *relational* Hubble sphere is a subspace of an absolute 12D hyperspace. Additional dimensions are not compact, but 'open', undergoing a process of continuous compactification and dimensional

reduction as the ‘standing wave’ of the temporal present is continuously created, annihilated and recreated out of parameters of the future-past.

2. Parallel Interpretations of Cosmological Data

Table 1.

	BIG BANG	**HAM**
RED SHIFT	Doppler recession of an inflationary expanding universe. ($m_\gamma = 0$)	‘Tired light’ - non-zero mass photon ($m_\gamma \neq 0$) couples to vacuum dissipating energy.
CMBR	$2.75^\circ k$ blackbody remnant of initial hot cataclysmic explosion ~ 15 billion years ago.	Result of continuous-state blackbody emission by spacetime C-QED electrodynamics inherent in a continuous compactification D reduction process.
OLBER’S PARADOX	Expansion of the universe accounts for dissipation of luminosity.	Lifetime of stars insufficient to illuminate heavens; absorption by vacuum coupling and dispersion by interstellar media.
MATTER	Matter creation at initial Big Bang. Missing dark matter required to explain galactic rotation.	Dark energy - balances the gravitational potential by matter in the multiverse. Results in flat spacetime. Spontaneous creation of matter; black hole evaporation removes evolved material.

3. Awareness: Physical Cosmology of the Fundamental Least-unit

Time and space are modes by which we think and not conditions in which we live. - Albert Einstein, 1941

The fundamental least-unit (The concept of a Least Unit in cosmology parallels the least unit of crystal structure – The basic scale invariant repeating element that builds up a crystal lattice) is a form sphere-packing [10] tiling the cosmological backcloth of the new 11(12)D superspace which makes correspondence with the F-Theory iteration of M-Theory [11], introduces the origin of complexity in self-organized living systems and refines the role of the observer in physical theory.

Awareness is introduced as a fundamental physical quantity. The context for defining awareness is an advanced form of Einstein’s model of a static universe, called the Continuous-State Holographic Anthropic Multiverse (HAM). The new cosmology is based on principles of the Wheeler-Feynman absorber theory of radiation [6] extended to the topology of a periodic 12D spacetime. The fundamental *least-unit of awareness* is shown to be a scale invariant complex cosmological system. Time arises naturally as a ‘beat frequency’ in the translating boundary conditions of a spin exchange ‘continuous-state’ dimensional reduction compactification process. A new set of Noetic transformations beyond the Galilean and

Poincairé-Lorentz are called for to show how the macroscopic nature of awareness arises from microscopic action principles inherent in the Dirac polarized vacuum [12]. The inherent topology of the Noetic Transformation is derived by coupling superluminal Lorentz boosts [13-15] with non-compactified Kaluza-Klein theory in the context of an energy dependent spacetime metric [16-18].

The current standard model for a living system, biological mechanism, presumes that life can be completely described by parameters of chemistry and physics. In general this biological naturalism is described by quantum theory which deals with the mechanics of atomic and related systems. Quantum theory is described formally by the Schrödinger equation which takes myriad forms, but simply equation (1)

$$ih(\partial\psi / \partial t) = H\psi \quad (1)$$

describes the action of a particle on a manifold. But the founding fathers of quantum theory said the standardized Copenhagen interpretation was incapable of describing biological systems. Therefore the bulk of this paper is devoted to developing the proper cosmological framework for introducing a fundamental definition of awareness.

4. Philosophy of Space in HAM Cosmology – Origin of Structure

Although the concept of Absolute Space (AS) as defined by Newton is discarded in contemporary physics, a deeper more fundamental form of AS nevertheless seems to exist and is a required foundation for HAM Cosmology. The HAM reintroduces a complementary AS that is non-Newtonian because Newtonian AS, once considered the basis of 'our 3D space', first of all is only a form of Euclidian space without sufficient degrees of freedom to incorporate Quantum or Relativity theory. HAM AS is different, but similar enough that Newton deserves credit for realizing the importance of AS. Secondly the relational space of the Einstein static or Big Bang universe contains insufficient symmetry parameters to describe the additional causal properties of a supralocal Multiverse. The AS proposed by the HAM) (defined in postulate 1) represents the ground of all existence and 'resides' beyond the observed Hubble sphere because its complex HD structure is not accessible by our perceptual apparatus [8]. The ultimate nature of HAM AS remains ineffable at the moment, but empirical tests are being prepared [19,20]. In the meantime, we can deduce some AS properties to steer empirical investigations to higher order properties these deductions suggest.

Postulate 1

Space is the most fundamental 'form or substance' of existence; and the origin of all structure and thus geometry. The demarcation and translation of which constitutes the basis of all energy and phenomenology. Space takes two forms in HAM cosmology, Absolute Space (atemporal) and the temporal relational subspaces of observational reality that arise from it. A basis for energy (dynamic and static spatial geometry) is a fundamental form of information which signifies the cosmological foundation of causality. This postulate connotes space as the most rudimentary basis of structural-phenomenology.

The complementarity between the new concept of AS in HAM Cosmology and the contemporary relational space suggested by Einstein's theories of relativity can be simplistically represented as a 'virtual reality' by interpreting HAM AS as a fundamental background space of the related space fields referred to by Einstein's quote below. Time is a complex process only just beginning to be adequately addressed by physicists [21-23]. One can say that all forms of time [21] represent various types of motion and in that sense time can be discounted as a concept (i.e. - not absolutely fundamental). Then geometric translation or field propagation becomes more fundamental. Thus space (whatever it is) is the most fundamental concept of the universe. Space with boundary conditions (therefore) energy is fundamental to all forms of matter.

5. Space: Relational Versus Absolute

The conceptual disparity regarding the fundamental nature of space arises in terms of correspondence between the Newtonian worldview of a continuous Absolute Space (AS) that is in opposition to the current Einsteinian view of discreteness of the spacetime manifold. This debate about the nature of space has continued at least since Aristotle. Einstein in his last published statement regarding the nature of space and time said:

> The victory over the concept of absolute space or over that of the inertial system became possible only because the concept of the material object was gradually replaced as the fundamental concept of physics by that of the field...The whole of physical reality could perhaps be represented as a field whose components depend on four space-time parameters. If the laws of this field are in general covariant, then the introduction of an independent (absolute) space is no longer necessary. That which constitutes the spatial character of reality is then simply the four-dimensionality of the field. There is then no 'empty space', that is, there is no space without a field [24].

Einstein's view is a form of the *relational theory* of space introduced initially by Leibniz and Huygens [25-26]. Relationalism is in opposition to *substantivalism* which gives space the ontological status of an independent reality as a kind of *substance* [25]; the Newtonian concept of absolute space being the prime example. We critique Einstein's declaration that there is no further need for AS for two reasons: 1) Einstein's cosmological view was only 4D and 2) Einstein's 4D field needs a broader context to be imbedded in.

Finding the founding fathers of quantum theory credible in their declaration that the standard model is incapable of describing biological systems; means awareness can only be defined adequately by extending all the standard models of physics. This means that:

- The standard cosmological model - the Big Bang is insufficient (no consciousness).
- The standard mechanistic model of biological naturalism is inadequate (no life principle).
- The standard Turing model of computation is inadequate (no room for free agency).
- The standard model of gravitation is insufficient (no quantum gravity or unified field).
- The standard Copenhagen phenomenological model of quantum theory is inadequate (no biology).
- The standard model of electromagnetism is inadequate (photon mass).

- The standard cognitive model of neuroscience is also insufficient (brain tantamount to mind).

This criticism does not mean these seven models are wrong; only that they go only part way. The focus here is primarily on the cosmological model as it is the core of the problem for a Cartesian basis for awareness.

The required parameters of the post Big Bang universe will be stated axiomatically for simplicity. The domain of the Big Bang is defined in terms of the Hubble radius for the large-scale structure of the universe and the Planck scale for the microscopic. The large-scale observational limit in Big Bang philosophy is caused by a Doppler effect on light propagation due to the recessional velocity or expansion of the universe. This observational limit is as far as light has traveled since the Big Bang.

The Hubble radius remains an observational limit in HAM cosmology also but is not caused by the Doppler effect. It is due to a minute non-zero rest mass for the photon m_γ [3,27]. As a photon propagates it couples to the polarized Dirac vacuum and loses energy also attenuating to zero observability; but if one were able to travel to the 15 billion lightyear Hubble limit observation would extend for another Hubble radius ad infinitum because of the holographic principle. Thus, a critical difference in interpretation of redshift – a physical limit for the Big Bang and an observational illusion in HAM cosmology.

Einstein's introduction of Special and General Relativity replaced the absolute 3D Newtonian continuum with a discrete 3(4)D relational spacetime manifold. This space has been interpreted as a Big Bang space terminating at an impenetrable Planck backcloth of stochastic foam. Noetic cosmology changes the interpretation of this limit. The Planck barrier is a virtual mathematical barrier to Fermions only as continuous compactification of the standing wave present recedes into the past.

The HAM [27,28] is a multiverse with the potential for an infinite number of nested Hubble spheres in causal separation and thus with their own laws of physics [8]. In the Big Bang the extra dimensions laid down at the beginning of time are curled up at the Planck scale as a compactified subspace. In Noetic HAM cosmology the opposite is true. A new form of HD AS projects a periodic 11(12)D space. The standard observed temporal relational Einstein reality, 3(4)D (M^4), is a subspace of the 11(12)D space projected from this new atemporal AS. An extension of the Wheeler-Feynman absorber theory of radiation [29] is utilized to define an eternal *present* as a standing wave of the *future-past* that is 'covered' at each level of scale by a HD Wheeler Geon [30,31] or ball of light. This HD Noetic light field filling the immensity of subspace is the unified field that acts as gravitation, the vital force, and light of the mind. As will be derived below this action principle can be described by a simple fundamental Noetic equation $F_{(N)} = \mathrm{E} / \mathrm{R}$ [32,33]. This complex least-unit explains the utility of the 12D space.

The world lines of relational space are virtual extensions created, annihilated and recreated harmonically by the torsion of the continuous compactification dimensional reduction process. Therefore instead of a rigid impenetrable Planck barrier covered by a stochastic foam of particle creation and annihilation, HAM cosmology has an ordered / open spacetime with a complex hyperstructure that is closed and finite in time for fermions, but open and infinite atemporally for bosons. In the HAM, stochasticity, i.e. string or brane dynamics, arises in the wake of unitary graviton propagation guiding the dynamics of the continuous-state. The Noetic graviton, is a quadrupole photon complex (the photon is putatively an element of the unitary field) confined to the spacetime metric like quarkonium [3]. The Planck singularity $(10^{-33} cm,\ 10^{-43} s)$ is *virtual*, a geometric orientation that arises as the present continuously recedes into the past [6,27-29].

6. Theological Basis at the Foundation of Noetic Cosmology

While statements like 'Gravitation is caused by the movement of spirit...' can be found in both Eastern and Western religious philosophies, the theological cosmology utilized as the basis for HAM cosmology is from the Judeo-Christian Doctrine or philosophical dogma of the Church of Jesus Christ of Latter-day Saints (LDS or Mormon) because as this author has found certain aspects of it such as 'All spirit is matter', although they might be found highly debatable by some theologians, directly support the noetic dualist-interactionist cosmology. This is not mere rationalization to utilize a ready-made compatibility with noetic theory; but an issue of '*absolute truth*' [34] and the methodology with which Absolute Truth can be arrived at by utilizing the complete epistemology promoted by the 'noetic ontology'. "And by the power of the Holy Ghost ye may know the truth of all things." [35] Absolute Truth is not a matter of opinion; it is never changing divine truth and cannot be disproved as often eventually happens to scientific truth which is relative to interpretation and the current level of sophistication of the empirical apparatus employed.

A. All Spirit is Matter

> "There is no such thing as immaterial matter. All spirit is matter." [36]

Due to Einstein's work on relativity ($E = mc^2$) physicists now agree that matter and energy are different forms of the same fundamental entity, the total quantity of which is conserved in any transformation of energy into matter or vice versa. At the most fundamental level the laws of physics are independent of time suggesting an eternal nature of 'elemental substance' (Ch. 12). This is compatible with Judeo-Christian theology. The meaning of the first word of the Book of Genesis, the Hebrew term *bereshith* - creation; does not signify a creation out of nothing (*ex nihilo nihil fit* - nothing produces nothing) but creation as 'organization' of materials already existing. A material nature for spirit is an essential component of a teleological life principle or *élan vital* postulated as the basis for Noetic Cosmology.

B. The Framing of the Heavens (Gravitation)

> "Which light proceedeth forth from the presence of God to fill the immensity of space-...The light which is in all things, ...is the law by which all things are governed" [37].

Again, according to Einstein, this time in terms of his General Theory of Relativity - the theory of gravitation, which is one of the four fundamental forces; physicists know something about the glue that arranges the universe into galaxies and solar systems and why planets remain in orbit around their stars. All physical forces are mediated by the exchange of energy. In the case of gravitation this exchange unit is called the graviton. Gravity is also closely related to inertia, which has recently been also equated with a flow of energy [38]. In Mormon doctrine the light of Christ, Holy Ghost, *chi* or *prana* - the light which is

in all things; is a true photonic light in the physical sense. Only like gravitational radiation this energy cannot be detected in free space, because is confined to the higher dimensions of the spacetime metric. In the continuous-state anthropic multiverse cosmology of noetic field theory [27,28]; the graviton is a system of confined photons of the unified field. This is a key relationship revealing the profound connection between science and theology because it shows God's hand in the continuous ordering of the cosmos by his spirit; i.e. 'Gravitation is caused by the movement of spirit'.

C. Holy Ghost as Life and the Light of the Mind (Vital Force or Élan Vital)

> "I am the true light that is in you, and that you are in me; otherwise you could not abound."[37] "And the light which shineth, which giveth you light, is through him who enlighteneth your eyes, which is the same light that quickeneth your understandings; ...The light which is in all things, which giveth life to all things, ..." [39]

This provides the entry point of the vital force [7,40-42] which since it has been physicalized in noetic theory makes it subject to the empirical methods of science and represents the first complete interactionist solution to the mind body problem beyond mere philosophical discourse [42]. The photonic character of the 'light of the mind' when empirically verified will lead to full realization of the new field of consciousness studies [19,20].

D. Elemental Intelligence

> "Intelligence or the light of truth, was not created or made...For man is spirit. The elements are eternal … The elements are the tabernacle of God; yea man is the tabernacle of God"[43]. "And the spirit and the body are the soul of man" [44].

These passages tell us something about the eternal and temporal nature of the human soul. A conscious entity is comprised of a complementary of eternal elemental intelligence, the temporal body and the flow of spirit that energizes and enlightens it [42,45].

E. Intelligence Cleaves Unto Intelligence.

> "...there are certain bounds and conditions...For intelligence cleaveth unto intelligence; ... truth embraceth truth ... light cleaveth unto light ..." [46].

This pertains to the law of hierarchies and, although it will not be explained in any detail here, relates to the boundary conditions of individual intelligence and how external influences are both allowed to enter the soul and are kept at bay. This is in the context of metaphysical unity and can be used to explain how dissonant effects relate to the nature of health and disease.

7. The Cosmology of Higher Dimensional Space

The Kaluza-Klein model utilized is set in a non-compactified D = 12 harmonic Noetic Superspace S_N since it is the foundation of a conscious universe. For symmetry reasons this superspace is comprised of an 11D hypersurface in a 12D Multiverse, giving it theoretical correspondence to 10D superstring theory and 11D supergravity and providing a context to solve the disparity between them. The general appeal of the Kaluza-Klein model is that physics seems simplified in HD, especially integration of the electromagnetic (*EM*) and gravitational field.

Kaluza's initial demonstration of gravity in 5D, ${}^5G_{AB} = 0$ with *AB* running from 0 to 4 contained 4D General Relativity with an *EM* field ${}^4G_{\alpha\beta} = {}^4T^{EM}_{\alpha\beta}$, with α, β running from 0 to 3 [18]. The currently less common non-compactified Kaluza-Klein model is utilized by Noetic Cosmology where also dependence on the extra D is required; this yields the same result for Einstein's equations ${}^5R_{AB} = 0$ except that the *EM* energy momentum tensor ${}^4T^{EM}_{\alpha\beta}$ is replaced by a general one ${}^4T_{\alpha\beta}$ instead [18].

Periodic Noetic superspace S_N entails a continuous-state of dimensional reduction that operates under transformations beyond the Poincairé / Lorentz where spatial dimensions D_S through superluminal boosts are transformed in to temporal dimensions D_t and further in terms of a non-compactified Kaluza-Klein model [17,18,47] into energy dimensions D_E by $D_S \rightarrow D_t \rightarrow D_E$. This requires the properties of an energy dependent spacetime metric first developed by Einstein where standard Minkowski space M_4 is a topologically invariant homeomorphic manifold of an energy dependent spacetime metric $\hat{M}_4$

$$f : M_4 \rightarrow \hat{M}_4 \quad (1)$$

According to the principle of relativity a spacetime region which is a 'perfect vacuum' (no matter and no fields) must be isotropic and covariant in the Lorentz sense [48]. The deformed region $\hat{M}_4$ of S_N and the symmetry of S_N itself reduces to the Einstein relativistic metric and is assumed compatible with a polarized Dirac vacuum.

8. The Wheeler Geon Concept

HAM Cosmology postulates that the twelfth dimension is a timeless ocean of light. Some elements of Wheeler's [30] postulate of a photonic mass of sufficient size to self-cohere into a spherical ball of light provides a starting point to develop an understanding of this unitary domain consciousness or spirit. In Wheeler's notation the Geon is described by three equations. The first (2) is the wave equation, followed by two field equations the first (3) of which gives a mass distance relationship and the second (4) variation of the factor *Q*:

$$d^2 f / d\rho^{*2} + [1 - (l^* Q / \rho)^2 (1 - 2L / \rho)] f = 0 \quad (2)$$

with circular frequency $c\Omega$ related to the dimensionless radial coordinate $\rho = \Omega r$ such that $d\rho^*$ is the abbreviation for $d\rho^* = Q^{-1}(1 - 2L / \rho)^{-1} d\rho$

$$dL / d\rho^* = (1/2Q)[f^2 + (df / d\rho^*)^2 + (l^* Qf / \rho)^2 (1 - 2L / \rho)] \quad (3)$$

$$dQ / d\rho^2 = (\rho - 2L)^{-1} [f^2 + (df / d\rho^*)^2] \quad (4)$$

L and *f* are mass and field factors respectively; *Q* is a scale correction factor. The factor *l* relates to a family of modes with distinct frequencies associated with the well known completeness theorem of spherical harmonics. HD extended modes of *l* are key elements in propagation of the noetic field; discussed in future works but alluded to in [12,27]. Wheeler states that these equations permit change of distance scale without change of form [30] which is compatible with the Noetic action principle [4,32,33] F_N = E/R derived below.

Postulate 2

The Supralocal Hyper-Geon is the most fundamental energy or structural-phenomenology of existence. This Energy arises from the ordering and translation of AS 'space' (i.e. information or change of entropy). This fundamental Geon energy, is the unified field, the primary action principle of all temporal existence; filling the immensity of space (nonlocally) controls (guides) the evolution of the large scale structure of the universe (gravitation), the origin of life ('élan vital') of classical philosophy and finally is the root and 'light of consciousness' (like an optical quantum computer).

9. The Hyper-Geon Domain of HAM Field Theory

As summarized above Wheeler defined the Geon as theoretical classical spacetime construct not yet observed in nature. For HAM cosmology a complex Hyper-dimensional Geon is postulated to topologically *cover* our observed 3(4)D virtual relational spacetime. This hyper-geon is scale invariant, cosmologically it equates with the unitary field or *spirit of God filling the immensity of space*. A type of Geon is also proposed to be equated with the eternal mind. Continuous-state dynamics of the hyper-geon is described by a new set of Noetic transformations for HAM cosmology [32,33]; acting on all levels of scale from the Einstein/Hubble radius to the Planck scale. Because of its contact with the Multiverse, it relates also to the cosmological constant Λ and is the dark energy responsible for the missing dark matter effecting galaxy rotation [27,28]. It also forms the lower energy boundary of a projected 12D space making it synonymous with the unified field. This unitary Noetic field is the origin of the teleological action principle [27,32]. This coalesced region of nonlocal photon-gravitons

The hyper-geon covering acts as:

- Gravitation (The graviton in HAM cosmology is a confined quadrupole photon $\hat{M}_4$ complex; thus teleological action of the unified field orders the large scale structure of the universe – which is a non-Darwinian guided evolution)
- Causal action of the quantum potential or pilot wave (An additional causal action principle pertinent extended quantum theory)
- *Élan vital* or life force (The long sought vital principle required to legitimize dualism / interactionism)
- "light' of the mind (Bosonization of the Eccles psychon as it couples to dendrons etc to become qualia)

10. The Complementarity of Physical Time and Conscious Time

Now that some cosmological properties are worked out it is easier to show the relationship of physical time to conscious time. All arrows of time reduce to the spacetime topology of the polarized vacuum [21-23]. From within the microscopic action of the complex hierarchical cosmology of the least-unit of awareness, macrophysical phenomena, which include thermodynamic processes, appear asymmetric because of a complementarity of boundary conditions related to human awareness and other physical conditions. There is no preferred temporal direction in the microphysical laws of physics. When this atemporality is reduced to the temporal domain (when it becomes a subspace) many parameters are subtracted out through the symmetry breaking of the spin exchange compactification process occurring at the speed of light. But this microscopic annihilation governed by teleological causality produces an orthogonal summation creating the macroscopia of perception. The velocity *c* of the reduction / compactification receding from the present has a discrete microscopic beat frequency which we perceive macroscopically as continuous.

First we will clarify the conceptual suggestion by Franck [49] that an eternal now occupies the center of awareness. Similar to physical concepts like 'charge' we assume that awareness is a fundamental physical principle [7,42,50] which is associated with the concept of the 'least-unit' in HAM cosmology. The Noetic *least-unit* is a microcosm of the whole universe where the Noetic Transform is in continuous operation. Information passes from M_4 through Superluminal Lorentz Transformation (SLT) -Kaluza-Klein boosting (see Chap 14) into the 12D Hyper-Geon domain in both directions in the context of the extended Wheeler-Feynman future/past [6,7,28,29,48].

If we utilize the metaphor of a movie theater to describe the structural phenomenology of the mind / body and apply Huygen's principle of wave train addition in a manner similar to how sunlight shines through discrete raindrops summating into the smooth image of a rainbow, we can begin to understand the human psychosphere [7,42,45]. The psychosphere is the standing wave light cone surface of human awareness impinged by qualia. It is not confined to the brain; but occupies the total boundary conditions of the human mind-body that extends from the Euclidian brain occupying M_4 to the limits of the HD Noetic Geon. There is a complementarity between these two domains of the human psychosphere. Fermi-Dirac statistic describe the temporal dynamics in the M_4 brain / body region and Einstein-Bose statistics describe the atemporal HD domain applicable to the Noetic hyper-geon. This is the HAM view of Franck's 'eternal now'. The two domains are mediated by the noeon of the unitary noetic field.

11. Raster of Consciousness – A Jacob's Ladder Movie Theater

The M_4 domain is described by the phenomenological Copenhagen interpretation of quantum theory where collapse of the wave function applies. However the HD region is governed by an ontological view of quantum theory where noncomputable noncollapse processes occur. The electromagnetic arrow of time originates at the juncture of the M_4 and the HD regions and is a 'beat frequency' inherent in the translation of their complementary relationship bounded as a least-unit as described above. This is the origin of the *EM* and thermodynamic arrow.

The exchange particle of the Noetic unified field, the noeon, follows preferred paths within the continuous spin exchange dimensional reduction compactification process. It is reminiscent of a traveling arc or *Jacob's ladder* where the 'charge' enters with a harmonic *holophote action* at the bottom (Planck scale) and travels to the HD region where it is released or reabsorbed cyclically as the *eternal present* remains a continuous-state of the future-past topology. This is the movie theater metaphor where discrete frames of film pass over the projector bulb (Planck scale holophote noeon emission into every point in spacetime and atom) propagating *up* the Jacob's ladder (psychosphere light cone surface) to the *screen* (smooth continuous raster of awareness) as qualia.

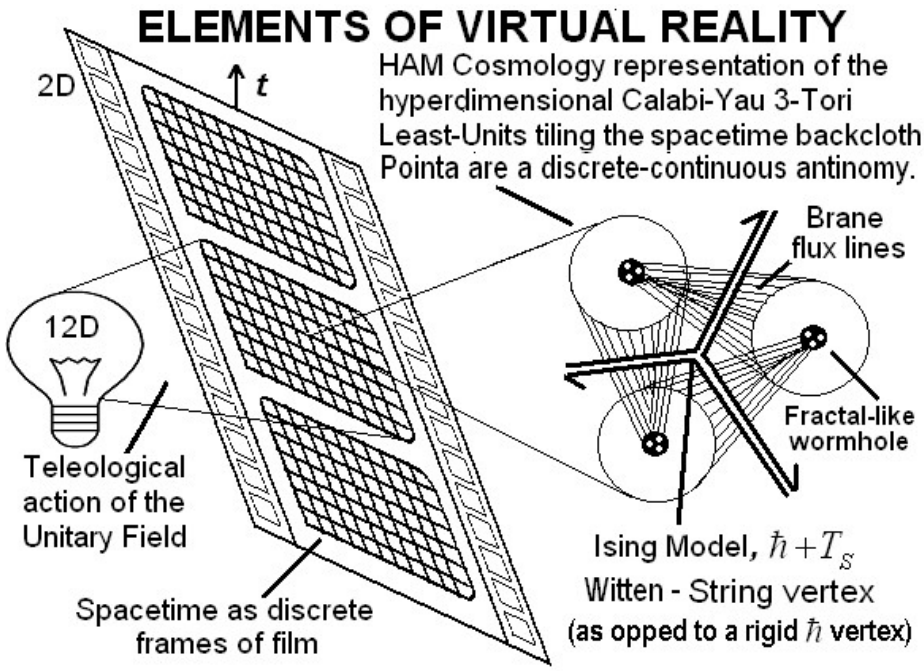

Figure 1. Cosmology of holographic reality. Anthropic action of the unitary field pilots the continuous-state evolution of spacetime and quantum dynamics through modulation of the supersymmetric topology of fundamental close-packed Calabi-Yau least-units as a finite regime tiling the spacetime backcloth.

12. The Vacuum Origin of Thermodynamics and Entropy

Temporal asymmetry is a fundamental problem because the microscopic laws of physics are time reversible. The macroscopic arrow of time arises from translation of the complex boundary conditions of consciousness, which ultimately is a property of the unified field. Although this is a perceptual phenomenology it is still physical. The most fundamental basis, more fundamental than for quantum interactions of matter is the unified electromagnetic-gravitational arrow; from which the thermodynamic and all other arrows arise. The continuous-state dimensional reduction compactification process within the topological structure of the polarized Dirac vacuum has a *beat frequency* associated with the inherent *Jacob's ladder-holophote* of least-unit translation.

Entropy increase in thermodynamic systems can be accounted for by vacuum radiation; and this interaction of vacuum radiation with matter is time-reversible. Therefore whether entropy increase in thermodynamic systems can be considered to produce an arrow of time depends on what controls the vacuum photons. Both cases are consistent with quantum mechanics. Position and momentum perturbation on particles by vacuum zero-point radiation is limited by uncertainty to

$$\langle \delta x^2 \rangle^{1/2} \langle \delta p_x^2 \rangle^{1/2} \quad (5)$$

where the first root mean square value is position and the second momentum respectively [23,51]. According to Zeh, [22]

$$< \delta x^2 >^{1/2} = (\hbar t / m)^{1/2}, \quad (6)$$

(where m is particle mass), can be obtained both from classical SED and the stochastic interpretation of quantum mechanics. Substituting the result into the uncertainty principle yields a fractional change in momentum coordinates, $< \delta p_x^2 >^{1/2} / p$, p is the total momentum, $2^{-3/2} (\hbar / Et)^{1/2}$, E is the kinetic energy. As vacuum radiation interacts with particles, momentum is exchanged. When an initial fractional change $< \delta p_x^2 >^{1/2}$ in momentum is amplified by the lever arm of molecular interaction,

$$< \delta p_x^2 >^{1/2} / p \geq 1 \quad (7)$$

it becomes greater than one in only a few collision times [22,23,51]. Therefore, the momentum distribution of a collection of interacting particles is randomized in that time, and the action of vacuum radiation on matter can account for entropy increase in thermodynamic systems; i.e. it can be related to the atemporal / temporal - microscopic / macroscopic cosmology of fundamental awareness. We don't see the extra dimensions because parallel transport creates a deficit angle in the future-past topology subtracting out this information as it spins at the speed of light.

Dynamical interactions occurring at the molecular level are time-reversible, but thermodynamic processes associated with entropy increase, like diffusion and heat flow, only proceed unitarily in time. Entropy increase appears to be only a macroscopic phenomenon, appearing when a coarse-grained average

is taken of microscopic processes. No averaging of time-reversible processes has been shown to account for temporally irreversible phenomena [22]. The reduced or temporal subspace nature of human perception filters out half of the microscopic action by the continuous dimensional reduction process. This action occurs at the speed of light and explains perspective – narrowing of the railroad tracks into the distance; which would not occur for a HD atemporal observer like God.

In the standard model (utilizing only the positive set of Maxwell's equations) electromagnetic waves emanate from a source to infinity only, and do not converge from infinity to a source. Collapse of the wave function is a one-way process [52]. Burns [23,51] has shown that entropy increase in thermodynamic systems is produced by the interaction of vacuum radiation with matter. This interaction is time reversible. Whether an arrow of time is ultimately involved in entropy increase depends on how vacuum radiation is produced. In Noetic cosmology which utilizes an extension of the Wheeler / Feynman absorber theory of radiation *EM* waves from infinity do converge with the standing wave source. There are extended quantum domains without collapse of the wave function where noncomputable ontological superpositions occur; and vacuum radiation is governed by teleological cosmological action principles inherent in the HD vacuum topology [47,53-55].

13. Derivation of the Universal Noetic Field Equation

The teleological and local action of consciousness is not a 5th fundamental force but an integration of the electromagnetic and gravitational force [4] as it is confined to the 12HD spacetime metric $S_N = M_4 \pm C_4$ [27,28]. It appears to be synonymous with the unitary field. In this section we derive the general action principle for HAM Cosmology [27,28]. It is an equation that will be seen to describe the topological transformation of HD space, gravitation, the unified field and consciousness. Newton's second law of motion $F = ma$ is the fundamental action principle of M_4 spacetime reality and derivation of the basic formalism for noetic theory begins at the same place. It is interesting to note that the Schrödinger equation $ih(\partial\psi / \partial t) = H\psi$ central to quantum theory has correspondence to $F = ma$ as does Newton's law of gravitation $F = Gm_1m_2 / r^2$ and likewise Einstein's law of gravitation $G = 8\pi T - \Lambda g$. These are not chosen as the starting place because they don't represent the correct form of gravitation and also contain an undesired constant of dimensionality. Whereas $F = ma$ is dimensionless and primary. Einstein's mass energy relation $E = mc^2$ can also be shown to reduce to Newton's second law. The Schrödinger equation is also not the place to look for mental action because as stated it describes particles on a manifold and does not encompass sufficient degrees of freedom to apply to biological systems.

To derive the fundamental Noetic action principle $F_{(N)}$ first we substitute Einstein's mass energy relation $E = mc^2$ into Newton's second law $F = ma$ and obtain:

$$F_{(n)} = E / c^2 a \quad (8)$$

Where $F_{(n)}$ is the noetic force and E represents the energy of the self-organized unified field that is scale invariant from the largest scale of the supralocal Multiverse, as a hyper-dimensional Wheeler Geon [30]

filling all space to the Planck scale covering (like a super-quantum potential [56,57]) the pertinent subspace at each level of dimensional reduction. Next the noetic equation is further generalized for HAM cosmology by utilizing boundary scaling principles from the work of Kafatos et al [8].

Taking the axiomatic approach to cosmological scaling that all lengths in the universe are scale invariant, we utilize the heuristic relation that

$$c \equiv \dot{R} \text{ or } \dot{R} = l/t = c \quad (9)$$

where $\dot{R}$ represents the rate of change of scale in the universe. This corresponds to the Hubble relation for perceived expansion of the universe where $H_0 = \dot{R}/R$ and $a = \dot{R} \times H_0$ or substituting $a = \dot{R}^2/R$. Returning to (8) for final substitution we have

$$F_{(n)} = E/c^2 a = E/c^2 \times \dot{R}^2/R \quad (10)$$

Since $c \equiv \dot{R}$ the c^2 & $\dot{R}^2$ terms cancel and we are left with:

$$F_{(n)} = E/R \quad (11)$$

Which is the formalism for fundamental action in the complex 12D space of HAM cosmology as opposed to Newton's $F = ma$ which represents classical action of particles in M_4 space. It should be noted that R is a complex rotational length and could also be derived in terms of a topological string theory or spacetime spinors at higher levels closer to domains described by more conventional theory. But the derivation above is much simpler and more fundamental. The point being that the noetic formalism could be derived and related to any level of 'conscious reality' and as will be shown elsewhere [58] expanded forms of the formalism can be used to describe intentionality, computation in biological systems and the origin of redshift and the CMBR [59]. It may seem on first glimpse that these concepts do not relate to each other; but in a universe with consciousness fundamental, it soon becomes obvious that they do. The close connection of light and space relates to the superluminal boosts in the Noetic transform [7,13-15]. It should be noted that (11) takes the same fundamental unexpanded form as the basic equation for string tension T_0 in M-theory [11,60] providing an alternative avenue for it's derivation [61]. This discovery should be a boon to String Theory because one of the missing aspects of the theory is the proper cosmological context.

$$T_0 = E/L = (2\pi\alpha')^{-1} \quad (12)$$

14. More on the Physical Cosmology of Time

The physics of time (thermodynamic processes, kaon decay etc.) seems independent of psychological time. But in a *conscious universe*, all arrows of time are interrelated and arise from a central point in the hierarchy

of unitary translation of the Noetic least-unit. An understanding can be garnered by explaining the amplification of microscopic phenomena by processes inherent in fundamental awareness. Observation - synonymous with measurement is the obverse of the process of awareness. William James stated that 'there is no splitting of experience into consciousness and what the consciousness is of'. So between experience A and experience B there is no gap, no collapse of the wave function is observed in thought processes. If one attempts to bring a photon to rest it vanishes. This observed reduction of the wave function in the external world has confused conceptions of what occurs in the mind where there is no collapse. But the phenomenology of awareness takes place in a structural noumenon. The additive properties of a Huygens rainbow effect applies to produce a framework for awareness. The summation of the effect in each individual microscopic raindrop produces the macroscopic rainbow. The rainbow is the screen in the movie theater upon which qualia may be projected. For the purpose of illustration this process could be said to be described by equation (16). The summation of the individual coherence lengths must have one orientation (time) or they would cancel and remain microscopic and reversible. The laws of physics have two forms with one generally ignored. The set of equations ignored is the one not observed or sacrificed to produce the perception of macroscopia. The continuous spin exchange compactification dimensional reduction process occurs at the speed of light and thus are too fast and small to be seen. So we don't see these Planck scale gaps in the continuous-state standing wave of perceived reality. This is the dimensional topology and geometric origin of time.

According to the Copenhagen interpretation all quantum measurements are associated with reduction of the wave function, a thermodynamically irreversible process. Only the final observed component of the ensemble is considered to be *real* [22] by

$$\sum_i c_i \psi_i \to \psi_i \quad (13)$$

This action directly creates boundary conditions separating the fundamental reversible aspects of microscopic natural law into the perceptual macroscopia and an additional HD physical realm not perceived by neurophysiology. Noetic cosmology proposes that this temporal asymmetry is completely observer related and the ensuing boundary conditions delete essentially half of the systems information cosmology. Bohr stated from the beginning that the Copenhagen interpretation did not describe biological systems; therefore a full physical description must utilize extended de Broglie/Bohm ontological forms of quantum theory without state reduction and therefore loss of systems information. The big question then is what is the utility of the unobserved parameters of this cosmology? Here is where the main utility of the Noetic least-unit transform enters in [62]. The complementary superluminal boosting of the 'standing wave' eternal present

$$D_s \to D_t \to D_E \; : \; R_U \to R_Q \to R_C \qquad (14)$$

produces and maintains the perceptual macroscopic amplification of microscopic phenomena. The Noetic boosts reduce the flux of all physical fields at the boundary by absolute parallelism $\partial \circ \partial = 0$ where the boundary of a boundary equals zero facilitating this whole cosmological process. We begin with the description of the electromagnetic field. Following Kafatos and his collaborators [8] suggesting the

importance of $\dot{R} \equiv C$ for universal boundary conditions which are also relevant to the velocity required for the observers mind to escape microphysics and become coupled to a macroscopia for *EM* by

$$\vec{c} = \frac{2\vec{E} \times \vec{B}}{\vec{E}^2 + \vec{B}^2} \quad (15)$$

where, according to Wheeler [31], velocity $\vec{c} = \vec{n} \tanh \alpha$ and the numerator is the Poynting flux and the denominator the energy density. This boost equation describes the reduction of the *EM* field to mutual parallelism which according to the Bianchi identity describes how the boundary of a boundary equals zero. Allowing half the universe to cancel into the resultant standing wave covering. The covering is piloted by the de Broglie wave-particle energy. Application of the Huygen's principle of wave addition produces the smooth feel of reality we observe by *surfing* as it were on the face of the discrete elements of atemporal microphysics!

15. Conclusion

Scientific theory, whether popular or unpopular at any point in history, must ultimately be based on description of natural law, not creative fantasies of a scientist's imagination. Only by adequate determination of natural law can a theory successfully model reality. *"There is good reason for the taboo against the postulate of new physics to solve new problems, for in the silly limit one invents new physics for every new phenomena* [6]*"*. Cosmology is becoming a mature science; mature enough that there is no room for surprises?

A new model of the universe called the HAM provides a fundamental framework for introducing a comprehensive dualist / interactionist model of mind and body for the first time in history. This noetic cosmology allows awareness to be defined as a fundamental scale invariant complex cosmological system representative of the structural phenomenology of the universe itself. The most important concept is the proposed origin of the unified field and the complex HD topology that facilitates its entry into every spacetime point and atom providing the necessary basis for dualism / interactionism – an action principle acting as the *élan vital* and providing a causal nature with sufficient degrees of freedom to explain intentionality. All the parameters of the anthropic multiverse are governed by utilizing suitable expansion of the formalism for Noetic action $F_N = E/R$ derived from Newton's second law $F = ma$. An axiomatic approach was taken for the sake of brevity. Many controversial principles were stated emphatically; but Noetic cosmology is empirically testable so it will now be possible to settle many of these questions experimentally.

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Chapter 3

THE PHYSICAL ORIGIN OF THE PRINCIPLE OF SELF-ORGANIZATION DRIVING LIVING SYSTEMS

> In my view the question of origin seems always left unanswered if we explore from a scientific point of view alone. Thus, I believe there is a need for some religious or metaphysical explanation. I believe in the concept of God and in His existence.
>
> - Charles Townes, Nobel Laureate

1. The Fundamental Basis of Self-Organized Living Systems (SOLS)

It has long been known that some form of subtle energy – spirit, chi, ki, or prana pervades the cosmos and every interstice of all forms of living systems. Until now there has never been a pragmatic scientific model of these energies that lends itself to rigorous empirical investigation. A self-organized cosmological model, called the Holographic Anthropic Multiverse (HAM), has been developed wherein a teleological action naturally arises. This new complex self-organized action principle is synonymous with the unified field sought by physicists such as Einstein; that in a conscious Multiverse 'pervades all space, gives life, is the light of the mind and the force that frames the heavens'. This action principle has broad application to fields of medicine, psychology and physics.

In order to examine the nature of this subtle energy some of the parameters defining living systems need to be explored. See Tables 1, 2 and 3. Generally unicellular prokaryotes which do not have a true nucleus and divide by fission not mitosis are considered the most fundamental form of living system. Many researchers include viruses as living entities since they commandeer their hosts' cellular machinery for replication; while others insist viruses are merely complex infective proteins. This controversy has continued over the last hundred years [1]. How could the question be answered if the nature of life is not well understood? New biological principles introduced suggest that the prion, the infectious protein responsible for transmissible spongiform encephalopathies (Mad Cow Disease) [2-3], qualifies as the most fundamental form of living system; but with a twist as we shall see. The prion appears to be the only known case of a purely mechanical life form; and therefore the only entity remaining in general concordance with the six-point definition of living systems put forth by Humberto Maturana and his colleagues in their original characterization of living organisms as a class of complex self-organized autopoietic systems in 1974 [4].

"What is the necessary and sufficient organization for a given system to be a *living unity*?" [4]. Maturana and his collaborators posed this question in their effort to formalize the general definition of a living system.

They further stated that all other functions are secondary to the task of establishing and maintaining this unitary organization, defining this process as *autopoiesis* [4]. For review, a summary of Maturana's description of an autopoietic living system follows through the next two sections:

> *Autopoiesis* from the Greek 'self-production' is a fundamental expression of the basic complementarity of structure and phenomenology [5-7]. An autopoietic system is self-organized, complex, open, dissipative, self-referential, incursive, autocatalytic, hierarchical, far from equilibrium and autonomous. A system is autopoietic when its primary function is self-renewal through self-referential activity. This contrasts an allopoietic system, like a robot, deriving function from an external source. Stated another way autopoiesis is a network of production components participating recursively as a globally stable structure operationally separable from the background [4,5]. By metabolic work a living system is able to expel entropy (disorder) continually into its surrounding environment and thereby maintain the life process.

Table 1. The Ascending Hierarchy of the Properties of Complex, Self-Organized Living Systems

1) An autopoietic system is an open non-equilibrium system. If closed in equilibrium all processes die down.
2) The processes are cyclical, recursive and incursive. (Incursion has recently been put forward as a fundamental physical principle [2,8])
3) As a complex self-organized system, operations occur within multi-levels where higher levels contain all lower levels.
4) Function – the primary function of the system is autopoiesis as defined above [4].
5) Self-Organization in living systems is driven by a cosmologically based teleological action principle (A key addition to Maturana's principles formally introduced here).

A teleological action principle, known as the life force or *élan vital*, has been discussed historically in theological, philosophical, and biological terms. In our current research, we introduce such a life principle for the first time, in a rigorous scientific manner open to empirical testing [9,10].

Table 2. Summary of Maturana's Six-Point Mechanistic Key for Determining Life

1) Does the entity have identifiable boundaries like a cell or body?
2) Does the entity have unique constitutive elements?
3) Is the entity a *mechanistic system* possessing properties satisfying certain relations for its interactions and transformations?
4) Do the components constituting the boundaries of the entity act through preferential relations and interactions between the components?

5) Are the components constituting the boundaries of the entity produced by interactions of the components either by transformation of previously produced components, or by transformations and/or coupling of non-component elements that enter the entity through its boundaries.
6) If all the other components of the entity are produced by the interaction of the components as in 5, the entity is an autopoietic entity in the space in which it exists [5].

Table 3 shows that Jantsch and Maturana both state that dissipative chemical reactions like the Belousov-Zhabotinsky reaction and the glycolytic cycle qualify as primitive autopoietic systems [4,5]. This is the first reason to question the finality of Maturana's conditions. Does this mean any of the entities above should be accepted as living systems? Maturana's six-point key is not experimental; but a set of logical premises, and in that sense based arbitrarily on philosophical deduction. Even if these systems are considered autopoietic by the claim of definition, the thesis developed here is to not accept these types of entities as living-systems but to make a case for requiring additional physical principles added to Maturana's mechanistic key to complete the requirements for properly defining a unique class of autopoietic systems qualifying as true Self-Organized Living-Systems (SOLS). Our conclusion is that Maturana's delineation of autopoiesis at best only defines the mechanistic components of self-organization. This has been a key problem hampering the comprehensive definition of life. Mechanism is so elegant and efficient (as it needs to be) that mechanism alone has been considered sufficient to describe life.

2. Mechanism in Biology as a Semi-Classical Limit

Autopoietic systems as defined by Maturana are a special class of *mechanistic system*. This has long been a challenging philosophical issue. It is generally considered an open question whether all biological process can be described completely in terms of the 'mechanics' of physics and chemistry. In the philosophy of biology *mechanism* is defined as the view that every event described as a biological event is the same as those exemplified in non-biological physical chemistry [12,14]. Beckner in a discussion of *mechanism* states:

> It is plausible to suppose that biology contains terms that could not be defined by reference to physics and chemistry, particularly if we count psychological phenomena as special cases of the biological, but perhaps even if we do not. Biological theory takes account of the circumstances of an event's occurrence in a way that the physical sciences do not. For example, it is a biological fact that lions hunt zebras. The biological mechanist ought to insist merely that everything that happens in a given case of zebra hunting is identical with a sequence of physicochemical events, not that the concept of hunting can be defined in physicochemical terms. It may be the case that *hunting* can be defined only in intentional language" [14].

Table 3. Non-Autopoietic Entities Appearing to Satisfy Maturana's Conditions for SOLS

1) **Automata** - Superficially automata [11] seem to obey Maturana's six points for autopoiesis, especially in terms of self-reproduction and autonomy; but they are readily disqualified for two salient reasons: Automata are generally nonphysical and cannot naturally escape or exist outside of the computer system they are programmed in.
2) **Crystals** - Crystalline structures conform to many of Maturana's six key requirements. The symmetry of the *unit cell* contains the geometric framework of the whole periodic structure, which is repeated in translations of the unit cell. So although a crystal has open self-organized boundary conditions, appears to be recursive and can reproduce; a crystals main failing is that it remains mainly a chemical reaction because its 'unique constitutive elements' can only be reproduced and remain structure preserving under precise conditions of chemical reactivity. Crystals cannot expel entropy and have no self-renewal.
3) **Ribosomes** - Although partially comprised of components produced by the ribosome, as entities processes beyond those comprising their operation produce them; and their function is not completely self-referential[4]. Ribosomes have high-level metabolic properties but they are cellular organelles not unique unities in themselves.
4) **Belousov-Zhabotinsky Reaction** - A key aspect of a self-organized autopoietic system is its globally stable structure over an extended time. These are called *dissipative structures* because they maintain a continuous production of entropy, which is then continually dissipated. The best-known dissipative structure is the Belousov-Zhabotinsky Reaction produced by the oxidation of malonic acid by bromate where rotating concentric or spiral waves create interference patterns oscillating with a periodicity maintaining itself for many hours [5,12]. Although self-organized with environmental interplay, can this be more than a recursive chemical reaction?

This issue has left the final reductionist judgment for the standard model of biology an open question; and until recently this is where conceptual development had to remain. The philosophy of biological mechanism reviewed here is akin to philosophical naturalism that states: 'the natural world represents the whole of reality without requiring any additional teleological parameters'. This suggests that the current limits of scientific pragmatism provide sufficient explanation for all universal phenomena. Arguments on mechanism and naturalism have not been quite beaten to death. Let it suffice for the purposes here to postulate that additional scientific laws need to be introduced because 'lion hunting' as intentional action is not describable by the laws of physics and chemistry alone.

As argued above one cannot in good conscience label the Belousov-Zhabotinsky reaction [5,12] as a living system any more than one can logically allocate consciousness with reasonable definition to the bi-level state of a thermostat as has been used in Artificial Intelligence (AI). However the sophistication of the mechanical properties of self-organization in autopoietic systems cannot be discounted. While this inherent complex order provides a highly efficient substrate for living systems to be built on, like a little finger applied to the helm of a megaton ship is able to steer it. We intend to show that mechanism alone provides an insufficient basis for the complete description of SOLS. A teleological action principle, inherent in the Holographic Anthropic Multiiverse (HAM) [15-17], acting in concert with mechanism is required for life,

providing components of what cosmologists have recently called the holographic cosmological principle [18].

3. New Cosmology Helps Redefine Biology

The success of Gauge Theory in describing elementary particles and their interactions has led to the standard model of particle physics. Gauge Theory or *gauging* provides a way to simplify the transformation of the underlying symmetry used to represent the internal structure for measuring interactions in standard Einstein-Minkowski 3(4)D spacetime (often called the Einstein Gauge). But Gauge Theory is only an approximation suggesting it will be replaced by a more fundamental principle [19] like the geometric principle Einstein used in formulating General Relativity from the approximation of Newton's gravity. It is believed that a massive photon would violate local gauge conservation laws, which are one of the fundamental concepts of modern physics. This would not be true in a higher dimensional (HD) space [20] where the photon may acquire mass by what is called spontaneous symmetry breaking [19]. This simple explanation for preserving the gauge principle in the local 4D gauge model allows the photon to have mass in the HD global case. A massive photon m_γ is allowed to have an internal symmetry with which it may couple to Dirac's model of a covariant polarized vacuum [21] supporting the new HAM cosmology needed as the basis for the work here.

Another essential factor not addressed here is what is called the Dirac polarized covariant vacuum [22]. This spacetime vacuum is key to the premises of HAM cosmology because it supports an energy dependent spacetime metric, massive photons, 12D reality of M-Theory (Superstring Theory). Although still unpopular, growing evidence supports Dirac's model [23,24]. The Dirac vacuum has also produced a large body of literature in a field called Extended Electromagnetism [25].

In the HAM context it is easier to state that Hubble discovered the cosmological redshift not a Doppler expansion of the universe, which becomes an invalid interpretation. Therefore, no mandate exists necessitating a trace back to an initial singularity (Big Bang) [26,27]. The Big Bang has two main pillars. The possibility of photon mass negates the first (expansion of the universe); and the other the Cosmic Microwave Background Radiation (CMBR), to which it has been stated 'no alternative has ever been shown' [28]. This issue has recently been addressed by using Cavity-QED to describe blackbody radiation in spacetime cavities as an equilibrium condition between redshift as absorption and CMBR as emission [29].

Until the advent of Noetic cosmology [15,16,26,27,30,31] physical cosmologists have generally believed that spacetime could not be highly ordered and symmetric with an inherent periodicity where the future-past[14] prepares the present as a chain of instantaneous continuous-state 'nows' [15] as a 3(4)D virtual reality that is a temporal subspace of a higher 11(12)D eternal multiverse. Such spacetimes were considered nonphysical and thought to violate the causal principles of quantum theory [32]; but Cramer [33] in what he calls a Transaction has shown this not to be true.

[14] Future-past – In the Wheeler-Feynman absorber theory of radiation, Cramer's transactional interpretation of quantum theory and the Noetic continuous-state Multiiverse present instants is are virtual standing waves determined by future and past elements. This is how temporal reality may be a subspace of eternity.

The standardized Copenhagen interpretation describes the boundary between Newtonian Classical Mechanics and Quantum Mechanics (QM). Classical Mechanics is macroscopic and considered a highly predictable clockwork. At the microscopic level described by QM uncertainties arise and the outcome of measurement of a system's dynamics is statistically based. Probability was put into the Schrödinger equation as a wave function. When a measurement is taken the wave function is said to collapse. Because of the inherent uncertainty principle only position or momentum, particle or wave properties could be measured precisely, never both simultaneously. De Broglie, Bohm and Vigier have developed an alternative interpretation called the Causal Stochastic Interpretation (CSI) of quantum theory [34]. In the CSI model the quantum wave function continually evolves without collapsing; and therefore with no restriction on measurement of complementary observables because of causal aspects of a guidance principle called the quantum potential. The domain described by the CSI Interpretation is the regime at the boundary between extended quantum theory and the unified noetic field.

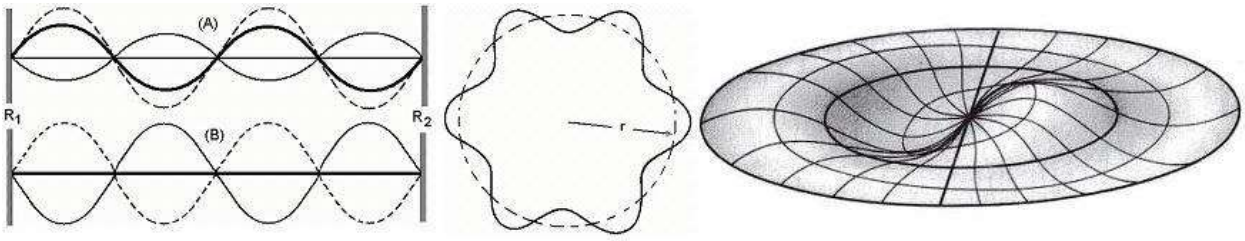

Figure 1. Examples of 1 and 2D standing waves respectively. Standing waves are quantized energy or matter waves because of the restrictions imposed by boundary conditions like the clamps holding the ends of a violin string or the cavity of a wave guide allowing only a specific integral number of whole waves reflected back from the fixed ends in A) or circumference in B) to produce a superposition of the waves. In the top part of A) the thin and dotted waves summate into the thick standing wave. At the bottom the thin and dotted wave are 180° out of phase and superpose into the central zero amplitude thick standing wave. B) and C are 2D standing waves. Following this metaphor 12D HAM cosmology postulates that reality itself is a form of complex standing wave.

In this regime SOLS or consciousness is able to violate quantum uncertainty because an extended form of CSI theory governs the description. From its inception quantum mechanics has been known to be both incomplete and unable to describe biological systems. Therefore, how can biological mechanism, which is a classical model, offer a complete framework for describing living-systems since it is Newtonian?

Self-organization produces a form of *freedom*; and the degree of autonomy a system achieves in relation to its environment provides one way to loosely define *consciousness*. Jantsch says, "this autonomy appears as an expression of the fundamental interdependence of structure and function which is one of the most profound laws of dissipative self-organization" [5]. Drãgãnescu further adds: "If a virus is alive it has a phenomenological subconscious, if not, it cannot have any form of consciousness, because there is no structural organization with sufficient complexity to process structural information significantly" [7]. This is similar to Maturana's idea that the autonomy obtained by autopoiesis relegates a primitive form of consciousness (even to chemical dissipative structures), which he calls a *cognitive domain* in relation to the systems environment [6]. This is where we must draw a line in the sand and give a definitive description of the term *cognitive domain* that goes beyond Maturana's and the current thinking on mechanism.

Consciousness, and not necessarily that with self-awareness, requires a sufficient number of degrees of freedom beyond those of an allopoietic mechanistic automaton. While one might reluctantly concede that the Belousov-Zhabotinsky reaction [5,12] is autopoietic because of Maturana's original definition [4]; one cannot proscribe a cognitive domain with a structural-phenomenology capable of intentional action to such autocatalytic pattern-producing chemical reactions. How is this ultimately different than programmed automata? It seems that embracing biological mechanism leads one into the trap of 'conscious thermostats' used to support the Artificial Intelligence (AI) and cognitive view that algorithm alone is sufficient to describe the complexity of the human mind.

We believe the autocatalytic chemistry of the Belousov-Zhabotinsky reaction has a cyclical self-organization keeping the cycle in motion recursively by a chaotic component in the symmetry of the boundary conditions. This leads generally to a global stabilization of the reaction until a chance occurrence of an ordered ground state occurs. One could argue the reaction is the result of the inherent activity in the reactions so-called *cognitive domain* because it includes a self-referential multilevel hierarchy that maintains the cycle of the reactions self-production. This however at least violates Gödel's incompleteness hypothesis: 'a system cannot be completely described only in terms of itself' [35,36]. One could carry this argument further to lend correspondence with Prigogine's symmetry breaking factors in the thermodynamics of evolution [37,38]. But the driving force described by these arguments is not an intrinsic *intentional awareness*; it is more like the incongruent geometric symmetries driving the chain of unstable intermediaries in a radioactive decay series – automatic unraveling of atomic structure (a form of mechanism) continues as long as a stable ground state with boundary conditions that preserve the unity of the intermediate atom cannot yet be reached. These wonders instead display the elegance and efficiency of mechanism as a substrate for facilitating self-organization in living systems. Mechanism in this sense makes life "inexpensive."

4. Living-Systems and Consciousness

Recall Jantsch's claim that the Beluzov-Zhabotinski reaction, as a result of its classification as an autopoietic system by Maturana's definition [6], has rudimentary consciousness [5,39]. During the formal age of Behaviorism (1913~ 1970) consciousness was discarded as an irrelevant black box; in recent decades cognitive researchers (~1935-present) claim that consciousness is merely a specialized computer program, "a special software in the hardware of the brain or just a matter of information processing" [40]. Since we are not robots without volition this seems unacceptable; more a reflection of the current myopic bias in the field of Consciousness Studies where the dominant cognitive model is aligned with the standard mechanical model of biology which remains couched in the current Big Bang cosmology which like all contemporary models of science is based on Darwinian naturalism [41]. This *philosophy of biological mechanism* provides only half the story of mind. Our aim is to show that an addition to and clarification of Maturana's key leads to a complete definition of SOLS and suggests that the prion [2,3,42,43] should be classified as the only truly mechanical form of living system. The prion then is the zero point or zeroth case of a living system. But this means it should not be classified as purely mechanistic like the Beluzov-Zhabotinski reaction because the Beluzov-Zhabotinski reaction does not utilize either the *élan vital* or machinery of a living system as viruses and prions do.

The *cognitive domain* [6] of a prion[15] does not create and dissipate entropy in its own right as higher life forms do. The prion is not at the same level as a virus where this critical factor of far from equilibrium complex processing is satisfied vicariously when viral proteins commandeer existing cellular machinery of the host. The prion, as the zeroth case of a living system, does not 'live' at the viral level. It has no cognitive domain. In a sense it is like anti-life. The conformational state of the prions geometry by its very existence in proximity to normal proteins is like a match igniting gasoline. The factor that separates the prion from the non-autopoietic entities listed in section 9 (which utilize only the mechanistic half of the complementarity required for a complex self-organized living system) is the prions utilization of the existing coherent energy of the *élan vital* in its propagation. This is a prediction of noetic theory that must be demonstrated empirically [9,10,44].

5. What About Quantum Biology?

Current thinking in Quantum Theory states that the evolution of all atomic and subatomic particle interactions can be described by a Schrödinger equation pertaining to action of particles moving on a manifold

$$i\hbar \frac{\partial \psi(x,t)}{\partial t} = -\frac{\hbar^2}{2m}\nabla^2 \psi(x,t) + V(x)\psi(x,t). \quad (1)$$

The Schrödinger equation takes myriad forms depending on the application it is used for. The one above is a positional representation of the equation in Cartesian coordinates where $\hbar$ represents Planck's constant, the ∂ terms denote the time derivative with respect to the wave function ψ, m is mass, ∇ denotes the space derivative and V is the potential energy function of (x,t).

In terms of the present status of biological theory explored in sections above it should be noted, as is generally known to physicists, that the founders of quantum theory emphatically stated that the standard phenomenological model of quantum theory (The Copenhagen interpretation) designated to describe all atomic and subatomic phenomena is incapable of describing biological systems.

Neurophysiologists have attempted modifications of the Schrödinger equation, to be used to describe trajectories of a neuronal action potential on a brain cell manifold in the neural bioplasma [45-47]. These extended forms of the Schrödinger equation relate to the ontological (CSI) interpretations of quantum theory developed initially by physicists de Broglie, Bohm and Vigier [34]. The ontological interpretation attempts to overcome the quantum uncertainty principle by adding an additional term to Schrödinger's equation called the pilot wave or Quantum Potential Q.

$$\frac{\partial S(x,t)}{\partial t} + \frac{(\nabla S_{(x,t)})^2}{2m} + V(x) + Q(x,t) = 0 \quad (2)$$

[15] Prions propagates through conformational changes in the geometry of its proteins molecular structure [2,3,42,43].

where the Quantum Potential

$$Q = -\frac{\hbar^2}{2m}\frac{\nabla^2 R(x,t)}{R(x,t)}, \quad (3)$$

and real functions *R* and *S* are the 'amplitude' and 'phase' respectively [45-47]. A reasonable step, but these incarnations of the ontological formalism do not complete quantum theory, i.e. do not extend far enough to provide the necessary substrate for intentional action missing from the standard model of quantum theory because they do not make correspondence to the unitary field which Einstein among others claimed provided the basis for all life. In describing CSI theory in 3(4)D Holland [48] briefly alludes to a "Super Quantum Potential" (SQP). In the noetic formalism if the SQP is extended to 11(12) D it can meet the requirement of being equated with the unified field.

Activity in the various structures of the neural bioplasma is considered a complex many body problem. When reduced to the molecular level only the scale has changed and the standard rules of quantum theory still seem to apply. This is the crux of the problem of biological mechanism. In mechanics, whether classical or quantum, objective analysis follows coherent lines. But in applying similar rules to biological systems there is a breakdown.

One can find little argument with these applications of quantum theory since obviously quantum fluctuations occur not only relative to all microscopic actions but also in relation to aspects of neural networks primarily because they are a quantum chemistry. But all descriptions of this type (particle activity on a manifold – what the Schrödinger equation was derived for) still represent action at the semi classical limit. As noted above – such physicochemical interactions, although under the panoply of the standard model of quantum theory, draw a line in the sand beyond which the founding fathers of quantum theory maintained that the quantum formalism offered no description of biological systems because whether linear or nonlinear, local or nonlocal there is no provision for the additional degrees of freedom that come with intentional agency – the ability to change an action once set in motion.

6. Is There More to Biology Than Mechanism?

Returning to the analysis of the fundamental philosophy of biology we summarize Brillouin's [49] historical categorization of the issues of mechanism versus teleology into three general positions in Table 4.:

Table 4. Mechanism and Interpretations of Life

1) Knowledge of physics and chemistry is essentially complete and life could be explained without introduction of any additional *life principle* (*élan vital*).
2) Considerable physics and chemistry is known, but not everything. A new law or principle needs to be discovered to explain life; but this concept will not be outside the laws of physics and chemistry already known. Whether or not this is considered a *life principle* or not is irrelevant.

3) A *life principle* is mandatory for an understanding of life because living systems are considerably different and much more complex than inert matter. The laws of thermodynamics describe only inert and *dead* matter to which life is an exception requiring a new principle to explain.

Theories of mind abound with great disparity between them [7,30]. It could be said to be like the early days of electromagnetism when 'for every 100 theorists there were 101 theories'. Simply stated, and using top-down reduction, mind theory can be categorized generally as follows:

A. Classical Reductionism – Newtonian Mechanics Deemed Sufficient to Describe Mental Activity

- Neural action – Consciousness can be completely explained by neuronal brain processes.
- Digital computer-like information processing in Neural Networks / Cellular Automata / Common laws of Physics and Chemistry.

B. Heisenberg Cut – Additional Quantum Degrees of Freedom, Possibility of Nonlinear & Nonlocal Interactions

- Quantum computation in brain microstructures like synapses, microtubules or ordered water.
- Copenhagen statistical phenomenology – collapse of wave function essential for mental activity.

C. Cartesian Cut – Requires Additional 'Life' and/or Physical Principles Beyond Mechanistic Theories

- Dualism / Interactionism – ontological extensions of quantum theory, evolution of the wave function without collapse.
- Monism – all is mind, consciousness is ineffable and immaterial.

The first four types above fall under the domain called the philosophy of biological mechanism. Theories in the Classical and Heisenberg arenas have defined consciousness as a hard problem too difficult to research [45,50]. This provides significant motivation to explore below the Cartesian divide where additional physical laws are anticipated. What evidence exists to justify such a search?
Continuing with the premise that quantum theory is incomplete, Schrödinger in relating the 2nd law of thermodynamics and life says: "We cannot expect that the 'laws of physics' derived from it to suffice straightway to explain the behavior of living matter…We must be prepared to find a new type of physical law prevailing in it. Or are we to term it a non-physical, not to say a super-physical law [51]?" But what can this new physical law be?

7. Complex Systems Theory: A New Model for the Origin of Life

Scientists unanimously consider unicellular prokaryotes (no nucleus, as opposed to eukaryotes with nucleation) as the most fundamental form of living system with the inclusion of viruses remaining controversial [1] because 'karyotes have cellular boundary conditions to demark the substance of a living system. Viruses commandeer the boundary conditions and prions demonstrate the mechanical properties driving action. By defining awareness as a fundamental physical quantity like the concept of *charge* in electrodynamics [16,52,53], it is possible to show how the prion recapitulates, in the sense of its organization, the propagation of its infective state by maintaining the 'charged' form of its conformation merely by being coupled to the Noetic Field in proximity of higher order SOLS. Prion propagation therefore represents biological mechanism in its most fundamental form and provides the root of its redefinition. Although slightly more complex, the self-organization pertinent to viral replication also falls under this new definition of biological mechanism. Something different happens at the level of bacteria or perhaps any motive unicellular life form. The cognitive domain has sufficient capacity for activity based on an *interactive computational model* [54]; the evolution of the 'minds' content (qualia) is driven by more than the mere presence of teleology as in the case of the prion or virus, i.e. more degrees of freedom are available. Our view of a ball bearing or marble is that they are spherical globs of elemental iron or quartz molecules. A more detailed case has been made elsewhere [16] that the HAM is self-organized and comprised of a system of scale invariant (same order from micro to macro) least units that in principle are like standing waves of their fundamental components. We call this a *continuous-state* and claim that it is a fundamental self-organizing principle of the universe like charge. The very existence of this continuous-state least unit allows it to be classified as an action principle because it entails a force to continuously produce and maintain coherence. The symmetry enhancing nature of the force acts not only on the topological states of prion conformation by constructive interference as the base state of biological mechanism, but also by higher order conditions of self-organization (defined in section 9.1). The structural-phenomenology of this new noetic action principle [15] is a complementarity of mechanism and the unified noetic field (we call the unified field noetic because it is a field of consciousness), together forming a teleology that is the general driving principle governing all aspects of complex SOLS [44]. Applying the concept of a *unit cell* from the nomenclature of crystal structure to this fundamental teleology in the topology of spacetime forms the scale-invariant hierarchical basis of living-systems from the microscopic origins of mechanism to macroscopic intentional systems like the mind of Man. The complementarity of mechanism and teleology is a structural-phenomenology that is the primary cosmological principle of the conscious universe; the fundamental least unit of which is defined as awareness [16,31].

Defining awareness as a fundamental principle like charge in Electromagnetic Theory [16,39] provides a path to formulate a theory of life and consciousness. The currently popular cognitive avenue poses the question '*what processes in the brain give rise to awareness*?' Unfortunately this creates what has been defined as the *hard problem*, which is deemed impossible to study empirically [50,55] - an investigative dead end! Charge has been considered a physically fundamental and indivisible concept; but this definition appears to hold only to the semi-classical limit. Physicists are finding out that the so-called unit of elementary charge arises from a deeper wormhole structure in the higher dimensional topology of spacetime [56]. This is also true in defining the fundamental unit of awareness. Charge, or in this case awareness, does not arise as a brain process. Only looking beyond the brain into spacetime leads to a model of awareness

(consciousness) that is both definable and empirically testable. In brief, the fundamental basis for the least unit of awareness is a cosmology that has three complementary components [16,53]:

Table 5. The Three Fundamental Complementary Cosmological Components of Mind

1)	Elemental Intelligence – A non-local atemporal HD domain, which is a set of boundary conditions co-eternal with God that define the fundamental limits of an individual entity.
2)	Noetic Ordering Principle – A new atemporal or eternal action principle synonymous with aspects of the unified field and mediated by an exchange particle called the noeon that is synonymous with chi, prana or spirit or a life principle (*élan vital*).
3)	Localized Fermi and Bose brain/body States – Classical, semi-classical and quantum temporal modes associated with neural activity and other aspects of simpler autopoietic or complex SOLS.

Remaining problems center around the fundamental nature of space; suffice it to say that Einstein's superceding of Newton's 3D absolute space with a 3(4)D relativistic space was a significant milestone, but not a final answer. The triune complementarity above provides a sufficient structural-phenomenology of when cast in the 11(12) noetic space to define the psychosphere of an individuals mind and body because 12D is the minimum number of dimensions needed to describe eternity [26].

8. Action of the Unified Noetic Field

Fröhlich [57] proposed a new energy that produces coherent long-range order in biological systems. Some authors have suggested this coherence is a type of Bose condensate[16]. Einstein and Hagelin [58] further postulate this coherent principle arises from the unified field, which is also proposed here by Noetic Field Theory. The action of the unified field is the basis for a life principle governing the evolution of complex SOLS.

We will show generally how the continuous transformation of the topology of the 11(12)D superspace of the noetic least unit introduces by periodic holophote[17] action evanescence of a life force from the HD energy covering of each virtual moment of the present [15,16,31]. First we illustrate one of a number of possible models of how at the semi-classical limit from the stochastic background of the vacuum zero-point field, this energy of the *élan vital* is harmonically injected into every point and atom in spacetime by a mechanism like a 'chaotic gun' [59,60].

Using equations for a chaotic gun developed by Ciubotariu [15,56,59,60] the nonlinear dynamics of the model for injecting a charged noeon into a spacetime cavity can be described as follows:

$$\dot{X} = \frac{\mathrm{d}X}{\mathrm{d}T} = \frac{1}{\gamma} P_x = \frac{1}{(1 + P_x^2 + P_y^2)^{1/2}} P_x, \quad (4)$$

[16] Light-like state as opposed to a Fermi state limited by the Pauli exclusion & Heizenberg Uncertainty Principles to one state per domain.

[17] Holophote – periodic flashing like a light house beacon.

$$\dot{P}_x = \frac{\mathrm{d}P_x}{\mathrm{d}T} = \Omega_c [\beta \cos(X - T) + 1] P_y, \quad (5)$$

$$\dot{P}_y = \frac{\mathrm{d}P_y}{\mathrm{d}T} = -\Omega_c [\beta \cos(X - T) + 1] P_x + H \cos(X - T), \quad (6)$$

Equations (4 to 6) illustrate a possible quantum model for entry of the new noetic action principle into the 3D phase space P_X, P_Y, X where photons of the Noetic field (noeons) are injected into each point (least unit) in spacetime and every atom by a periodic 'gun effect' of the continuous holophote action. This is a continuous-state spin-exchange dimensional reduction compactification process inherent in the topology of Noetic Superspace [15,16,30] acting like a hysteresis loop. Ciubotariu's equations combine Maxwell's equations and relativistic equations of motion for the phase space P_X, P_Y, X. The Ω terms represent the cyclotron frequency of the chaotic gun effect. Infusion of the noeon Boson (photon) field mediating action of the life-force in spacetime cavities only occurs in certain preferred directions allowed by the symmetry conditions of what is called parallel transport in the dimensional reduction compactification process [15,16]. The holophote effect appears in the Noetic cosmology because in its energy dependent spacetime metric $\hat{M}_4$ [16], just as a periodicity of wave and particle moments occur in photon propagation through space, so does charge or energy arise in periodic moments of the Noetic least unit transformation (see Figure 9.1). Because as Wheeler showed in 1962 [61] 'charge is topology'. According to Wheeler [61] lines of force in a wormhole can thread through a handle and emerge through each mouth to give the appearance of charge in an otherwise charge free spacetime. Each mode of the field of a quantum harmonic oscillator is associated with the quantum cavity dynamics (Cavity-QED) of the spacetime topology as it undergoes its continuous-state transitions.

$$E_n = (n + \frac{1}{2})\hbar\omega \quad (7)$$

E is the state of energy for *n* photons. For $n = 0$ the oscillator is in the ground state; but a finite energy $1/2\hbar\omega$ of the ground state, called the zero-point energy, is still present in the region of the cavity. According to equation (7) of the quantum harmonic oscillator the field energy of the photons undergo periodic annihilation and recreation in the periodic symmetry of noetic spacetime [62].

9. Peripheral Physical Properties

Twelve dimensions (12D) [CASYS QC] is the minimum number required to describe eternity. By eternity we mean a continuous-state topological manifold able to completely transform out of contact and independent of time. This is a property of observed Euclidean / Minkowski space being a standing wave subspace of the 12D HAM Absolute space. The rigorous description of this property requires a new set of

transformations beyond the standard Lorentz / Poincairé transformations. Plank's constant reformulated allowing quantum theory to be completed.

Noeons represent both the *élan vital* and *light of consciousness*. They propagate with an inherent *beat frequency* along preferred paths of the *Jacob's ladder* holophote by the Noetic transform (SLT-Kaluza-Klein to Geon light boosts). The *smoothness of awareness* is the oscillating leading edge of the lightcone kept in phase by a Huygen's like principle of wave train addition. b) More sophisticated Quantum view of the same process. Several imbedded actions: 1. Quantum foam background. 2. Unitary Noeons evanesce into temporality by quasiparticle transitions [39] into neural networks and other elements of the dendritic microprocess as qualia are produced [34,35,39]. *r* represents a relational unit of standing wave spacetime extension maintained by the energy of the discrete X_N fundamental units according to the noetic action formalism $F_N = E/R$ [x].

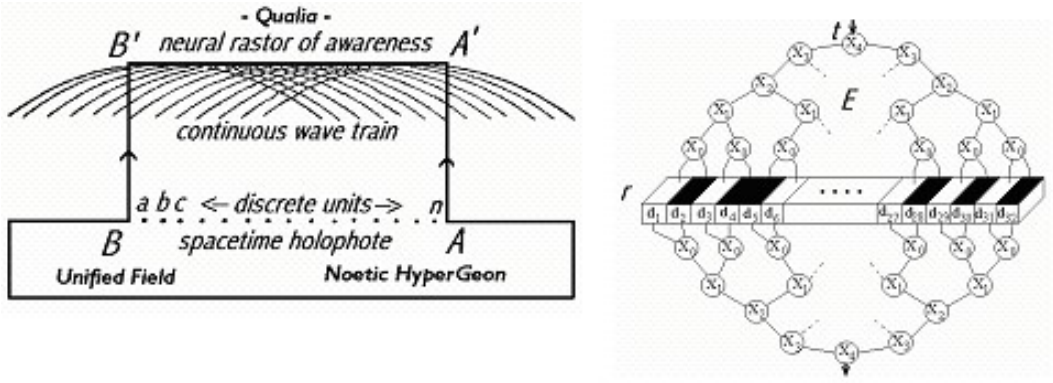

Figure 2. *Movie theater* views of the *psychosphere* light cone boundary. All *D* suppressed except one extended spatial element *B' – A'* or *r*. a) Classical view: Noeons (exchange particles of the Noetic Unified Field) propagate within the discrete Planck scale backcloth of the polarized Dirac vacuum, not in free space, but confined to the metric of the HD fabric like quarks. B) Quantum view.

10. Mechanism of Protein Conformation in Prion Propagation

Fatal neurodegenerative disorders known as transmissible spongiform encephalopathies (TSE'S) have been shown to spread by a proteinaceous infectious particle dubbed the prion [42,43,63,64]. According to Prusiner's definition these prion elements propagate conformational variation leading to replication by a mechanism not well understood until recently [43]. Two conversion hypotheses have been proposed:

- The *template-assisted conversion model* [65] where a putative cellular chaperone called protein X assists conformational transition by altering the thermodynamic equilibrium of a kinetic barrier in favor of transition state protein formation.
- The *nucleation-polymerization model* where highly orderedaggregates of the infectious element form. This also shifts thermodynamic equilibrium allowing this nucleus to act as a seed for further prion

propagation. Protein folding thus appears in both cases to be the primary autocatalytic mechanism propagating prion diseases.

According to Prusiner [64]:

> Nascent prions are created either spontaneously by mutation of a host protein or by exposure to an exogenous source. Prions are composed largely, if not entirely, of a modified form of the prion protein (PrP) designated PrPSc. Like other infectious pathogens, they multiply but prions do not have a nucleic acid genome to direct the synthesis of their progeny. A post-translational, conformational change features in the conversion of cellular PrP (PrPC) into PrPSc during which alpha-helices are transformed into beta-sheets. Since this structural transition in PrP underlies both the replication of prions and the pathogenesis of the CNS degeneration, much of the effort in the laboratory is devoted to elucidating the molecular events responsible for this process. Indeed, prion diseases seem to be disorders of protein conformation.

And further relative to the theory of prion propagation proposed here:

> During prion replication, an as yet to be identified factor that we have provisionally designated protein X binds to PrPC. The PrPC/protein X complex then binds PrPSc; by an unknown process, PrPC is transformed into a second molecule of PrPSc [64].

A Postulated 3D X-bundle structure of the PrPC was chosen by Prusiner from four penultimate PrPC models reduced from ~300,000 possible configurations by both theoretical and experimental constraints. These four choices correlated best with human prion mutations. A Conceptual model of the orientation of the four helices of the X-bundle model looks like two X's nearly superimposed on each other. Since prions have no nucleic acid-based genome to direct their propagation. Noetic theory proposes that prion replication is directed by fundamental mechanisms of complex systems theory and that the action principles driving complexity are a more fundamental form of mechanism (stated in 9.4) than that perceived currently by the philosophical basis of mechanism in biology.

11. Physical Cosmology of the Fundamental Least Unit

Crystals are built up from unit cells, which are like bricks, bonded together to form the crystals structure. The same is true of cosmological models [66]. Modern Big Bang cosmology is said to be comprised of Planck scale least units $\hbar$ of $10^{-33}\,cm$. Noetic cosmology introduces a modified fundamental cosmological least unit in the context of an advanced form of Einstein's model of a static universe, called the Continuous-state Holographic Anthropic Multverse (HAM) [15]. If there is more to SOLS than brain cosmology is required. Since the Big Bang is a naturalistic cosmology, it provides an insufficient basis for describing life. HAM cosmology is based on principles originally introduced in 1945 by the Wheeler-Feynman absorber theory of radiation [67] that proposed future – past conditions governing radiation. In 1983 Cramer developed a model of quantum theory based on the Wheeler-Feynman model. In noetic cosmology the model is extended to the topology of a highly symmetric periodic (11)12D spacetime manifold [26,27]. The fundamental *least unit* is described as a scale invariant complex self-organized cosmological system. This

means the noetic least unit (why it's termed noetic) includes autopoietic principles of "awareness" [16,30,39]! The main difference is that rather than being fixed fourteen billion years ago in a primordial singularity, boundary conditions translate as a *continuous-state* in a spin exchange dimensional reduction compactification process inherent in what Dirac defined as a covariant polarized vacuum [22]. As will be developed in detail below this topology is defined mathematically by coupling what are called superluminal Lorentz boosts with a form of noncompactified Kaluza-Klein theory [68] in the context of an energy dependent Minkowski spacetime metric $\hat{M}_4$ (see eq. 12). This whole concatenation is required so that reality may take the form of (11)12D standing wave; which is required to introduce teleology in a fundamental way.

12. Euclidian / Minkowski Geometry as the Basis for Reality

The Euclidian line in 3D space is assumed to be the real line [69] because it is what is observed. Logical reasons from supersymmetry and supergravity suggest there are a number of additional unobserved dimensions [68] leaving the issue of dimensionality as an open question. Euclidian space in classical Newtonian mechanics is a continuous 3D absolute space with time an independent parameter often considered irrelevant.

Einstein's relativity theories provided a discrete 3(4)D transmutable relational spacetime manifold. The debate between absolute space or substantivism and relational space still continues. Utilizing the standard definition of a straight line as the intersection of two rigid planes, measurements could be taken to observe whether the angles of a triangle add up to 180°; but settling the question definitively is a cosmological issue requiring astronomical scale measurements where it appears physically impossible to apply the concept of a rigid body or to define a straight line in terms of a light ray by stellar parallax because of the effects of general relativity. Therefore, all physics knows with certainty at the present time is that observed space is approximately Euclidian E_3 as is Einstein-Minkowski space $M_{(3)4}$ [68,69].

According to the proof of Schöenflies theorem [70] there can be no topological knots in a 2D plane. Therefore, there can be no topological torsion (gravitation) in a 2D reality; thus, the observed real line must be at least 3D Euclidian where the standard Pythagorean line element is

$$ds^2 = dx_1^2 + dx_2^2 + dx_3^2 \qquad (8)$$

This assumption that the Euclidian line is the real line is intuitive. Currently there is no known method of empirical proof; and since the Euclidian line is what the Human mind apprehends it remains the formal basis for all empirical scientific fact [69,71]. But this assumption remains profoundly problematical with issues stemming from both the foundations of mathematics and developments in the nature of physical theory itself concerning the fundamental basis for sets, discreteness versus continuity, geometry and topology, and the relationship of real numbers to rational numbers for example [69].

In general, the class of theories unifying gauge and gravitational fields by utilizing extra dimensions is called Kaluza-Klein theories. In these theories what is called spontaneous symmetry breaking by coordinate transformation starting in 5D is a product of the standard 4D transformation and a local U(1) gauge group

arising in basic form in a general relativistic framework of five dimensions described according to the Einstein-Hilbert action

$$A = \int d^5 x \sqrt{g} R. \quad (9)$$

Where instead of postulating a 5D Minkowski space M^5 as the ground state, the ground state is taken to be the product $M^4 \times S^1$ where a circle S^1 is a U(1) group of rotations [68]. In conventional supersymmetry models like String Theory the radius of circle S^1 is considered to be microscopically small (compactified at the time of the Big Bang) on the order of the Planck scale $(10^{-33} cm,\ 10^{-43} s)$, very short and very fast, explaining why these extra dimensions are not observed. This will be discussed in more detail below where Planck's constant is recalculated utilizing the Larmor radius of the hydrogen atom as it relates to non-compactified Kaluza-Klein theory [68] in the 12D Wheeler-Feynman context [15,67].

An SU(3) x SU(2) x U(1) gauge symmetry group can be used to describe all known particle interactions. Following Witten, [69] the *minimum* number of dimensions of a manifold with this symmetry is seven. In this SU(3) x SU(2) x U(1) symmetry group gauge fields arise in the gravitational field as components of more than four dimensions. This yields a dimensionality for our reality of at least four non-compact and seven compact spacetime dimensions, $M^4 \times S^7 = 11D$; which Witten [68] calls a remarkable numerical coincidence since this 11D maximum for supergravity is the minimum for SU(3) x SU(2) x U(1) symmetry which also for symmetry reasons observed in nature is in practicality the largest group one could obtain from Kaluza-Klein theories in seven additional dimensions.

This gauge group for gravitational field components is insufficient to describe nature; for a complete theory quarks and leptons plus a Higgs type mechanism triggering symmetry breaking must be added to the Kaluza-Klein framework. In attempting to complete the theory, the gauge coupling constants are determined by calculating the Einstein action over the compact dimensions. This scales at a high power of $1/(M_p R)$, where M_p is the Planck length and R is the radius of the extra dimensions showing that R must actually be in the $10^{-33}\,cm$ range for these standard model gauge theories. If one adds the Lagrangian of a cosmological constant Witten finds one can form a reasonable theory [68].

Noetic Cosmology relies heavily on the relational 11D symmetry described by Witten with a different view of compactification because the Einstein gauge is both classical and incomplete as formulated in terms of the Darwinain naturalism of the Big Bang. However Noetic Cosmology like any new theory must however make correspondence to the established Einstein gauge. To do this a new 12D absolute space is postulated as the eternal basis for a (11)12D relational spacetime manifold that makes correspondence to Witten's supersymmetry model. To assume that the extra dimensions are compactified to the Planck scale because they are not observed is only one theoretical choice. The relativistic processes of the continuous-state also allow large-scale dimensions to appear invisible. For example, when I a Noeticist open his eyes in the morning to get out of bed it is a complicated scenario. Firstly, his eyeballs are pressed against an atmosphere with a force of 7 pounds per square inch. He must put his foot on a floor that is traveling 19 miles per second around a yellow-green thermonuclear fireball. The floor is not solid; it is 90% empty space, made of tiny charges called electrons spinning near the speed of light that he is supposed to believe are mathematical constructs called 2-spinor fields. At best he is stepping onto a swarm of bees. While doing

this wind of the unitary noetic field passes through every nook and cranny of his body like a tornado and animates the entelechies of his mind. Will he fall into the abyss or burst into flame? Truly as the parable states, it is easier for a camel to pass through the eye of a needle than for a scientist to get out of bed in the morning. It would be far simpler to be an ordinary man and enjoy a spot of tea than to suffer the difficulties involved in resolving these scientific issues [27].

The existing derivation of Planck's constant represents classical mathematical limits that are not considered real physical limits in HAM cosmology. In Big Bang cosmology the universe reduces to a stochastic impenetrable Planck scale barrier. Noetic cosmology utilizes what is called an antinomy to escape the cosmological conundrum and still make correspondence to established theory. In HAM cosmology the universe is observationally closed and finite in time (the 14 billion light year Hubble radius) and open and infinite (a holographic multiverse with the possibility of an infinite number of Hubble spheres each with their own laws of physics[18]) in eternity. Since the Higg's mechanism (for producing mass) also arises from approximations in the Einstein gauge it is also called into question and replaced by a different symmetry breaking mechanism in the noncompactified form of Kaluza-Klein theory utilized in Noetic Cosmology.

13. Overview of the Formalism for Noetic Cosmology

Noetic HAM Cosmology is cast in an (11)12D harmonic superspace $S_N = S_0 + S_1 + S_2$ in the context of an extended Wheeler/Feynman absorber theory [15,67] where standard Einstein Minkowski space M_4 becomes an energy dependent spacetime metric $\widehat{M}_4$, which is a virtual *standing wave* present of the future-past. This eternal present ($\widehat{M}_4$) is a 4D temporal subspace of a 12D eternal (timeless) absolute space where 12D is the minimum number of dimensions required to describe eternity[19] [72]; and takes the general mathematical form

$$R^{S_{N0}}_{symM_4} = \frac{1}{2}\left[R^{S_{N1}}_{retC_4} + R^{S_{N2}}_{advC_4}\right] \quad (10)$$

or simplistically stated the 12D noetic superspace S_N represents a complex Minkowski metric $M_4 + C_8$ (or $\pm C_4$). S_N thus combines the standard four *real* dimensions (D) of M_4 plus 8 complex imaginary D representing a *retarded* (future) and *advanced* (past) complex hyperspace topology, which adapts the complex ($M_4 + C_8$) Minkowski metric from the standard stationary form of Big Bang cosmology to a periodic form for HAM cosmology. $S_0 = M_4$ represents the noetic 3(4)D *standing wave* Minkowski 'present' spacetime; $S_1 = -C_{4(ret)}$ represents the past retarded component and $S_2 = +C_{4(adv)}$ represents the future advanced component for complex correspondence to the standard 4 real dimensions utilizing 8

[18] In an eternal conscious megaverse the observational limit and laws of physics are determined by the quantity of souls occupying the particular creation, i.e. "Adam was given his reckoning."

[19] By eternity here we mean to be causally (or ontologically) separated from events in M_4 or local observed reality.

imaginary dimensions. The 8 imaginary dimensions, while not manifest generally (locally) on the visible Euclidean real line, are nevertheless 'physically real' in HAM cosmology and can be represented by complex HD coordinates

$$X = \pm(x + i\xi), Y = \pm(y + i\eta), Z = \pm(z + i\zeta)$$

and $$t = \pm(t + i\tau) \qquad (11)$$

designating correspondence to real and $\pm$ retarded/advanced continuous spacetime transformations. For symmetry reasons the metric for the standard Minkowski line element $ds^2 = g_{ij}dx^i dx^j$ is expanded into periodic *retarded* and *advanced* topological elements fundamental to the 'extension' of relational space giving Noetic Superspace S_N its continuous-state dimensional reduction standing wave periodicity.

The Kaluza-Klein model utilized is set in a noncompactified D = 12 harmonic Noetic Superspace S_N and is the foundation of a holographic conscious multiverse. For symmetry reasons shown in the text this superspace comprises an 11D hypersurface in a 12D multiverse, giving it theoretical correspondence to the 10D superstring theory and 11D supergravity of M-Theory or 12D F-Theory providing a context to solve the disparity between them. The appeal of Kaluza-Klein models is that physics seems simplified in HD, especially integration of the electromagnetic (EM) and gravitational fields [73,74].

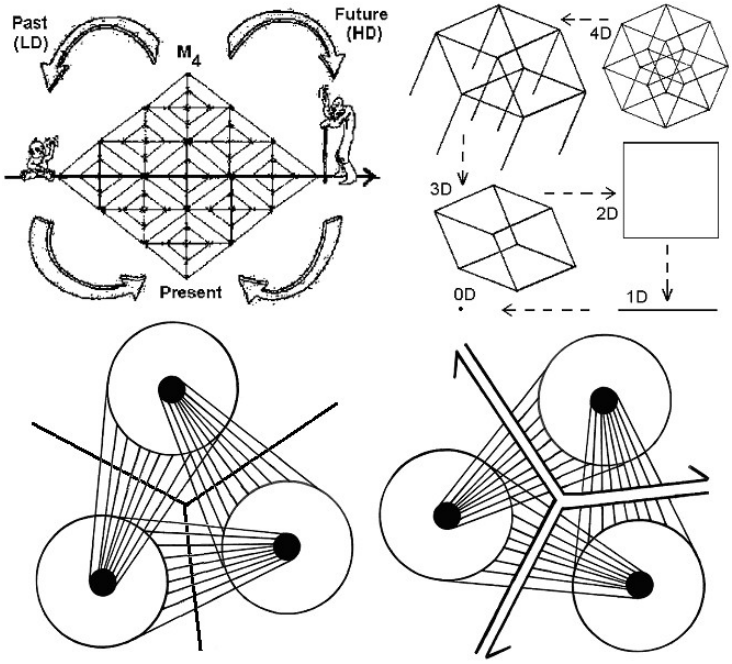

Figure 3. Four conceptual views of underlying reality representing topological premises of the fundamental least unit of Noetic Cosmology derived by applying extended Wheeler/Feynman absorber theory to the present as a virtual standing wave of the future/past.

Looking at Figure 3, in A) the Baby and old man represent the *relational* periodic basis of the present as a future-past standing wave illustrated simplistically as a 2D spacetime sheet. In 3 B) The 12D harmonic superspace translates in a continuous-state dimensional reduction spin exchange compactification process from 12D to 0D by parallel transport of the boundaries (only a 4D translation shown for simplicity). In C) A 3-torus illustrating continuous creation and annihilation of a discrete virtual standing wave Euclidian point (P_E). The three 3(4)D ($S_0 = M_4$, $S_1 = -C_{4(ret)}$ and $S_2 = +C_{4(adv)}$) spacetime packages surround a virtual Planck scale singularity, (in the form of a 3-torus $\left[\sqrt{(x^2 + y^2)} - R\right]^2 + z^2 = r^2$) the continuous propagation of which 'create and recreate' periodically the 'standing wave' Euclidean real line illustrating the virtual basis of relational Einsteinian reality as a subspace of absolute HD HAM space. which would be denoted as $\hbar$ by current thinking in terms of the standard model. But in HAM cosmology the least unit is the whole structure and has a harmonic radius governed by the string tension equation and oscillates from $\hbar$ at $10^{-33}\,cm$ to the Larmour radius of the Hydrogen atom $10^{-15}\,cm$. The additional 9D are suppressed for simplicity. d) Another least unit view where the vertex is modeled after string theory to flip like an Ising lattice. All six segments in Figs. 2 and 3 are different conceptual views of the least unit [27,73]. A 'least unit' of Noetic cosmology represents periodic future/past transactions (as an inherent part of the continuous-state Compactification process) [26,27,33,67] as continuous cycling of *classical* $\rightarrow$ *quantum stochasticity* $\rightarrow$ *fundamental unitarity* ($R_C \rightarrow R_Q \rightarrow R_U$) in a D reduction spin exchange compactification Ising model[20] $D_s \rightarrow D_t \rightarrow D_E$ transformation process, where a Euclidian Point $P_E \rightarrow \hbar$ [15].

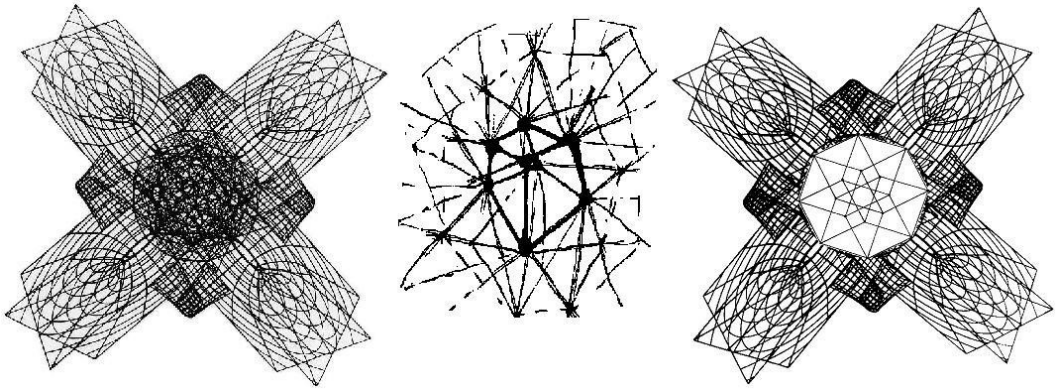

Figure 4. Additional conceptualization of the Noetic least unit from three hierarchical perspectives representing topological slices in the periodic 12D superstructure which could be considered compatible with the causal stochastic interpretation of QT from the HAM point of view. A) The central circle represents a 3D microscopic view of Planck scale stochasticity. The outer cross hatched square represents closed spacetime tubes in the process of compactification from 3(4)D to 0D, i.e. the central stochastic Planck scale domain. The larger diameter open tubes represent compactification from 11D to 4D, i.e. the Multiverse is closed in time and open in eternity. B) A local 3D cube representing our observed virtual reality as a relational standing wave created or emerging from the continuous-state background. C) The central hypersphere (here a simplified 4D

[20] Ising model – Used to illustrate a property of the string vertex as in Figure 14.3. When compactification reaches zero an Ising flip of the Riemann sphere (or here the least cosmological unit) brings it back to infinity or 12D.

representation of a 12D hypercube) represents the atemporal hidden supralocal extra HD covering of the standing wave present instant in B). Again the larger peripheral spacetime tubes represent open dimensions oriented toward the future; and the narrower coupled tube forming a cross hatched square represents a phase of recessional compactification $P_E \rightarrow \hbar$ toward the past. The final phase of this 12D to 0D compactification end up like – a virtual Planck scale singularity.

Figure 4 hints at why the Planck constant needs to be recalculated. Related to the past – the resultant of measurement, the Planck constant apples as usual. In the *eternal now*, the Planck constant takes the form of the Larmor atomic radius and is an unbounded component of the unitary field in the future orientation. Figure 4B conceptualizes the relational nature of Minkowski space emerging from the polarized Dirac vacuum.

While only glossed over here, these concepts are challenging problems for physical cosmologists. For example, string theorists believe extra dimensions (XD) must be ultramicroscopic because they are not observed. In a movie theater, discrete frames of film move across the projector lens at only a few cm/sec. but the image observed on the screen appears continuous to our senses. Matter all around us (and comprising us) moves FAPP infinitely faster near light speed. More than enough velocity to allow continuously compacting XD to appear invisible; so it is only a disagreement of interpretation. If the noetic alternative is the true case immediate and profound implications arise: Plank's constant is not fundamental, there are no magnetic monopoles, supersymmetric partners; there is no Higgs mechanism or quantum gravity, and the photon has minute mass [15]! All supporting a conscious multiverse.

Standard measurement techniques create the uncertainty and Pauli Exclusion Principles by discretising angular momentum and in that sense are Fermi-like and past (compactification) oriented causing the Planck constant to be applied as usual as a fundamental barrier. Because "Quantum mechanical uncertainty is the mystery; even the mystery of God" [74]. In the unmeasured, the *eternal now* (Schrödinger Cat Paradox), the Planck constant takes the form of the Larmor atomic radius and is an unbounded open component of the unitary field in the future orientation. In this HAM model Planck scale stochasticity arises in the temporal wake of graviton propagation[21], i.e. the continuous-state spin exchange dimensional reduction process (12D to 4D to 0D). Or viewed in another way the 12D superspace is a coherent structure like the frame of a building, which when demolished collapses into a stochastic pile of rubble.

Highly ordered, harmonic, symmetric and periodic Noetic superspace S_N entails a continuous-state dimensional reduction spin exchange compactification process operating under a new set of transformations beyond the standard Lorentz/Poincaré [30] where spatial dimensions D_S transform through superluminal boosts into temporal dimensions D_t; and by further boosting in terms of noncompactified Kaluza-Klein modeling [68,74] into energy dimensions D_E denoted $D_S \rightarrow D_t \rightarrow D_E$. This requires the properties of an energy dependent spacetime metric as first developed by Einstein. In the model standard Einstein Minkowski space M_4 becomes instead a topologically invariant homeomorphic manifold of the energy dependent spacetime metric $\hat{M}_4$ for HAM cosmology.

$$f : M_4 \rightarrow \hat{M}_4 \text{ and } \hbar \Rightarrow \hat{N}_R \quad (12)$$

[21] In the Noetic Megaverse the graviton becomes synonymous with the unified field, which is synonymous with the spirit of God, chi or prana.

where $\hat{N}_R$ is the continuous-state average of the fundamental least unit of noetic superspace purported to harmonically oscillate from the Plank radius $\hbar$ $10^{-33} cm$ to the Larmour radius of the Hydrogen atom $10^{-15} cm$ [15].
According to the principle of relativity a spacetime region that is a 'perfect vacuum' (no matter or fields) must be isotropic and covariant or Lorentz invariant [69]. The deformed region $\hat{M}_4$ of S_N and the symmetry of S_N itself reduce to Einstein's relativistic metric and are assumed compatible with Dirac's polarized covariant vacuum [75].

14. Transformation of Space Into Time

It is well known that Superluminal Lorentz Transformations (SLT) can mathematically change real quantities into imaginary ones. Following Cole [76] and Rauscher [77-79] we illustrate the transformation of complex spatial dimensions into temporal dimensions by orthogonal superluminal boosts (SLB). For example an SLB in the *x* direction with velocity $v_x \pm \infty$, the SLT is $x' = \pm t,\ y' = -iy,\ z' = -iz,\ t' = x.$. In complex Minkowski space the coordinates are $z^u = x^u_{\mathrm{Re}} + ix^u_{\mathrm{Im}}$ where *z* is complex and x_{Re} and x_{Im} are real and index *u* runs over 0,1,2,3. Using classical notation for simplicity one then obtains

$$t = t_{\mathrm{Re}} + it_{\mathrm{Im}},\ x = x_{\mathrm{Re}} + ix_{\mathrm{Im}},\ y = y_{\mathrm{Re}} + iy_{\mathrm{Im}},\ z = z_{\mathrm{Re}} + iz_{\mathrm{Im}} \quad (13)$$

To clarify the meaning of imaginary quantities in an SLT it is helpful to represent time as the 3D vector $t_x,\ t_y,\ t_z$; therefore time is defined as $t = t_x\hat{x} + t_y\hat{y} + t_z\hat{z}$ where

$$t_x = t_{x\,\mathrm{Re}} + it_{x\,\mathrm{Im}},\ t_y = t_{y\,\mathrm{Re}} + it_{y\,\mathrm{Im}},\ t_z = t_{z\,\mathrm{Re}} + it_{z\,\mathrm{Im}} \quad (14)$$

Finally for the SLB for velocity $v_x \pm \infty$ along *x* the transformations are

$$\begin{aligned} &x'_{\mathrm{Re}} + ix'_{\mathrm{Im}} = t_{x\,\mathrm{Re}} + it_{x\,\mathrm{Im}},\ y'_{\mathrm{Re}} + iy'_{\mathrm{Im}} = y_{\mathrm{Im}} - iy_{\mathrm{Re}},\ z'_{\mathrm{Re}} + iz'_{\mathrm{Im}} = z_{\mathrm{Im}} - iz_{\mathrm{Re}} \\ &t'_{x\,\mathrm{Re}} + it'_{x\,\mathrm{Im}} = x_{\mathrm{Re}} + ix_{\mathrm{Im}},\ t'_{y\,\mathrm{Re}} + it'_{y\,\mathrm{Im}} = t_{y\,\mathrm{Im}} - it_{y\,\mathrm{Re}},\ t'_{z\,\mathrm{Re}} + it'_{z\,\mathrm{Im}} = t_{z\,\mathrm{Im}} - it_{z\,\mathrm{Re}} \end{aligned} \quad (15)$$

where the SLT in *x* of M_4 spacetime transforms real components into imaginary ones and imaginary complex quantities into real quantities illustrating a major property of the periodic nature of Noetic spacetime [27,76,77].

15. Energy Dependent Spacetime Metric

Einstein originated the concept of an energy dependent spacetime for explaining temporal rate changes in the presence of a gravitational field by generalizing the special relativistic line element

$$ds^2 = (1 + 2\phi / c^2)c^2 dt^2 - dx^2 - dy^2 - dz^2 \quad (16)$$

with the introduction of time curvature [80,81] where ϕ is the Newtonian gravitational potential. This utilizes the deformed Minkowski metric $\hat{M}_4$ (introduced by eq. 12) above which is imbedded in the periodic HD Noetic space S_N chosen axiomatically for HAM cosmology to take the form of a noncompactified Kaluza-Klein theory [68,74].

Kaluza's initial demonstration of gravity in 5D, ${}^5G_{AB} = 0$ with AB running 0,1,2,3,4 contained the usual 4D General Relativity with an EM field ${}^4G_{\alpha\beta} = {}^4T^{EM}_{\alpha\beta}$, with α, β running 0,1,2,3 [74]. The currently less common non-compactified Kaluza-Klein model is utilized by Noetic Cosmology where dependence on the extra D is also required. This yields the same result for Einstein's equations ${}^5R_{AB} = 0$ except that the EM energy momentum tensor ${}^4T^{EM}_{\alpha\beta}$ is replaced by a general one ${}^4T_{\alpha\beta}$ instead [74]. Sections 9.6 & 9.7 demonstrate the feasibility of an energy domain pervading HD spacetime with properties similar to Wheeler's Geon [82] which is developed here as the unified field. In a generalized deformed spacetime $\hat{M}_4$, spacetime is fixed by the energy and has the metric

$$\eta(E) = diag.(a(E),\ -b(E),\ -c(E),\ -d(E)) \quad (17)$$

Skipping the mathematics for brevity and because it is similar; in the same manner that space is transformed into time by the special SLT, complex time may be boosted again by the noetic transformation into an HD causal energy covering of each least cosmological unit ($D_S \rightarrow D_t \rightarrow D_E$). This energy could be called a super quantum potential and is an aspect of the unified field.

16. Dirac Spherical Rotation and Transformation of Least Unit – Dirac String Trick

The Dirac dual spinor (4π) rotation applies to the observation that an electron undergoes 720° of rotation (not the usual 360° or 2π rotation) before returning to the initial orientation. Traditional thinking has assumed this to be some property of matter. But the discovery of the complex structure of spacetime has shown that this is not merely a property fundamental to the electron; but additionally a property of the superspace the electron is imbedded in and an inherent part of. Dirac spherical rotation as this is also called,

is more fundamentally a primary property of space than of matter. This is revealed in the complex hierarchical structure of the least unit of Noetic superspace discussed here.

There are simple ways to illustrate spherical rotation (Figure 4). Tie the four corners of a square to another larger square by loose string, (alternatively, tie the initial square to the four corners of a room). Now rotate the plane of the small square or cube clockwise or counter clockwise by 360 degrees about a vertical axis, that is, in a horizontal plane. The strings will become tangled, and it is not possible to untangle them without rotating the square back to its original position.

If one rotates the square through another 360 degrees, for a total of 720 degrees in the e direction; it is now possible to untangle the string without further rotation of the square by simply allowing enough space for the strings to be looped over the top of the square! It's hard to believe unless you try it. Use paperclips to attach the strings or ribbons to the squares, so they can be undone easily if it gets too tangled. A similar idea works for a rotation through 720 degrees about any other axis [83].

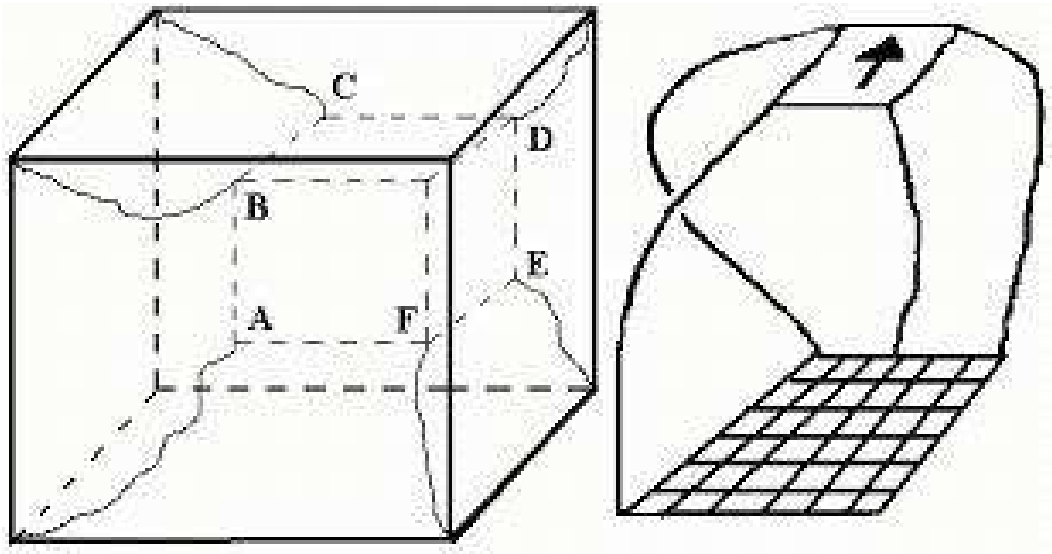

Figure 5. Two demonstration versions of Dirac spherical rotation for demonstrating that the spherical rotation or spin of the electron undergoes 720 degrees of rotation rather than the usual 360 degree rotation before returning to the starting position.

Another version of the Dirac string trick is called the Philippine wineglass dance. A glass of water held in the hand can be rotated continuously through 720 degrees without spilling any water. These geometrical demonstrations are related to the physical fact that an electron has spin 1/2. A particle with spin 1/2 is something like a ball attached to its surroundings with strings. Its amplitude changes under a 360 degree (2π) rotation and is restored by rotation of 720 degrees (4π). The formal description of such complex phenomena typically requires sophisticated mathematics (algebra, group theory, topology, quaternions...) since Dirac rotations are not part of everyday experience.

17. The Noetic Spacetime Transformation

As stated above Noetic cosmology implies that the so-called 'real space' that we observe is in essence a virtual reality much like that simulated in theme park rides or by donning computerized gaming visors. This relational standing wave spacetime is a 4D subspace of an absolute HD space, where a continuous-state dimensional reduction compactification process is central to the scale invariant periodic geometric structure. It is useful to initiate the description by introducing a toy model of the lower *D* space and build it up to the actual 12D Noetic space.

Maintaining extended Wheeler-Feynman properties of the present as a future-past function we begin by describing a discrete Einstein type point in the relational spacetime manifold. Since points are defined as singularities where dimensionality breaks down, a dimensionless point cannot be 'covered'. This property is a valuable criteria providing a 'hole' or fiducial for oriented orthogonal superluminal boosts in the noetic transformation. This also contrasts the nature of continuity (Absolute space) with discreteness (relational space) [84]. Points are not absolute because the universe as now well known is not a fixed 3D Newtonian continuum.

A. The 1D Case

Therefore, we begin construction of dimensionality with the 1D scalar case. Assuming an arbitrary, discrete, infinitesimal, oriented least unit $h = \Delta x$, an entourage of additional HD's are required to 'cover' or geometrically confine each subspace level. 'Covering' is the addition of HD (n+1) topological or geometric boundary conditions that enclose the (n) lower D as a subspace of the (n+1D); essentially sealing it from any external influence except by specific oriented directions under control of the HD cover like guidance by the quantum potential. Usually, the covering entourage has one more D than its subspace. The 1D least unit *h*, a line segment on coordinate *x*, can be covered by a 2-torus when the orthogonal generating circle *A,* of radius *r* located a distance $R > h_{\Delta x}$ from x_0 and not on *h* is rotated through orthogonal dimension *y* into a new plane *x, y*. Thus a 2D flat torus covers the least unit $h_{\Delta x}$ with an *x, y* plane. The rotation through *y* (of growing importance later) may occur in counter propagating directions. Finally the 1D case utilizes a $\pm 2D$ covering for the $h = \Delta x$ unit of extension, which may wink in and out of existence since it is a complementarity of 0D and 1D compactification and Ising model boosting [85].

B. The 2D Case

Covering the least unit of a plane $h = \Delta x, \Delta y$ uses a method similar to the 1D case except that two complementary modes of covering are allowed:

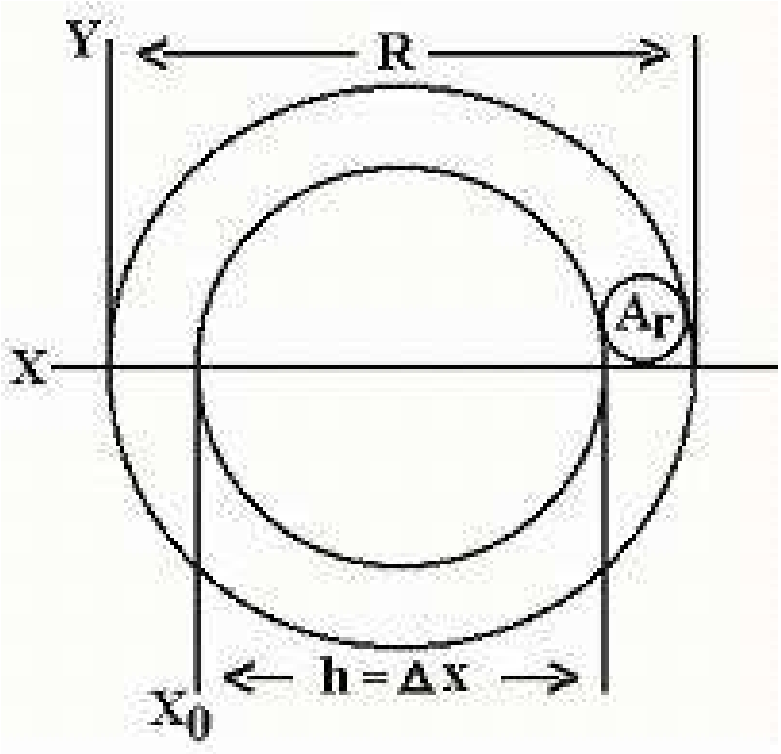

Figure 6. The 2-torus appearing as a donut slice acts as a covering of an infinitesimal 1D topological least unit $h = \Delta x$. A point of *h = 0* (the 0D case) is dimensionless and cannot be covered (or confined). But $h = \Delta x$, acting as a transient 1D unit of extension, may be covered by a 2-torus. Generally one additional dimension is required to cover *n* of the next lower D space.

Type 1.
Energy –Time. An intermediate covering of the planar region *h* by a $\pm 2D$ flat torus in the plane *x, y* as in the 1D case which leaves room for access of a 3rd energy or time coordinate utilizing either the spin exchange dimensional reduction process or superluminal boost into HD.

Type 2
Spatial. Region $h = \Delta x, \Delta y$ is completely covered by a 3-torus. This occurs by rotating a generating circle orthogonal to *x, y* through the *z* direction. With the addition of time as a fluid or flux dimension this covering represents the lower limit of standard (3)4D Einstein-Minkowski space M_4.

There isn't much utility in developing our toy model all the way to 12D as pertinent aspects of the noetic transformation are now sufficiently illustrated showing how boundary conditions transform the dimensionality of space and time along with appearance of the piloting energy potential (covering) of the unified field by $D_S \rightarrow D_t \rightarrow D_e$ boosting. The unified field governs gravitation, and the quantum

potential guides the action of translation along certain allowed pathways. For example, if either *l*, *w* or *h* is removed from a 3D cube the geometry of the object collapses or transforms to a 2D plane. Removing one dimension from the plane causes compactification to a line and so on until the 0D Ising lattice regeneration point is reached. The released spaces are not initially empty. They act as hysteresis loops. At the first stage of D reduction space transforms into time; at the second stage time transforms into the energy that couples with the energy governing it as compactification is completed for that particular least unit. Of course no least unit exists alone; they are inseparably imbedded in and as the geometry of space and spacetime and like in $E = mc^2$ become matter and energy over and over again.

18. Permutation of Dimensions in the Noetic Transformation

Only certain pathways for parallel transport by spin exchange dimensional reduction (*D* down scaling) and superluminal boosting (*D* up scaling) are allowed by the Noetic extension of the Wheeler-Feynman symmetry breaking relations in the continuous maintenance of the HAM cosmology of a standing wave present. It is useful to clarify the utility of the dual covering modes in terms of parallel transport and the Regge equations relation to the Bianchi identity of a boundary of a boundary being equal to zero $(\partial \circ \partial \equiv 0)$ [83,86,87].

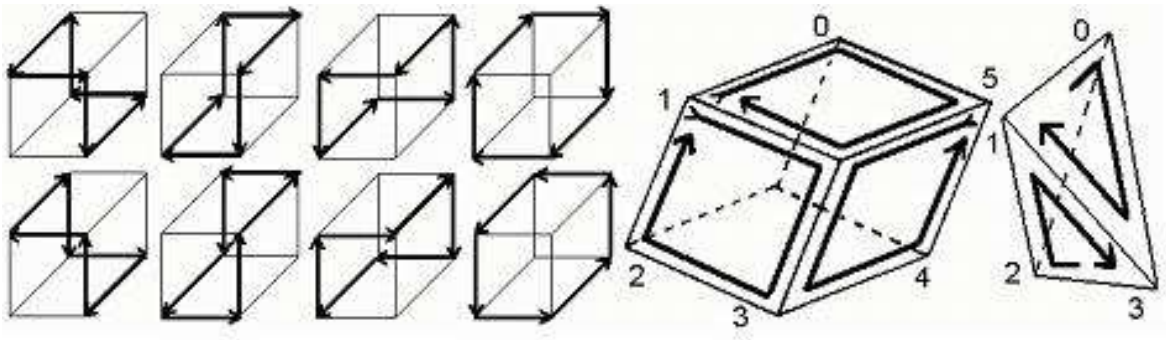

Figure 7. Parallel transport of dimensional structure.

In figure 7 we see in part (a) the four possible counter-propagating (top & bottom for each case) circular permutations of the vertices of a cube representing parallel transport about each of the cubes four diagonals. These allowed paths and orientations constrict the dimensional reduction process of the entourage of associated spaces into symmetry breaking pathways according to strict rules. Ordering the vertices as shown in (b) induces an orientation on the cubes two-dimensional boundary, which consists of six oriented squares by $\partial(012345)$. Note how each vertex of the cube is like the figure in 2 d). For illustration taking the simpler case of a tetrahedron (c) consisting of four oriented triangles by $\partial(0123) =$ (012) - (013) + (023) - (123). This in turn induces an orientation on the edges of the one-dimensional boundaries $\partial(012) =$ (01) - (02) + (12). Summing the dimensional boundaries cancels them in pairs [(01) - (01) = 0]. This is the Bianchi identity $\partial \circ \partial = 0$ described by the Regge equations for parallel transport

where the boundary of a boundary is zero. Or suggesting the cube is edgeless because the 1D boundary of the 2D boundary of the 2D region is zero.

18. Developing the Line Element for Noetic Superspace

The line element of a cosmological model describes the metric or coordinate system used to establish a basis for making measurements comparing two events in the spacetime. The real parameters for the line element in standard Einstein-Minkowski space M_4 (compare (8) or for Newtonian space E_3 essentially the Pythagorean theorem) is

$$dS_0^2 = dx_1^2 + dx_2^2 + dx_3^2 - dt^2 \quad (18)$$

to which noetic superspace must make physical correspondence to be a viable theory. We begin by developing the associated eight-dimensional complex space of the future-past following work initiated by Amoroso [15,16], Rauscher [77,78], Cole [76] and Hansen and Newman [58] on complex Minkowski space [66].

For $X^j_{\mathrm{Re}} + iX^j_{\mathrm{Im}}$ with j = 1,4 and $X^k_{\mathrm{Re}} + iX^k_{\mathrm{Im}}$ also with k = 1,4 we set up the complex relation

$$Z^{jk} = [X^j_{\mathrm{Re}} + iX^k_{\mathrm{Im}}],\ [\overline{X}^j_{ret} + \overline{X}^k_{adv}] \quad (19)$$

again with $j,\ k$ = 1,4 yielding the standard signature (1, 1, 1, -1). Then for the complex advanced space $+C_4$ we have the general relation $Z^{jk}_{adv} = X^{jk}_{\mathrm{Re}(adv)} + iX^{jk}_{\mathrm{Im}(adv)},\ \overline{X}^{jk}_{\mathrm{Re}(adv)} + \overline{X}^{jk}_{\mathrm{Im}(adv)}$ with j = 1, 4. For complex retarded space $-C_4$ the relation is $Z^{jk}_{ret} = X^{jk}_{\mathrm{Re}(ret)} + iX^{jk}_{\mathrm{Im}(ret)},\ \overline{X}^{jk}_{\mathrm{Re}(ret)} + \overline{X}^{jk}_{\mathrm{Im}(ret)}$ with k = 1, 4. Then the line element is

$$\Delta S^2 = \eta_{jk} dZ^{jk}_{adv} Z^{jk}_{ret} \quad (20)$$

with the further condition satisfied that $\eta_{jk} = \alpha_{jk} + i\beta_{jk}$ where

$$\alpha_{jk}(dx^j_- dx^k_p + dx^j_p dx^k_+) + \beta_{jk}(dx^j_- dx^k_+ - dx^j_p dx^k_p) = 0 \quad (21)$$

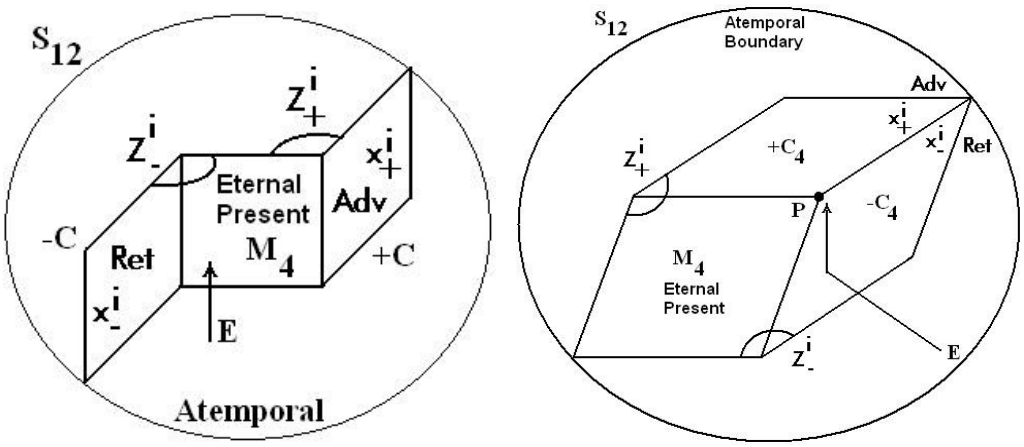

Figure 8. Two simplistic 2D representations of the three 4D spacetime packages of the periodic (11)12D noetic superspace continuous-state megaverse comprising one fundamental least unit. The radius of the circle represents the variable extended Planck radius of $\hbar + N_R$ rather than just the central point *E* or vertex *P* as in a). The radius of the circles represent the extended definition of Planck's constant. The square M_4 illustrates the Euclidian based Minkowski/Riemann standing-wave eternal present with the two attached higher dimensional complex spacetime packages $\mp C$ representing the four retarded (past) and four advanced (future) dimensions respectively that put certain constraints on the description of the noetic line element in HAM cosmology.

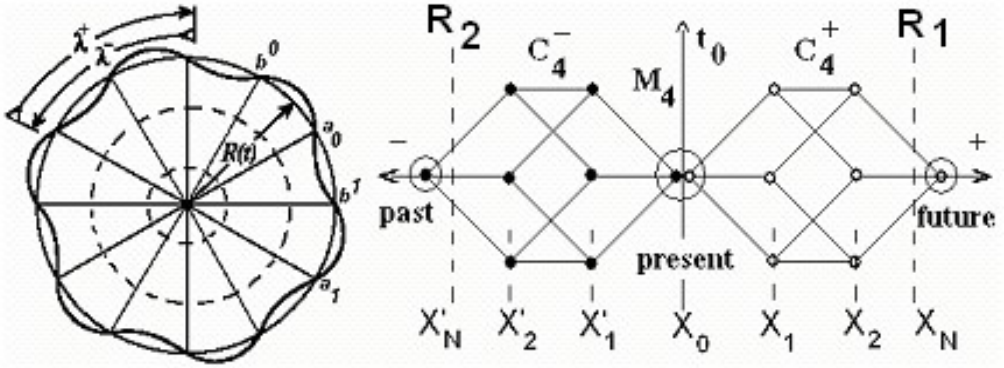

Figure 9. Exploded conceptual view of the future-past symmetry of a fundamental least unit of Noetic Superspace showing the relationship of its twelve dimensions here depicted as points. The open circled points represent future components and the solid circles represent past oriented components of a transaction.

In Figure 9 the larger circle in the center represents a suppressed view of the virtual Minkowski M_4 standing wave present comprised of the 2 obverse smaller circles at each end representing future/past components that produce it. The twelve points labeled $\pm C_4$ symbolize an exploded conceptualization of the 12 dimensions comprising a

fundamental least unit. The dimensionality and asymmetry of the complex plane is suppressed for simplicity. The 12 HD $\pm C_4$ points create and annihilate the energy dependent $\hat{M}_4$ eternal present (the three small circles are used to represent the simpler 3D view). The present moment is a standing wave; r_1, r_2 represent the HD boundary conditions for the standing wave (as illustrated for 1D, 2D & 3D in Figure 9.1) in terms of Cramer's transactional model of QT.

This action directly creates boundary conditions separating the fundamental reversible aspects of microscopic natural law into the perceptual macroscopia and an additional HD physical realm not perceived by normal neurophysiology [15,81,82]. Noetic cosmology proposes that this temporal asymmetry is completely observer related and the ensuing parallel transported boundary conditions delete essentially half of the systems information cosmology. Bohr stated from the beginning that the Copenhagen interpretation did not describe biological systems; therefore a full physical description must utilize extended de Broglie/Bohm/Vigier ontological forms of quantum theory without state reduction and therefore loss of some of the systems information by uncertainty and exclusion. The big question then is what is the utility of the unobserved parameters of this noetic cosmology?

Here is where the main utility of the Noetic least unit transform enters in. The complementary superluminal boosting of the 'standing wave' eternal present

$$D_s \rightarrow D_t \rightarrow D_E \; : \; R_U \rightarrow R_Q \rightarrow R_C \quad (22)$$

produces and maintains the perceptual macroscopic amplification of microscopic phenomena by spin-exchange annihilation and creation of the compactifying boundaries. The Noetic boosts reduce the flux of all physical fields at the boundary by absolute parallelism $\partial \circ \partial = 0$ where the boundary of a boundary equals zero facilitating the whole cosmological process. Following Kafatos and his collaborators [89] we begin with the description of the electromagnetic field (EM). We have already stated that the continuous-state compactification process in Noetic cosmology takes the place of expansion/inflation in Big Bang cosmology. Because of the antinomy conditions the rate of change of boundary conditions $\dot{R} \equiv C$ ($\dot{R}$ is the 1st derivative or rate of change and C is the speed of light) appears the same observationally in both models. The importance of $\dot{R} \equiv C$ for universal boundary conditions which are also relevant to the velocity required for the Earth-SOLS observers mind to escape microphysical perception and become a smoothly coupled macroscopia (remember the movie theater model) for EM by

$$\vec{c} = \frac{2\vec{E} \times \vec{B}}{\vec{E}^2 + \vec{B}^2} \quad (23)$$

where, according to Wheeler [61], velocity $\vec{c} = \vec{n} \tanh \alpha$ and the numerator is the Poynting flux and the denominator the energy density. This boost equation describes reduction of the EM field to mutual parallelism; which according to the Bianchi identity describes how the boundary of a boundary equals zero. Allowing half the information of the universe to cancel into the resultant standing wave covering. This is a simplistic view of the origin of the arrow of time for temporal SOLS imbedded in an eternal megaverse. The covering is piloted by the de Broglie wave-particle energy. Application of the Huygen's principle of

wave addition produces the smooth feel of reality we observe by *surfing* as it were on the face of the discrete elements of atemporal microphysics [90-92]!

20. Conclusion

Many new and novel trans-disciplinary concepts have been introduced. Hopefully this limited survey of such complex issues often foreign in a first exposure has given the reader the flavor of what is required to define life properly. Redefining all the standard models of science and extending them to include principles in the context of the noetic HAM arena where a rigorous formalism to define SOLS could be developed. We hope we have made it clear that not only classical mechanics, but also the current Copenhagen interpretation of quantum theory and cosmology is inadequate to describe a cosmology of mind [93,94]. The implications are vast. Medicine and Psychology will not be the same again; psychology can now become a physical science. Because the unified noeon field is physically real [95], it is therefore empirically accessible, leading to innumerable new conscious technologies that can be developed soon.

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Chapter 4

THE PHYSICAL BASIS OF QUALIA: DELINEATING THE SUBSTANCE OF THOUGHT

1. Postulating a Physical Basis for Qualia

The oldest and most difficult epistemological question is considered to be the nature of consciousness or awareness. Of the myriad definitions in use, none are considered complete; and each discipline maintains its own operational model. In medicine for example it usually suffices to consider consciousness as simply the state of wakefulness. Delineating a physical basis for qualia is tantamount to solving the problem of consciousness itself. The challenge has seemed intractable if consciousness is considered synonymous with current definitions of awareness. Compounding the problem, the term consciousness, mind and awareness are often used interchangeably. For our purposes here we define:

- Awareness: The continuous variety of experiential states of mind coded dynamically in terms of *qualia* [1].
- Mind: The *cognitive domain* [2] or active site of awareness; a subspace of the psychosphere[22] housing the dynamics of qualia.
- Consciousness: a fundamental cosmological principle inherent in an Anthropic Multiverse, [3-7] acting like the concept of *charge* in electrodynamics [1]. This universal principle provides the basis for defining complex Self-Organized Living Systems (SOLS) in terms of three complementary base states in continuous dynamical interaction [3-8] of which Mind and Awareness are integral elements [4,7,9-11]. Note that the Anthropic Multiverse is itself considered a form of complex self-organized system.

Awareness has a component 'feeling' or sense of being (Figure 3); that 'feel' according to the currently dominant neural identity model is said to arise or be identical to a computational product of brain neural or

[22] Psychosphere – Following the definition that the spirit and the body is the soul, the Psychosphere is the total boundary conditions of the spirit relative to the limits of individuality. Whether there is a corona beyond the bodies limit will remain unknown until empirically tested; however theory suggests a corona extends to some degree beyond the body. [14] represents the sum total of an individual entities mental existence which includes the mind and consciousness. This represents a complex geometric topology which at the semi-classical limit entails a temporal domain in Minkowski space that couples to quantum processes in the brain and body; and through the mediation of the Noetic Field (noeon) also includes a timeless higher dimensional domain of an individuals eternal elemental intelligence.

quantum biochemistry [12]. This work develops "Consciousness" from a modified Cartesian interactionist[23] perspective. Dualism suggests that the brain plays a secondary role as a transducer or data processor; and that the fundamental basis for awareness must be explored from a cosmological perspective that includes additional teleological action components driving the self-organization (life) and mental activity of complex self-organized living systems. The primary task for this Noetic Field Theory (NFT)[24] [3-9,13-15] is to define consciousness as a dynamic system comprised of three fundamental base states or complementary / interacting parameters:

- A presently ineffable domain of *elemental intelligence* signifying eternal[25] boundary conditions of an individual mind, representing one complement of the universal principle of consciousness.
- A complex self-organized system (brain / body) to couple that portion of universal mind to temporal reality. This is the 2nd complement forming an entity.
- A teleological action principle equated with the unitary noetic field, *élan vital*, chi, *prana* or 'spirit of God' [16] which is the 'noetic force' giving life or driving self-organization[26]. This action principle is the 'substance' of interaction and therefore also the 'light of the mind' [16]. Because it is physically real NFT is empirically testable [17,18] and will lead to conscious technologies.

Noetic cosmology is considered a continuous-state Holographic Anthropic Multiiverse (HAM) [3,14]. In this HAM context awareness is an evanescent property of the inherent self-organization of the cosmology (within the bounds of a cognitive domain) produced by the continuous-state dynamics of the three complementary-interacting components or base states. This structure is meant to appear somewhat circular because the continuous-state dynamics of both HAM cosmology and consciousness operate as complex self-organized systems with scale-invariant anticipatory properties [8]; which as generally known are hierarchical with recursive and incursive properties [8]. The structural-phenomenology[27] of the three components represent a difficult panoply of theological, philosophical and scientific issues that have been argued in more detail elsewhere [4,7,9]. We apologize to the reader for the horrendous concatenation of concepts; but this bears witness to why the nature of consciousness is called the oldest and most difficult

[23] Dualism: Cartesian Dualism states that there is more to mind than brain alone. The two elements Descartes proposed res extensa – body stuff and the additional interacting mental component res cogitans – mind stuff, are here considered physically real as opposed to ineffable, nonphysical, immaterial or nonexistent as in the current forms of cognitive mind-brain identity theories.

[24] Noetic Field Theory (NFT) – A comprehensive theory of consciousness based on dualist-interactionist action principles inherent the 12D cosmology of a Holographic Anthropic Multiverse (HAM) [36,39,47].

[25] Eternal – A higher dimensional atemporal domain in causal separation from 3D temporal reality [39]. 12D being the minimum number of dimensions able to describe eternity [36].

[26] This is the corner stone of dualism - that the cognitive domains of SOLS couple to elements in both 3(4)D temporal reality and 11(12)D eternity; this is a fundamental characteristic of a SOLS' structural-phenomenology. Soul is defined as the 'spirit and the body' [43]. In this context there are disembodied spirits but not disembodied souls. The New Testament supports Dualism "It is sown a natural body; it is raised a spiritual body. There is a natural body, and there is a spiritual body" [44]. This dualistic distinction is one of progression from a temporal to an eternal state of existence. We will not argue this theological distinction further here; only note it for completeness of the tenets of the Noetic Theory.

[27] Structural-Phenomenology: Classical fields are considered either structural – described microscopically as the gravitational or electromagnetic field; or phenomenological – described macroscopically as in the velocity field of the mechanics of continuous media. NFT must integrate both domains.

problem. As we will define in more detail, from the triune context above, qualia are the moment to moment superradiance[28] or evanescent character of this cosmology of consciousness or put another way qualia are moment to moment slices of the physically real structural-phenomenology of mind.
How should mental content be represented? The Psychoneural Identy hypothesis [12], currently the dominant view maintained by cognitive psychologists states that the mind is a product of the central nervous system, predominantly the brain [1]. No cosmological perspective is required to describe consciousness from the Cognitive perspective since it follows that consciousness must either emerge from the brain or take some form of mind brain identity, with awareness based on properties of some form of classical or quantum neural programming. But this has led to the definition of consciousness as a *Hard Problem* 'that is too difficult to research scientifically' [1]. Cognitive scientists formally pose the issue of consciousness with the query: 'What processes in the brain give rise to awareness?' NFT considers this a category error for philosophy of mind. The question should be posed instead as: 'What *processes* give rise to awareness?'. In the complementary / dualist-interactionist model utilized by NFT the brain is the least important factor of the three basis states of consciousness:

- The brain is primarily a data processing transducer of information between the mind and the external world [15].
- The material brain / body couples the SOLS and its consciousness to temporal 3D reality.
- The brain also manages a spectrum of physiological processes and homeostasis.
- For these three purposes (it appears there are no others) the brain, in the context of the larger triune noetic system of a cosmology of consciousness, is the central processor (relative to the temporal domain) of a special form of conscious quantum computer [19]. The linear programming of a Turing machine is insufficient to handle the whims of intentional action.

Dualism is currently unpopular with philosophers of science, not because there is no philosophical basis for dualism, but because the basis has remained more theological and until now there has never been a well developed scientific theory amenable to scrutiny. This is considered unacceptable by definition. Even Eccles' (the last great dualist) theory [20-22], the most highly developed interactionist model to date remained a philosophical construct because at the time he could say nothing about the nature of his Psychon. This problem is expounded by Dennett [23]:

> This fundamentally antiscientific stance of dualism is, to my mind, its most disqualifying feature, and is the reason why in this book I adopt the apparently dogmatic rule that dualism is to be avoided *at all costs*. It is not that I think I can give a knock-down proof that dualism, in all its forms, is false or incoherent, but that, given the way dualism wallows in mystery, accepting dualism is giving up.

The purpose of this work to satisfy Dennett type criticisms. But why bother? Why is a heretical context in radical opposition to current thinking required? The history of science has shown that before a new model is empirically tested indicators of its veracity are: internal logical consistency, elegance and explanatory power. First one must realize that the Big Bang (like all current models of science) is Naturalistic or

[28] Superradiance - amplification of spontaneously emitted collective emission of an ensemble of excited atoms or ions after coherent excitation leading to a macroscopic dipole moment as in a LASER. Originally described by Dicke [45] as an 'optical bomb.'

Darwinian with adherents insisting that an additional life principle is not required. However HAM Cosmology [3,14], introduces a teleological action principle allowing consciousness and qualia to be modeled in a comprehensive manner with evolution no longer considered random, but driven or guided by the additional self-organized parameters inherent in the HAM cosmology [8,14]. This work presents the first comprehensive and empirically testable description for the physical basis of qualia in history [17,18]! Postulating a physical basis for Qualia suggests Qualia may also be 'bottled' or exist independently of private 1st person introspection (breaking the 1st person 3rd person barrier). This statement's context must be clarified. For example, by definition 'a sound in the forest' is not merely the physical ripple in the leaves of trees, nor an analog or digital recording of such; but the conscious apprehension (qualia) of tree ripples by some conscious entity. This definition of sound is required because a 'ripple' like the information content of thought has no meaning without apprehension. What then is the "it"; what is the physical substrate or noumenon beyond this phenomenon of 'ripple and apprehension' that could physically exist and be recorded *extra-entity*? What could produce or reproduce the same Qualia later, in the same individual, or another individual and thus potentially also in a conscious computer or robotic android device? Our attempt to accomplish this task will of course be accomplished in terms of the three-fold noetic basis of consciousness.

Obviously, our noetic postulates must demonstrate that subjectivity is not the sole requisite for the existence of qualia; and that current philosophical constraints about subjectivity are grossly inadequate for describing the material existence of qualia or for developing a model for dissolution of the 1st person 3rd person barrier. As the chemical elements were classified into a periodic table in past centuries; a similar tabulation is predicted for quale in ensuing decades. The knowledgeable reader has already noticed that we are in conflict with the current definition of qualia. To resolve the conflict qualia will have to be redefined, but first it is useful to review the current thinking about Qualia.

2. Qualia: An Initial Definition Drawn From Current Thinking

A basic definition given by Penrose equates qualia with *subjective experience* [24]. Although incisive this definition is much too simple for our purposes. Chalmers delineates a broader *working definition* of qualia with descriptive phrases like "the subjective quality of experience" or "there is something it feels like to be a cognitive agent" [1]. He initiates his definition with a well-known line from Nagel [25]: "a being is conscious if there is *something it is like* to be that being":

> A mental state is conscious if there is something it is like to be in that mental state...a mental state is conscious if it has a *qualitative feel* - an associated quality of experience. These qualitative feels are also known as phenomenal qualities, or *qualia* for short. The problem of explaining these phenomenal qualities is just the problem of explaining consciousness. This is the really hard part of the mind-body problem. I use the term [qualia] in what I think is the standard way, to refer to those properties of mental states that type those states by what it is like to have them...Qualia can be properties of 'internal' mental states as well as of sensations. It is often convenient to speak as if qualia are properties instantiated directly by a subject, rather than a subject's mental states; this practice is harmless, and justified by the fact that qualia correspond to mental state-types in their own right [1].

General Summary of the Conventional Definition of Qualia

The *what it's like* character of mental states. The way it *feels* to have mental states like pain, seeing red, smelling a rose, etc. Qualia, plural of "quale", is a term introduced by C.I. Lewis in 1929 [26,27]. A quale is an introspectible and seemingly monadic property of a sense datum. For example, qualia of a rose includes the visual sense datum of experienced redness, and qualia of an olfactory sense datum of the sweetness of the scent.

Variations of the above summary represent the limits of current thinking; while insightful only a philosophical basis for Qualia is supplied. Defining qualia is no simple task. One must first, as Chalmers predicts, complete the task of preparing a comprehensive model of consciousness, and then at the leading edge of that theory clarify a plethora of new terms and conditions before there is any hope of developing a rigorous model for understanding how Qualia are represented dynamically and apprehended by the mind ontologically. Since this task is theoretically possible under the auspices of NFT lets begin.

In terms of our noetic cosmology, an Anthropic continuous-state HAM [3,14], there exists a structural-phenomenological domain defined as the psychosphere or complete set of boundary conditions housing the life energy and mind of a living system or individual conscious entity. The cognitive domain – the active seat of qualia, of such an entity entails a complementarity of static and dynamic Casimir modes[29] [28] or boundary conditions described by the Noetic Field equation $F_{(N)} = E / R$ [29,30]. Central to this domain is the temporally localized Heisenberg matrix[30] coupled to the brain holoscape[31] [7] together representing the mental raster (TV screen) transducing entrained moments of conscious awareness. This raster of awareness contains standing wave modes (like the vibration of a violin string) centered on the timeless or eternal present moment [31]; as a self-organized complex system which is in essence a microcosm of the entire scale-invariant conscious Multiverse [3-7]. These continuously evanescing mental states of information termed qualia or the physical embodiment of mental content change or evolve with changes in mentation, intention or sensory input.

There was a mantra passed around the Stanford University physics department in the mid 1970's (later determined to be insufficient) to describe the nature of matter. It went like this: '*If one assumes that matter is a vector gluon, the leading light cone singularity is modulated by a phase of the quark gluon field*'. It's an interesting 'thing' for a particle physicist to ponder because it suggests various aspects of both the particle and wave nature of matter. In the framework of the noetic formalism a similar mantra for consciousness would state*: If one assumes that qualia are tensor psychons; the leading lightcone singularity is modulated by a phase of the noeon*[32] *psychon field.* Why tease the reader with such a concatenation? For three reasons:

1) To take us away from the 'brain only' limitations posited by neural identity theory,

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[29] Casimir effect – An attractive force between parallel conducting plates by quantum fluctuations of the vacuum zero-point field because quantization rules only allow certain frequencies.

[30] Heizenberg Matrix – Quantum substrate where quantum interactions occur.

[31] Holoscape – Neuronal manifold of dendrons (nerve dendrite bundles) where Pribram [10] theorizes by quantum holographic brain theory that a 'dendritic microprocess' occurs as the action of consciousness. This is also the site where the 'psychon' (Eccles unit for dualistic interaction) attaches to brain dendrons, with one psychon per dendron.

[32] Noeon – In noetic field theory the exchange unit of the unified field, spirit or élan vital.

2) To stress the cosmological properties of the noumenon of awareness,
3) Point out its physical, material, wave-particle duality-like and continuous-state basis.

We will do our best in the rest of this chapter explaining in plainer language what the above mellifluous statement means!

3. The Physical Basis of Subjective Experience

"What's it like to be a bat?" is the title of a well known 1974 article by Thomas Nagel [25] that discusses the difficulties associated with developing a scientific explanation for the nature of experience. Nagel states that current reductionist attempts fail by filtering out any basis for consciousness and thus become meaningless since they are logically compatible with its absence [25,32]. His main premise is that if one assumes that an organism has any conscious experience at all, "that there is something it is like to *be* that organism". This is the subjective character of experience for any conscious entity whether it be a bat or a Martian. Every experience has a specific subjective nature [10,16,23,33], i.e. qualia.

Nagel also states that "there are facts which could not ever be represented or comprehended by human beings, simply because our *structure* does not permit us to operate with concepts of the requisite type"; because "to even form a *conception* of what it is like to be a bat one must take up the bat 's point of view". If one removed the viewpoint of the subjective observer; what would be left? Nagel suggests that the remaining properties might be those detectable by other human beings or the physical processes themselves or states intrinsic to the experience of awareness. This changes the point of view of qualia to the form that "there is something it is like to undergo certain physical processes". If our idea of the physical ever expands to include mental phenomena, it will have to assign them an objective character. Nagel recognizes the fact that:

> Very little work has been done on the basic question (from which mention of the brain can be entirely omitted) whether any sense can be made of experiences having an objective character at all. Does it make sense ... to ask what my experiences are *really* like, as opposed to how they appear to me?...This question also lies at the heart of the problem of other minds...If one understood how subjective experience could have an objective nature, one would understand the existence of subjects other than oneself [25].

These questions we intend to answer here. Firstly this means contemporary definitions of qualia are grossly inadequate philosophical constructs. The standard definition is still somewhat suited for philosophically describing the subjective character of qualia; but since qualia are physically real in terms of NFT, additional components of the definition must be generated to describe qualia from the objective sense - i.e. to distinguish the phenomenology of qualia from the ontological noumenon or existence of the physical 'thing in itself' with a putative basis for breaking down the 1st person 3rd person barrier. Thus the noetic definition of qualia must be three-fold requiring the following forms:

- Type I. The Subjective - The *what it feels like* basis of awareness. The phenomenological states of a qualia experience. (This is the current philosophical definition of qualia used by Cognitive Psychology)
- Type II. The Objective - Physical basis of qualia independent of the subjective feel that could be stored or transferred to a 3rd party. The noumenal elements of qualia upon which the phenomenology is based.

- Type III. The Universal - Living systems represent Qualia states of the conscious universe. SOLS provide a substrate representing a "blank slate", a TV turned on (alive) but with no program signal (mental content). Q-III act as carrier waves from which Q-II are modulated into Q-I by superradiance of the unified noetic field. By Gödel's Incompleteness Theorem [34] he objective elements cannot stand alone and be mental but must be imbedded in the context of the greater dynamic holism of HAM Cosmology. Just as for the definition of a sound above.

For clarification it should be noted that all three forms of qualia are considered physically real by noetic theory because the noetic fields of HAM cosmology on which the model is based are all physically real. The noetic field is the unified field or life principle – the inherent cosmological ordering principle driving the self-organization of SOLS.

4. What's it Like to be a Prion

We will analyze the objective character of qualia by taking a much more fundamental approach than that of confining ourselves only to mammals as Nagel did. We begin by defining the prion[33] [35,36] as the most fundamental form of living system [2,13] because of its use of the noetic effect (See sect. 12.7 and Ch. 12 note 8). Until now Biological Mechanism[34] has remained the basis for living systems. NFT does not discard mechanism. The mechanical properties of SOLS make them very efficient ironically masking the need for an additional life principle.

It is generally accepted that unicellular organism are the most fundamental life form. Some debate is centered around viruses since they have no cell wall. But they commandeer their host's cellular machinery, supporting the case for them as living systems. The prion however is only a complex protein molecule making a case to classify them as living systems a tougher one to make. The tenets of NFT suggest that the prion remains as the only truly mechanical life-form. Prion propagation only requires a conformational or 'shape change' of it's molecule to change its activity from the normal to infectious prion state. While a virus commandeers a cell, prions appear only to steal some of a host's *élan vital* to drive the purely mechanical activity of conformational change. A technical issue addressed elsewhere [18]

Since NFT assumes that self-awareness is not a requisite for qualia; a primitive form must be associated with the *cognitive domain* [2] of even the most fundamental living systems. Very few activities are associated with the mechanical 'life' of a prion – no Q-I or Q-II, but it couples to the Q-III of its host allowing it's mechanical properties to operate through the noetic effect by the presence of the Noetic Field. It may be reasonable to limit prion existence to only three activities: 1. Translation, 2. Conformational change and 3. Propagation. We need not say the prion has any form of rudimentary awareness at all if we use only the objective definition of qualia. Later we discuss the relation of qualia to the noetic basis of life. Suffice it to say that at the most fundamental level, just being a living system 'entitles' any life form, even the most primitive such as prions and viruses, to certain fundamental action modes. These 'actions' are the effects of the inherent mechanistic aspects of complex self-organization in an Anthropic conscious

[33] Prion – infectious protein responsible for 'mad cow' and other degenerative encephalopathies [X].

[34] Biological Mechanism – The laws of chemistry and physics are sufficient to describe all life; no additional life-principle is required [X].

Multiverse. To repeat in the case of the prion protein action is purely mechanical because there is no cognitive domain and therefore no self-organization.

It is postulated that the holophote (flashing like a light house beacon) entry [4,6] of the noeon (exchange particle of the unitary noetic field) from every point in the topology of spacetime into every atom or molecule [4], provides a coherence (which in this case acts like a Casmir force) that facilitates the conformational changes responsible for prion propagation when certain other *in vivo* noetic conditions are met [13,37]. If we assume that a noetic topological charge is associated with the boundary conditions of the prions physical chemistry, certain specific orientations of the molecular bonds are associated with the translations involved in conformational transitions. The infectious prion protein has a Casimir pressure stronger than the forces stabilizing normal prion protein's configuration. This is a purely mechanistic effect, but not a chemical reaction because it utilizes computational aspects of the noetic field.

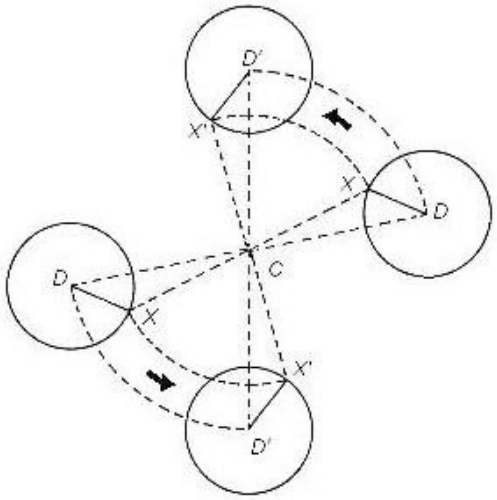


Figure 1. Through destructive interference the prion may use the noetic field of the host to its advantage and translate the infectious conformation of the prion protein. The normal coherent Casimir charges of the field becomes coupled to the dissonant state facilitating the conformal change.

5. Developing a Metaphor for Delineating Qualia

A "Movie Theater" model of mind (Figure 2) readily illustrates the triune basis of Consciousness / Qualia because its structural-phenomenology is synonymous with the three fundamental base states [7,9] of consciousness in the anthropic cosmology of NFT:

1) Eternal elemental Intelligence,
2) The ubiquitous Noetic Unified Field (or spirit of God),
3) Classical / Quantum spacetime dynamics in brain and body.

Secondary metaphors of rainbow formation or stroboscopic stop action on the standing wave of a plucked stringed instrument are also pertinent metaphors. Qualia are only perceived within the recursive hierarchical processes of the complex structure of SOLS [8] (or perhaps in the future a form of cybernetic system that extracellularly duplicates these features).

According to NFT [4-6,38] a living system is comprised of a local spacetime connected computational biochemistry animated by a nonlocal / supralocal[35] teleological action principle synonymous with the life-force, *élan vital*, chi, ki, spirit of God or unified field of physics. SOLS also entail a Cognitive Domain [2,4,6] a dynamic subspace within the boundaries of the entities psychosphere [7,9] that is the arena where the Q-III, Q-II components associated with the complex processes producing conscious awareness produce Qualia type I (Q-I) as the continuous instantaneous evanesce of apprehension. The psychosphere could be said to be the conscious field in complementarity with the active mental site of the cognitive domain operationally like a wave-particle duality oscillating between dynamic and static modes [28]. This is key to understanding the noetic delineation of qualia.

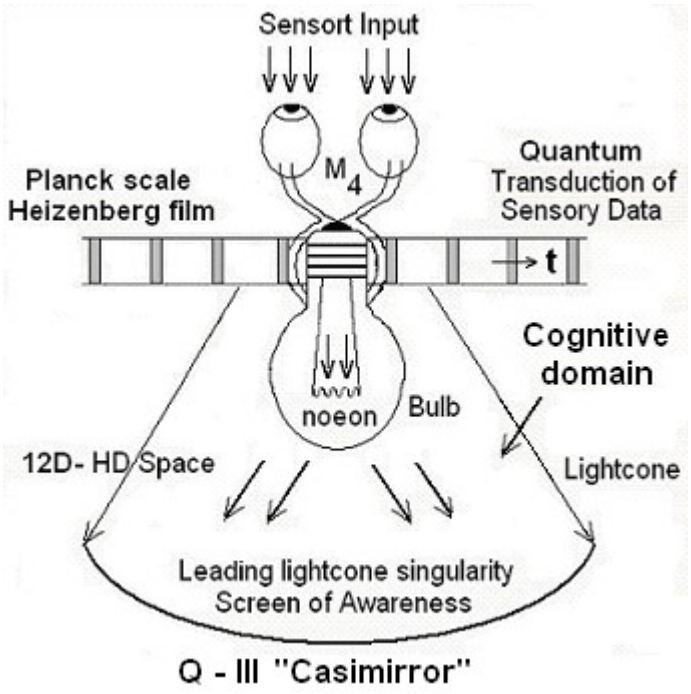


Figure 2. The Movie Theater Metaphor of Qualia displayed as a two-dimensional representation of the twelve dimensions of the psychosphere. In the description of the scale invariant least unit of awareness the Wheeler Geon or de Broglie wave ball of light covering HD space is the *light* comprising Qualia which would be represented at the movie screen. The projector bulb when on represents the spark of life or *élan vital* inherent in every point of a multidimensional spacetime and every atom of a living systems biochemistry. The film represents the informational basis arising from quantum activity in sensory processing and mentation by the brain or cognitive domain acting as a transducer. The lightcone is oscillating at the speed

[35] Nonlocal / Supralocal – Because NFT is cast in 12D, nonlocality alone does not provide sufficient parameters to describe Consciousness.

of light. Only one Casimir element of the screen is depicted. In actuality perhaps hundreds of millions of these screen components like the pixilation at the raster of a TV screen are utilized in the hyperhologram to represent qualia apprehended in the sea of awareness.

Can there be a living-system with a cognitive domain devoid of mental content? In this respect we might assume that coma is a deeper or more 'empty' state than sleep. NFT postulates that the prion is the simplest or limiting form of living system albeit one that is purely mechanistic and therefore devoid of a domain of Elemental Intelligence that is co-eternal with God or the Anthropic Multiverse. Noetic Theory contains the concepts that can solve this dilemma. According to NFT inanimate matter like plastic or steel is one of the triune elements of consciousness - the noetic field according to Einstein's $E = mc^2$. But rock itself is not alive or conscious relative to our perspective because it is not a component of living systems. Prions and viruses do have a cognitive Domain (although commandeered) but no agency or self-awareness. Their activity is a purely mechanistic program. Plants are living systems, i.e. material "animated" by the *élan vital*, but the "agency" of their cognitive domain is also mechanistic and chemotaxic. Any living system by virtue of the life process has a Cognitive Domain which in the most primitive is little more than synonymous with its de Broglie wave (adding a higher order spiritual control element to the nature of the de Broglie matter wave – the conscious informational character of the unitary field). True agency and in that sense rudimentary awareness seems to begin with bacteria, making them smarter than trees, since they are reported to make primitive choices (in mazes) beyond that dictated by mechanism alone [39]**;** but whether self-awareness begins with mammals, dolphins or birds is an open question especially in the face of the waggle dance of bees. Logically, but somewhat arbitrarily, the assumption is made that prions and viruses are not 'aware' but have the mechanistic consciousness of plants - a step above rock. Something about the boundary conditions of a cell seems required for the rudimentary intelligence assigned to bacteria to operate; perhaps this relates to the nature of the noetic field. Since a virus commandeers a cell and its machinery should this be called a form of anti-consciousness rather than the simplest form of self-intelligence; does thievery allow true cognition by use of the hosts body or cellular level of consciousness. The current state of NFT development cannot make this delineation definitively only probably. A rigorous answer must wait for empirical testing [17,18]. But in the interim logic suggests there must be some form of destructive interference between the two systems that would for example in the case of the prion give it the 'power' to translate.

The next challenge is what entities or "who" should have elemental intelligence co-eternal with God? In some theologies - *The spirit and the body is the soul of man* [16]. If we assign intentional action to the lowly bacteria as we have done here; are they entitled to this distinction? Is the fundamental domain of Elemental Intelligence some micro boundary condition so that a human being would, as it were, be a "galaxy" of micro bacterial type domains of Elemental Intelligence? At present this seems too 'woo woo' Sci-Fi or Eastern panpsychic-monistic to answer. But without some Cartesian style revelation from God or future empirical development utilizing putative Dirac-Noetic Interferometry [18] or the cerebroscopic transducer as a research platform to 'see' the HD domain of Elemental Intelligence; we are forced to leave this as an open question at present. Fortunately this bears little effect on our seminal definitions of the physical nature of Qualia because it seems that wherever we set a demarcation on the "qualia pyramid" or hierarchy, the result is the same as far as defining Qualia is concerned.

Firstly, the initial corollary is that Qualia can only be apprehended subjectively in a complex self-organized living system, shared by synchronous entanglement breaking down the 1st person 3rd person

barrier, Q-II recording induced into a "sufficiently simulated" artificial living system – an Android? (since we don 't know exactly what that means at present, we will drop it from the discussion for now). By following the predictions of NFT by definition:

Postulate 1

Any entity with sufficient awareness (Coherence length [40] or psychosphere radius of computation in the logic array of its cognitive domain) for intentional action, beginning with bacteria [39], have the *conscious* ability to apprehend Qualia Type I and utilize type II. For the lowest living systems (virus, prion) this is primarily a purely mechanistic activity. The mechanistic effects result from the "radiation pressure" or topological coherence of the unified noeon field in the holographic backcloth of the conscious multiverse. To put it another way mechanistic systems get a bit of a free ride by being imbedded in the self-organized structure of the universal self-organization.

A single hydrogen atom has the ability to exist as an isolated entity in space from a 3D perspective, but this does not seem to be true of a Quale (singular of Qualia) because their "light" structure is confined to the hyper-holographic domain of the psychosphere comprised of an array of 'least units' of awareness which cannot be separated from the topological fabric of reality in the same way that an image cannot be resolved by a single photon. But in the future, it may be possible to confine a Quale in a QED cavity or atom as was recently done for photons. It would still have to kept in an active state because a 'stopped photon' is annihilated. The main utility of the concept of Quale may be in defining some particular unit of awareness in stand-alone form for illustrative purposes.

Is there a definitional distinction between apprehension and the "feel" of Qualia? This represents a challenge that is perhaps moot; but in order to consider infinitesimal shades of difference, for the purpose of discussion we will say that Qualia is the content of the instantaneous moment of apprehension in a stream of consciousness. We want to make this distinction so fine that FAPP there is no distinction between apprehension and qualia. The rational for this nomenclatural abyss is that by the noetic definition Qualia has properties like that of a blind man exploring an elephant: a rope (tail), pillar (leg), hose (trunk), wall (body) fan (ear) in that Qualia can be looked at from perspectives of both apprehension (Type I) and structural phenomenology (Type II). Specifically, Qualia exist in a hyperholograpic domain that has eternal or timeless properties, spatial cavity configuration properties, noetic field informational and temporal wave-particle duality action properties etc.

Back to the "movie theater" mind metaphor. When the projector bulb is on (no film), this represents a living system with a blank slate of Type III Qualia. If the projector bulb is on but not shining on the screen, a boundary condition proximal to the screen would represent sleep and a boundary condition distal to the screen could represent coma. Some mention will have to be made at some point concerning distortion. Filters of personality, psychosis, drugs etc. that distort apprehension, i.e. S1 "sees" lucidly and S2 is wearing "filters". This brings up another definitional dilemma that relates to the collective unconscious. Is there some absolute Platonic form residing in a Jungian collective unconscious for each Quale that is apprehended in various degrees of impurity by each entity from within species and from bacteria upwards? Or should we define everyone's perception as different which therefore becomes a different Qualia. We already know that individual differences cause varied reaction to the same stimulus.

Qualia I cannot be just the film in the projector. Just the film would be Q-II objects like a DVD, video tape or the vibration of the leaves of trees as the unapprehended precursor to sound. Therefore, Qualia in the 'movie theater' metaphor entail a complex self-organized system built on the three types of qualia in the context of the triune nature of consciousness. These factors working in concert summate into Qualia I when apprehended by a conscious living system:

- The *film* - data impinging the quantum raster from either external or internal sensory input or mentation processed in each case by the Cognitive Domain or Brain as data processor / transducer. Q-II.
- The *light* - Noeons of the unified noetic field Q-III that act as
  A) the *élan vital* and
  B) "light of the mind"
  C) Gravitation framing the heavens.
- The *image* on the screen - Content of the mind filling the cognitive domain of the mental theater. Q-I.
- The *feel* or apprehension of qualia entails all of the above - Type I qualia (Q-I).
- Type II qualia is all the above physical parameters not apprehended as in Type I. Type II qualia may be stored extracellularly, shared by revelation, telepathy or by synchronicity breaking down the 1st person 3rd person barrier.
- Type III qualia – Q-III, qualia of the conscious Multiiverse.

Postulate 2

In the above context in general: If one assumes that Qualia can be represented as a continuous array of tensor Psychons[36] evanescing within the temporal brain holoscape of the cognitive domain of an entities psychosphere; the leading lightcone singularity is modulated by a phase of the noeon-psychon field.

This postulate first made above now begins to be more comprehensible.

[36] Tensor psychons – Least cosmological units of awareness interfacing with brain/body.

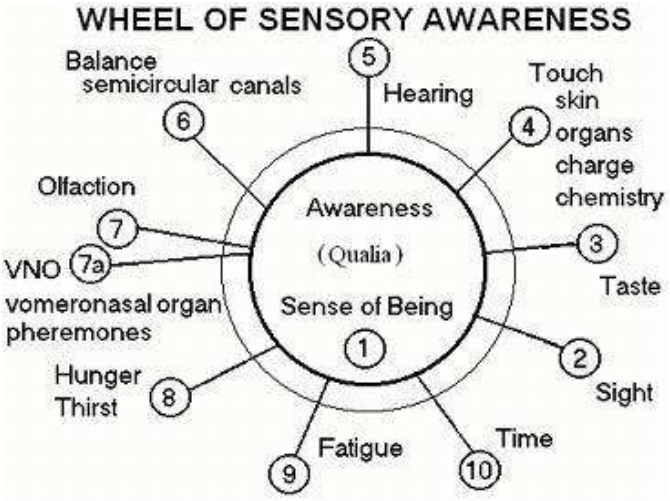


Figure 3. W*heel of awareness*. All sensory input is transduced by the brain into the mind - the seat of awareness (not the brain). It is in this primary core –the cognitive domain of the psychosphere that the 'feel' of qualia occur. Like the spokes of a wheel, all senses arise from the central hub of the mind which is the sense of being associated with Q-III.

6. Applying the Movie Theater Metaphor of Qualia

Based on the fundamental Cartesian dualist-interactionist tenets of Noetic Field Theory (NFT) suggesting that consciousness has three base states[37]:

1) Supralocal (co-eternal with God) - Elemental Intelligence, (Elemental Intelligence is currently ineffable other than that is some form of eternal boundary condition).
2) Action of the ubiquitous Unified Noetic Field (spirit of God, chi, ki or prana) and
3) Semi-classical (temporal) quantum Brain Dynamics or Cognitive Domain.

In total comprising the cosmology of individual entities Psychosphere (a conscious entity is a cosmology in Noetic Theory rather than just an object (brain) as in Cognitive Theory). It is possible to make a generalized table of living systems and qualia reminiscent of the periodic table of chemical elements. The chart cannot be perfected without future empirical research; but the table represents a "best guess" based on what the Noetic Theory currently suggests.

Table 1. Hierarchy Of Life And Awareness (Qualia)

[37] The three noetic base states bear some similarity to the Eccles-Popper Three-Worlds and Penrose's Three-Forms of existence but not sufficiently so to utilize them as the basis for Noetic consciousness.

1) ROCK OR INANIMATE MATTER – Pervaded by Noetic Field only, thus containing one of the three component of consciousness, but is not a living system. $E = mc^2$ (all spirit is matter). Continual transformation of matter and energy. No Qualia relative.
2) PLANTS, AND INFECTIOUS PROTEINS LIKE THE PRION AND VIRUSES - Noetic Field. Rudimentary Cognitive Domain, but activity is purely mechanistic by flux of Qualia type II. Rudimentary levels of Q-III.
3) BACTERIA PLUS - Noetic Field, Qualia Type I and II, Cognitive Domain has rudimentary awareness, *choice* is generally a mechanistic computation, Q-III.
4) LOWER CLASSES OF ANIMALS - Noetic Field. Qualia Type I, II and III. Cognitive Domain / Brain has basic awareness and ability for conscious choice, some of which is genetically encoded and instinctual.
5) MAMMALS, DOLPHINS, BIRDS - Noetic Field. Cognitive Domain/ Brain. Elemental Intelligence (Soul). Qualia Type I, II and III. Many in this class have self-awareness. Elemental Intelligence is a more theological component of consciousness; it is this parameter that allows a living system or conscious systems to exist beyond Earthly temporal existence after temporal death.

7. The Limits of Quale

Does our putative extracellular or extra-sentient containment of Qualia have to be immediate to another living system? If we utilized the true definition of a sound. But that is a superficial definition like defining consciousness as wakefulness. Our intention here is to develop a definition of Qualia that is not just descriptive of its phenomenological character but descriptive of its complete structural-phenomenological noumenon which gives the character and the context of Qualia within the continuous-state Holographic Conscious Multiverse (HAM). With the proper configuration which would entail some sort of control mechanism, theoretically one could put the proper 'configuration' of a Qualia within a 'rock' but it would not be apprehended unless placed in superposition with a living-system. Since Qualia by the generally accepted definition listed in section 1 is in essence the 'feel of awareness' or the what it's like to be aware, we now begin to split hairs if we are going to be able to able to define Qualia in a manner in which it can be transferred or shared and stored extracellularly.

Assume a particular conscious entity perceives a simplest form of experience, not temperature because it habituates dramatically over a short duration. All continuous experience habituates to a degree. Let's arbitrarily choose a simple visual experience because vision is the dominant sense with the largest data field. Assume the subject is in a completely darkened room with only a pinpoint of monochromatic light emitted in millisecond pencils. If the subject is highly skilled at attention by for example with extensive training in meditation; awareness for illustrative purposes is maximized. But there will still be infinitesimal differences in the chain of Qualia from individual limitations and instantaneous variation.

Qualia generally occur in a smooth or continuous perceptual stream of discrete events - discrete frames of film in the projector appear as a smooth continuum on the screen in the same manner that tiny raindrops summate by the Huygens principle of wave train addition into a coherently perceived rainbow that might stretch from horizon to horizon. Because of quantum changes or differences from moment to moment the same Qualia varies because:

1) Subjective attention to nodes X_1 to X_2 to X_n is never perfect.
2) Quantum uncertainty or fuzziness exists in the oscillation of all biochemical species.
3) Other extra-quantum oscillations from macroscopic motions or distractions.
4) Loss by habituation

If we claim the infinitesimal variances are minimal and can be ignored for all practical purposes (FAPP) in the case of individual awareness, these variances could be said to be maximized in a different subject sharing the exact same state of awareness measured by some method of dissolution of the 1st person 3rd person barrier. What is the point of that spectral variance? The answer is that a particular quale is never precisely the ideal state of a particular qualia. Since even intra-subjectively there is some averaging over the interval of an instantaneous qualia. To clarify - when is a qualia not the Qualia? Is there a Platonic-type form for a particular quale? Lets, assume an object in some arbitrary setting. For the sake of precision, we must realize that each 1,000 units of a particular qualia are all different according to the above four parameters, but FAPP with some averaging we can claim that the 1,000 vary only with infinitesimal differences such that the 1,000 are in essence the same qualia in this particular case.

It is this 'average' that we would like to quantify as the 'point of white light' (in a dark room) with 'full' attention and neglecting loss by habituation. So the infinitesimal averaging would be multidimensional across all properties. Even though all qualia are considered unique, we will not be concerned with the infinitesimal differences within a category for a unique qualia. At some level an 'impure qualia' breaks the barrier of infinitesimal differences and does become a different qualia. By putting the infinitesimal variations aside, we are ready to begin the next problem in our discussion; that of the 'periodic table' of conscious elements and holographic properties of the 'collective unconscious'.

Awareness has been defined as the fundamental principle of a conscious universe. As illustrated in Figure 4 below it is in the seat of this awareness that qualia is experienced. After a further note on the philosophical basis for qualia, its physical cosmology will be addressed.

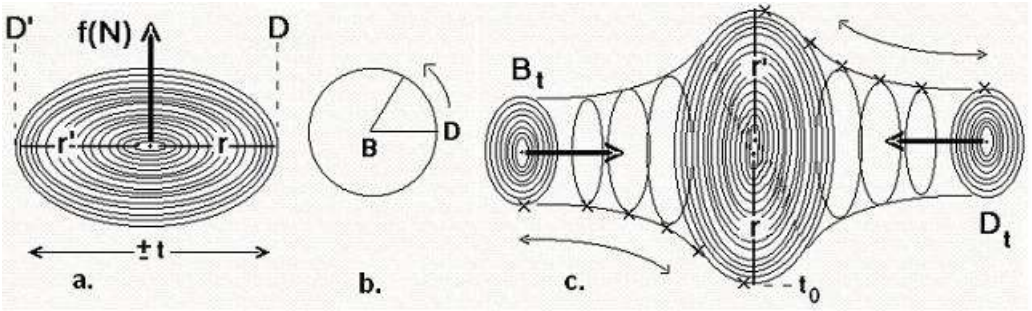


Figure 4. Temporal / Atemporal duality of the wavefunction of a living system. a) represents a 2D model of the cognitive domain where the noetic force f(n) that couples the mind to 3D reality focuses the noetic field on the 'eternal present' a node which then spreads out as a standing wave along its coherence length *r* in spacetime by influence of the future / past pilot wave. Inside the circle is life and outside is death *D* or inanimate matter. The reference circle b) illustrates how the coherence length (radius) evolves with the increase of intelligence and content concentrically from birth *B* to death *D*. Although the radial velocity signified by the arrow remains the same along the radius from B to D, the more mature entity maps out more

area in the same time segment – like a rotating phonograph record. This seems to explain why time perception seems longer for a youth and accelerates with age. c) is a 2D drawing conceptualizing a 4D slice of the 12D psychosphere showing the present and future / past boundaries of its wave function. The central sphere is the cognitive domain where qualia of the moment emerges (Psychosphere as whole structure); but total life energy and memory fills the whole eternal cavity like in an optical computer where both programming and data are stored holographically in light beams without need for static storage devices.

8. Philosophical Basis for the Universal Nature of Qualia

The following remarks support the philosophical suggestion that qualia are the same for all living systems in the same way that DNA is universal to all cellular organisms. Hemoglobin and chlorophyll molecules used for energy transport in animals and plants respectively have very similar molecular structures. Likewise Noetic Theory predicts that qualia have universal structural-phenomenological forms in a conscious universe that can be categorized in a manner paralleling that of the periodic table of chemical elements. But apprehension differences would occur. So even if a Q-II is standardized, if as suggested cats are color blind, apprehension of the same Q-II would be different in each case.

It is generally believed by Jungian psychologists that archetypes of the collective unconscious (Perhaps some form of nonlocal repository bottled in the Earth's psychosphere) represent some form of physically real basis for historical human memory, a basis for personality, and act as a storehouse fostering the evolution of human consciousness. The best circumstantial evidence for the existence of a Jungian type collective unconscious is the uncanny ability of *idiot savants,* who are typically handicapped, often isolated in remote areas, and with little formal education, to recite daily weather data perfectly for hundred year periods. Cats are able to watch videos of birds or fish with interest. Several commercial products are available. Telepathic visions of shared images with animals have been reported suggesting at least some form of universal translator. These ruminations lend a degree of philosophical support to the assumption of Noetic Cosmology predicting that local, nonlocal and unitary aspects of Q-II qualia are universal for all living systems.

But one asks, if the cognitive domain of a bacterium has only a few bits relative to the yottabit (10^{24} bit) capacity of a human brain how could a bacterium experience 'thought' based on the same fundamental Q-II form? Several reasons apply theoretically. A large 2 x 2 meter holographic film would contain the same information as a pin head size piece torn out of it, only dimmer. The intelligence of the honey bee seems far greater than the capacity of its pin point size neural ganglia, suggesting that a group mind or aspects of the collective unconscious become entangled or superposed through the spacetime manifold. Theologically the dualist – interactionist model theorizes that the conscious life of the soul continues after Earthly death in some form of a spiritual body. This suggests that ultimately the mind is a form of optical computer with holographic optical storage. In this context the Pauli Exclusion Principle for one at a time Fermi states would not apply. The Bose or photonic state is said to have capacity for infinite superposition. Some creatures for example are color blind. When presented with color, information loss would occur suggesting the scaling of intelligence also scales the information capacity. One immediately sees that a lot of research will be required to definitively explore these possibilities. We remind the reader NFT is empirically testable and apparatus has been designed to falsify it [17,18]. When the research begins a new 'transistor of the vacuum' will allow empirical study of qualia.

9. The Microscopic Cognitive Domain - Base of the Qualia Pyramid

Barbara Shipman discovered a mathematical relationship between the topology of the quarkonium manifold and the waggle dance of honey bees [41]. By mapping a six-dimensional quantum geometrical figure onto two-dimensions she recognized the pattern as that of the honeybee's ritual dance. To her, this implied that the bees mind is coupled to the quantum world, since it is in the quantum realm that the six-dimensional geometry of phase space has real meaning. This might also imply a theoretical reason why bees seem to have a lot more intelligence relative to a neural ganglion (insect brain) the size of a pin point. This could support a model indicating action by quantum superposition of a Jungian type collective unconscious. This is the type of concept that could be empirically tested when the Dirac-Noetic interferometer (DNI) is developed [13,17,18].

The bees use the waggle dance to communicate to other bees in the hive the location and distance of a food source. The form of the dance changes according to the location of the flowers constituting the source. The surprising thing is that there may be a deep mathematical explanation for how the dance changes form. Shipman ‘s reasoning related the geometry of the bee’s waggle dance to a space in symplectic geometry known as a "flag manifold." Shipman believes it is possible that the instincts which control bee behavior are wired in such a way that the quantum principles related to this kind of geometry apply. It could also suggest an advanced form of an EPR-like resonant condition that correlates conscious information across the cognitive domain of the bee’s individual and collective unconscious.

Shipman says that it is not the standard Copenhagen Interpretation (CI) of quantum theory that explains the waggling dance but the ontological non-collapse versions of de Broglie, Bohm and Vigier (DBV) [42]**.** The Bohm & Hiley model [43] suggests that a ‘quantum force’ directs an electrons motion by a field that it is always in contact with. A higher dimensional super-quantum potential version of Bohm’s quantum potential is compatible with the ‘energy covering’ (unified field) of the least unit of awareness described by noetic cosmology [3,4,8]. While an extension of CI the DBV interpretation is not a sufficient extension to describe living systems because they still don’t describe consciousness. Instead of a statistical evaluation of the action of a particle on a manifold, they suggest how a potential may guide the action. This provides a context for intentional action but does not describe intentionality itself. For this we need more physics and eight more dimensions [8].

Wheeler and Feynman developed what is called the absorber model of radiation suggesting that propagation is mediated by future-past conditions supplied by an absorber and emitter with advanced and retarded potentials [44]. Some thirty years later Cramer extended their model to the CI model of quantum theory providing an avenue for correspondence with required new cosmology [45] so that these two arenas may be sufficiently extended to describe mind.

Korall and his collaborators [46] have found that bursts of 250 Hz magnetic fields applied to dancing bees cause a misdirection of up to 10 degrees in the honeybee’s flight direction. Their analysis of the data suggests that this action is the result of a quantum mechanical nuclear spin resonance. This work on the language of bees seems to give evidence of the involvement of a nonlocal collective unconscious that can enable a superposition of states among the cognitive domains of individual bees. Shipman [41] concludes that the geometry of the collective activity [47] relates to vacuum topology [48] in the same manner as elementary quarks and anti quarks confined to the spacetime manifold correspond to the vertices of a

hexagon. The resonant motion of the quark manifold can be shown to include a 'holophote' (like the oscillating beacon of a lighthouse) entry of the noetic field of consciousness into all living systems [3,4,6]. Additional theoretical evidence that mental activity is associated with the noetic field is suggested by a behavior observed in some birds called the vestibular-ocular response. A bird's body oscillates stochastically in the wind while perched on a tree branch; but the bird's head remains fixed perfectly still. This process is considered non-computable [24] and as such beyond the capabilities of a bird brain to process. Indeed, it is believed a super computer could not compute it. The more sophisticated the super computer only the better the approximation. If this is true it suggests sophisticated non-computable information exchange occurs in the 'collective unconscious' of vacuum topology. This also suggests that the mind-body interface is a naturally occurring form of conscious quantum computer [49].

10. The Foundations of Qualia in Physical Cosmology

Even the simplest living systems given intentionality are comprised of hundreds of billions of atoms. Each atom is known to have an associated de Broglie wave suggesting that a rich nonlocal structural-phenomenological cavity-QED computational informational array configures qualia. Therefore, explaining qualia should entail a discussion of the HD topological properties of the polarized Dirac vacuum in association with the cosmology of the Noetic least unit [4]. The Noetic Model of mind is a structural-phenomenological microcosm with boundary conditions defined as the limits of the entities psychosphere. The domain of this multi-level complex system operates under a complementarity of classical, quantum and unitary mechanics. Following this Noetic definition, a living-system is a triune system; which signifies the brain as a classical / semi-classical I/O array and the mind as a unitary coherent system with the long-range correspondence between the two mediated by the Noetic Field.

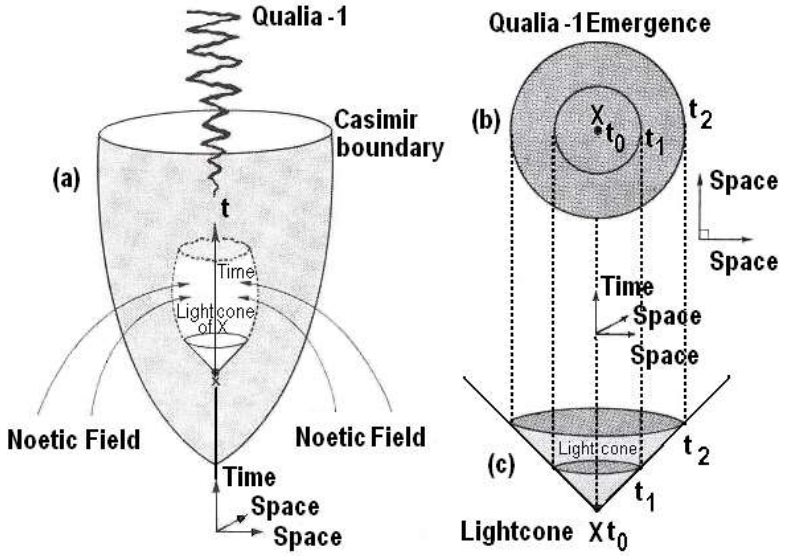


Figure 5. Conceptual extension of the 'movie theater' metaphor of Figure 2 Each discrete unit (dots *a* to *n*) in 4a represents a fundamental least unit of awareness tiling the spacetime backcloth; the holophote action of the noetic unified field emitting by superradiance, noeons (The exchange particle of the noetic unified field; it action is synonymous with the *élan vital* or spirit of God) into every spacetime point and atom of a living systems psychosphere. The neural raster coincides with the leading lightcone singularity of awareness in Figure 2; only one wave front of which is shown in either figure. Multiple wave fronts summate by Huygens 'principle of wave train addition (as microscopic drops of water create a macroscopic rainbow) to form the structural-phenomenology of qualia. 4a and 4b are side views and 4c is more of a top view of the wave surface.

Hawking has discussed a quantum wave function of the entire universe where the ground state corresponds to de Sitter space in the classical limit [50]. Noetic Cosmology includes everything within the bounds of the 4D Hubble sphere H_R. Every lesser system within H_R would be a component of the H_R wave function having it's own component wave function of the total universe.

$$\Psi_{U_{H_R}} = \sum_{i}^{\infty} \left| \psi_i \right\rangle \qquad \Psi_{U_{H_R}} = \psi\psi^* \qquad (1)$$

According to the de Broglie / Bohm model of quantum theory all matter has an associated pilot wave guiding its evolution of state. This quantum potential as it is also called engulfs all 'particles' including living systems. In the noetic cosmology developed here this is synonymous with the HD energy covering of each least unit, which has also been described as a Wheeler Geon or 'ball' of light with sufficient self-energy to cohere. This energy is what noetic cosmology considers to be contained in the psychosphere or 'soul' that can exist eternally independent of temporal 3(4)D Euclidian / Minkowski reality. Like the wave function of all matter for the entire universe in Hawking 's Big Bang quantum cosmology; 'consciousness' holds a similar status in Noetic Cosmology. As stated in section 2, a living-systems is defined as a Qualia of the conscious universe (Q-III). In terms of the 'least unit' of noetic cosmology [3,14] and the associated triune nature forming the basis of living-systems, this consciousness provides [6,8]:

- The unitary field filling all space, governing all matter
- The *élan vital* or life principle
- Light of the Mind - Qualia I, II & III

Qualia are a high-level component of conscious life with more complexity than described by the usual type I definition as the 'what it feels like' aspect of awareness centered on the eternal 'now' of a living system [31]. Any 'thought' occurs in a web of multiple states: mood, health, energy, degree of wakefulness, biases toward object of apprehension. Can Noetic Theory definitively categorize these aspects of Qualia?? Some aspects of qualia description could be considered extraneous under certain specific conditions, for example, orientation could be discounted when contemplating a sphere. Probably the distance factor would cancel in apprehending a pencil of light in a dark chamber. The point of this discussion is that within certain limits there is a particular fundamental 'form' that manifests any particular qualia. Meaning that there exists a universal fundamental periodic array of conscious elements utilized by all conscious systems - high level language like German or Greek are different but the language of Qualia (like DNA) is the same for all conscious systems. This principle of course is required for dissolution of the 1st person 3rd person barrier. The best current theory for a preliminary description of the interrelationship between the two domains is that of Cavity Quantum Electrodynamics (CQED). QED couples the mental Psychon [7] to the brain

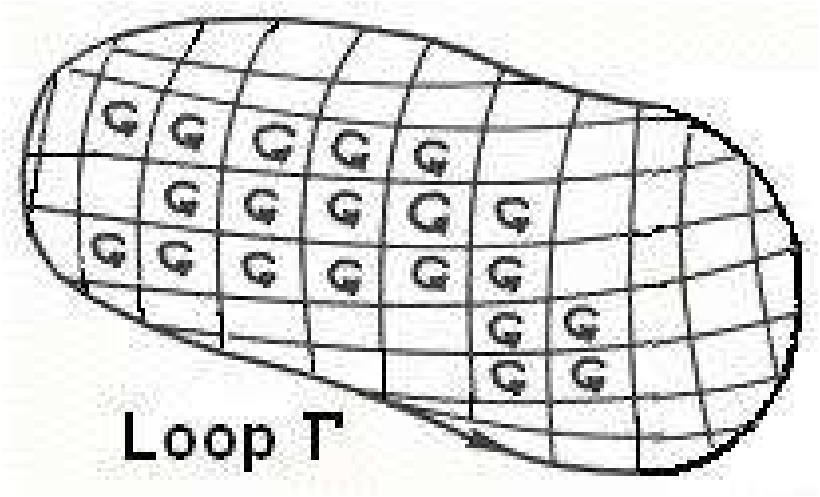
Dendron on the classical side and QED long range coherence couples the Psychon to it's qualia on the mind side. We will use the work of Preparata [51-54] as the model of QED for the discussion here.
General principles of CQED laser physics [51-54] stated by Anderson's dictum that the production of coherent modes requires two special conditions:

- An external power source called the "pump" and
- Finely tuned Q-III 'Casimirrors'[38] or the hyper-boundary conditions of the "cavity".

Without these conditions, there is no lasing.

The continuous-state CQED of the Noetic Least Unit [3,4] satisfies these conditions [7]. The Action or "pump" is inherent to the dynamics of the continuous dimensional-reduction-spin exchange-compactification process of the of the 12D topology creating and recreating the standing-wave present [3,4,6]. The same hyperstructures of the least unit provide the QED cavity. The present acts as the neutral ground state and the energy mode covering [4] at the 'top' of the cycle is the excited state. The wave train of qualia is the evanescent 'lasing' action.

Classical information undergoes a type of "superradiant phase transition" during the continuous noetic transformation, a form of 'quasi-particle' transition [17] through the intervening "Fermi-measurement" barrier of quantum chaos. In the noetic cosmology [3,14] the unitary domain is 'always' coherent. Planck scale chaos is the temporal barrier between the 4D Minkowski subspace and the HD eternal realm. Our perception of Euclidian reality is also a form of coherence, although a more limited form; this is why it appears smooth. Chaos is required for the barrier so that the higher and lower domains can both interface and be isolated (a form of complementarity) with enough degrees of freedom for the complexities of matter, living-systems, and intelligent intentionality.



[38] The 'mirrors' may be charged Casimir boundary conditions. Metaphorically radio waves bounce off charged layers formed by rarified air molecules of the upper atmosphere which is mostly empty space.

Figure 6. 2D view of the circulation *C* (Continuous-state dimensional reduction compactification process of noetic cosmology) around the loop Γ surrounding the closed (12D Superspace backcloth) noetic surface of the Psychosphere that leads to superradiance (The continuous-state of the least unit is a damped harmonic transformation which produces superradiance by CQED) of the *élan vital* from every point in space into the biochemistry of living systems generating life at the 1st level of the hierarchy and qualia at the 2nd level through self-referential hyperholographic feedback.

This process can be described by Gauss' Theorem for the flux of a vector field *C* through the surface of a cube:

$$\int_S C \cdot n da = \int_V \nabla \cdot C dV, \quad (2)$$

where *S* is any closed surface, *V* is the volume inside it, and *n* is the outward unit vector normal to the of the surface area element *da*; and by Stokes 'Theorem for the circulation *C* around a square:

$$\oint_\Gamma C \cdot ds = \int_S (\nabla \times C)_n da, \quad (3)$$

where *S* is any surface bounded by Γ. ∇ is the vector operator

$$\nabla = \left(\frac{\partial}{\partial_X}, \frac{\partial}{\partial_Y}, \frac{\partial}{\partial_Z} \right) \quad (4)$$

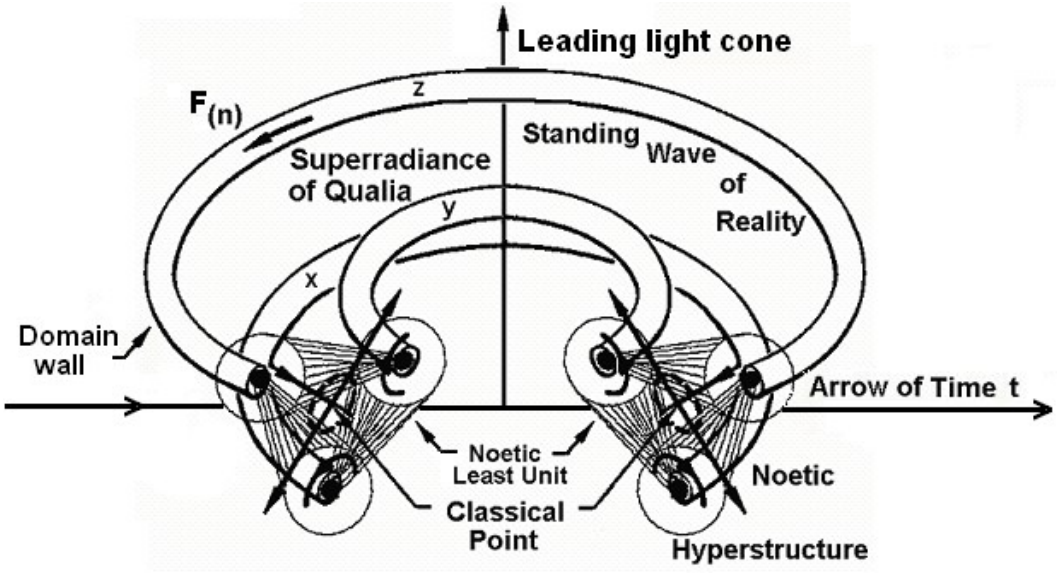


Figure 7. Continuing to build a metaphor for the emergence of qualia from the continuous action of the noetic least unit, recall that the least unit structure (6a) is a microcosm of the whole conscious universe and as such the past oriented reduction process produces periodically a classical spacetime points, the locus of which is the arrow of time. The domain walls

represent the lightcone singularities of Q-III propagation, the surfaces of which act structurally as Casimir-like plates, and phenomenologically as a carrier wave base for Q-I qualia production by Q-II modulation. 6b represents two pairs of parabolic mirrors (the Q-III Casimir domain walls) whose foci overlap; this is the high frequency wave in 6c denoted as a. The longer wave b represents a Q-II qualia which is modulated by the Q-III wave into the usual Q-I qualia. Thus a, b, and c in 6c represent the three forms of qualia and how they work together to form Q-I by superradiance of the noetic field.

11. The Physical Basis of Qualia

To provide a complete context for qualia a *psychosphere* is defined. This psychosphere is the complete domain (brain plus cosmology) comprising activity of an individual entities conscious mind. The cosmology of this domain provides an additional set of self-organized boundary conditions with both temporal and eternal parameters encompassing all three types of qualia. The hyperholographic-like topology is a structural-phenomenological cosmological process comprised of *dynamic* and *static* Casimir modes [7]. These counter propagating future-past Casimir boundary conditions simplistically can be said to be governed by Gauss and Stokes theorem and generate an evanescent wave of Q-I awareness (on the Q-III carrier base) that is focused physically on the 'leading light-cone singularity of a Minkowski space *standing wave* domain of each *present instant*. This tier of the complex system operates by absolute parallelism[39] [55] and deficit angle hysteresis[40] of the continuous-state noetic transformation of the dynamic / static Casimir boundary conditions of Q-II elements where Q-I appear as a superradiant effect. This domain could be said to couple to the dendritic microprocess of Pribram's holoscape or dendron by way of the Eccles psychon [7,20]. The experimental design for empirically testing this noetic model is based on a new class of interferometer called the Dirac-Noetic Interferometer (DNI) that utilizes spin states of Dirac spherical rotation in contrast with the symmetry conditions of the continuous-state transformation of the least unit of noetic superspace to manipulate superradiant effects of the new noetic action principle to be applied in initial experimentation to the *cognitive domain* of the prion [13] defined by noetic theory as the simplest mode of a complex living system.

Our earlier definition of a living system as a complex hierarchical structural-phenomenology can now be seen to coincide with the model of qualia we have developed in this discourse. The following postulate, which will probably be found challenging for most cognitive psychologists to accept, is made directly by noetic theory as a result of noetic theory being a form of Cartesian dualism where mind is able to exist independent of the temporal reality.

Postulate 3

The Type II Qualia for a *pencil of light*[41], is the pencil of light.

[39] Absolute parallelism.

[40] Hysteresis – lag occurring between application and removal of a force and its effect. An oscillating force creates harmonic hysteresis loops where the hysteroid is the closed space emcompassing the hysteresis. Without hysteresis force would map a line. Hysteresis is important to NFT in several ways – The lag between time and eternity in the creation of spacetime, The volume of the hysteroid is the quantity of the noetic field injected into each spacetime point as the élan vital.

[41] Pencil of light – short narrow light segment as produced by the rapid opening and closing of a pinhole shutter.

The contrast between qualia and quale of the light pencil relates to the nature of light waves and quanta, which at present is still not completely understood. The photon concept is still incomplete. In addition to the current understanding of the photon as a wave-particle duality; there is also a duality between time and eternity or the unified field [4,6]. As stated in earlier chapters the Planck barrier exists only for fermions. So the 'hidden' unitary aspects of the photon (in this case our light pencil) allow it to be shuttled into the timeless domain of the mind through quasiparticle transitions [7].

Once postulate 3 is made however noetic theory does clearly predict that Qualia Type I occurs when the Qualia Type II energizes the appropriate cavity of the cognitive domain of the psychosphere with Q-III as a carrier. The delineation above leads to one more complexity in our definition of Qualia. Noetic Theory by definition claims that the noumenon of Q-I phenomena is its unapprehended Q-II form which is a structural-phenomenology in its own right physically and therefore has its own noumenal elements. We avoid discussion here of the noumenon of Q-III as a path not relevant to human awareness. In this sense though the noumenon of Q-III is the whole cosmology of the HAM. Returning to the additional complexity of defining Q-II as a photonic pencil. The light pencil is a dynamic element. Perhaps static elements should be included. Possible digital or analog forms of storage that could be fed into the holographic matrix of a cerebroscopic transducer.

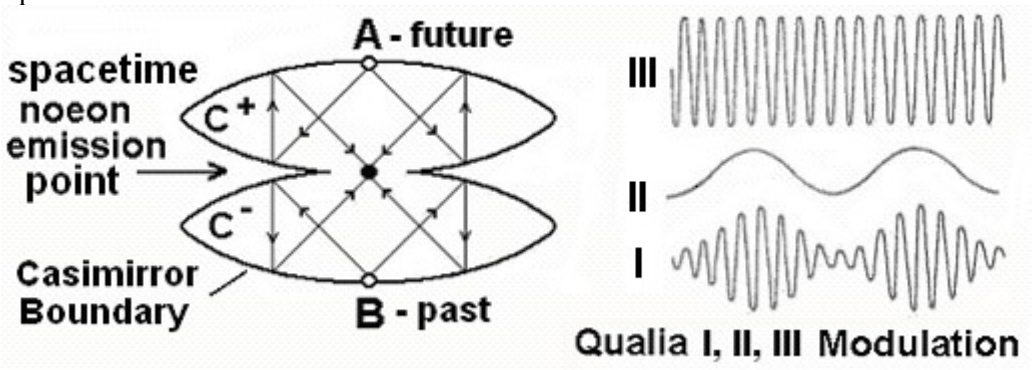


Figure 8 a) Noeon emission from spacetime Casimirror future-past cavity. b) Modulation of the noeon field cavity into quanemes of qualia.

A standard image requires a screen or other reflective surface to be resolved; but if the foci of two parabolic mirrors (Casimir plates in our model) are made to coincide the two images superpose into a real 3D holographic image that does not need a screen. See Figure 6 above. There is a science toy called the 'magic mirage' that is used to demonstrate this effect of parabolic mirrors. Objects placed in the bottom appear like solid objects at the top of the device.

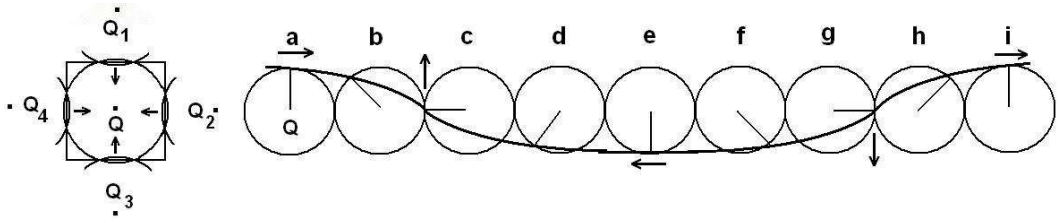


Figure 9. Each microscopic least unit, a quale (9a expanded into components *a* to *k* in 9b represent one 720° phase cycle of macroscopic reality) coupled into harmonic motion results in a standing or stationary wave when the incident and reflected transverse and longitudinal component waves are in superposition. The disturbed least unit elements move in circular orbits; where on the crest the movement is forward, backward in the hollow and both vertically and horizontally in intermediate positions. This motion is the same as that of surface water waves; metaphorically representing the Geon or 'ocean of light' of the 12D unified field. This is a Q-III wave front built on the action of noetic superspace. In 9a as part of the close packing of least units reflection and refraction occurs. Reflected waves which are images of the source at the center Q have centers at Q1 through Q4. The higher level associated spacetime modeled in 9b through topological switching and infinite topological form is able to evanesce any type I qualia by the summation and modulation of the quaneme sub-elements.

The holophote action of *élan vital* energetics arises from the harmonic oscillation (static-dynamic) of least unit boundary conditions tiling the spacetime backcloth. The beat frequency of this continuous action is the carrier wave of Q-III that modulates cognitive data of Q-II into Q-I awareness states which is a superposition of the two (Q-III and Q-II). This modulation of qualia occurs in the HD QED cavities of the cognitive domain. The QED cavities are a close-packed tiling of least unit hyperspheres; the Casimir surfaces of which are able to reflect quaneme elements. While the best reflectors of EM waves are polished metal mirrors, charged boundary conditions also reflect EM waves in the same way radio signals bounce off the ionized gases of the Kennelly-Heaviside layers if the ionosphere. This reflective "sheath" Figs. 3,4,5 & 6 enclosing the cognitive domain is charged by the Noeon radiation of the *élan vital*, the phases of which are "regulated" in the complex HD space of the least unit cosmology.

How does noetic theory arrive at describing other more complex qualia from the simple light pencil? Light quanta are microscopic in contrast to the macroscopic sphere of awareness. It would thus seem reasonable to assume that scale invariant properties of the HAM least unit of awareness would apply. Like phonemes as the fundamental sound elements for language there are qualia-nemes or *quanemes* for awareness all based on modulated Q-II states of the geometric structural-phenomenology of Q-III.

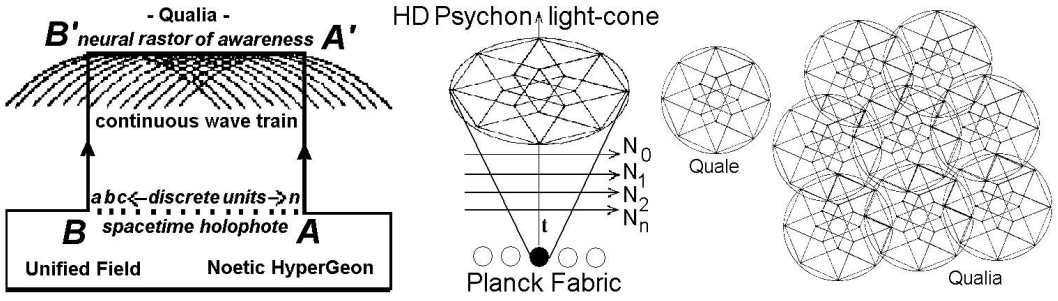


Figure 10. Views of the three-fold complementary nature of noetic cosmology and the noetic field.

Propagation and reflection of the quanemes of Type-II qualia is the key to the simplicity of the physical basis of qualia as described in noetic cosmology because according to postulate 3 although these Type-II quanemes are noumenal sub-elements of qualia they represent more usual physical aspects of CQED interactions. At the level of quanemes the contemporary physics that might best apply to their description is that of the several forms of superstring theory. Strings are considered the fundamental objects of nature in this model. Recent arguments concerning the small scale topology of space challenge the customary assumption that the dimensionality of space must be an integer [56]. This recent conjecture of non-integer

dimensionalities seems to be compatible with the continuous dimensional reduction compactification process as it would occur at the level of quaneme modulation in the noetic theory of qualia. The beauty of non-integer spacetime dimension is that it provides a way to eliminate the troubling divergencies plaguing quantum electrodynamics. Another boon of this idea for the noetic cosmology is that the Hausdorff classical measure-theoretical definition of dimension can be used to define non-integer dimensionalities in a way that implies a limiting process that entails a convergence of real numbers toward zero [57]. Which is the situation in noetic cosmologies continuous dimensional reduction process from 12D to 0D; and although physicists consider this model incompatible with quantum theory because of its precision, it is compatible with the extension of quantum theory in noetic cosmology which does allow such precision in some circumstances! The next step is construction of the Dirac-Noetic Interferometer to test these hypotheses [13,18].

12. Applications Resulting from the Physical Understanding of Qualia

Understanding the physical basis of qualia can be utilized to make psychology a hard science and develop a fundamental basis for creating a 'Moral Psychology'. Simply utilizing dissonant or harmonious resonance with a quale's physical field is not sufficient. If this was the essential requirement a 'real' moral psychology would not be possible because commensurate states of harmony could be generated for both 'evil' systems and 'good' systems. (Setting aside for now any definition of evil and good) Opposite systems would be dissonant and similar systems resonant with each other; revealing nothing about their absolute moral nature. All that could be said is that they are structurally different producing constructive or destructive interference by phase alignment.

The inherent teleology of the HAM can be used to overcome this limitation. The origin of this approach is initially theological. But since noetic action is physical, scientific methods may be employed leaving theological roots dormant. The noetic principle shows that life is a higher order coherent system produced by the hierarchical functioning of the noetic field acting in conjunction with eternal elemental intelligence and the temporal structural phenomenology of the cosmology of the fundamental 'least unit'. Theological implications suggest that the noetic field acts as an *élan vital* emanating from the *Throne of God* to fill all space. This is the basis for developing a moral psychology. By Gödel's incompleteness theorem [34], a system cannot be fully known solely in terms of itself, i.e. resonance modes for constructive interference must arise from resonant coupling to a higher order regime beyond the systems limits. Of course this premise is only valid if the noetic unitary field of HAM cosmology tantamount to the spirit of God therefore entailing "perfect" knowledge relative to the lower order regime.

The implications for medicine and psychology are enormous both in terms of diagnosis, treatment and elevating norms. A new class of diseases of consciousness will be defined for etiologies like ulcerative colitis, Alzheimer's disease [58], or fiber myalgia for example for which fundamental cause and cure are currently unknown. Also the eventual practical development of Conscious technologies like telepathic machines, intelligent androids and the possibility of locating criminals by clairvoyance enhancing technologies like those portrayed in the 2002 Hollywood film - *The Minority Report* will be feasible . Since the noetic model of mind entails a temporal/eternal complementarity-duality; injecting timeless phase elements (eternity wave) would allow practical development of a Star Trek Medical Tricorder for instant healing of wounds normally taking several months [49].

13. Final Thoughts

The application of the quantum hypothesis to blackbody radiation by Planck in 1900 and to the photoelectric effect by Einstein in 1905 was met with disbelief by most and scorn by some. In a letter to a friend Einstein wrote: '*I have just published a fundamental paper about light, but I am sure that nobody will understand it.*' Einstein was correct! Scientists were so sure that energy followed a continuous spectrum that it took about fifteen years before his theory was experimentally verified.

Today most scientists believe strongly in biological mechanism and vigorously deny a need for teleology or any type of *life force* beyond random evolutionary the tenets of Darwinian Naturalism. A Nobel Prize was given in 2006 for 'proof of the Big Bang'; this is troubling because Hubble discovered cosmological redshift, not a Doppler expansion of the universe. One of these Nobelists has often proclaimed that 'it is impossible that the Big Bang is wrong'. Scientific progress is typically a locus of tiny steps. When major paradigm shifts periodically occur like those inaugurated by Copernicus and Galileo, the resistance can be great.

An extreme case of this resistance occurred with the great Greek mathematician Hipparchus - He calculated heliocentric orbits of the planets, but because they were not perfect spheres (believed at the time to be the only way God would create them) he abandoned his work. Hipparchus' influence was so strong that it was 2,000 years before Copernicus bravely presented his version of heliocentricity, but only on his deathbed for fear of the trouble it would cause. Cartesian dualism is presently considered so archaic (and wrong!) that scientists openly mock colleagues adhering to it. Some scientists and philosophers are currently trying to 'prove' God doesn't exist or is an irrelevant concept to be absorbed into other nomenclature. Christopher Columbus did not sail off the edge of a flat Earth or get swallowed up by a plethora of phantasmagoric sea monsters on his way to a new world. This fog of myopic "see" monsters shall not block the horizon to wonders of mind much longer…

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Chapter 5

Completing Epistemology: The Utility of Transcendence as a Tool in Scientific Theory Formation

I want to know God's thoughts ... the rest are details - *Albert Einstein*

1. Introduction

Human epistemology has steadily evolved from dark ages of superstition through enlightened periods of logical reason to the current pragmatic age of empiricism. Now another Galilean class revolution completing epistemology by integrating Science and Theology (S&T) utilizing transcendence seems immanent. S&T represent opposite ends of a long continuum of schools of thought rather than mutually exclusive disciplines as often believed. To implement the required paradigm shift an integrative noetic science must include an adequate understanding of Transcendence. Over 2,000 years ago the Greek philosopher Plato considered this type of noetic insight, paraphrased here as a corollary:

§ Noetic Insight

> *No matter how great ones intelligence or how vast ones wisdom, noetic insight is cosmic insight transcending the capacity of the self [1].*

> Human epistemology has come full circle to a time not only for another evolutionary step, but the final one completing the tools of epistemology through the use of transcendence.

For the first time since the Dark Ages, physicists Paul Ginsparg and Sheldon L. Glashow wrote 12 years ago, we can see how our noble search may end, with faith replacing science once again [2].

> This condition is not what is advocated here because it seems that no matter how advanced tools of transcendence may become, empiricism leads directly to engineering which is an integral part of temporal existence. In some arenas current science has already reached, at least in terms of experimental design, the limits of empiricism; for example, some experiments in particle physics require an accelerator the size of the universe and some calculations require a computation cycle with a duration the age of the universe. Only about 70 years ago Cosmology was not considered science. The universe was believed to be clock-like as described by Newtonian mechanics. Since the advent of Quantum Theory, the majority of scientists have considered the universe to be quantum.

But recent studies extending the standard models have allowed a growing number of scientists to embrace forms of an Anthropic Conscious Multiverse. The form utilized here in Noetic Theory has continuous-state properties with temporal reality cast as a virtual subspace of a higher dimensional eternity [3,4]. This new cosmology yields key elements pertinent to premises here (especially the periodic properties enabling introduction of an inherent spirit-based action or life principle); some of which are:

- The fabric of reality continuously cycles between classical, quantum and unitarity (continuous-state).
- Phenomenological reality is virtual; because of the arrow of time much of the underlying noumenon is 'filtered' out of perception.
- Dimensionality cycles continuously from spatial to temporal to energy.
- Matter by Einstein's $E = mc^2$ is continuously created, annihilated and recreated (the well known wave-particle duality) forming the holographic backcloth of perceptual reality.

Inherent in these periodic properties is the unitary field or spirit of God, acting in governance as a higher dimensional de Broglie-Bohm super quantum potential [5,6]. Periodicity allows for the pervasive ubiquity of this supernumerary action principle. Since a conscious universe is implied the field is one of information. This is key to our idea of transcendence. In an Anthropic Holographic Anthropic Multiiverse (HAM) human beings are spiritual beings and a path to enlightenment is possible by following certain laws related to this condition. Because of the nonlocal (and because of the additional dimensionality – supralocal) character of the Holographic Principle individuals perceive themselves as separate entities in 3-space. But in Higher Dimensionality (HD) we are unitarily imbedded in the holographic backcloth, which because of its spiritual nature –

- Transcendence may occur and
- Information received in the process

The coming paradigm shift does not merely represent a significant intellectual breakthrough like Copernicus' transformation of egocentricity into heliocentricity, the advent of quantum theory or Einstein's theories of relativity; but a profound paradigm shift where Humanity will leave the so-called Modern Age behind an enter an Age of Consciousness.

An 'empirical metaphysics' [7] is under development that will violate the uncertainty principle and allow actualization of Plato's noetic insights in a manner useful for scientific exploration. Noetics, the study of the cosmology of mind, comes from the Greek word *nous* meaning intellect. Noetic insight when used scientifically to complete epistemology is the highest form of knowing because it utilizes and integrates the pure logic of philosophical reason, the rigors of scientific empiricism and the absolute truth of theology.
All scientific theory formation has at least low level metaphysical components. Without entering into a technical discussion of the nature of creativity, we assume here that this is what any creative process entails. The latter-day Mormon prophet Brigham Young went so far as to say "All scientific discovery comes as a revelation from God" [8]; while this may indeed be considered true in an Anthropic Universe, one would suspect the vast majority of scientists are currently neither generally interested in, aware of, nor even consider this possibility, especially since statistics have demonstrated that only about 20 to 30% of scientist believe in some form of god in contrast to 95% of the general population.

Does this mean that only few might be initially prepared to take advantage of the premises of noetic transcendence? An informal survey of my colleagues has revealed that some have already begun using transcendent abilities in various ways in scientific endeavor and daily routine with reasonable success. I know of no team efforts yet at this writing; although a five year budget for implementing bulk quantum computing approved in March 2007 will be used to test the premises here. As principle investigator I have chosen a question I believe, because of infinite possibilities, can only be answered by transcendence. Should we be successful certainly "the game will be afoot" as Sherlock Holmes would say at the beginning of a case. Hopefully preliminary results will be available before this volume appears in mid 2008. I think a result like this is required to create sufficient pause for engendering a Galilean class paradigm shift in epistemology. Since inception in the 1980's all attempts have failed at implementing bulk quantum computing. I have been provided a unique approach by the *Zeitgeist*; that approach demands the development of what I have called "the Noetic Transform" [**9**].

The value of the high-level addition of Transcendence as a tool of science in theory formation would be to accelerate progress by saving considerable time, energy and funds by optimizing both avenues for empirical research and efficiency in contemplating and defining fundamental new tenets of a model. For example, early in my career I sat in on a round table discussion by an august body of great thinkers of the age. They divided up a challenging problem into every logical possibility like spokes of a wheel. Each agreed to take a spoke or two, intending to spend the remainder of their careers working on their arena of interest of the problem. The utility of transcendence in cases like this would be to narrow the field to a spoke or two.

Currently all the standard models of science are Darwinian or naturalistic excluding any place for God or Spirit. For example, Biological Mechanism, the basis for allopathic or scientific medicine and psychology states: *The laws of chemistry and physics are sufficient to describe all life; no additional life principle is required* [10-12]. The founding fathers of quantum theory stated it could not describe biological systems, Big Bang cosmology is also naturalistic; therefore, something most assuredly must be missing in physical theory.

The noetic model for the integration of S&T is based on three premises:

- §1. That transcendence is a universal Anthropic Principle able to provide an interface or *common ground* between S&T.
- §2. Rigorous application of The Golden Rule (see below) spontaneously leads to transcendent abilities under certain optimal conditions because
- §3. Man is inherently a spiritual being (*The spirit and the body are the soul of man* [13]) imbedded in a conscious universe guided by a unitary field tantamount to this spirit.

A common ground [14] uniting S&T is required because traditionally scientific principles are not accepted by faith-based theology; and religious dogma is generally considered an unacceptable anti-intellectual mode of epistemological inquiry by the common definition of scientific pragmatism in place since Galileo showed that reason, in the case of heavier objects falling faster, failed. Similarly, today Hubble discovered redshift, not a Doppler expansion of the universe. Other interpretations are available [3,4] supporting HAM cosmology.

To achieve this integrative result a model of an Anthropic Continuous-state Holographic Anthropic Multiverse (HAM) [3,4] (and this volume) is utilized that includes an inherent basis for defining complex

self-organized living systems in a manner that includes the physical basis of spirituality and therefore transcendence [15] (and this volume).

According to the Perennial Philosophy: *God exists and has revealed a path to find him [16]*. This perennial philosophy is not only universal to all theology but ultimately to all truth whether theological or scientific as we make the case for here. The HAM [3,4] an extension of Einstein's Static Universe model, is shown to naturally include a new action principle governing complex self-organized living systems. This HAM elucidates the physical basis of spirituality. All legitimate religions or life paths in principle provide avenues to transcendence. Achieving transcendence is not based on the superficial icons of the world's theologies. Superficial artifacts like phylacteries, crosses, rosaries or rituals like bowing east or genuflecting are not relevant.

Because human beings are inherently spiritual [13,15], transcendence can be achieved universally by practicing principles of love, service and charity; or adhering FAPP perfectly to what is called the Golden Rule - Do unto others, as you would have them do unto you [17-24]. The Golden Rule is the most fundamental moral or ethical principle; it is the basis for the theology of virtually all world religions, the basis of social order, interpersonal relations, sound business practices and international diplomacy. The Golden Rule has many similarities to the Hindu belief in karma.

2. The Golden Rule Subsidiary to Love for God – The Great Commandment

For simplicity we will argue our case only form the point of view of Judeo-Christianity but the reader is asked to keep in mind that as illustrated in fig 2 the premises here are postulated to apply to all legitimate theologies. The monotheistic religions Judaism and Christianity teach that the Golden Rule and other moral commands for human relations are subsidiary to the Great Commandment relating to God, e.g., Jehovah, Emmanuel or Jesus The Christ explicitly identified the Great Commandment as supreme love for God, as affirmed in the Hebrew Torah and Christian Bible [25]. In contrast to the ancient 'an eye for an eye', Jesus gave a new command - "Love one another as I have loved you" [26]. By categorizing 'Love your neighbor as yourself' as the Second command like unto the first, Jesus placed the Golden Rule and human relationships as not subsidiary but tantamount to one's ideal relationship with God the father.

The paramount statement relating to our purpose here is Christ's teaching regarding the two great commands, specifically as stated in the last sentence:

> Master, which is the great commandment in the law? Jesus said unto him, Thou shalt love the Lord thy God with all thy heart, and with all thy soul, and with all thy mind. This is the first and great commandment. And the second is like unto it, Thou shalt love thy neighbor as thyself. On these two commandments hang all the law and the prophets [27].

Prophets are seers and revelators – users of transcendent abilities. The requirements for transcendence may be further clarified in terms of a three-level pyramid (Figure 1). The base represents crimes or sins of action like murder, theft or adultery for example. The middle of the hierarchy is represented by sins of word like lies or insults, which under extreme conditions could lead to another's harm or death. Goethe's 1774 classic *Sorrows of Young Werther* [28] is purported to have produced a rash of suicides on its publication; whereas a statement like 'where'd you get that stupid shirt' may or may not only hurt one's feelings. The top of the pyramid represents sins of thought. Thought by nature is fleeting. As long as an *evil* thought is not dwelt

on; it can be forgiven as quickly as contemplated. At this level of living the limitations of being human come into play. Deity can expect no more of a mortal being than trying to manage one's thoughts.

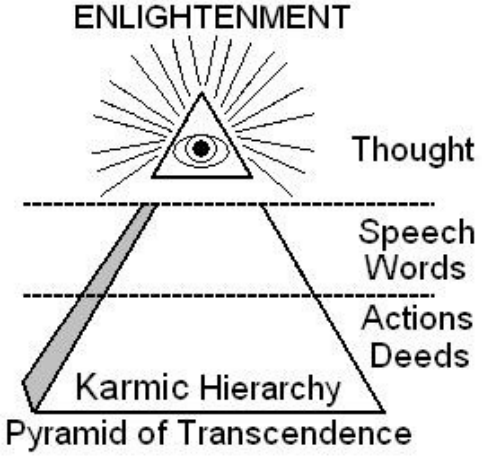


Figure 1. Pyramid of Transcendence / enlightenment. Individuals 'Living' operationally at the top of this 'karmic pyramid' spontaneously develop transcendent abilities. 'Sin' or violation of ethical principles, commandments or Karmic law can be classified into three weighted categories of decreasing severity: 1. Actions, 2. Speech, 3. Thoughts.

According to metaphysical law of the perennial philosophy as applied to HAM cosmology, one is virtually guaranteed attainment of a degree of transcendence when ones 'moral crimes' hover at the apex of the pyramid (Figure 1); provided one has sufficiently good karma or repaired any karmic debt or made restitution for negative conditions of the past.

Noetic Cosmology suggests that by routinely living at this apex a universal Anthropic Principle of Transcendence comes into play whereby anyone maintaining this mode will spontaneously achieve a state of transcendence. If the premise for this noetic Principle of Transcendence is correct, any team of scientists whether comprised of any combination of Jew, Christian or Shinto for example will be able to utilize Transcendence as a tool in scientific theory formation (Figure 2). Likewise, any dialogue between scientists and theologians could achieve similar fruition. Based on the fundamental premise that Men are spiritual beings [13,15] living in an Anthropic Multiverse; the following postulate is said to hold true:

Postulate 1

Any individual or group of individuals living by the Golden Rule, to the extent where those individual's moral offenses[42] occur generally only at the level of thought, will spontaneously develop transcendent abilities.

[42] Moral offense – We wish to skip for the most part a detailed delineation of what constitutes moral offense. For our purpose here we chose to simply state that good has a tendency to bring people together and moral offense has a tendency to separate or harm.

Two conditions apply. The past history of the individual must be relatively free of serious offense. The postulate may not apply to those guilty of unpardonable offenses like murder or blasphemy against God[43]. The activity of thought is at the limit of human control. Human beings cannot be expected to have perfect control of their thoughts. The karmic rule is satisfied if one does not dwell on negative thoughts.

A power factor exists. Christian doctrine states: *Charity covereth a multitude of sins* [30]. This charity or good works, (charity of time or substance) provides a power factor for eliminating residual or negative Karma enabling the time to be shortened in reaching the apex of the pyramid or the transcendent state.

The basic needs of all life on Earth is optimized by 'The Golden Rule'- treating other entities and the environment holistically in the same manner as we would like to be treated. This perennial philosophy is an absolute truth that relates to all sentient consciousness universally throughout the Holographic Multiverse where intelligent life is the rule not the exception. Transcendence can be achieved by a high-level adherence to the universal tenets of the Golden Rule. Empiricism has been an impossible challenge for theology; and scientists have historically denigrated any dialogue utilizing religious dogma based on faith-based logic put forth by theologians as merely a product of pre-Galilean imagination. Therefore, only by developing a common basis for utilizing transcendence as a universal epistemological tool can S&T be united pragmatically. Producing a universal framework for transcendence seems of grave import because such a completion of human epistemology could have broad impact ultimately leading to world peace, higher quality of life and amelioration of environmental concerns.

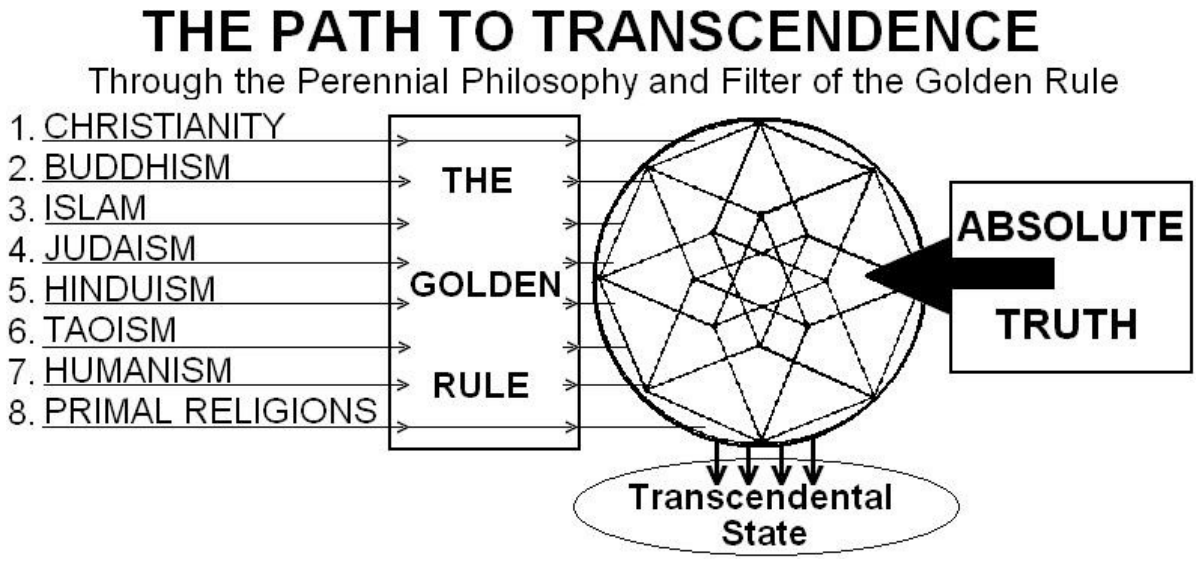


Figure 2. Because of the inherent spiritual nature of mankind as part of an Anthropic Cosmology with an inherent teleological life principle and the concomitant existence of 'Absolute Truth' in regard to spiritual matters, the Golden

[43] Unpardonable Blasphemy – This is not a condition of swearing or cursing of the general kind; but a rare occurrence of a fully transfigured person who has beheld God like a Moses who then turn against God.

Rule, as a universal principle of the Perennial Philosophy provides a path to both find God and spontaneously develop transcendence.

3. Transcendence as a Tool in Scientific Theory Formation

Since there are about 10,000 religious sects or spiritual paths in the world today, most of which have conflicting teachings or dogmas; how could developing an empirical metaphysics be possible? Whatever one's spiritual path - the dance of a twirling Dervish, fasting, meditation, charity, chanting, prayer or peyote, it is achieving the resulting pure transcendental state that is of paramount importance.
As done here for Noetic Cosmology a team of investigators attempting to utilize transcendence might also utilize the historical tracts or scriptures pertinent to their individual path as a starting point to help guide the questions posed to the universe. We realize the extent of this challenge; one must have sufficient faith in the veracity of a scriptural tract to use it as a starting point. The spirit of truth gained from entering the state of transcendence is then used in the Platonic sense [1] for verification. Noetic insight is received through diligent study after sufficiently following ones individual path to perfection (fig 1) in conjunction with prayerful meditation. Alternatively, when one comfortably 'hovers' at the apex of the pyramid if ones is studying a mathematical physics manuscript a passage on the Bessel function may leap out while reading or later while pondering as a transcendent suggestion that the Bessel function is pertinent to the engineering or otherwise problem at hand.

We wish to make it clear that receiving such 'revelations from God' need not interfere with experimental verification; because as we mentioned earlier all theory formation has a metaphysical element when initially formulated in the creative mind(s) of its inventor(s). Therefore, the metaphysical act of theory formation is independent of the pragmatic demands of hard science which is the second step or companion step in theory testing. There is already a growing movement for integrating science and theology.

Examples of noetic insight from history are Friedrich Kekule's dream of a snake joining head to tail in the discovery of the benzene ring, or perhaps more pertinent to our interest in the nature of consciousness here, Descartes claim of receiving a revelation from God designating to the distinction between mind and body [31]. Descartes 'vision' has remained controversial for over 400 years and is only now about to be tested by the methods of noetic theory. Science, if my work here has been successful, has finally progressed to the point where this is possible.

The great value of developing an integrative discipline of science and spirituality is that potentially 10's, 100's, or even 1,000's of years could be saved, along with the resources expended on spurious research paths that could alternatively be used to alleviate human suffering or maintain the environment etc. The timing in the Zeitgeist seems on target as history already suggests an asymptotic increase of technical information; so to keep pace transcendence seems timely.

As an example of a test question, for example noetic theory considers the Big Bang an erroneous interpretation of astrophysical data (Hubble discovered redshift not a Doppler expansion); more horrific at the time of this writing when a Nobel Prize has just been given out for the Big Bang's discovery touted as one of the most profound discoveries of the last century. If this noetic premise is proven true, some of the best minds in astrophysics could have more efficiently expended hundreds of thousands of man-hours over the last 75 years. Science by definition is satisfied only by empirical evidence and theology by quietly submitting to faith. Francis Crick believes that the concept of a soul is a myth and that modern

neurobiologists (except notably the late sir John Eccles [32] see no need for a religious concept to explain the interaction of nerve cells [33]. He calls this an astonishing hypothesis since over ninety percent of the earth's population believes in the soul.

4. Absolute Truth in Theology

The philosophical or theological concept of absolute truth is something has been argued for centuries; whether there is such a thing, what form it takes, can it be proven, and what are the implications if any. A very simple perspective is taken here: Absolute truth indeed exists, it is independent of opinion or even what some kinds of empirical tests might show; because sometimes interpretation can be ambiguous. Absolute Truth can only be verified through transcendence. For example, in near history the Earth was considered flat (as can be seen from any mountain top or the seashore) and the center of the universe.

Although we might be interested in forms of theological Absolute Truth like 'the Gods organized the Earth and gave life to man' [34]; some theological elements will not easily lend themselves to standard experiential-experimental forms of ‘empirical metaphysics’ and will have to be ‘confirmed’ by mutual verification by teams of noeticists experiencing the same transcendent “facts” or remain faith-based until a viable experimental protocol can be designed. Critics might consider the “divinations” of a particular group a form of group hysteria, which might be dispelled if disparate groups are causally separated.

If we consider God to be the Great Physicist, it is physical truths that science would be most interested in and also most readily verified by standard empiricism after transcendent discovery. It is difficult to predict what the world might do when it realizes that the path to transcendence is formulaic and while not necessarily a cake-walk so to speak but certainly no more difficult than learning to play the piano proficiently. And the earlier one began the easier the journey. This is not unreasonable considering that most scientists undergo an average of 22 years of study in preparing for an academic life, plus the lifelong study to keep abreast of developments in ones field(s).

5. Absolute Truth in Science

Interestingly there exists a concept of absolute or immutable truth in science:

> A truth that represents a permanent and final grasp of some limited aspect of nature. Most people would say this is incompatible with the expectation that our theories will be falsified. I adhere to the expectation that our theories will be falsified, and look for the immutable truth only in those theories that have already been falsified. Newtonian mechanics...is an example of the most certain and permanent truth man has ever achieved. Its only failing is its scope; it does not cover everything [35].

Now that it has been falsified it is an 'absolute truth' in the domain it describes.

6. The Path to Transcendence

Consciousness is an ubiquitous cosmological principle of the universe; and the human mind is a complex system imbedded in this universe. Inherent in the nature of the human mind is a fundamental spiritual component; that allows absolute truth to be perceived from any valid perennial path. Transcendent abilities seem to derive from three main avenues:

1) A specific type of innate personality structure, which comprises our psychological makeup, level of intelligence, knowledge and wisdom, all of which occupies the spacetime structure of the individual psychosphere [36].
2) Special gifts that the universe bestows upon us for its own purposes, or more likely through modification of number 1 above or that we have developed by certain forms of psychological stress or earned as in 3 below.
3) Personal preparedness; which seems to equate in direct proportion to living life by the golden rule and any other ethical principles.

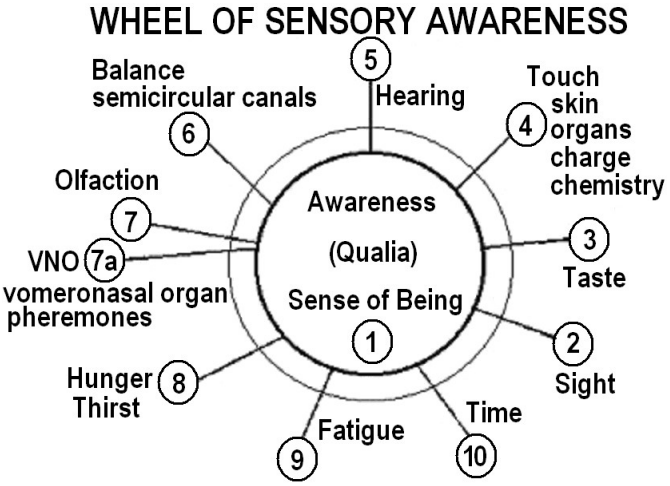
There are exceptions to the ascension of the basic karmic pyramid and more details beyond the scope of the discussion here, but as a simple generalization as one climbs the Karmic pyramid of perfection the threshold of spiritual enlightenment or reaching the transcendent state occurs when our imperfections become limited to misdeeds of thought only. There is a motivational factor also, and wisdom can also relate to mastery of the principles related to the chosen path that might enhance or vary this threshold. It helps to be actively engaged in a worthy cause or service to humanity. Idleness would be a detractor to spiritual awareness. One must at least be involved in meditation or prayer.

One must also choose a viable spiritual path. It does not seem reasonable that one could pay singular homage to a stone, currency, psychotropic pharmacopoeia, or 'legal' forms of passion and expect a significant degree of success while mentally occupying the top of the pyramid. Of the 10,000 spiritual paths existing on Earth today, one must use one that works. One's stage of personal growth limits the choice of perceived path. Some paths are significantly better; and it seems that there are relatively few that enable true enlightenment in a reasonable length of time. The path must therefore be chosen carefully. "It takes nearly a quarter century to become a great physician. Why, oh, why do people think they can fathom the most spiritual depths without the necessary experimental and laboratory work accompanied by compliance with the laws that govern it?" [34]. Kimball further states this expertise comes from personal righteousness followed by revelatory experience precept upon precept.

7. The Law of Hierarchies and Noetic Epistemology

In applying Noetic Field Theory [37-39] to the quantization of the soul [40] and "The spirit in the body is the soul of man" [13]; how does the metaphor of the Karmic pyramid relate physically as a law of hierarchies as the means for reaching the transcendental state? Following the work of Plato we have defined noetic insight [1] as the highest form of knowing; and stated that transcendent communion operates because 'the spirit in the body is the soul of man' [15] and 'all spirit is matter' [15].

Figure 3. There are many more than the 5 common senses; all of which are connected to awareness. The term '6th sense' is a misconception. All of the senses are normally coupled to receive input from external sources but through a different orientation the mind can be coupled to higher dimensional spacetime to receive nonlocal input which is how 'paranormal' effects occur.



All matter is not spirit but can become so by perfection. But in the meantime, in our temporal existence the human soul is comprised of earthy matter and spiritual matter in a complementarity of temporality and eternity. Our consciousness is imbedded in temporality and this is where our sensory apparatus is coupled to. It is a misconception that there is a 'sixth sense'. What actually happens is that the senses couple to higher dimensionality instead which is in closer proximity to the flux of the vital noetic field. This is what occurs when one achieves the transcendental state. In a crude metaphor this could be likened to an electron going to a higher orbit in an atom when it is energized. The confinement of the electron to the higher orbit is similar to the senses being coupled to a higher plane of spacetime.

Newtonian mechanics was cast in 3 dimensions. Einstein showed us that we live in 4 dimensions, which is the limit of our normal perceptual phenomenology; but God dwells in the complete hyperstructure of at least 12 dimensions because this is the minimum number to describe eternity – meaning being causally free of temporal reality. Sins of deed and thought maintain a gulf from the 12D of perfection separating us from the full unity of the spirit and confining our matter to the 4D subspace.

Our goal should be to separate our being from the dross matter of imperfection and *precept-by-precept* climb the ladder of dimensions to the full 12D complement of light. Like the light in a laser reverberating between the mirrors of coherent reflection, a light explosion in all the 12 directions, not attenuated by any darkness that stops the light or makes it tarry into dissipation.

Spirit Song Over the Waters

The soul of man
Resembleth water:
From heaven it cometh,
To heaven it soareth,

And then again,
To earth it descendeth,
Changing ever.

- Goethe

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