

## Article

# Crossing the Psycho-Physical Bridge: Elucidating the Objective Character of Experience

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### Abstract

Recalling Thomas Nagel's discussion concerning 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. In this article we call into question the fundamental philosophy of the mind-brain identity hypothesis of Cognitive Theory: 'What processes in the brain give rise to awareness?' and the associated search for 'neural correlates of consciousness' (NCC). The proper scientific manner of posing the query should simply be 'What processes give rise to awareness?'. We begin to formalize the Eccles psychon and summarize one of fourteen empirical protocols to test this putative model. This requires a new science of Unified Field,  $U_F$  Mechanics, entailing in terms of our current stage of development operationally completed forms of quantum theory, gravitation and cosmology arising from a unique derivation of the M-Theory (string theoretic) vacuum. Until now the quest for psychophysical bridging has typically been in the arena between brain and quantum geometry; and many have wondered if contemporary science is sufficient for the task. Nagel further asks 'what would be left if one removed the viewpoint of the subjective observer' and then suggests 'that the remaining properties would be the physical processes themselves or states intrinsic to the experience of awareness'. We examine a new theoretical framework for introducing and experimentally testing the underlying physical cosmology of these noetic parameters.

**Keywords:** psycho-physical, objective character, experience, consciousness, unified field, noetic.

“There is ... only being.” – *Albert Einstein* [1]

If [all physicists] follow the same current fashion in expressing and thinking about electrodynamics or field theory, then the variety of hypotheses being generated ... is limited. Perhaps rightly *so*, for possibly the chance is high that the truth lies in the fashionable direction. But, on the off chance that it is in another direction - a direction obvious from an unfashionable view of field theory - who will find it? Only someone who sacrifices himself ... from a peculiar and unusual point of view, one may have to invent for himself - *Richard Feynman*, Nobel Prize lecture.

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## 1. Philosophical Overview - Critique of the Current Perspective

Thomas Nagel has said, if our idea of the physical ever expands to include mental phenomena, it will have to assign them an objective character [2]. Nagel recognized 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 [2].

Psychophysical bridging was considered in the 1920s by Harvard philosopher Troland [3]: “*We can say that the consciousness belongs to the organism as a piece of private property. It would be equally legitimate, however, to say that the organism belongs to the consciousness. One thing is certain, that the consciousness does not reside in the organism nor is the organism present in consciousness.*” In honor of Nobelist Sir John Eccles we attempt to cross the psychophysical bridge by formalizing his psychon concept [4], not limiting it to the dendron as he originally suggested; but extending it to all coupling structures involved in ‘consciousness’ such as microtubules, neural networks, DNA, and cells in general. We further suggest this association applies to all biochemical species throughout the body and all associated spacetime points of an entities temporal-local and atemporal-nonlocal ‘Psychosphere’ - defined as the total domain of individuality [5-8]. This is not merely a relation of classical/quantum mechanics as considered until now. The key advance is to introduce a Unified Field,  $U_F$  Mechanics itself [9].

In summary, delineating the principles for introducing  $U_F$  mechanics into Self-Organized Living Systems (SOLS) is compounded by the fact that the parameters are *avant-garde* to current thinking in biophysics. Key elements are a new cosmological paradigm with a unique string or M-Theoretic vacuum, and higher dimensional (HD) extensions of quantum theory. Details are extensive and technically obtuse but can be found in [5-11]; here we provide axiomatic conceptual summations. The field of consciousness research has a broad spectrum with ongoing debate about whether classical dynamics is sufficient, or from the AI camp whether an algorithm on a standard Turing machine could be used to demonstrate human mind. In many ways the Penrose orchestrated reduction (OR) model could be said until now to be the most detailed avenue for exploring psychophysical-bridging with most cognitive scientists currently agreeing that a better understanding of quantum principles is required to bridge the gap between mind and body. But is anything left under the auspices of the Copenhagen interpretation of quantum theory which even its founders said could not describe living systems? Here we suggest that the Copenhagen Interpretation fails all attempts to describe psychophysical-bridging as it is not the physical regime of mind-body interaction. The fourth avenue, interactive dualism has been summarily rejected as archaic and intractable because an immaterial mind, as Descartes proposed, is said to violate the 2<sup>nd</sup> law of thermodynamics or the conservation of energy.

We cannot fault Descartes for thinking his concept of *res cogitans* was immaterial because even now 400 years later we still do not know the ultimate fundamental nature of matter [8-11]; what we perceive as his understanding of the term *immaterial* would be open to considerable debate. The

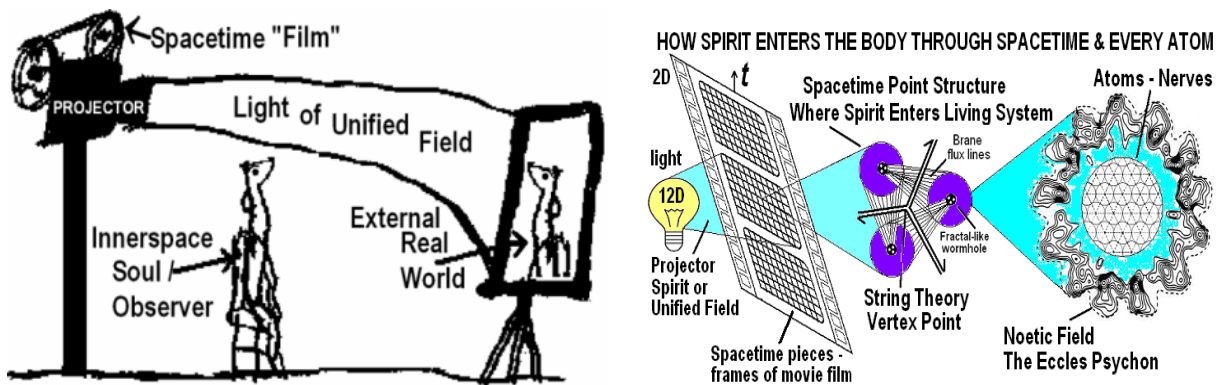
simple Webster definition of immaterial is: ‘not consisting of matter - spiritual’. One would surmise that Descartes dwelt on the spiritual aspect of the meaning and not a possible physicality. Also recall that it was not until 300 years later that Einstein proposed a definition of light as quanta. Paraphrasing, Einstein went on to say, ‘anyone who thinks they understand the nature of light is a fool’. We should likewise not fault cognitive theorists for not accepting the existence of an underlying anthropic principle because until now its discovery has remained elusive, undefined, beyond the reach of experimental science and relegated to historical disparagement going back to the myopic bias of the Inquisition at the time of Galileo. In the same manner that quantum principles are unavailable to methods of classical science; consciousness has likewise not been measureable from within the framework of current empirical techniques of quantum cosmology.

Summarizing Hameroff:

The embedding of proto-conscious experience is described in the physics of quantum geometry at the Planck scale, the most fundamental level of the universe. The physical/material side resides in the brain—specifically, in quantum electron dipole states mediating computations in microtubules and other biomolecular structures involved in consciousness. The connection between the two sides—the psycho-physical bridge—is a specific process called Penrose objective reduction (OR), a proposed threshold for quantum state reduction inherent in Planck scale quantum geometry...The Planck scale is the basement level of reality...operates in microtubules within gamma-synchronized dendrites...Each conscious moment...is according to Penrose OR, an event or transition in spacetime geometry. Consciousness is a sequence of transitions, of ripples in fundamental spacetime geometry, connected to the brain through Orch OR...provid(ing) the best general framework for understanding the mind-matter bridge [12].

## 2. Radical New Direction for Mind-Body Research

We must now take umbrage with statements ‘the Planck scale is the most fundamental basement level of the universe’, that OR represents the psycho-physical bridge or spacetime geometry is fundamental; because these conditions are false and can no longer be considered a sufficient basis for defining parameters of awareness. In the same way we discovered a distinction between Classical and Quantum with each domain being a physical regime with its own laws and methods of investigation; mind is also comprised of physically real matter that exists and operates in a different arena. Recall that  $U_F$  Mechanics [9] is just being formalized providing the long anticipated third regime. Thus our understanding of the physical world now evolves from Classical to Quantum to Unified (CQU). Description of our universe, called the Standard Model, is presently governed by the rules of the Copenhagen Interpretation of quantum theory, electromagnetism and Special/General Relativity cast in a Big Bang cosmology. A top down description that reduces to an impenetrable barrier, a so-called stochastic quantum foam at the  $10^{-33}$  cm Planck scale representing the lower limit of a reality where we (mind, awareness) as ‘observer’ are embedded in and made out of its emergent material properties. This Planck scale is not the ‘basement of reality’ as Hameroff calls it [12], only a temporarily closed door [11] imposed by the Copenhagen interpretation of quantum theory that we can now open and pass through with parameters of Noetic Field Theory (NFT): The Quantization of Mind [5-8]. This CQU progression is neither top-down nor bottom-up but entails what we call continuous-state free fall-like cycling [5-11].



**Figure 1.** a) Macroscopic movie theatre metaphor of anthropic awareness (like Plato's analogy of the cave or virtual reality) and the observer's place in the theatre. Discrete frames (film) pass through the projector (spacetime) lit by coherent energy of the  $U_F$  streaming through the observer embedded in the theatre and appearing as the continuous flow of reality (awareness) on the screen. b) Microscopic details of transduction of the  $U_F$  through the complex exciplex spacetime raster LCU gate (Figs. 3,4) into every point, atom and thus molecule of Self-Organized Living Systems (SOLS) the propagation of which also produces a locus of spacetime points associated with the arrow of time because it is part of the structure and content of the observers mind [10].

The last great age of discovery about 100 years ago, a transition from the Newtonian 3D representation of classical mechanics (Euclidean) to Einstein's relativistic and quantum mechanical 4D world (Riemannian), was preceded by a dilemma called the ultraviolet catastrophe predicting an ideal black body at thermal equilibrium emitted continuous radiation with infinite power. Discrete quantum jumps solved this problem. The current dilemma is similar and centers on what physicists call renormalizable and nonrenormalizable infinities in quantum field theory calculations. The method is tantamount to artificially subtracting infinities from infinities to get desired finite answers. This conundrum provides the current historical indicia of the immanent transition to a new age of discovery [10]. As usually the case with radical new ideas the transition appears complex initially - the transition from the current 4D quantum perspective to a 12D  $U_F$  string or M-Theoretic Anthropic Multiverse [5-11].

There is currently no consensus on what form this evolution should take. Most physicists believe a  $U_F$  theory (coined by Einstein) should be a quantum theory uniting the four fundamental interactions; but there is no *a priori* reason this should be the case and many physicists in recent decades transferred the search to an 11D M-Theoretic (4D + 2D to 6D brane world instead of the original 1D string) regime. The 11<sup>th</sup> dimension in M-Theory unites the five forms of string theory; and the 12<sup>th</sup> dimension of noetic cosmology (NFT) introduces the action of the anthropic principle absent from the usual Big Bang form of 11D M-Theory.

Classical Mechanics describes an event between two coordinate systems by what is called the Galilean transformation for uniform motion at velocities less than the speed of light in 3D Euclidean space. Events of quantum mechanics and with relativistic velocities are described by the Lorentz-Poincaré group of transformations in a 4D Einstein-Minkowski spacetime. In order to

cross the Psycho-Physical Bridge noetic cosmology utilizes an extension of M-Theory requiring a new 12D set of transformations called the Noetic Transform because it includes properties of an inherent teleological anthropic principle described by the evolution of  $U_F$  dynamics [9-11].

To achieve this result we utilize a battery of new physical assumptions (developed in ensuing sections):

- The HD regime of  $U_F$  dynamics is a ‘sea’ of infinite potentia from which the 4D reality of the observer cyclically emerges as a nilpotent resultant (Figs. 6,7). Nilpotency - technically meaning ‘sums to zero’ [13], is a required basis for the noetic cosmologies infinite potentia simplistically like the entangled alive-dead quantum state of Schrödinger’s cat before a realized local event occurs.
- Action of the  $U_F$  mediated by noeon ‘flux’ (the noeon is the exchange unit of the  $U_F$ ) is the life principle both animating SOLS and supplying psychon energy for the physical evolution of qualia [6-8].
- The  $U_F$  does not operate as a usual phenomenal field (mediated by an energetic exchange quanta like the photon of the electromagnetic field) but as an energyless ontological field by a process called ‘topological switching’ transferring a force of coherence between branes [6,8]. Note: This property of  $U_F$  dynamics removes the problem of violation of the 2<sup>nd</sup> law of thermodynamics or the conservation of energy from Cartesian interactive dualism.
- The key process associated with the topological transformation of noeon exchange is a holophote action (like a lighthouse beacon) providing a gating mechanism acting as the psychophysical bridge between the potentia of the  $U_F$  12D space and the localized 4D spacetime and 3D matter it embeds [5-11].
- The noeon gating mechanism is a complex of close-packed Least Cosmological Units (LCU) [5,14,15] comprising the raster tessellating spacetime detailed in the text below as an exciplex (excited complex) [9-11]. This delineation is the primary focus of our discourse as it provides the actual psychophysical bridge.

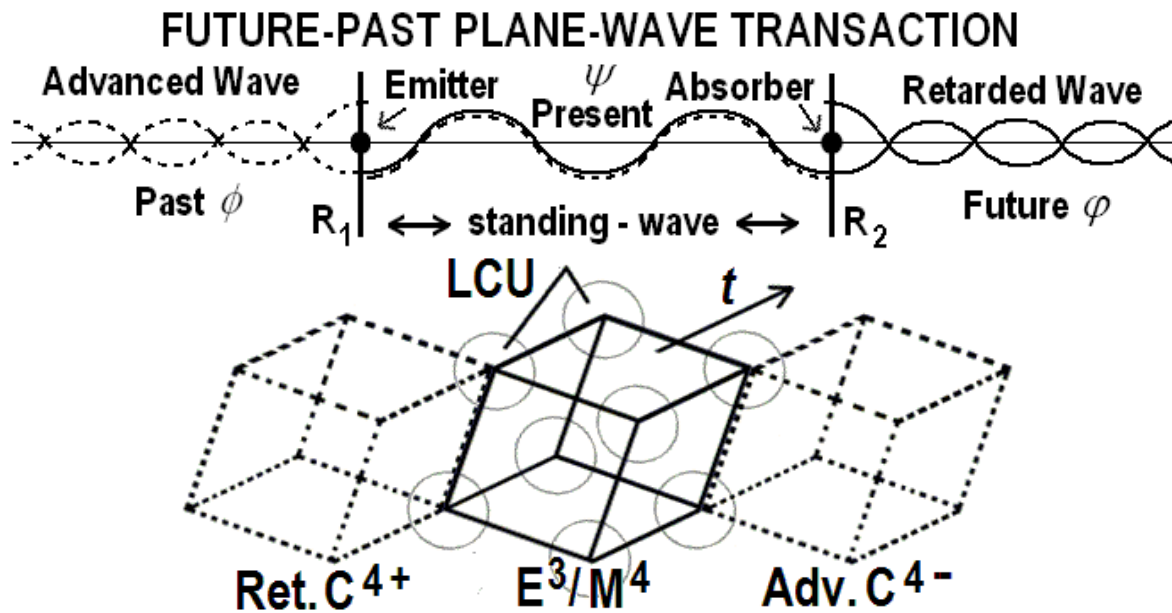
### 3. Required New Cosmology and Associated Physics

For the scientific perspective to evolve beyond the usual Copenhagen Interpretation of quantum theory requires a new cosmological paradigm, an enormous challenge because as generally known a Nobel Prize was given for discovering supposed Big Bang parameters. At the time of Galileo logic failed beginning the current age of empiricism. One should not say that the current conundrum is an error of experimental method; but rather an error in data interpretation. Hubble discovered redshift not a Doppler expansion of the universe! Full delineation of the new cosmology is beyond the scope of this paper, but detailed in [5-11]. In summary we axiomatically introduce pertinent concepts. The new noetic cosmology is required to explain, utilize and design experimental access to the new  $U_F$  regime where physical parameters for psychophysical-bridging reside.

- The Planck scale can no longer be considered the most fundamental level of reality. Three regimes of reality must be addressed: Classical  $\Leftrightarrow$  Quantum  $\Leftrightarrow$  Unified Field; all of which cycle continuously [5-11].
- No ‘mental’ quantum state reduction exists in the usual sense of wave function collapse [16]; suffice it to say (in terms of the de Broglie-Bohm and extended Cramer interpretations of quantum theory) [17,18] a continuous evolution exists instead [5,17]. Collapse of the wavefunction reduces the quantum state to a classical state, which does not generally happen (perhaps a ‘senior moment’ or other form of momentary total gap in awareness may constitute collapse) in the nonlocal flux of qualia as the locus of awareness; especially since now more pertinently qualia are not quantum phenomena per se but unified field phenomena. Quale ‘rest on’ the quantum regime but only as part of the sensory transduction apparatus.
- The Planck scale is not an impenetrable barrier [5] even though considered so as an empirical fact demonstrated by the quantum uncertainty principle. This is a main problem with utilizing a Darwinian naturalistic Big Bang cosmology originating from a putative singularity in time as the basis for cognitive theory. In an anthropic multiverse cosmology utilizing extended quantum theory and M-Theory the answer is simply: ‘do something else!’ which opens physical investigation into a new  $U_F$  realm of large scale additional dimensions (LSXD) [10,11,19]. The anthropic multiverse is closed and finite in time, i.e. the 14.7 billion light year Hubble radius,  $H_R$ , but open and infinite in atemporal eternity [5,11]. ‘Worlds without number, like grains of sand at the seashore’ [20] the multiverse has room for an infinite number of nested Hubble spheres each with their own fine-tuned laws of physics [5].

Fourteen empirical protocols have been proposed [11] (the 1<sup>st</sup> reviewed here) for demonstrating, gaining access to and leading to a variety of experimental platforms for first hand investigation of awareness (qualia) breaking down the 1<sup>st</sup> person 3<sup>rd</sup> person barrier as called for by Nagel [2].

It is said that string theory only has one parameter; that of string tension,  $T_S$ . But string theory has been fraught with the dilemma of a Googolplex ( $10^{\text{googol}}$ ) or infinite number of vacuum possibilities. Utilizing the Eddington, Dirac, and Wheeler large number hypothesis [5,10] we derived an alternative derivation of  $T_S$  leading to one unique string vacuum and what we call the ‘continuous-state hypothesis’ an alternative to the expansion/inflation parameters of Big Bang cosmology [5]. Simplistically the perceived inflation energy of Big Bang cosmology postulated as a Doppler expansion from a primordial temporal singularity, instead according to the noetic continuous-state hypothesis, is localized in an ‘eternal present’ as if in permanent ‘gravitational free-fall’ [5]. Since we are relativistically embedded in and made out of matter this condition means that all objects (in our 3D virtual reality bubble) exist (in HD) as if they were in gravitational ‘free-fall’. This is better explained by two other interpretations of quantum theory generally ignored by the physics community because they are myopically considered to add nothing. That of the de Broglie-Bohm Causal Interpretation [17] and the Cramer Transactional Interpretation [18]; where spacetime and the matter within it (all matter is made of de Broglie waves) are created-annihilated and recreated over and over as part of the perceived arrow of time and creation of our 3D reality as a resultant from HD infinite potentia as a ‘standing-wave’ (Fig. 2) [5,10]. This can be best understood conceptually by a movie theatre metaphor (Fig. 1).



**Figure 2.** a) Conceptualized structure of a Cramer transaction (present state or event) where the present (simplistically) is a standing-wave of future-past potential elements. A point is not a rigid singularity (although still discrete) as in the classical sense, but has a complex structure like a mini-wormhole where  $R_1$  &  $R_2$  (like the frets holding the wire of a stringed instrument) represent opposite ends of its diameter. b) How observed (virtual) 3D reality arises from the infinite potentia of HD space (like a macroscopic transaction). The ‘standing-wave-like’ (retarded-advanced future-past) mirror symmetric elements  $C^{4+}$  /  $C^{4-}$  (where  $C^4$  signifies 4D potentia of complex space distinguished from the realized 3D of visible space) of continuous-state spacetime show a central observed Euclidian,  $E_3$ , Minkowski,  $M_4$  space resultant. Least Cosmological Units (LCU) governing evolution of the ‘points’ of 3D reality are represented by circles. The Advanced-Retarded future-past 3-cubes in HD space guide the evolution of the central cube (our virtual reality) that emerges from elements of HD space.

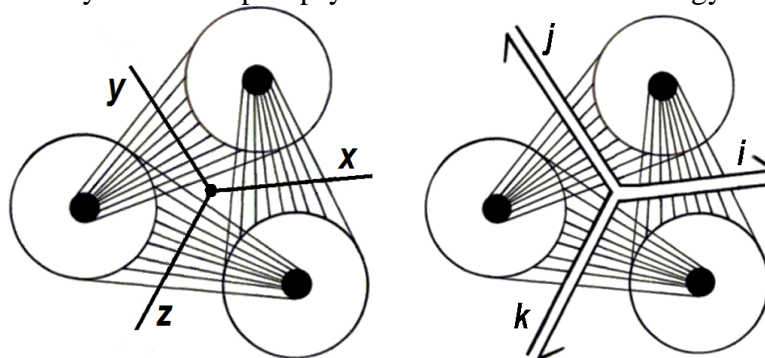
The problem has to do with the nature of a point or 3D vertex in physical theory [10,13]. What extended versions of de Broglie-Bohm and Cramer bring to the table is a basis for defining a fundamental ‘point’ that instead of being rigidly fixed classically (Fig. 3a) is continuously transmutable (Fig. 3b) as in string theory. This represents in essence the elevation of the so-called wave-particle duality for quanta to a Principle of continuous-state cosmology. What this does is cancel the troubling infinities in the standard model of particle physics in a natural way rather than by use of a mathematical gimmick called renormalization. We also build the continuous-state hypothesis around an object in string theory called the Witten Vertex [21] (Fig. 3b after noted M-Theorist David Witten). This means that when certain parameters (compactification, dimensional reduction etc.) associated with the Riemann sphere reach a zero-point; the Riemann sphere relativistically rotates back to infinity and so on continuously (Reminiscent of how water waves operate). The HD branes of so-called Calabi-Yau mirror symmetry are forms of Riemann 3-spheres or Kahler manifolds [10]. Instead of the insurmountable Plank foam, the gate keeper in this cosmology is an array of least cosmological units (LCU) [5,14,15] of which part (like the tip of

an iceberg) resides in our virtual 4-space and the other part resides in the HD (12D) regime of M-Theory. These LCU exciplex gates govern mediation of the  $U_F$  in the coherent ordering of the life principle of SOLS embedded in localized spacetime.

### 3.1. Spacetime Exciplex - $U_F$ Noeon Mediator

The spacetime exciplex or ‘excited complex’ of least cosmological units (LCU) is key to mediation of the  $U_F$  life principle of consciousness. In the usual 4D interpretation of quantum theory limited by the uncertainty principle, virtual quanta in the zero point field wink in and out of existence limited to the Planck time,  $10^{-43}$  s. For the noetic spacetime exciplex the situation is radically different. The duality of its HD structure (i.e. living in both local 4-space and nonlocal 8-space) allows it to remain in an excited state in 4-space never fully coupling with the Planck-scale ground state. This holophote interaction emits a noeon into every point (and thus atom) in spacetime (providing the life principle) and interaction with brain dendrons etc. for example as the flow of qualia as a form of superradiance.

Kowalski discovered that photon emission occurs only after electrons complete full Bohr orbits [22,23]. We apply this as a general principle for emission during rotation of the complex Calabi-Yau Riemann sphere which acts like a pinwheel-like scoop bringing in the next topologically switched hysteresis loop of psychon-brain interaction energy.

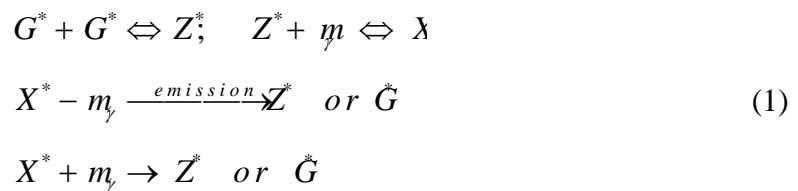


**Figure 3.** Conceptualization of the cosmological Least-Unit (LCU) tessellating space which like quark confinement cannot exist alone. a) Current view of a so-called point particle or metric  $x,y,z$  vertex. The three large circles are an LCU array slice. It is a form of close-packed spheres forming a 3-torus; missing from the illustration are an upper and bottom layer covering the  $x,y,z$  vertex and completing one fundamental element of an LCU complex. The field lines emanating from one circle to another represent the de Broglie-Bohm concept of a quantum ‘pilot wave or potential’ governing evolution. b) Similar to a) but drawn with a central ‘Witten string vertex’ [21] and relativistic quantum field potentials (lines) guiding its evolution in spacetime. The Witten vertex is not a closed singularity and because of its open structure provides a key element to the continuous-state process and rotation of the Riemann sphere cyclically from zero to infinity which represents rotational elements of the HD exciplex brane topology.

The exciplex concept as defined in engineering parlance is an ‘excited complex’ or form of excimer - short for excited dimer in chemistry nomenclature used to describe an excited, transient, combined state, of two different atomic species (like XeCl) that dissociate back into the constituent



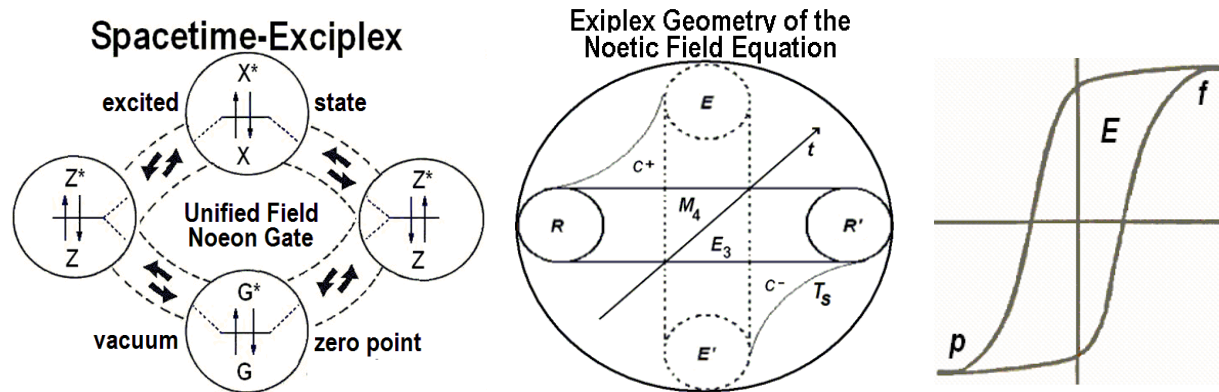
atoms rather than reversion to some ground state after photon emission. An excimer is a short-lived dimeric or heterodimeric molecule formed from two species, at least one of which is in an electronic excited state. Excimers are often diatomic and are formed between two atoms or molecules that would not bond if both were in the ground state. The lifetime of an excimer is very short, on the order of nanoseconds. Binding a larger number of excited atoms form Rydberg clusters extending the lifetime which can exceed many seconds. An Exciplex is also defined as an electronically excited complex, ‘non-bonding’ in the ground state. For example, a complex formed by the interaction of an excited molecular entity with a ground state counterpart of a different structure. When it hits ground a photon or quasiparticle soliton is emitted. In Noetic Cosmology we have adapted the exciplex concept as a tool to describe the LCU gating mechanism between the quantum regime and the regime of the  $U_F$ . The exciplex LCU gate is key to understanding interaction of the life principle with SOLS and the basis for developing empirical tests. The general equations for a putative spacetime exciplex are:



where as seen in Fig. 4a  $G$  is the ZPF ground state,  $Z$  intermediate cavity excited states and  $X$  the spacetime C-QED (Cavity-Quantum Electrodynamics) exciplex coupling. The numerous configurations plus the large variety of photon frequencies absorbed allow for a full absorption-emission equilibrium spectrum. We believe the spacetime exciplex model also has sufficient parameters to allow for the spontaneous emission of protons by a process similar to the photoelectric effect but from HD spacetime C-QED brane spallation rather than from a charged metallic surface. Not having a sufficient spacetime vacuum proton creation mechanism led to the downfall of Steady-State cosmology.

The new  $U_F$  basis centers on defining what is called a Least Cosmological Unit (LCU) [5,14] tiling the spacetime backcloth. An LCU (Fig. 3) conceptually parallels the unit cell that builds up crystal structure. The LCU entails the next evolutionary step for the basis of a point particle [13] and has two main functions; It is the raster from which matter arises, and is a central mechanism that mediates the syntropic gating of life principle parameters of the  $U_F$ . Syntropy is the negentropy process of expelling entropy by the teleological action of SOLS.

The LCU change from the current concept of a fixed Planck scale point (Fig. 3a) to what is called a Witten string vertex [21] (Fig. 3b) is a form of Riemann sphere (model of the extended complex-plane with points at zero and infinity for stereographic projection to the Euclidean plane) that cyclically opens into the LSXD regime of the  $U_F$ . Behind the current view of  $\hbar$  (Planck’s constant) as a barrier of stochastic foam is a coherent topology with the symmetry of a spin raster comprised of LCUs [5,14].

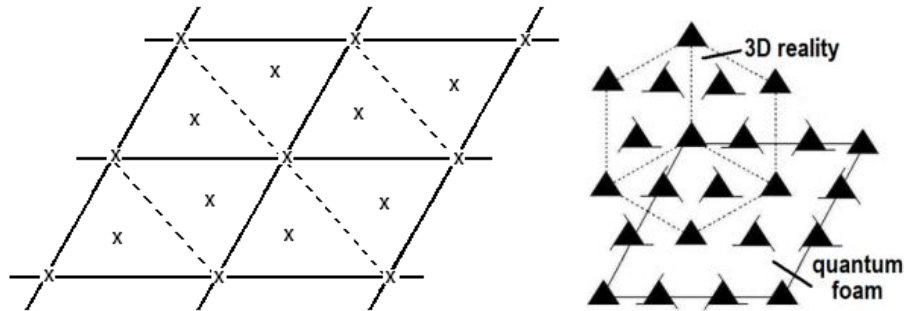


**Figure 4.** a) The geometry of the ‘spacetime exciplex’ (excited complex), a configuration of spacetime LCUs that act like a holophote laser pumping mechanism of  $U_F$  noeon energy and also how coherence of the  $U_F$  interacts with 3D compactified states in dendrons or microtubules for example. Locally the exciplex acts like an oscillating ‘cootie catcher’ [24]. b) Geometric representation of the Noetic Unified Field Equation,  $F_{(N)} = E/R$  for an array of cosmological LCUs. Solid lines represent extension, dotted lines field. Where  $F_{(N)}$  is the anthropic or coherent force of the  $U_F$  driving self-organization, total  $E$  equals the c) hysteresis loop energy of the hypervolume,  $R$  is the scale-invariant rotational radius of the action and the domain wall (curves) string tension,  $T_0$ .

### 3.2. Classical Phenomenology Versus Noetic Ontology

There is a major conceptual change from Quantum Mechanics to Unified Field Mechanics. The ‘energy’ of the  $U_F$  is not quantized and thus is radically different from other known fields. Here is what troubled Nobelist Richard Feynman: “...maybe nature is trying to tell us something new here, maybe we should not try to quantize gravity... Is it possible that gravity is not quantized and all the rest of the world is?” [25]. It turns out that not only is gravity not quantized but neither is the noeon energy of the  $U_F$  which is a step deeper than gravity.

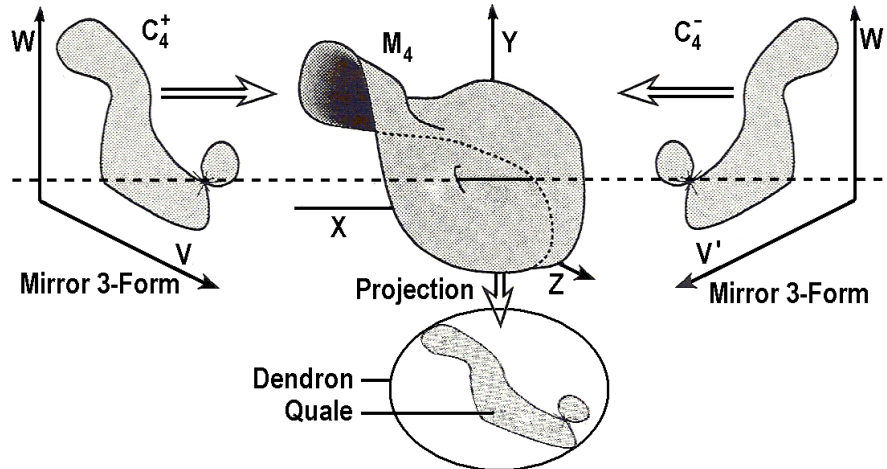
Here is one way to explain it. In a usual field like electromagnetism which is easiest for us to understand because we have the most experience with it, field lines connect to adjacent point charges. The quanta of the fields force is exchanged along those field lines (in this case photons). We perceive this as occurring in 4-space (4D). It is phenomenological. This is the phenomenon of fields. For topological charge as in the  $U_F$  with properties related to consciousness; the situation is vastly different. The fields are still coupled and there is tension between them but no phenomenological energy (i.e. field quanta) is exchanged. This is the situation in the ontological case. The adjacent branes “become” each other as they overlap by a process called ‘topological switching’. This is not possible for the 4-space field because they are quantized resultants of the HD topological field components. The HD ‘units’ (noeons) are free to “mix” ontologically as they are not resolved into points.



**Figure 5.** a) 2D view of the LCU tiling of the spacetime backcloth (Fig. 3). b) Projective geometry topologically giving rise to higher dimensionality (here the Fig. 4a 2D view extended to 3D). The triangles with tails represent the trefoil knots in Fig. 7 and the naked triangles the resultant cyclic point or fermionic vertex quantum state in 3-space (Spheres in Fig. 2b).

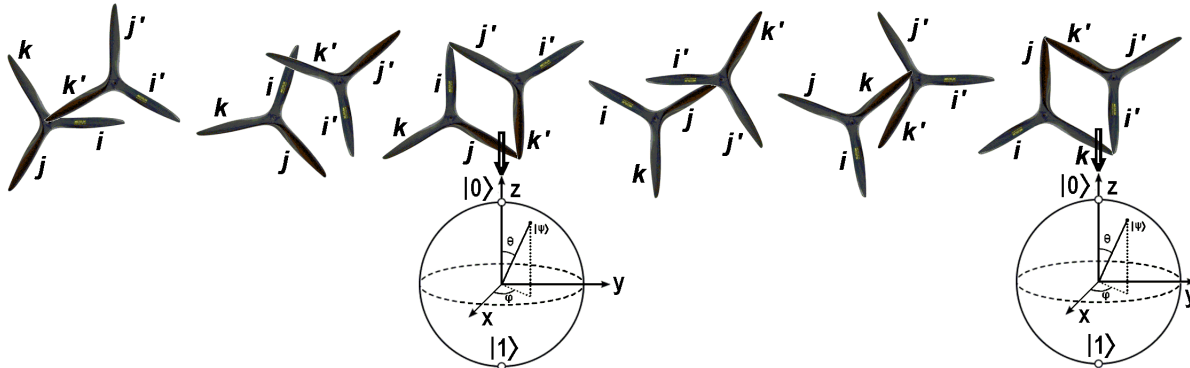
The metric still has points, or it might be better to say coordinates; but in HD super space they are unrestricted and free to interact by topological switching which is not the case for an “event” in 4-space. Whereas this singular quality (basis of our perceived reality) does not exist in the HD regime ( $U_F$ ) of infinite potentia! So if the  $U_F$  is not quantized how can there be a force which is mediated by the exchange of quanta? Firstly the  $U_F$  does not provide a 5<sup>th</sup> force as one might initially assume; instead the ontological ‘presence’ of the  $U_F$  provides a ‘force of coherence’ which is based on ‘topological charge’. It helps to consider this in terms of perception. If one looks along parallel railroad tracks they recede into a point in the distance, a property of time and space. For the unitary evolution of consciousness [6-8] this would break the requirement of coherence. For the  $U_F$  which is outside of local time and space, a cyclical restoring force is applied to our *res extensa* putting it in a *res cogitans* mode. The exciplex mechanism [5,10] guides rotation of the Witten vertex Riemann spheres to maintain a consistent level of periodic coherence (parallelism). It is a relativistic  $U_F$  process. The railroad tracks do not recede into a point. The Riemann sphere flips (our perception) beforehand.

The  $U_F$  provides an inherent force of coherence just by its cyclical presence. This means that it is ontological in its propagation or ‘interaction’. The railroad tracks remain parallel and do not recede to a point as in the 3-D phenomenological realm where forces are mediated by a quantal energy exchange. Another way of looking at this is that the 3-D observer can only look at one page of a book at a time while the HD observer (Godlike) can see all pages continuously (time-like). The LCU space-time exciplex is a mechanism allowing both worlds to interact nonlocally.



**Figure 6.** Complex HD Calabi-Yau mirror symmetric 3-forms,  $C_4$  become embedded in Minkowski space,  $M_4$  and the  $U_F$  energy of this resultant is projected (Fig. 1) into brain dendrons as a continuous stream of evolving (evanescent) superradiant qualia. This represents the lower portion only that embeds in local spacetime; there is an additional duality above this projection embedded in the infinite potentia of the  $U_F$  from which it arises (Fig.8).

Most are familiar with the 3D Necker cube (center of Fig. 2b is like a Necker cube) that when stared at central vertices topologically reverse. This is called topological switching. There is another paper child's toy called a 'cootie catcher' [24] that fits over the fingers and can switch positions. What the cootie catcher has over the Necker cube is that it has an easier to visualize a defined center or vertex switching point. So in the LCU exiplex spacetime background we have this topological switching which represents the frame that houses the gate which is the lighthouse with the rotating light on top.

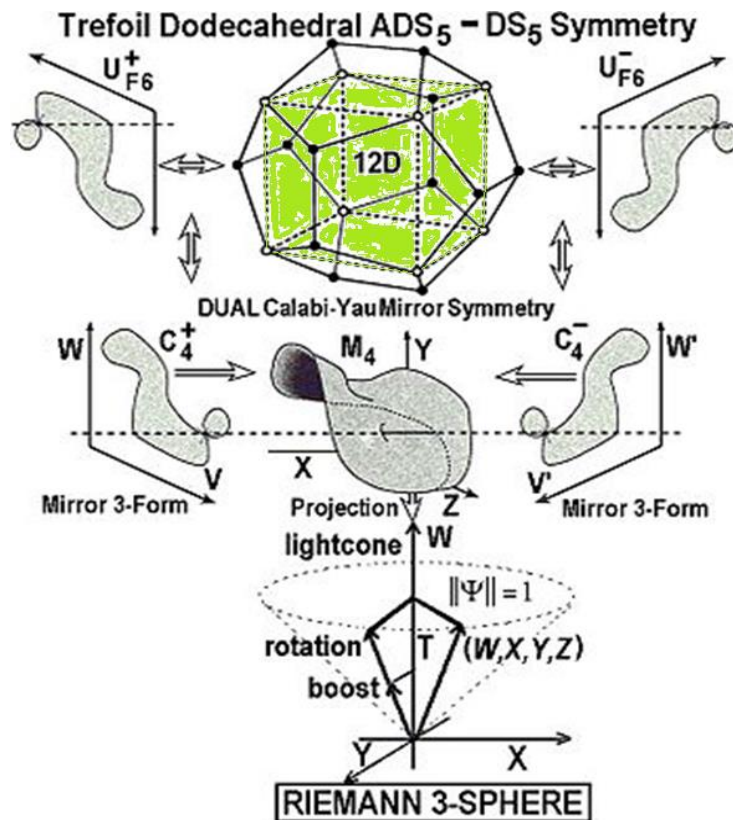


**Figure 7.** Locus of nonlocal HD mirror symmetric Calabi-Yau 3-tori (here technically depicted quaternionic trefoil knots) spinning relativistically and evolving in time. Nodes in the cycle are sometimes chaotic and sometimes periodically couple into resultant (faces of a cube) quantum states in 3-space depicted in the diagram as Riemann Bloch spheres. An animated version of Fig.6.

Now inside the structure there is also a 'baton passing'. The baton is like the lens that the light shines through but only at the moment of transfer (or coupling). In the HD  $U_F$  regime the 'light' is always on omni-directionally but only 'shines' into 3-space when the gate is open during the

moment of baton passing. In addition to baton passing there is also a form of ‘leap-frogging’. The leap-frogging represents wave-particle duality (remember we elevated it to a principle of cosmology). The leaping moment represents the wave, and the crouched person being leapt over is the particulate moment. The particle moment acts like a domain wall and no light passes when its orientation is aligned towards the 3-D world resultant. This is also an important aspect of the gating mechanism. This is of course a relativistic process such that the ‘beat frequency’ keeps SOLS well lit with the teleological anthropic ‘light of life’.

The trefoil knot (in Fig. 7 drawn as a Planck scale quaternion vertices) is holomorphic to the circle. Since energy is conserved we may ignore the complexity of the HD symmetries and use the area of the circle for the noeon hysteresis loop (Fig. 4c), in this case a 2D resultant as a 2-sphere quantum state as the coupling area of one psychon to a dendron. This idea is further conceptualized in Fig. 5 illustrating how a 3D object emerges from close-packed spacetime LCUs.



**Figure 8.** Completion of Figs. 5 & 6 illustrating full extension to an HD relativistic quantum state in continuous-state dual Calabi-Yau mirror symmetric HAM cosmology with Dodecahedral involute properties, as well as the continuous-state exciplex ‘hysteresis loop’ of noeon injection (not shown) as far as currently understood. The Bloch 2-sphere representation is also replaced with an extended Riemann 4-sphere resultant with sufficient parameters to surmount the uncertainty principle representing a unique M-Theoretic model of ‘Continuous-State’  $U_F$  dynamics as it relates to NFT and its putative exchange quanta of the  $U_F$ . the noeon.

## 4. The Physical Basis of Qualia

Qualia, plural of *quale*, as defined in philosophy of mind is ‘the subjective quality of experience; a *qualitative feel* associated with an experience’. The physics of noetic cosmology with an inherent *élan vital* based on  $U_F$  mechanics also provides the physical basis for representing quale in a rigorous empirically testable manner. Every experience has a specific subjective nature. If one removed the viewpoint of the subjective observer; what would be left? Nagel suggests the remaining properties might be those detectable by other beings, the physical processes themselves or states intrinsic to the experience of awareness. This changes the perspective of qualia to the form “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*” [2].

These are questions an integrative Noetic Science can now answer theoretically and empirically. Standard definitions of qualia are an inadequate philosophical construct describing only the subjective character. In the physical sense of Noetic Field Theory (NFT) components describing qualia from the objective sense are introduced for the first time - i.e. distinguishing the phenomenology of qualia from the underlying ontological ‘nonlocal noumenon’ or physical existence of the fundamental absolute *thing in itself*.

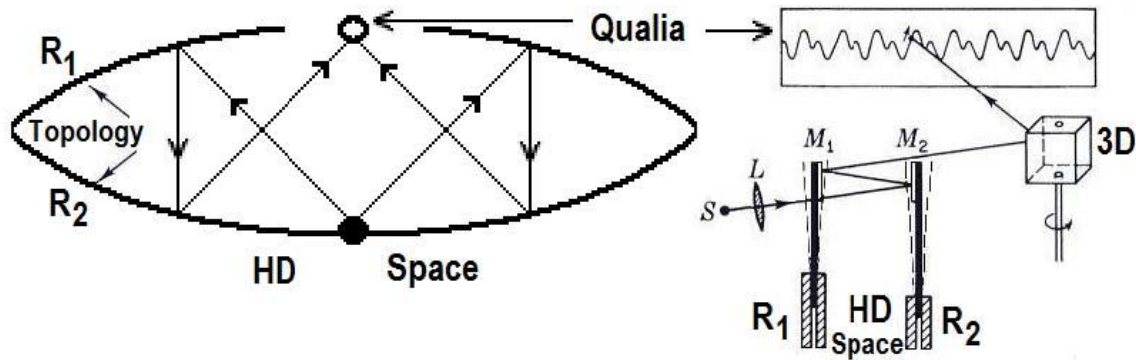
NFT suggests that a comprehensive definition of qualia is comprised of three component forms considered physically real because the noetic fields of Holographic Anthropic Multiverse (HAM) cosmology on which the noetic model for the quantization of mind is based are all physically real. The proposed triune basis of quale is as follows:

Type I. The Subjective - The *what it feels like* basis of awareness. Phenomenological mental states of the qualia of experience. (This is the current philosophical definition of qualia, Q-I)

Type II. The Objective - Physical basis of qualia phenomenology independent of the *subjective feel* that could be stored or transferred to another entity breaking down the 1<sup>st</sup> person 3<sup>rd</sup> person barrier. Noumenal nonlocal  $U_F$  elements and related processes evanesce qualia by a form of superradiance, Q-II.

Type III. The Cosmological - SOLS by being alive represent a Qualia substrate of the anthropic multiverse, acting as a ‘blank slate’ carrier (like a television set turned on but with no broadcast signal) from within which Q-II are modulated into the Q-I of experience by a form of superradiance (noeon exciplex gating mechanism) or hyper- holographic evanescence. Note: Q-III has sub-elements addressed elsewhere [6].

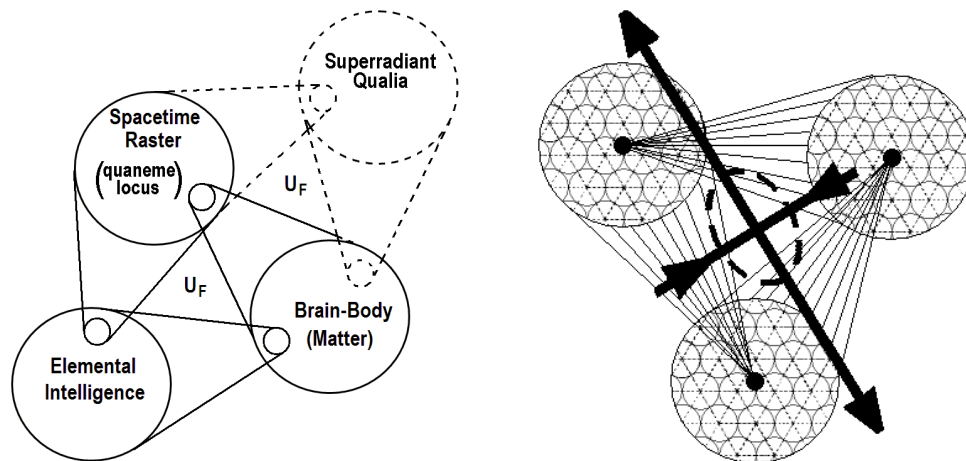
A standard image requires a screen or other reflective surface to be resolved; but if the foci of two parabolic mirrors (Casimir-like vacuum plates in our model) are made to coincide, the two images superpose into a real 3D holographic image that does not need a screen. A science toy called the ‘magic mirage’ is used to demonstrate this effect of parabolic mirrors. Objects placed in the bottom appear like solid objects at the top of the device. In 12D reality Calabi-Yau brane topology performs the same function for the locus of qualia propagation.



**Figure 9.** 2D rendition of an HD holographic process. An object (black circle) placed inside two parabolic mirrors (like Casimir domain walls) produces a virtual image (white circle) representing creation of a point in spacetime. Our virtual holographic reality is produced in a similar fashion by Cramer future-past standing-wave parameters from the HD Calabi-Yau mirror symmetric infinite potentia of the  $U_F$ . As in Fig. 1 this same process produces qualia with each lit point like a raindrop producing a rainbow.

The holophote action of *élan vital* energetics arises from the harmonic oscillation of close-packed LCU boundary conditions tiling the spacetime backcloth and pervading all SOLS. The inherent beat frequency of this continuous action produces the Q-III carrier wave that is an *empty slate* modulating cognitive data of Q-II physical parameters into Q-I awareness states as a superposition of the two (Q-III and Q-II). This modulation of qualia occurs in the HD QED cavities of the psychospheres cognitive domain. The QED cavities are a close-packed tiling of LCU noetic hyperspheres; the Casimir surfaces of which are able to reflect *quaneme* subelements. 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 in the Earth's ionosphere. This reflective 'sheath' enclosing the cognitive domain is charged by the Noeon radiation (exchange particle of the noetic field) of the *élan vital*, the phases of which are 'regulated' in the complex HD space of the fundamental least units of HAM cosmology.

How does noetic theory describe more complex aspects of qualia? Like a rainbow, light quanta (drop) are microscopic in contrast to the macroscopic sphere of awareness (rainbow). It thus seems reasonable to assume that scale-invariant properties of the HAM least units of awareness would apply. Like phonemes as fundamental sound elements for audible language qualia-nemes or *quanemes* are proposed for awareness; all based on the physical modulation of Q-II states by the geometric structural-phenomenology of the Q-III carrier base of living systems. The *quaneme* is a singular Witten point in the raster of mind like a locus of points forming a line. Each of these 'quaneme points' of noeon entry through the LCU exciplex gating array are like an individual raindrop that summate into a rainbow or thought train of awareness. This again takes us back to the movie theater metaphor of Fig.1 where the discrete frame of film (exciplex gated) is projected continuously on the screen, in this case the mind.



**Figure 10.** a) The physical basis of the continuous superradiant generation of qualia from the three components of mind: eternal Elemental Intelligence, Brain-Body (Descartes *res extensa*), and the superradiant qualia (Descartes *res cogitans*) mediated by the spacetime raster (quaneme locus) that exciplex gates ‘the light of the mind’ or  $U_F$  energy. The term quaneme is derived to parallel the phoneme component of sounds. b) LCU construct hidden nonlocally behind a 3-space singularity (black cross vertex).

#### 4.1 Formalizing the Eccles Psychon, a New Physical Unit for Measuring Energy of Awareness (Qualia)

NFT elevates the concept of qualia from the traditionally philosophical concept as used in cognitive science to an actual physically real fundamental noumenon. The term noumenon is defined as the ‘thing in itself’ beyond the veil of the phenomenological world; in Kantian philosophy a noumenon is something that exists independently of the intellectual or sensory perception of it. It is this fundamental physicality that will allow qualia to be ‘digitized’ in some form breaking down the 1<sup>st</sup> person-3<sup>rd</sup> person barrier leading to profound new ‘conscious’ technologies. Nobelist Sir John Eccles coined albeit an undefined construct, he called the psychon, to illustrate how mental energy coupled to brain dendrons (bundle of neural dendrites) [4] to complete his interactionist model of mind-body dualism [6-8].

Formalizing a ‘Psychon unit’ of measure is one of the applications made possible by a comprehensive science of qualia tantamount to the fundamental basis or nature of awareness. In meditative science it is said that ‘energy follows thought’. Here we have postulated that the qualia of awareness are comprised of a real physical form of energy related to new physics of the unified field,  $U_F$  [9,10]. In honor of Nobelist Sir J.C Eccles (discovery of the synapse) we propose to quantify this mental energy in terms of a new physical unit called the Psychon. The Einstein, a physical unit of energy measure named in honor of Albert Einstein for his explanation of the photoelectric effect in terms of light quanta (photons) bears conceptual similarity and we thus use that as our starting point. The Einstein is used to measure the power of electromagnetic radiation in photosynthesis for example where one Einstein represents one mole or Avogadro’s number of photons ( $6.02 \times 10^{23}$ ). In general physics the energy of  $n$  photons is  $E = n\hbar\nu = n\hbar(c/\lambda)$  where  $\hbar$  is Planck’s constant and  $\nu$  is the frequency. The second part of the equation is energy in terms of



the wavelength,  $\lambda$  (in nanometers,  $nm$ ) and the speed of light,  $c$ . Adaptation of this photon energy equation to measure Einsteins is very similar,  $E = N_0 \hbar \nu = N_0 \hbar (c / \lambda)$  where the energy of  $N_0$  photons is instead in Einsteins,  $E$ . In photometrics the measure used is one microeinstein per second per square meter, where one microeinstein,  $\mu E$  is one-millionth of an Einstein or  $6.02 \times 10^{17}$  photons imping a leaf for example.

We create a similar unit of measure to quantify the mental energy of quale called the Psychon as one mole or Avogadro's number of noeons. The force of all four known phenomenological fields (electromagnetic, strong, weak and gravitational) are said to have exchange quanta which mediate the field's interactions by an exchange of energy. For electromagnetism the exchange quanta is the photon. This quantal mediation has been experimentally verified for all fields except gravity because the graviton has not been discovered and according to NFT is not expected to be as the regime of unification is not quantum but instead correlates with parameters of  $U_F$  Mechanics [9,10].

The trefoil knots (in Fig. 7 drawn as Planck scale quaternion vertices) is holomorphic to the circle. Since energy is conserved we may ignore the complexity of the LSXD Calabi-Yau and AdS5 Dodecahedral symmetries and use the area of the circle, in this case a resultant continuous rotations of two circles as a 2-sphere quantum state or perhaps better as a torus as the coupling area of one psychon to a dendron. This idea is further conceptualized in Fig. 5 illustrating how a 3D object emerges from spacetime LCUs.

In considering psychon energy it may be easier to calculate the nonlocal brane area of the spacetime explex than the local volume or surface area of a dendron or array of microtubules etc. Recall that the intestinal villi are purported to provide the area of a football field. In any case we will not calculate here but leave it for a later publication since we still struggle with the conceptual problems relating to the geometric topology of noeon coherence. Recall that the de Broglie-Bohm interpretation entails a nonlocal pilot-wave or quantum-potential said to guide the evolution of the wavefunction ontologically. This concept was not very successful in 4D, but when carried to LSXD it works elegantly and the pilot-wave-quantum potential is like a 'Super Quantum Potential' that becomes synonymous with coherent aspects of the  $U_F$ . The  $U_F$  provides the basis for gravitation [10] and the life principle for living systems not just the evolutionary flow of qualia in the mind.

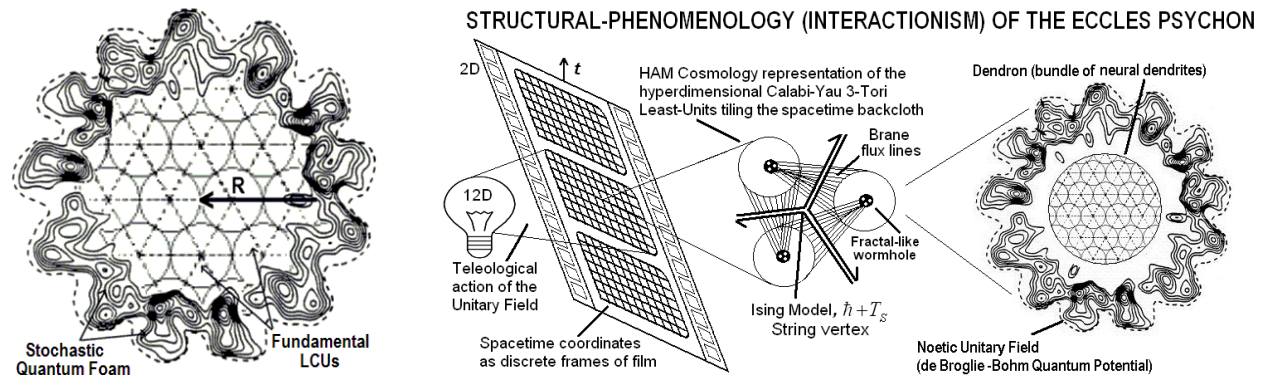


Figure 11. Conceptualization of Interactionist cosmology. a) Coherent interaction of the  $U_F$  bridging the stochastic quantum barrier into a brain dendron of radius  $R$  correlated with an underlying array of fundamental Least Cosmological Units (LCUs) forming the coupling of one Eccles Psychon unit with the brain. b) Showing injection of the noetic field or *élan vital* into spacetime points. c) Planck scale LCUs mediating the noetic field, d) An Eccles Psychon- $U_F$  Noeon field coupled putatively to a brain dendron.

A bit more noeon-psychon theory: A torus is generated by rotating a circle about an extended line in its plane where the circles become a continuous ring. According to the equation for a torus,  $\left[\left(\sqrt{x^2 + y^2}\right) - R\right]^2 + z^2 = r^2$ , where  $r$  is the radius of the rotating circle and  $R$  is the distance between the center of the circle and the axis of rotation. The volume of the torus is  $2\pi^2 Rr^2$  and the surface area is  $4\pi^2 Rr$ , in the above Cartesian formula the  $z$  axis is the axis of rotation. We wish to apply this to the holophote action of noeon exciplex flux. In atomic theory electron charged particle spherical domains fill the toroidal volume of the atomic orbit by their wave motion. If a photon of specific quanta is emitted while an electron is resident in an upper (like the  $U_F$  domain) more excited Bohr orbit, the radius of the orbit drops back down to the next lower energy level decreasing the volume of the torus in the emission process. (For the noeon-psychon maintaining a syntropic force of coherence.)

To summarize pertinent aspects of HAM cosmology:

- The nature of a point particle or singularity in physics has long been under debate. In Noetic Cosmology it becomes a continuous Witten vertex.
- The energyless interaction of the  $U_F$  occurs by what is called ‘topological switching’. Metaphorically this is like what happens when one stares at a Necker cube and the vertices are perceived to oscillate back and forth. This is the exciplex gate in noetic cosmology.
- In deference to Nobelist Sir John Eccles concept for mind-body interaction we quantify the energy of qualia in Psychons [4]. Like the Einstein, the psychon is defined as a measure of one mole of noeons, purported to be the topological exchange complex of the Unified Field,  $U_F$  which provides the energy that animates the stream of awareness or qualia.

Using the noetic field equation,  $N_F = E/R$  we need to calculate the energy of the noeon field from its space-time hysteresis loop (Fig. 4 b,c). This is a practical and conceptual challenge that is hard to meet. Imagine trying to calculate the surface area of the dendrite and synaptic boutons in a dendron, neural network or array of microtubules for example. Imagine a helicopter like those used to put out forest fires carrying a bucket of water retrieved from a nearby lake ( $U_F$ ). The volume of that bucket is known. So it is infinitely easier to work with the volume of the helicopter water bucket than to try to measure the surface area of the trees and other objects on the ground. When Eccles loosely defined the psychon dendron correlation he did not consider and Avogadro's number of noeons to enter into the picture. The question is can we correlate helicopter buckets of the  $U_F$  with the volume or surface area of an array of LCUs modulating energy of coherence entering the local space-time of a dendron?

For simplicity at this stage of development we use the general unexpanded form of the Noetic  $U_F$  equation,  $F_{(N)} = E/R$  where  $F_{(N)}$  is the force of coherence of the  $U_F$ ,  $E$  the relativistic rotational

energy and  $R$  the ‘cavity’ radius. The cavity represents a hysteresis loop of the LSXD brane energy dynamics. The cavity relates to the volume of the Calabi-Yau mirror symmetric dual 3-tori of the LCU holophote (lighthouse) gating mechanism. The gate cycles continuously through HD symmetries of M-Theoretic space through various compactification modes [5] until it reaches a 4D ‘standing-wave’ Minkowski spacetime of the standard model of observed reality, i.e. a Copenhagen domain wall of noeon energy pervading all spacetime and matter, i.e. SOLS as the *élan vital* (In our example a dendron). This process, is further described by the physics of the exciplex gating mechanism which is mediated by a new set of transformations beyond the Galilean-Lorentz-Poincaré which we call in deference to the anthropic multiverse which it is cast in - the Noetic Transform [5,6,10].

We derived our definition of the noeon (from the Greek *nous*, mind and *noēsis* / *noētikos*, perception-what the *nous* does) and the common “on” suffix in particle physics such as the phot-on as the fundamental exchange unit of the anthropic unified noetic field.

Although  $U_F$  dynamics entails a ‘force of coherence’ this does not seem to entail a 5<sup>th</sup> force. The ‘coherence’ implied is the resultant action; perhaps that is misleading. The  $U_F$  is primary - an originator of all the other forces that brings (pumps like a holophote) noeons, which are then immediately returned to the sea of infinite potentia. This cyclical process energizes living systems, qualia and gravitation etc. Theologically this is stated as: ‘*The spirit emanates from the throne of God, filling the immensity of space, it is life, the light of the mind and the power that frames the heavens*’ [26]. One sees that the anthropic principle (spirit of God) provides all these phenomena - Life, the Light of the Mind (qualia) and Gravitation! More work has to be done on noeon dynamics. This is what the experimental protocols are designed for - rigorous investigation.

#### 4.2. Parameters of Psycho-Physical Bridging: Neural Correlates of Consciousness (NCC)

We have said little of NCC; we do not claim there are none, only that the current Copenhagen Interpretation approach of Cognitive Science has been superficial and now needs to be recast in terms of the additional required  $U_F$  mechanics parameters. A simple delineation of these new principles is a challenge because it is expressed formally in terms of mathematical physics and cosmology. We have taken great pains to utilize metaphor and graphic aides. Technical details are found in the volumes [5,6,10] and numerous preprints online at [27].

The nature of the observer has long plagued physical science. Here we have briefly reviewed the current status and limitations of cognitive science in the context of a cosmology of mind in an Anthropic Multiverse [5,10]. The concept of an *élan vital* or life force has long been considered the elementary action principle driving the evolution of living-systems by theologically minded scientists and individuals. Sufficiently extending Einstein’s original model of a Static Universe, to a Holographic Anthropic Multiverse (HAM), has provided a context for solving this centuries old problem for introducing this type of teleological principle into Physics, Biology, Medicine and Psychology. This means the contemporary framework of biological mechanism (chemistry and physics are sufficient for describing life - no additional life principle is required, i.e. the cognitive mind-brain identity hypothesis) should no longer be considered the formal philosophical basis for describing living systems, the mind-body interface and contemporary allopathic (scientific)

medicine. The new noetic action principle of the unified field has far reaching implications for medicine and transpersonal psychology.

## 5. Empirical Tests of Noetic Cosmology Summarized

Viable experimentation will lead to new consciousness research platforms for studying fundamental syntropic properties of living systems. We have proposed fourteen tests of NFT; in this paper we summarize the main experimental protocol to test the noetic teleological 'life-principle' hypotheses. Note: Not all of the experiments relate directly to mediation of the life principle; but since the life-principle is putatively an aspect of the  $U_F$ , all of the experiments manipulate the new physical regime of the  $U_F$  or importantly mediate the 'gating mechanism' by which access is gained, thus facilitating mind-body research in addition to M-Theory and nuclear physics.

### 5.1 Basic Experimental Protocol

Basic Experiment - Fundamental test that the concatenation of new NFT  $U_F$  principles is theoretically sound. A laser oscillated rf-pulsed vacuum resonance hierarchy is set up to interfere with the periodic (continuous-state) structure of the inherent 'beat frequency' of a Dirac polarized spacetime vacuum exciplex to detect the new coherence principle associated with a cyclical holophote entry of the  $U_F$  into 4-space. This experiment 'pokes a hole in spacetime' in order to bring the energy of the  $U_F$  into a detector. The remaining protocols are variations of the parameters of this experiment. See Figs. 11 & 12.

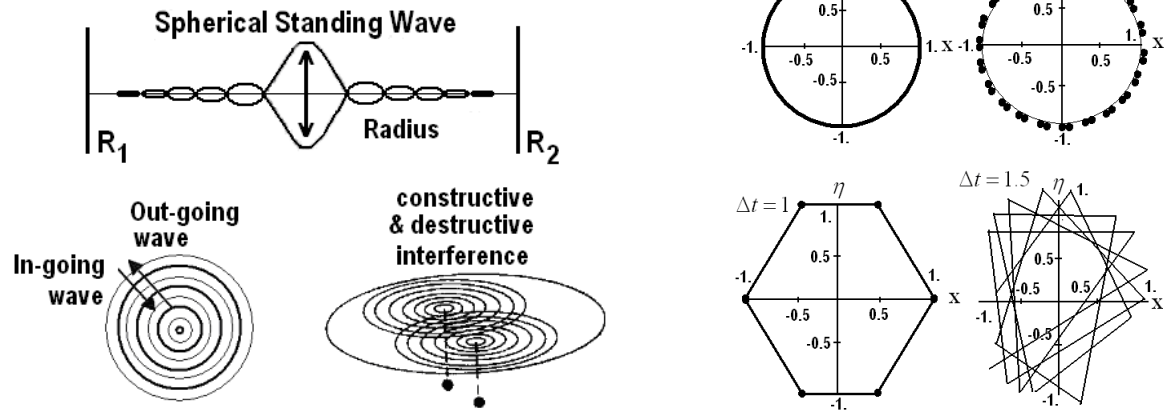
There are a number of very specific postulated cosmological properties required in order to perform these experiments [5,10]. Summaries of the additional 13 experiments can be found in [5,11].

### 5.2. Summary of Key Experimental Details

To empirically gain access to the regime of the Unified Field one must pass through the so-called Planck scale stochastic barrier. In order to do this one must violate the quantum uncertainty principle. Since by definition the standard methods of quantum theory produce the uncertainty principle; the simple solution is to do something else! Because of the great success of gauge theory physicists have ignored the existence of a Dirac polarized vacuum because they believe its existence would violate gauge principles. The best evidence for a Dirac polarized vacuum is what is called the Casimir Effect. The methods of gauge theory however are only an approximation suggesting that there is additional new physics. Next we outline the general method for accessing the higher dimensional superspace of the  $U_F$ . Technical details can be found in references [5,10,28-30].

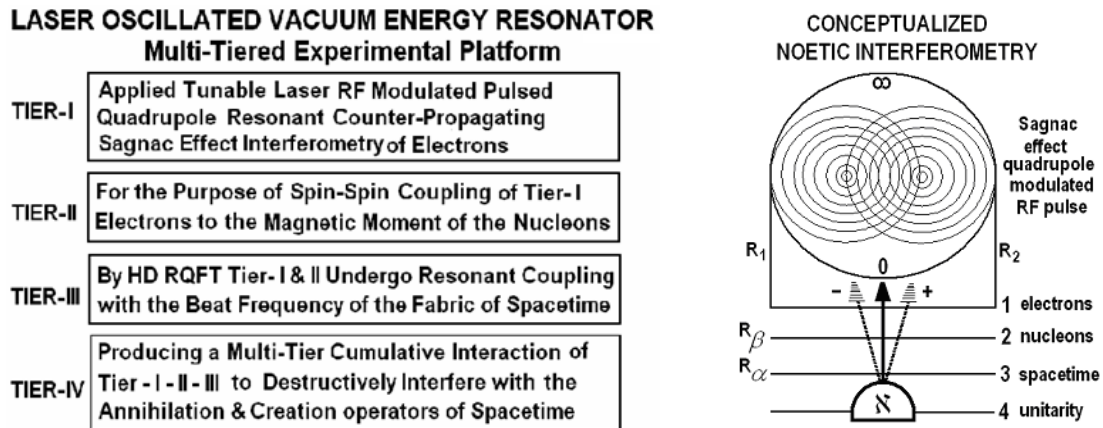
Postulates introduced in this paper are utilized; in general the de Broglie-Bohm and Cramer (TI) interpretations of quantum theory, the Dirac polarized vacuum, the Sagnac affect [5,17,18], the unique string vacuum derived from HAM cosmology and the special class of Calabi-Yau mirror symmetry conditions.

## SPACETIME RESONANCE HAS SPHERICAL SYMMETRY



**Figure 12.** The Dirac polarized vacuum has hyperspherical symmetry. a) Top left, metaphor for TI standing-wave present showing future-past elements,  $R_1, R_2$ , eleven of twelve dimensions suppressed for simplicity. b) Bottom left, top view of a) 2D spherical standing-wave; c) Bottom left right portion, manipulating the relative quantum/brane phase of oscillations creates nodes of destructive and constructive interference. d) Right, Four numerical simulations of the phase space trajectory of the Dubois *superposed incurvise oscillator* based on coordinates and velocities  $x_n = 1/2[x_n(1) + x_n(2)]$   $v_n = 1/2[v_n(1) + v_n(2)]$  is shown in the figure for values of  $\Delta\tau = \omega t$  equal to 0.1, 0.5, 1.0 and 1.5. Initial conditions are  $\chi_0 = 1, \eta_0 = 0 \& \tau_0 = 0$  with total simulation time  $\tau = \omega t = 8\pi$ . Figure 12b adapted from [31].

It is important to recall one of our main proposals concerning the wave structure of matter and that space-time is created, annihilated and recreated continuously. If one throws a stone in a pool of water concentric ripples occur. If one drops two stones into the water, regions of constructive and destructive interference occur. This is essentially how our resonant hierarchy operates as shown in Fig. 13c. The basic idea of the radio frequency or rf-modulated resonance hierarchy is as follows: in the first tier (Fig. 13a) a radio frequency is chosen to oscillate the electrons in the atom or molecule chosen in such a way that the nucleons will resonate. This is related to the principles of nuclear magnetic resonance (NMR). This couples electrons to the magnetic moment of the nucleons in tier 2. By the principles of relativistic quantum field theory (RQFT) tiers one and two undergo resonant coupling to the beat frequency of the fabric of space-time. The multitier cumulative interaction of tiers 1, 2 and 3 by application of the incurvise oscillator can be set to destructively or constructively interfere with the annihilation or creation operators of space-time.



**Figure 13. a)** Design elements of the Noetic Interferometer postulated to constructively-destructively interfere with the topology of the spacetime manifold to manipulate the unified field. The first three tiers set the stage for the critically important 4<sup>th</sup> tier which by way of an incursive oscillator punches a hole in the fabric of spacetime creating a holophote or lighthouse effect of the  $U_F$  into the experimental apparatus momentarily missing its usual coupling node into a biological system. **b)** Conceptualized Witten vertex Riemann sphere cavity-QED multi-level Sagnac effect interferometer designed to ‘penetrate’ space-time to emit the ‘eternity wave,  $\aleph$ ’ of the unified field. Experimental access to vacuum structure or for surmounting the uncertainty principle can be done by two similar methods. One is to utilize an atomic resonance hierarchy and the other a spacetime resonance hierarchy. The spheroid is a 2D representation of a HD complex Riemann sphere able to spin-flip from zero to infinity continuously.

A final essential component of the vacuum interferometer is called an incursive oscillator [31] which acts as a feedback loop on the arrow of time [10]. Parameters of the Dubois incursive oscillator are also required for aligning the interferometer hierarchy with the beat frequency of spacetime by  $x(t + \Delta t) \quad v(t + \Delta t)$ . Critically the size of  $\Delta t$  correlates with the size of the ‘hole’ to be punched in spacetime which also correlates with the wavelength,  $\lambda$  of the rf-resonance pulse. There you have it or at least an initial foray; let the battle begin...

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