

Constructing Sentient Androids

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Abstract: Generally the simplistic distinction between a humanoid robot, a computerized machine capable of replicating a variety of complex human functions automatically, and an android is one of appearance; an android is meant to look and act like a human being even to the extent of being indistinguishable. While one day a yottaflop (10^{24} bits per second) hyper-supercomputer could have a sufficient holographic database and processing power to be truly indistinguishable from a human being, the issue of the applicability of sentience (self-awareness) to an android comes to the forefront. The currently dominant cognitive model of awareness, closely aligned to the AI model, states that mind equals brain and that once correct algorithms are known all of human intelligence could be replicated artificially. This is the so-called mechanistic view: ‘The laws of physics and chemistry are sufficient to describe all living systems; no additional life principle is required’. In this work we develop the point of view that the regime of Unified Field Mechanics (UFM) supplies an inherent action principle driving both the evolution of complex Self-Organized Living Systems (SOLS) and the physical processes of awareness. These UFM parameters in conjunction with ‘conscious quantum computing’ (class of quantum computer modeled with physical parameters of mind-body interaction) putatively leads directly to the construction of sentient (or sentient-like) Androids.

Key Words: Android; Artificial intelligence; Consciousness; Mind-body problem; Quantum computing; Sentience; Unified field mechanics.

PART I: SOLVING THE MIND-BODY PROBLEM

1. Introduction and Overview

Science Fiction author Isaac Asimov coined the term ‘Positronic Brain’ for his robotic characters beginning in 1939 ‘imagining their thoughts to consist of flashing streams of positrons winking in and out of existence’. Constructing sentient robotic devices in our model requires three precursors:

- 1) Utility of the 3rd regime of Natural Science - Unified Field Mechanics (UFM) which includes an inherent life principle with experimental access to a physically real ‘light of the mind’.
- 2) Development of the fundamental principles of awareness (solving the Mind-Body problem); and
- 3) Implementing a special class of universal ‘conscious quantum computer’ (QC) modeled after the naturally occurring mind-body interface.

In this work therefore we delineate the framework for discovery of the mind and the requirements for general universal quantum computing incorporating those elements into a class of ‘conscious’ quantum computing. Our approach to defining awareness does not adhere fully to the standard Cognitive approach where ‘mind equals brain’ but rather to a Cartesian interactionist model where Descartes *res cogitans* (mind stuff) is considered a physically real coherent action of the Unified Field; with instead of a ‘flashing stream of positrons’ as Asimov suggested, rather a stream of ‘noeons’ the proposed exchange unit of UFM^[1].

Epistemology progressed from myth and superstition to the age of logic and reason. When logic failed Galileo was credited with founding the age of empirical science currently in effect. This evolution in modern times centered at first on the 3D Euclidean space of Newtonian or Classical Mechanics. Then at the turn of the 20th Century Quantum Mechanics and Relativity were created in a 4D Minkowski-Riemann spacetime. Now as we develop the ‘Age of Mind’ we enter a 3rd 12D String/M-Theoretic regime of UFM^[1-3]. It is postulated that this UFM regime contains an inherent new action or life principle driving the evolution of complex Self-Organized Living Systems (SOLS) and mind or mentation (stream of qualia)^[1,4]. Therefore sentient life is a form of complex self-organized autopoietic system within which awareness is an evanescent process between local phenomenological and nonlocal ontological domains of Descartes *res extensa* (body stuff) interacting with physically real *res cogitans* (mind stuff).

We will discuss several experimental protocols under development that test these noetic hypotheses^[5,6]. It is in this guise that we are able to propose that the mind-body interface is a form of naturally occurring ‘conscious quantum computer’^[7]; which under the right conditions could lead to the ‘extracellular containment’ of natural intelligence or awareness in an android. In addition our QC model is radically different from those currently studied; it relies on a relativistic model of the qubit (r-qubit) and relativistic topological quantum field theory in conjunction with salient aspects of UFM. The r-qubit adds additional degrees of freedom causing the standard Bloch sphere representation of a qubit to be obsolete^[2]. The additional degrees of freedom require development of a new class of quantum logic gates and algorithms. QC operation becomes a duality, partially quantum mechanically (current thinking) and partially within the 3rd regime of UFM (new physics) in conjunction with brane dynamics correlated with Calabi-Yau mirror symmetry attributed to M-Theory^[2,3].

This is key to surmounting the uncertainty principle which also puts an end to the major problem of decoherence^[5,6,8]. We suspect Bulk Scalable Universal QC cannot be achieved without these proposed improvements in QC modeling. Finally we discuss the current state of the art for the ‘extracellular containment of awareness’ and timeline for implementing the physical principles of mind and processing in a first sentient android prototype - not as Asimov suggested with a ‘flashing stream of positrons but rather with a noeon flux, the putative exchange unit of the Unified Field synonymous with a life principle and stream of qualia.

2. Radical New Direction for Mind-Body Research

In contrast to current thinking we can no longer accept reasoning that ‘the Planck scale is the fundamental basement level of the universe’ (reality), or that spacetime geometry is the fundamental domain where the psycho-physical bridge occurs; because spacetime is an emergent property associated with the regime of quantum mechanical uncertainty which we now know has a finite radius^[3] beyond which lies the domain of

UFM. A sufficient basis for defining awareness requires parameters of UFM beyond this virtual veil of uncertainty. In the same way a distinction between Classical and Quantum was discovered 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 another arena hidden until now. Recall that UFM^[3] is just being formalized providing the long anticipated 3rd regime of reality. Thus our understanding of the physical world evolves from Classical to Quantum to Unified (CQU). The current 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^[9], only a temporarily closed door^[10] imposed by the Copenhagen interpretation of quantum theory that can now be opened and past through with parameters of Noetic Field Theory (NFT): The Quantization of Mind^[1-5,8]. This CQU progression is neither top-down nor bottom-up but entails what is described as a ‘continuous-state’ free fall-like cycling^[1-3,8].

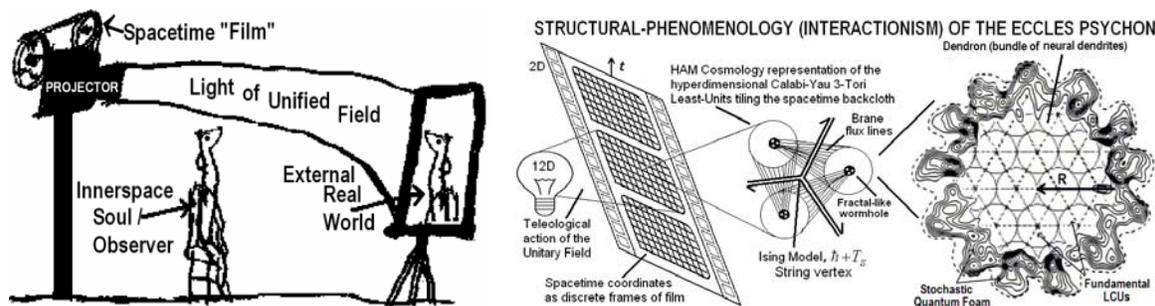


Figure 1. a) Macroscopic movie theatre metaphor of anthropic awareness (like Plato’s analogy of the cave or virtual reality) and the observer’s (self) place in the theatre. Discrete frames (film) pass through the projector (spacetime) lit by coherent energy of the U_F streaming through the observer embedded 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 spacetime raster into every point, atom and thus molecule of Self-Organized Living Systems (SOLS). c) Showing relativistic injection of the noetic field into spacetime points. d) Coherent interaction of the U_F bridging the stochastic quantum barrier coupled to a brain dendron of radius R correlated with an underlying array forming one Eccles Psychon unit within the brain.

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 Quantum 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^[1-6] in the 3rd regime of Large-Scale Additional Dimensionality (LSXD).

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

- The LSXD regime of U_F dynamics is a ‘sea’ of infinite potentia from which the 4D reality of the 3D observer cyclically emerges as a nilpotent resultant (Figs. 4,5). Nilpotency - technically meaning ‘sums to zero’^[2,11], 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’ (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^[1-6].
- 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 field by a process called ‘topological switching’ transferring a force of coherence ontologically between M-Theoretic branes^[4,12]. Note: This property of U_F dynamics removes the problem of violation of the 2nd law of thermodynamics or the conservation of energy from Cartesian interactive dualism.
- The key process for 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^[1,4].

3. Solving the Mind-Body Problem - Nature of Sentience

To solve the mind-body problem the scientific perspective must evolve beyond the usual Copenhagen Interpretation of quantum theory to the new physics required to explain, utilize and design experimental access to the U_F regime where physical parameters able to explain psychophysical-bridging reside.

- The Planck scale cannot 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^[1-4,8].
- Qualia are not quantum phenomena per se but unified field phenomena. Quale ‘rest on’ the quantum regime (tip of iceberg) only as part of the sensory transduction apparatus (Mind-body interaction).
- The Planck scale is not an impenetrable barrier^[3] even though considered so as an empirical fact demonstrated by the quantum uncertainty principle - UFM can be utilized to surmount uncertainty.

Fourteen empirical protocols have been proposed^[5,6] (the 1st reviewed here) for demonstrating, gaining access to and leading to a variety of experimental platforms for first hand investigation of the physical basis of awareness (qualia) breaking down the 1st person 3rd person barrier as called for by Nagel^[13].

String theory has one parameter, string tension, T_S ; but has been fraught with the dilemma of a Googolplex (10^{googol}) or infinite number of vacuum possibilities. By utilizing the Eddington, Dirac, and Wheeler large number hypothesis^[1,8] we found an alternative derivation of T_S leading to one unique vacuum and what we call the ‘continuous-state hypothesis’ an alternative to expansion/inflation parameters of Big Bang cosmology^[8]. Simplistically the perceived inflation energy of Big Bang cosmology postulates a Doppler expansion from a primordial temporal singularity. But the noetic continuous-state hypothesis proposes a localized ‘eternal present’ as if in permanent ‘gravitational free-fall’^[1,4,8]. Since we are relativistically embedded in and made out of matter this condition means that all objects (in our 3D virtual reality) are embedded in LSXD 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^[14] and the Cramer Transactional Interpretation^[15]; where spacetime and the matter within it (matter is made of de Broglie waves) is 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 LSXD infinite potentia as a ‘standing-wave’ (Fig. 2)^[1-3,10]. This can be understood conceptually by a movie theatre metaphor (Fig. 1).

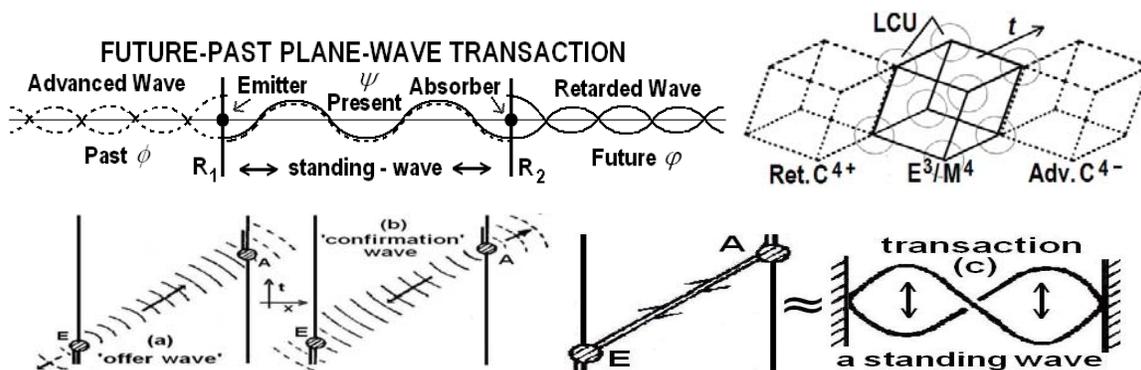


Figure 2. a) Conceptualized Cramer transaction (present state or event) where the present (simplistically) is a standing-wave of future-past potential elements. A point is not a rigid singularity (although still discrete) as in the classical sense, but has complex structure like a mini-wormhole where R_1 & R_2 (like frets holding a 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. c) Transactional model with offer-wave & confirmation-wave combined into a resultant transaction d) A future-past advanced-retarded standing/stationary wave. Figs. adapted from Cramer^[15].

The problem has to do with the nature of a point or 3D vertex in physical theory^[2,11]. What extended versions of de Broglie-Bohm and Cramer suggest 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 elevates the so-called wave-particle duality for quanta to a Principle of continuous-state cosmology canceling 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^[16] (Fig. 3b after noted M-Theorist E. 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 LSXD branes of so-called Calabi-Yau mirror symmetry are forms of Riemann 3-spheres or Kahler manifolds^[2,10]. Instead of the insurmountable Plank foam, the gate keeper in this scenario is an array of least cosmological units (LCU)^[1-3,10] of which part (like the tip of an iceberg) resides in our virtual 4-space and the other part resides in the LSXD (12D) regime of M-Theory. These LCU gates govern mediation of the U_F in the coherent ordering of the life principle of SOLS.

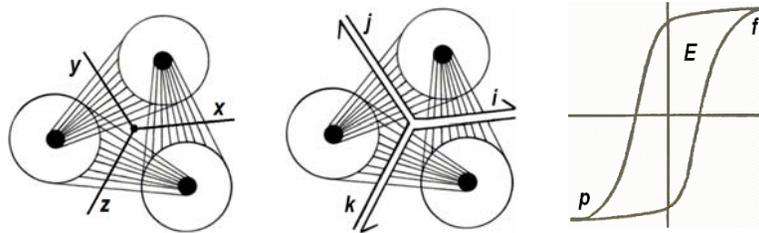


Figure 3. Conceptualization of the cosmological Least-Unit (LCU) tessellating space which like quark confinement cannot exist alone. a) Current view of a ‘fixed’ point particle or metric x,y,z vertex. The three large circles are an LCU array slice. A form of close-packed spheres forming a 3-torus; missing from the illustration are an top and bottom layers covering the x,y,z vertex and completing one fundamental element of an LCU complex. Field lines emanating from one circle to another represent the de Broglie-Bohm concept of a ‘pilot wave or potential’ governing evolution. b) Similar to a) but drawn with a central ‘Witten string vertex’^[16] and relativistic quantum field potentials (lines) guiding its evolution in spacetime. A 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 LSXD brane topology. 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 .

Accessing the U_F basis centers on defining what is called a Least Cosmological Unit (LCU)^[1,8] tiling the spacetime backcloth. An LCU (Fig. 3) conceptually parallels the unit cell building up crystal structure. The LCU entails the next evolutionary step for the basis of a point particle^[10,11] 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 expelling entropy by the teleological action of SOLS.

There is a major conceptual change from Quantum Mechanics to UFM. 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?"^[17]. It turns out that not only is gravity not quantized but neither is the noone energy of the U_F related to gravity^[1-3].

Here is one way to explain it. In a usual field like electromagnetism (easiest to understand sense 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). This is phenomenological as 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'^[1,12]. This is not possible for a 4-space field because they are quantized resultants of LSXD topological field components. The LSXD 'units' (noeons) are free to "mix" ontologically as they are not resolved into fixed points.

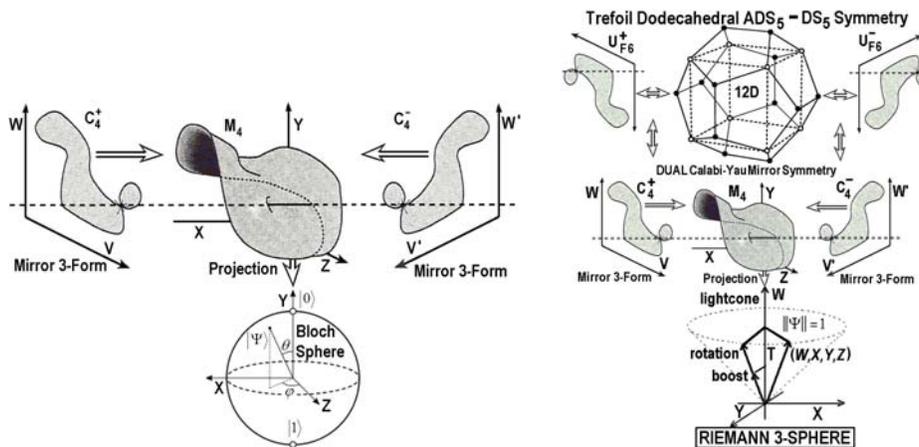


Figure 4. a) Complex HD Calabi-Yau mirror symmetric 3-forms, $\pm C_4$ complex dimensions become embedded in Minkowski space, M_4 . This resultant U_F energy is projected into brain dendrons as a stream of evolving (evanescent) superradiant qualia as a continuous quantum state evolution considered a nilpotent Bloch sphere representing the lower portion 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. What a U_F LSXD reality means is that the usual consideration of a Bloch 2-sphere (representing the lower portion only that embeds in local spacetime) vector based qubit is insufficient for bulk QC. b) From 8D to 12D, illustrating full extended rendition of additional parameters for a relativistic LSXD continuous-state dual Calabi-Yau mirror symmetric cosmology as far as currently understood. The Bloch 2-sphere qubit representation is replaced with the new extended r-qubit Riemann 3-sphere resultant representation that has sufficient parameters to surmount the uncertainty principle and therefore operate quantum computers.

If the U_F is not quantized how can a force mediate quantal exchange? Firstly the U_F does not provide a 5th force as one might initially assume; instead the 'presence' of the U_F provides a 'force of coherence' which based on 'topological charge'^[1,8] is ontological or 'energyless'. Consider this perceptually: 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^[1,4] 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 matter waves putting it in a mind mode where railroad tracks do not recede into a point - The Riemann sphere flips (our perception) beforehand.

The familiar 3D Necker cube (center of Fig. 2b is like a Necker cube) when stared at central vertices topologically reverse. This is called topological switching. In the LCU spacetime background this topological switching represents the gate which is the lighthouse with the rotating light on top.

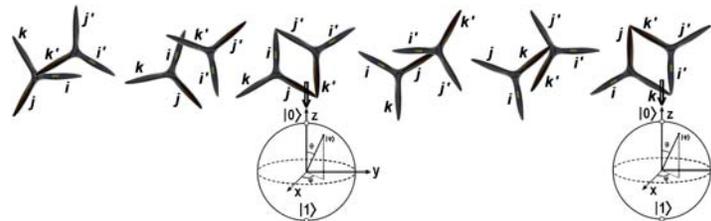


Figure 5. Locus of nonlocal HD mirror symmetric Calabi-Yau 3-tori (here technically depicted as quaternionic trefoil knots) spinning relativistically and evolving in time. Nodes in the cycle are sometimes chaotic and sometimes periodically couple into resultant (faces of a cube) quantum states in 3-space depicted in the diagram as Riemann Bloch 2-spheres.

4. The Physical Basis of Qualia

Qualia, plural of *quale*, is defined as ‘the subjective quality of experience; a *qualitative feel* associated with an experience’. The physics of noetic cosmology with an inherent ‘life principle’ based on U_F mechanics also provides for the first time a physical basis for representing quale in a rigorous empirically testable manner. If experience has a specific subjective nature; if one removed the viewpoint of the subjective observer; what would be left? 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*”^[13]. This breaks down the 1st person-3rd person barrier: A major step in implementing extra-cellular sentience.

These are questions an integrative Noetic Science now answers 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): The Quantization of Mind components describing qualia from the objective sense distinguish the phenomenology of qualia from the underlying ontological ‘nonlocal noumenon’ or physical existence of the fundamental *thing in itself*. NFT suggests that a comprehensive definition of qualia is comprised of three component forms considered physically real because the noetic unified field on which the NFT is based is 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 1st person-3rd 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. Note: Q-III has sub-elements called *quanemes* addressed elsewhere^[1,4].

Standard images require a screen or reflective surface to be resolved; but if the foci of two parabolic mirrors (Casimir-like vacuum plates) 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’ can demonstrate this effect of parabolic mirrors. Objects placed in the bottom appear like solid objects at the top of the device. In 12D LSXD reality Calabi-Yau brane topology performs the same function for the locus of qualia propagation.

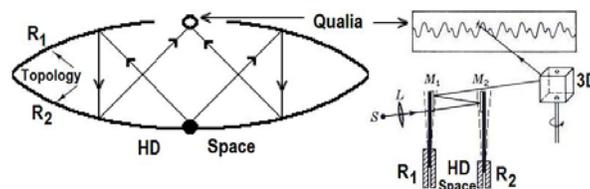


Figure 6. 2D rendition of an HD holographic process. a) An object (small black circle) placed inside two parabolic mirrors (Casimir-like domain walls) produces a virtual image (white circle) representing creation of a point in spacetime or stream of elements producing qualia. b) Our virtual holographic reality is produced in a similar fashion by Cramer future-past standing-wave parameters from the LSXD 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 by the ‘light’ of the U_F .

The ‘light-house’ (flashing) action of U_F life principle energetics arises from harmonic oscillations of 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 individual’s psychosphere cognitive domain. The QED cavities are a close-packed tiling of LCU noetic hyperspheres; the Casimir surfaces of which reflect *quaneme* subelements. The best reflectors of em-waves are polished metal mirrors; charged boundary conditions also reflect em-waves the same way radio signals bounce off the ionized gases of the Kennelly-Heaviside layers in the ionosphere. This reflective ‘sheath’ enclosing the cognitive domain is charged by the Noeon radiation (exchange particle of the noetic field) of the life principle, the phases of which are ‘regulated’ in the complex LSXD space.

How does noetic theory describe more complex aspects of qualia? Like a rainbow, light quanta (water

drop) are microscopic in contrast to the macroscopic sphere of awareness (rainbow). It thus seems reasonable to assume that scale-invariant properties of the LCUs modulating awareness would apply. Like phonemes as fundamental sound elements for audible language qualia-nemes or *quanemes* are proposed for subelements of 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 noone entry through the LCU 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 (LCU gated) is projected continuously on the screen, in this case the mind.

For cognitive theory all intelligence/consciousness resides in the brain (mind equals brain). The situation is radically different for Cartesian interactive dualism requiring a life principle. Cognitive theory requires only one component - body stuff or matter; but interactive dualism requires three components: 1) Matter (Cartesian *res extensa*). 2) Mind stuff (*res cogitans*) and 3) Nonlocal Elemental Intelligence. Because of space constrictions these critically important aspects are only mentioned here^[1].

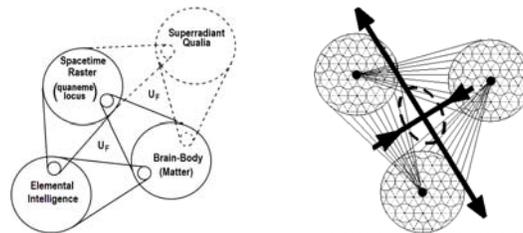


Figure 7. a) The physical basis of the continuous superradiant generation of qualia from the three components of mind: eternal Elemental Intelligence, Brain-Body (Descartes *res extensa*), and the superradiant qualia (Descartes *res cogitans*) mediated by the spacetime raster (quaneme locus) that gates ‘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 local 3-space singularity (black cross vertex).

5. Formalizing the Psychon, Physical Unit Measuring Energy of Mind

NFT elevates the concept of qualia from the traditionally philosophical concept used in cognitive science to a physically real fundamental noumenon. Noumenon is defined as the ‘thing in itself’ beyond the veil of the 3D phenomenological world; in Kantian philosophy a noumenon is something existing independently of intellectual or sensory perception. This fundamental physicality allows qualia to be ‘digitized’ in some form breaking down the 1st person-3rd person barrier leading to profound new ‘conscious’ technologies. Nobelist Sir John Eccles coined a construct called the psychon, to illustrate how mental energy coupled to brain dendrons (bundle of neural dendrites)^[18] to complete his Cartesian interactionist model of mind-body dualism^[1-6].

Formalizing the ‘Psychon’ as a unit of measure is made possible by a comprehensive science of qualia or

fundamental basis of awareness. In meditative science it is said that ‘energy follows thought’. Here we postulate that the qualia of awareness are comprised of a real physical flux of energy related to new physics of the unified field, U_F ^[4]. In honor of Nobelist Sir J.C. Eccles (synapse discovery) 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 where one Einstein represents one mole or Avogadro’s number of photons (6.02×10^{23}). In general physics the energy, E of n photons is $E = n\hbar\nu = n\hbar(c/\lambda)$ where \hbar is Planck’s constant and ν the frequency. The second part of the equation is energy in terms of the wavelength, λ (in nanometers, nm) and the speed of light, c . Adapting this photon energy equation to measure Einsteins is 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, μE is one-millionth of an Einstein or 6.02×10^{17} photons imping a leaf for example.

A similar unit of measure to quantify the mental energy of quale called the Psychon as one mole or Avogadro’s number of noeons is created. The force of all four known phenomenological fields (electromagnetic, strong, weak and gravitational) are said to have exchange quanta mediating the field’s interactions by a quantal 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. According to NFT the regime of unification is not quantum but instead correlates with ontological parameters of UFM^[3].

The trefoil knots (Fig. 5 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. 4 illustrating how a 3D object emerges from spacetime.

In considering psychon energy it appears easier to calculate the nonlocal brane area rather than the local volume or surface area of a neural 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 . Note that the U_F provides the basis for gravitation^[1,8] and the life principle for living systems not just the evolutionary flow of qualia in the mind.

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 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. 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, $N_F = \varepsilon / \rho$ ^[1,4] we need to calculate the energy of the noeon field from its space-time hysteresis loop (Fig. 3 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. Instead 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 an 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 the hysteresis loop 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, $N_F = \varepsilon / \rho$ where N_F is the force of coherence of the U_F , ε the relativistic rotational energy and ρ the ‘cavity’ radius (Fig. 3). 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 lighthouse gating mechanism. The gate cycles continuously through LSXD symmetries of M-Theoretic space through various

compactification modes^[2,8] 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 *life principle* (in our example a dendron). This process, is further described by the physics of the 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^[2].

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 5th 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 noeons, which are then immediately returned to the sea of infinite potentia. This cyclical process energizes living systems, qualia and gravitation etc. One sees that the anthropic principle 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.

6. Protocol for Experimentally Testing Unified Field Theory

NFT is empirical testable and has broad explanatory power. Viable experimentation will lead to new consciousness research platforms for studying fundamental properties of SOLS. Fourteen tests^[5,6] of NFT have been proposed; in this short paper only the main experimental protocol testing the U_F ‘life-principle’ hypotheses is summarized: Mediating the ‘gating mechanism’ by which access is gained to the U_F regime. This will facilitate not only mind-body but also new aspects of M-Theory and nuclear physics research.

Extrapolating Einstein’s energy dependent/deformed spacetime metric, \hat{M}_4 ^[8] to a 12D Calabi-Yau mirror-symmetric standing-wave future-past advanced-retarded topology^[2,8] a spacetime resonance hierarchy protocol utilizing a covariant Dirac polarized vacuum has been designed^[5,6] to access the U_F regime^[3].

Motion of a 1D classical harmonic oscillator is given by $q = A \sin(\omega t + \varphi)$ and $p = m\omega A \cos(\omega t + \varphi)$ where A is the amplitude and φ is the phase constant for fixed energy $E = m\omega^2 A^2 / 2$. For state $|n\rangle$, with $n = 0, 1, 2, \dots, \infty$ and Hamiltonian $E_n = (n + 1/2)\hbar\omega$ the quantum harmonic oscillator becomes

$$\langle n | q^2 | n \rangle = \hbar / 2m\omega \langle n | (a^\dagger a + a a^\dagger) | n \rangle = E_n / m\omega^2 \quad (1)$$

and
$$\langle n | p^2 | n \rangle = 1/2(m\hbar\omega) \langle n | a^\dagger a + a a^\dagger = mE_n \quad (2)$$

where a & a^\dagger are the annihilation and creation operators, $q = \sqrt{\hbar/2m\omega}(a^\dagger + a)$ and $p = i\sqrt{m\hbar\omega/2}(a^\dagger - a)$.

For the 3D harmonic oscillator each equation^[19] is the same with energies

$$E_x = (n_x + 1/2)\hbar\omega_x, E_y = (n_y + 1/2)\hbar\omega_y \quad \text{and} \quad E_z = (n_z + 1/2)\hbar\omega_z \quad (3)$$

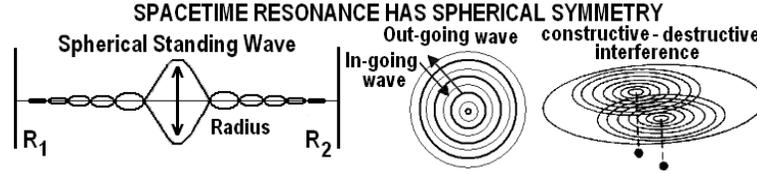


Figure 8. The Dirac polarized vacuum has hyperspherical symmetry. a) Metaphor for standing-wave present showing future-past elements, R_1, R_2 , eleven of twelve dimensions suppressed for simplicity. b) Top view of a) a 2D spherical standing-wave. c) Manipulating the relative phase of oscillations creates nodes of destructive and constructive interference.

In Dubois' notation the classical 1D harmonic oscillator for Newton's second law in coordinates t and $x(t)$ for a mass m in a potential $U(x) = 1/2(kx^2)$ takes the differential form

$$\frac{d^2x}{dt^2} + \omega^2 x = 0 \quad \text{where} \quad \omega = \sqrt{k/m} \quad (4)$$

which can be separated into the coupled equations^[5,19]

$$\frac{dx(t)}{dt} - v(t) = 0 \quad \text{and} \quad \frac{dv(t)}{dt} + \omega^2 x = 0. \quad (5)$$

From incursive discretization, Dubois creates two solutions $x(t + \Delta t)$ $v(t + \Delta t)$ providing a structural bifurcation of the system producing Hyperincursion. The effect of increasing the time interval discretizes the trajectory as in Fig. 9 below. This represents a background independent discretization of spacetime^[8,19].

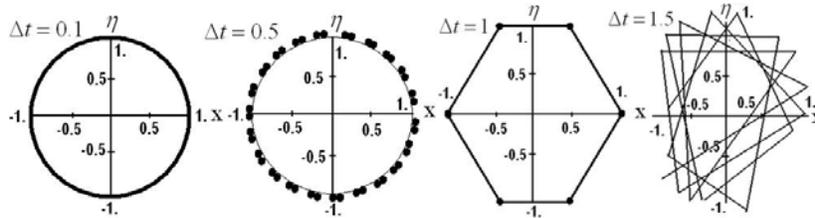


Figure 9. Numerical simulation of the phase space trajectory of the Dubois *superposed incursive oscillator* based on coordinates and velocities $x_n = 1/2[x_n(1) + x_n(2)]$ $v_n = 1/2[v_n(1) + v_n(2)]$ is shown in the figure for values of $\Delta\tau = \omega t$ equal to

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 adapted from^[19]. Protocol for QC operations continued in Sect. 10.

PART II: THE REQUIREMENT OF QUANTUM COMPUTING

7. Bulk Universal Quantum Computing

Quantum Computing (QC) has remained elusive beyond a few qubits. Feynman's recommended use of a "synchronization backbone"^[20] for achieving bulk implementation has generally been abandoned as intractable; a conundrum we believe arises from limitations imposed by the standard models of Quantum Theory (QT). It is proposed that Feynman's model can be utilized to implement Universal Quantum Computing (UQC) with valid operationally completed extensions of QT and cosmology^[2]. Requisite additional degrees of freedom are introduced by defining a relativistic basis for the qubit (r-qubit) in a higher dimensional (LSXD) conformal scale-invariant context and defining a new anticipatory based cosmology (cosmology itself cast as a hierarchical form of complex self-organized system) making correspondence to unique 12D Calabi-Yau mirror symmetries of M-Theory. The causal structure of these conditions reveal an inherent new Unified Field, U_F "action principle" (force of coherence) driving self-organization and providing a basis for applying Feynman's synchronization backbone principle. Operationally a new set of transformations (beyond the standard Galilean / Lorentz-Poincaré) *ontologically* surmounts the quantum condition (producing decoherence during both initialization and measurement) by an acausal energyless (ontological) topological interaction^[2]. Utilizing the inherent LSXD regime requires new commutation rules and corresponding I/O techniques based on a coherent control process with applicable rf-pulsed incursive harmonic modes of LSXD spacetime manifolds described by the a spin-exchange continuous-state spacetime resonance hierarchy.

We postulate bulk universal QC cannot be achieved without surmounting the quantum uncertainty principle, an inherent barrier by empirical definition in the regime described by the 4D Copenhagen interpretation - last remaining hurdle to bulk QC. QC operations by surmounting uncertainty with probability $\equiv 1$, requires redefining the basis for the qubit. Our form of M-Theoretic Calabi-Yau mirror symmetry cast in an LSXD Dirac covariant polarized vacuum contains an inherent 'Feynman synchronization backbone'. This also incorporates a relativistic qubit (r-qubit) providing additional degrees of freedom beyond the traditional Bloch 2-sphere qubit bringing the r-qubit.

Review of bulk universal QC prototype design able to incorporate a sentient android:

- We arbitrarily choose a class-II mesoionic xanthine crystal stable at room temperature for ~ 100 years with 10 evenly separable quantum states in its ground state configuration. The xanthine is programmed by rf-pulsed Sagnac Effect resonance to overcome I/O decoherence^[2,8]. This is the holographic 'neural net android brain'.
- For greater efficiency (intelligence) quantum dot ring laser arrays manufactured with internal mirrors may

be utilized instead of IC arrays. The quantum dots would be arrayed on a suitable substrate rather than an IC.

- Another android brain model could utilize a class II mesoionic xanthine doped multilayer graphene molecule array (currently under study) where it may be possible to operate a QC by forms of Quantum Hall effects, bilayer graphene alone, or a stand-alone mesoionic xanthine configuration since several mesoionic xanthine molecules have pertinent polar properties.

Because the model surmounts the quantum uncertainty principle in a complex 12-space the current Bloch (Riemann) sphere representation of qubits (classical 2-sphere model) is a nonphysical mathematical representation too primitive and not suited for actualizing bulk universal QC. For the past several years our model was based on a relativistic (r-qubit) where the additional degree of freedom was an aid to surmounting uncertainty^[2,6,8]. Recently we realized this 4D r-qubit, while on the right track was also insufficient. This arose from extending quantum theory to the regime of the Unified Field, U_F primarily based on extended LSXD versions of Cramer's transactional interpretation and de Broglie-Bohm interpretation of QT. This was as much a breakthrough in nilpotent cosmology as QT. We discovered there was more to a quantum state than a Copenhagen 'particle in a box'; the quantum state was conformally scale-invariant requiring a representation utilizing a system of dual continuous-state Calabi-Yau mirror symmetric 3-tori (class of Kähler manifolds)^[6,8]. One surprise is that this cosmology contains an inherent 'synchronization backbone'^[20] which ends up like getting half the QC for free; making the essential process of surmounting uncertainty almost simplistic^[2,6].

8. Qubit Basis, Geometry, Invariants and Case for Relativistic Qubits

This summarizes the current thinking on representations of quantum states where the quantum wavefunction is the most complete description that can currently be given to a physical system:

- Physical information about a transition is encoded in a unit vector in a complex vector space.
- Physical process without measurement corresponds to unitary transformation of this vector.
- A measurement corresponds to the probabilistic choice of a covector to form an amplitude $\langle \Psi | U | \Phi \rangle$

where the probability is $\langle \Psi | U | \Phi \rangle^2$.

We intend to show that this currently utilized vector algebra is not physical but rather a convenient mathematical representation. The Bloch sphere is merely a 2D representation of 4D reality. We show below a recent attempt at a 6D dual qubit as an indicia of our 12D model which we believe is required to fully represent a properly physicalized qubit!

In the philosophy of physical science there is no *a priori* reason why nature must be described by a U_F

theory. The current drive in physics is to bring the four fundamental field interactions into a single unified framework as a form of quantum theory. Because of the inherent difficulty associated with renormalization and uniting gravity and quantum theory many physicists believe a framework other than a field theory such as a version of an 11D String/M-Theory may be a viable alternative avenue.

In the usual nonrelativistic quantum theory of computation it was necessary only to point to the number of states, 2^n for a description of n qubits. In our extended relativistic theory there are many special cases. Charged and neutral, massive and massless particles etc. should be described differently.

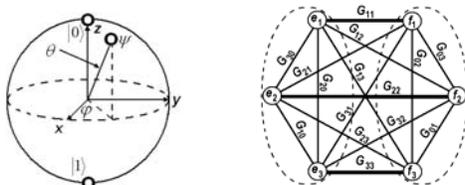


Figure 10. a) Representation of a qubit $|0\rangle + |1\rangle = \psi^2$ as a complex Riemann Bloch 2-sphere. b) Combinatorial graph of vertices corresponding to basis vectors of a Bloch sphere for two qubits $[e_1, e_2, e_3]$ & $[f_1, f_2, f_3]$ and the edges to the corresponding bivector basis G_{ij} . Dashed ellipses enclose induced subgraphs corresponding to “local” subalgebras of each Bloch sphere model, while the perfect matching of a Cartan subalgebra is indicated by the bolder lines of edges G_{11}, G_{22}, G_{33} . Fig. redrawn from^[21].

The problem of extending the fundamental basis of the qubit is manifold. Many physicists do not accept dimensionality beyond 4D. Those that do, predominantly string theorists, now M-Theorists, are confounded by the search for a unique string vacuum claimed to have a Googolplex or 10^∞ possibilities. Our model has discovered a unique string vacuum^[8]. Further restrictions arise from a unique form of inherent Calabi-Yau mirror symmetry. Thus a clear avenue is provided to ‘divine’ the complex LSXD space from which our 3D virtual reality is a resultant. Fortunately our unusual model is empirically testable^[2,5,8].

The perceived required redefinition of the qubit also requires new logic gates and QC algorithms taking full advantage of the requires new physics. Operationally the new r-qubit basis entails a new set of transformations beyond the usual Galilean-Lorentz-Poincaré which have been temporally adjoint along an axis or light cone in Euclidean and then Minkowski coordinates. We choose to call the new transformation ‘The Noetic Transformation’ because it is cast in an anthropic multiverse. What separates the Noetic Transform from its precursors (Galilean, Lorentz-Poincaré) is that it uncouples from the 3D or 4D realm of the observer and has no temporal component. This evolution now continues to a new regime of Unified Field Theory, U_F .

We do not wish to say ‘uncouples from reality’, rather that fundamental reality should now be considered 12D instead of the 3(4)D of the Lorentz-Poincaré Transformation. The elimination of the concept of time occurs by a double superluminal boost, $x \leftrightarrow t_x \leftrightarrow w_x$ that also occurs along the y and z axes simultaneously $x]$. The infinities plaguing renormalization are indicia of this 12D reality (in the same way infinities in the

Raleigh-Jeans law for black body radiation were an indicia of the immanent discovery of quantum mechanics).

We anticipate that the realized basis for bulk universal QC diverges from the anticipated form by current QC researchers utilizing the standard Copenhagen Interpretation (CI) of quantum theory. What this means is that the Bloch 2-sphere vector basis is archaic and not an appropriate model for bulk QC gates or algorithms. As our starting point we follow recent efforts of Makhlin^[22] Zhang et al.^[23] and Havel^[21], (MZH) who have pointed the way to our model with a geometric algebra rendition of a dual Bloch sphere.

MZH illustrates the Cartan decompositions and subalgebras of the 4D unitary group, which have recently been used to study the entangling capabilities of two-qubit unitaries. “...we show how the geometric algebra of a 6D real Euclidean vector space naturally allows one to construct the special unitary group on a two-qubit (quantum bit) Hilbert space, in a fashion similar to that used in the well-established Bloch sphere model for a single qubit^[21]. The group $SU(2)$ is isomorphic to the group of quaternions of norm 1, and is thus diffeomorphic to the 3-sphere. Since unit quaternions can be used to represent rotations in 3D space (up to sign), we have a surjective homeomorphism from $SU(2)$ to the rotation group $SO(3)$ whose kernel is $\{+I, -I\}$. The geometric structure of nonlocal gates is a 3-torus. The local equivalence classes of 2-qubit gates are in one-to-one correspondence with the points in a tetrahedron except on the base.

The MZH model is based on complex Minkowski space and the Copenhagen Interpretation. Our model is different - cast in a 9D M-Theoretic Calabi-Yau mirror symmetry utilizing an operationally completed form of QT achieved by integrating LSXD forms of the de Broglie-Bohm Causal Interpretation^[14] and Cramer’s Transactional Interpretation^[15] but that still makes correspondence with the MZH 6D model^[21-23].

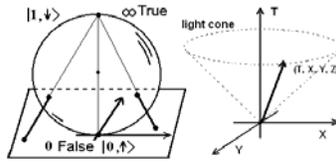


Figure 11. (a) Stereographic projection model of a qubit on a complex Riemann sphere, usual q-gate with constant number of states and particles. (b) Relativistic model of a qubit (r-qubit) with interacting quantum fields entailing an extra HD degree of freedom with constant particles but variable or infinite states.

In the conventional consideration of quantum computing a qubit is any two-state quantum system defined as a superposition of two logical states of a usual bit with complex coefficients that can be mapped to the Riemann sphere by stereographic projection (Fig. 11a); formally represented as: $|\Psi\rangle = \xi|0\rangle + \eta|1\rangle$ with each ray $\xi, \eta \in \mathbb{C}$ in complex Hilbert space and $\|\Psi\|^2 = \xi\bar{\xi} + \eta\bar{\eta} = 1$, where $|0\rangle$ corresponds to the south or 0 pole of the Riemann sphere and $|1\rangle$ corresponds to the opposite north or ∞ pole of the Riemann complex sphere. The

conventional qubit maps to the complex plane of the Riemann sphere shown below as:

$$\xi\bar{\eta} + \eta\bar{\xi} \rightarrow X, \quad \xi\bar{\eta} - \eta\bar{\xi} \rightarrow iY, \quad \xi\bar{\xi} - \eta\bar{\eta} \rightarrow Z.$$

Unitary qubit transformations correspond to 3D rotations of the Riemann sphere; but following Vlasov^[24] for relativistic considerations of a qubit (r-qubit) an additional 4D W parameter is added to the equation (6):

$$\begin{aligned} \xi\bar{\eta} + \eta\bar{\xi} &\rightarrow X, & \xi\bar{\eta} - \eta\bar{\xi} &\rightarrow iY, \\ \xi\bar{\xi} - \eta\bar{\eta} &\rightarrow Z, & \xi\bar{\xi} + \eta\bar{\eta} &\rightarrow W \end{aligned} \quad (6)$$

In cartography and geometry, a stereographic projection is a mapping projecting each point on a sphere onto a tangent plane along a straight line from the antipode of the point of tangency (with one exception: the center of projection, antipodal to the point of tangency, is not projected to any point in the Euclidean plane; it corresponds to a "point at infinity"). One approaches that point at infinity by continuing in any direction at all; in that respect this situation is unlike the real projective plane, which has many points at infinity. This 4D r-qubit representation is only the first step; viable quantum computing requires extension to a 12D r-qubit!

9. Basis for the Noetic Transformation

The Noetic Transform extends quantum theory into the regime of UFM as a requirement for quantum computing. An event in spacetime is an idealized instant of time at a definite position in space labeled by time and position coordinates, t,x,y,z . Coordinates have no absolute significance; they are arbitrary continuous single-valued labels given invariant meaning by the expression for the line-element connecting two events^[25,26].

The usual expression for a line-element in Minkowski coordinates is

$$ds^2 = dt^2 - dx^2 - dy^2 - dz^2. \quad (7)$$

For simplicity at this stage of development of the Noetic Transformation we devise the XD coordinates as orthogonal and evenly spaced. Firstly since the LSXD space is time independent we may drop the dt^2 term from the line-element and introduce a new spatial form, dl^2 where dl^2 reduces to ds^2 and

$$dl^2 = dx^2 + dy^2 + dz^2 + dW^2 \quad (8)$$

where $W = w^j + w^j + w^k$ (before complex dualing to LSXD Calabi-Yau mirror symmetry) as a 9D quaternion-like trivector representation. This is like an extension of the 3-sphere of Einstein's space where the set of points x,y,z,W are at a fixed distance R from the origin such that $R^2 = x^2 + y^2 + z^2 + W^2$ preserving the wanted three time independent space variables, x,y,z and where the fourth LSXD variable W^2 is given as

$$W^2 = R^2 - r^2 \quad (9)$$

where $r^2 = x^2 + y^2 + z^2$ such that (5) becomes

$$dW = \frac{r dr}{W} = \frac{r dr}{(R^2 - r^2)^{1/2}} \quad (10)$$

So that the dual local-HD spatial line-element dl^2 becomes

$$dl^2 = dx^2 + dy^2 + dz^2 + \frac{r^2 dr^2}{R^2 - r^2} \quad (11)$$

where R may be used to represent the center of dual Calabi-Yau mirror symmetric 3-tori. See Fig. 8.

Continuing to follow Peebles^[25,26] this generalizes the usual 2D line-element to 9D where the length R is a constant because spacetime is assumed to be static. For $r \ll R$ our extended Einstein line element approaches the usual Minkowski form (11). When $r = R$ the geometry makes correspondence to the surface of a Riemann 2-sphere which is utilized in the standard description of a qubit as a Bloch Sphere. (Fig. 10a)

Let's look at the additional parameters this space allows us to add to the fundamental description of a quantum state beyond the usual inherent uncertainties of Copenhagen interpretation. Because of the conformal scale-invariance of the Nilpotent criteria an additional duality must be incorporated into the mirror symmetric parameters of W^2 which is a further correspondence to the standing wave-like properties of the Cramer Transactional Interpretation to simplistic-ally what might be labeled, $\pm W^2$. This addition would incorporate all the additional parameters for a complete description of a quantum state as embedded in the LSXD aspects of the U_F required for the r-qubit to include the additional HD conformal scale-invariant parameters.

The Pythagorean Theorem, $a^2 + b^2 + c^2 = d^2$ gives the diagonal length, d of a 3D cube, a, b, c . Adding terms to the equation describes the diagonal of an nD hypercube. The locking together of the Calabi-Yau components in the resultant localized cube creates the quantum uncertainty principle which can be surmounted^[2,3,5] if the Calabi-Yau nilpotent 'copies' are accessed by incursive resonance.

The additional parameters of this space allows us to add to the fundamental description of a quantum state beyond the usual Copenhagen interpretation. Because of the conformal scale-invariance to the Nilpotent criteria an additional duality must be incorporated into the mirror symmetric parameters of W^2 which is a further correspondence to the standing-wave-like properties of the Cramer Transactional Interpretation to simplistically what might be labeled, $\pm W^2$. This addition as far as we currently understand would incorporate all the additional parameters for a complete description of a quantum state as embedded in the HD aspects of the U_F requiring a new representation of the qubit to include the additional parameters.

We can also attempt to describe this topological geometry with dual quaternion-like trefoil knots. The trefoil knot array (in Fig. 5 drawn as 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 that circle as the Lagrangian, in this case a resultant of two trefoil knots as a 2-sphere quantum state as the coupling area. The figure also provides a conceptualized view of how one sees continuous-state evolution of conformal scale-invariant Calabi-Yau mirror symmetric topology. As QT has a semi-classical limit this might be termed semi-quantum in terms of the HD U_F . There is a 2nd LSXD level ‘above’ this one postulated as the regime of full U_F potentia. The cycle goes from chaotic-uncertain to coherent-certain non-commutative to commutative according to the noetic transformation. This is represented in the Dirac string trick^[27].

To formalize the model a complex quaternion Clifford algebra is required to incorporate all the new LSXD U_F parameters. Thus in contrast to Havel’s 6D bivector in complex Minkowski or Hilbert space (Fig. 10b) we can illustrate a LSXD r-qubit by the Philippine wine dance^[27]. Each wine glass would represent one standard Bloch sphere; the dancer is like an atom and each glass represents one of the 2 possible spin states. Havel would have 2 entangled wine dancers standing near each other in Minkowski-Hilbert space. What we require to completely define a quantum state physically is that the wine dancers are like puppets standing additionally in a hall of mirrors^[28] (Calabi-Yau mirror symmetry). The puppet master is the super-quantum potential provided by parameters of the U_F . The mirror images are restricted on each side of the Cramer future-past Calabi-Yau mirror symmetry. By the continuous-state premise of this LSXD hierarchy - the left-right or future-past components become embedded in each other in the cycle^[2,6,8]. The bottom (3D resultant) becomes the usual semi-classical phenomenological q-state we observe. At the 12D top the embedding is the causally free (ontological) quantum state copy - i.e. surmounting the quantum uncertainty principle^[6,8].

In summary Havel uses a 6D bivector to represent 2 qubits. In our model a single qubit should be represented as some form of a dual quaternion trivector. What we get with this new qubit representation is QC logic gates able to surmount the uncertainty principle and proper algorithms for universal QC. Normalized quaternions are simply Euclidean 4-vectors (length one) and thus fermionic vertices in spacetime or points on a unit hypersphere (this case a 3-sphere) embedded in 4D. Just as the unit sphere has two degrees of freedom, e.g., latitude and longitude, the unit hypersphere has three degrees of freedom. The coordinate fixing-unfixing mechanism is superbly illustrated by the ‘walking of the Moai on Rapa Nui’^[29].

However a 3rd complex metric is involved making an evolution from dual quaternions to a 3rd quaternion we choose to name a trivector that acts as a baton passing mechanism between the space-antispacetime or dual quaternion vector space. Of paramount importance this trivector facilitates a ‘leap-frogging’ between anti-commutative and commutative modes of HD space. This inaugurates a Mobius transformation between the

Riemann dual stereographic projection complex planes. Geometrically, a standard Möbius transformation can be obtained by first performing stereographic projection from the plane to the unit 2-sphere, rotating and moving the sphere to a new location and orientation in space, and then performing stereographic projection (from the new position of the sphere) to the plane. These transformations preserve angles, map every straight line to a line or circle, and map every circle to a line or circle. Möbius transformations are defined on the extended complex plane (i.e. the complex plane augmented by the point at infinity): $\hat{\mathbb{C}} = \mathbb{C} \cup \{\infty\}$.

This extended complex plane can be thought of as a sphere, the Riemann sphere, or as the complex projective line. Every Möbius transformation is a bijective conformal map of the Riemann sphere to itself. Every such map is by necessity a Möbius transformation. Geometrically this map is the Riemann stereographic projection of a rotation by 90° around $\pm i$ with period 4, which takes the continuous cycle $0 \rightarrow 1 \rightarrow \infty \rightarrow -1 \rightarrow 0$. This is required to oscillate from anticommutivity to commutivity in order to provide the cyclic opportunity to violate 4D quantum uncertainty^[2,6]!

10. Intro to a Quantum Computing $P \equiv 1$ Operational Android Design

In a homogeneous magnetic field, the forces exerted on opposite ends of the dipole cancel each other out and the trajectory of the particle is unaffected. if the particles are classical "spinning" particles then the distribution of their spin angular momentum vectors is taken to be truly random and each particle would be deflected up or down by a different amount producing an even distribution on the screen of a detector. instead, quantum mechanically, the particles passing through the device are deflected either up or down by a specific amount. this means that spin angular momentum is quantized (also called space quantization), i.e. it can only take on discrete values. there is not a continuous distribution of possible angular momenta. this is the usual fundamental basis of the standard quantum theory and where we must introduce a new experimental protocol to surmount it. This is the crux of our new methodology: If application of a homogeneous magnetic field produces quantum uncertainty upon measurement, then "do something else"!

Of the three types of spin-spin coupling, this QC protocol relies on the hyperfine interaction for electron-nucleon coupling, specifically the interaction of the nuclear electric quadrupole moment induced by an applied oscillating rf-electric field to act on the nuclear magnetic dipole moment, μ . When the electron and nuclear spins align strongly along their z -components the Hamiltonian is $-m \cdot B$, and if B is in the z direction

$$H = -\gamma_N I \cdot B = -\gamma_N B I_x \quad (12)$$

with $m = \gamma_N I$, γ_N the magnetogyric ratio $\gamma_N = e\hbar/2m_p$ and m_p the mass of the proton.

Radio frequency excitation of the nuclear magnetic moment, μ to resonance occurs for a nucleus collectively which rotates μ to some angle with respect to the applied field, B_0 . This produces a torque $\mu_i \times B_0$ causing the angular momentum, μ itself to precess around B_0 at the Larmor frequency $\omega_L = \gamma_N B_0$. This coherent precessing of μ can also induce a 'voltage' in surrounding media, an energy component of the Hamiltonian utilized to create interference in the structure of spacetime^[8].

Metaphorically this is like dropping stones in a pool of water: One stone creates concentric ripples; two stones create domains of constructive and destructive interference. Such an event is not considered possible in the standard models of particle physics, quantum theory and cosmology. However Noetic science uses extended versions of these theories wherein a new teleological action principle is utilized to develop what might be called a 'transistor of the vacuum'. Just as standard transistors and copper wires provide the basis for almost all modern electronic devices; This Laser Oscillated Vacuum Energy Resonator using the information content of spacetime geodesics (null lines) will become the basis of many forms of Noetic Technologies especially QC.

Simplistically in this context, utilizing an array of modulated tunable lasers, atomic electrons are rf-pulsed with a resonant frequency coupling them to the magnetic moment of nucleons such that a cumulative interaction is created to dramatically enhance the Haisch-Rueda inertial back-reaction^[8]. The laser beams are counter-propagating producing a Sagnac effect Interferometry to maximize the violation of Special Relativity. This is the 1st stage of a multi-tier experimental platform designed (according to Noetic Field Theory) to 'open a hole' in the fabric of spacetime in order to isolate and utilize the force \hat{F}_U of the Unitary Field.

The interferometer utilized as the basis for our vacuum engineering QC platform is a multi-tiered device. The top tier is comprised of counter-propagating Sagnac effect ring lasers that can be built into an IC or Q-dot array of 1,000+ ring lasers. If each microlaser in the array is designed to be counterpropagating, an interference phenomena called the Sagnac Effect occurs that violates special relativity in the small scale^[8]. This array of rf-modulated Sagnac-Effect ring lasers provides the top tier of the multi-tier QC unit. Inside the ring of each laser is a cavity where quantum effects called Cavity Quantum Electrodynamics (C-QED) may occur. A specific molecule is placed inside each cavity (we propose a xanthine). If the ring laser array is modulated with resonant frequency modes chosen to achieve spin-spin coupling with the molecules electrons and neutrons, by a process of Coherent Control^[8] of Cumulative Interaction an inertial back-reaction is produced whereby the electrons also resonate with the spacetime backcloth in order to 'open an oscillating (periodic) hole' in it.

The first step in the interference hierarchy (Fig. 12) is to establish an inertial back-reaction between the

modulated electrons and their coupled resonance modes with the nucleons. Following the Sakarov and Puthoff conjecture^[8] the initial resistance to motion, are actions of the vacuum zero-point field. Therefore the parameter m in Newton's second law, $f = ma$ is a function of the zero-point field^[8]. Newton's third law states that 'every force has an equal and opposite reaction'. Haisch & Rueda^[8] claim vacuum resistance arises from this reaction force, $f = -f$. This inertial back-reaction is like an electromotive force (Electromotive force, E : The internal resistance, r generated when a load is put upon an electric current, I between a potential difference V , i.e. $r = (E - V) / I$) of a de Broglie matter-wave field in the spin exchange annihilation creation process inherent in a hysteresis of relativistic spacetime fabric. We further suggest that the energy responsible for Newton's third law is a result of the continuous-state flux of the ubiquitous noetic U_F ^[2,8]. For QC android implementation we assume the Haisch-Rueda postulate is correct

$$f = \frac{d\rho}{dt} - \lim_{\Delta t \rightarrow 0} \frac{\Delta\rho}{\Delta t} \equiv \frac{d\rho_*}{dt_*} - \lim_{\Delta t_* \rightarrow 0} \frac{\Delta\rho_*}{\Delta t_*} = f_* \tag{13}$$

where $\Delta\rho$ is the impulse given by the accelerating agent and thus $\Delta\rho_*^{zp} = -\Delta\rho_*$ ^[8].

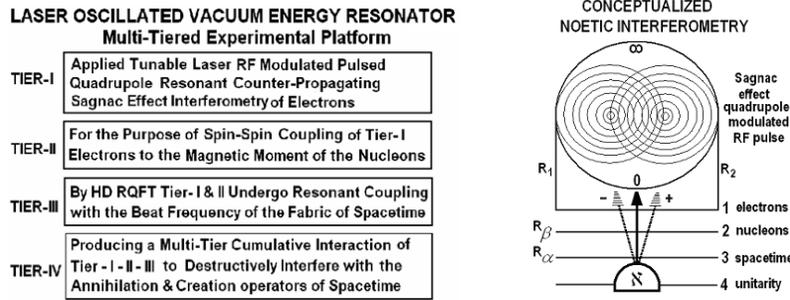


Figure 12. a) Design elements of the Noetic Interferometer postulated to constructively-destructively interfere with the topology of the spacetime manifold to manipulate the U_F . The first three tiers set the stage for the critically important 4th tier which by way of an incursive oscillator punches 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 U_F . 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.

The cyclotron resonance hierarchy must also utilize the proper beat frequency of the continuous-state dimensional reduction spin-exchange compactification process inherent in the cyclic symmetry of noetic spacetime 'tuned' so the speed of light $c \equiv c$. With this apparatus noetic theory suggests that destructive-constructive C-QED interference of spacetime occurs such that the noeton eternity wave, \aleph of the U_F is harmonically (holophote) released into the detector cavity array. Parameters of the Dubois incursive oscillator are also required for aligning the interferometer hierarchy with the beat frequency of spacetime.

As illustrated in Fig. 12 the coherent control of the multi-level tier of cumulative interactions relies on full utilization of the continuous-state cycling inherent in parameters of Multiverse cosmology^[8]. What putatively will allow noetic interferometry to operate is the harmonic coupling to periodic modes of Dirac spherical rotation in the symmetry of the HD geometry. The universe is no more classical than quantum as currently believed; reality rather is a continuous state cycling of nodes of classical to quantum to unitary, $C \rightarrow Q \rightarrow U$. Space does not permit detailed delineation of the parameters of Multiverse cosmology here; see^[8]. The salient point is that cosmology, the topology of spacetime itself, has the same type of spinorial rotation and wave-particle duality Dirac postulated for the electron. Recall that the electron requires a 4D topology and 720° for one rotation instead of the usual 360° to complete a rotation in 3D. The hierarchy of noetic cosmology is cast in 12D such that the pertinent form of relativistic quantum field theory has significantly more degrees of freedom whereby the modes of resonant coupling may act on the structural-phenomenology of Dirac ‘sea’ itself rather than just the superficial zero-point field surface approaches to vacuum engineering common until now. 12D is the minimum to surmount uncertainty because the ‘mirror image of the mirror image in HD space is causally free of the 3D quantum particle!

The parameters of the noetic oscillator (Fig. 12) may best be implemented using a form of de Broglie fusion. According to de Broglie a spin 1 photon can be considered a fusion of a pair of spin 1/2 corpuscles linked by an electrostatic force. Initially de Broglie thought this might be an electron-positron pair and later a neutrino and antineutrino. “A more complete theory of quanta of light must introduce polarization in such a way that to each atom of light should be linked an internal state of right and left polarization represented by an axial vector with the same direction as the propagation velocity”^[14]. These prospects suggest a deeper relationship in the structure of spacetime of the Cramer type^[8,15] (Figs. 2,8). The epistemological implications of 12D must be delineated. The empirical domain of the standard model relates to the 4D phenomenology of elementary particles. It is the intricate notion of what constitutes a particle that concerns us – objects emerging from the quantized fields defined on Minkowski spacetime. This domain is insufficient for our purposes.

For a basic description, following de Broglie’s fusion concept, assume two sets of coordinates x_1, y_1, z_1 and x_2, y_2, z_2 which become

$$X = \frac{x_1 + x_2}{2}, \quad Y = \frac{y_1 + y_2}{2}, \quad Z = \frac{z_1 + z_2}{2}. \quad (14)$$

Then for identical particles of mass m without distinguishing coordinates, the Schrödinger equation (for the center of mass) is

$$-i\hbar \frac{\partial \psi}{\partial t} = \frac{1}{2M} \Delta \psi, \quad M = 2m \quad (15)$$

Equation 15 corresponds to the present and Eq. 16a corresponds to the advanced wave and (16b) to the retarded wave^[15].

$$-i\hbar \frac{\partial \phi}{\partial t} = \frac{1}{2M} \Delta \phi, \quad -i\hbar \frac{\partial \varphi}{\partial t} = \frac{1}{2M} \Delta \varphi. \quad (16)$$

Extending Rauscher's concept for a complex eight space differential line element $dS^2 = \eta_{\mu\nu} dZ^\mu dZ^{*\nu}$, where the indices run 1 to 4, $\eta_{\mu\nu}$ is the complex eight-space metric, Z^μ the complex 8-space variable and where $Z^\mu = X_{\text{Re}}^\mu + iX_{\text{Im}}^\mu$ and $Z^{*\nu}$ is the complex conjugate^[8], to 12D continuous-state spacetime; we write just the dimensions for simplicity and space constraints

$$x_{\text{Re}}, y_{\text{Re}}, z_{\text{Re}}, t_{\text{Re}}, \pm x_{\text{Im}}, \pm y_{\text{Im}}, \pm z_{\text{Im}}, \pm t_{\text{Im}} \quad (17)$$

where \pm signifies Wheeler-Feynman/Cramer type future-past/retarded-advanced dimensions. This dimensionality provides an elementary framework for applying the hierarchical harmonic oscillator parameters suggested in Fig. 12 to operate a QC without decoherence.

11. Conclusion - Criteria for Sentience

Sentience is suggested to be synonymous with an entity having subjective experiences also known in Philosophy of Mind as experiencing qualia. Sentience is often considered to be distinct from other aspects of mind like intelligence, self-awareness or free agency. The issue of conscious machines remains difficult compounded by the 'Chinese Room' analogy suggesting it could also remain a challenge experimentally. The problem cannot be solved philosophically only laid bare to certain probabilities. It is possible to list salient components of consciousness. We suggest four: Sentience, Intelligence Self-awareness and Free will.

Must a conscious system be considered alive? We have addressed this issue elsewhere in what we have termed System-Zero: The proteinaceous unit called the prion, (responsible for neurodegenerative encephalopathies) a particle 'below' the virus. System-Zero propagates from normal to infectious by a conformal change in the protein structure by action of the force of coherence of the U_F .

Following the assumptions: 1) A physically real noetic 'life principle' exists synonymous with the action of the U_F , 2) The mind-body interface is a form of naturally occurring 'conscious quantum computer' (not that the QC is conscious but modeled after such principles) and 3) Combining the two concepts leads to truly sentient androids when applied to a class of QC systems modeled after the noetic mind-body interface.

The noetic QC Android model is empirically testable with experimental protocols summarized. Access to the U_F action of the life principle requires surmounting the quantum uncertainty principle. Furthermore the required universal bulk QC cannot be achieved with 4-space parameters and requires M-Theoretic principles of UFM cast in LSXD. We believe implementing sentient android devices is only this far away!

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