Perspective

Application of Unified Field Mechanics: Can Sentient Androids Be Constructed?
Part II: The Requirement of Quantum Computing

Richard L. Amoroso*

Noetic Advanced Studies Institute, Los Angeles, California, USA

Abstract

An android is meant to look and act like a human being even to the extent of being indistinguishable. 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. 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.

This is Part II of this two-part article entitled "The Requirement of Quantum Computing".

Keywords: Android, artificial intelligence, consciousness, mind-body problem, quantum computing, sentience, unified field mechanics.

* Correspondence: Prof. Richard L. Amoroso, Director of Physics Lab., Noetic Advanced Studies Institute, California, USA.
http://www.noeticadvancedstudies.us E-mail: amoroso@noeticadvancedstudies.us

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 Block 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.

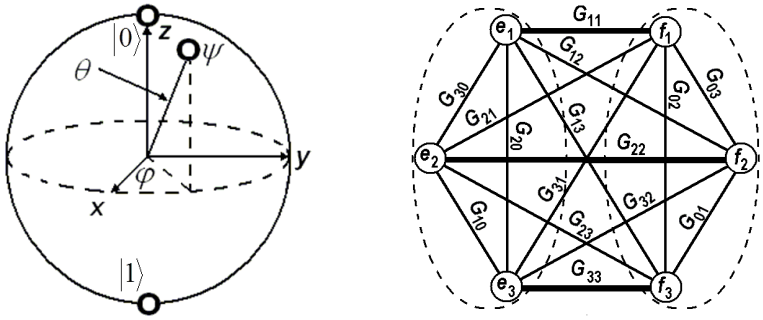

Figure 10. a) Representation of a qubit $|0\rangle+|1\rangle=\Psi^2$ as a complex Riemann Bloch 2-sphere. b) Combinatorial graph of vertices corresponding to basis vectors of a Bloch sphere for two qubits [e1, e2, e3] & [f1, f2, f3] and the edges to the corresponding bivector basis G_{ij}. Dashed ellipses 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 G11,G22,G33. 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-Poincairé 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-Poincairé) 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-Poincairé 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[8]. 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].

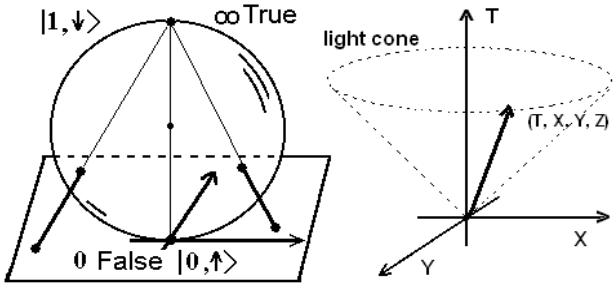

Figure 11. (a) Stereographic projection model of a qubit on a complex Riemann sphere, usual q-gate with constant number of states and particles. (b) Relativistic model of a qubit (r-qubit) with interacting quantum fields entailing an extra HD degree of freedom with constant particles but

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: $\Psi = \xi|0\rangle + \eta|1\rangle$ with each ray $\xi, \eta \in C$ 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: $\xi\bar{\eta} + \eta\bar{\xi} \to X$, $\xi\bar{\eta} - \eta\bar{\xi} \to iY$, $\xi\bar{\xi} - \eta\bar{\eta} \to Z$.

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):

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

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

$$ds^2 = dt^2 - dx^2 - dy^2 - \quad . \tag{7}$$

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

$$dl^2 = dx^2 + dy^2 + dz^2 + \quad \tag{8}$$

where $W = w^i + w^j + w^k$ (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

$$W^2 = R^2 - r^2 \tag{9}$$

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

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

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

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

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-antispace 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 $0 \to 1 \to \infty \to -1 \to 0$. This is required to oscillate from anticommutivity to commutivity in order to provide the cyclic opportunity to violate 4D quantum uncertainty [2,6]!

10. Introduction to a Quantum Computing $\mathbf{P} \equiv 1$ 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

$$H = -\gamma_N I \cdot B = -\gamma_N B I_x \tag{12}$$

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

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

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

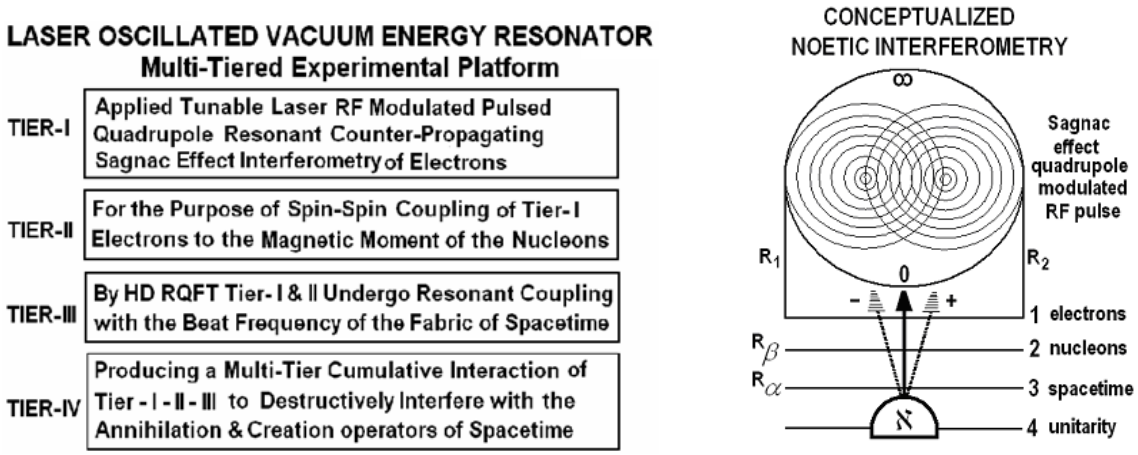

Figure 12. a) Design elements of the Noetic Interferometer postulated to constructively-destructively interfere with the topology of the spacetime manifold to manipulate the U_F. The first three tiers set the stage for the critically important 4th tier which by way of an incursive oscillator punches 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, ℵ' 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 noeon eternity wave, ℵ 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, $C \to Q \to U$. 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 e 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

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

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

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

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

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

Extending Rauscher's concept for a complex eight space differential line element $dS^2=\eta_{\mu\upsilon}dZ^{\mu}dZ^{*\nu}$, 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 $Z^{\mu}=X^{\mu}_{\mathrm{Re}}+iX^{\mu}_{\mathrm{Im}}$ and $Z^{*\nu}$ is the complex conjugate[8] , to 12D continuous-state spacetime; we write just the dimensions for simplicity and space constraints

$$x_{\mathrm{Re}}, y_{\mathrm{Re}}, z_{\mathrm{Re}}, t_{\mathrm{Re}}, \pm x_{\mathrm{Im}}, \pm y_{\mathrm{Im}}, \pm z_{\mathrm{Im}}, \pm t_{\mathrm{Im}} \tag{17}$$

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 form 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!

References

[1] Amoroso, R. L. (2010) Complementarity of Mind and Body: Realizing the Dream of Descartes, Einstein, and Eccles, New York: Nova Science Publishers.

[2] Amoroso, R.L., Kauffman, L.H. & Rolands, P. (2013) The Physics of Reality: Space, Time, Matter, Cosmos, Hackensack: World Scientific.

[3] Amoroso, R.L., Kauffman, L.H. & Rolands, P. (2015) Unified Field Mechanics: Natural Science Beyond the Veil of Spacetime, Hackensack: World Scientific.

[4] Amoroso, R. L., & Di Biase, F. (2013) Crossing the psycho-physical bridge: elucidating the objective character of experience, Journal of Consciousness Exploration and Research, Vol. 4, No. 9.

[5] Amoroso, R. L. (2013) Empirical protocols for mediating long-range coherence in biological systems, Journal of Consciousness Exploration and Research, Vol. 4, No. 9.

[6] Amoroso, R. L. (2010) Simple resonance hierarchy for surmounting quantum uncertainty, In Amoroso, R. L., Rowlands, P., & Jeffers, S. (eds) AIP Conference Proceedings-American Institute of Physics, Vol. 1316, No. 1, p. 185.

[7] Amoroso, R. L. (1997) The theoretical foundations for engineering a conscious quantum computer, in M. Gams et al. (eds) Mind Versus Computer: Were Dreyfus and Winograd Right? Amsterdam: IOS Press, 43, 141-155.

[8] Amoroso, R.L. & E.A. Rauscher, E.A. (2009) The Holographic Anthropic Multiverse: Formalizing the Complex Geometry of Ultimate Reality, Singapore: World Scientific.

[9] Hameroff, S. & Powell, J. (2008) The Conscious Connection: A Psycho-physical Bridge between Brain and Pan-experiential Quantum Geometry in D. Skrbina, (ed.), Mind That Abides: Panpsychism in the New Millennium, New York: Benjamins.

[10] Amoroso, R.L. (2013) "Shut the front door!": Obviating the challenge of large-scale extra dimensions and psychophysical bridging, in R.L. Amoroso, L.H. Kauffman, & P. Rolands, P. (eds.) The Physics of Reality: Space, Time, Matter, Cosmos, Hackensack: World Scientific.

[11] Rowlands, P. (2007) Zero to Infinity: The Foundations of Physics, Singapore: World Scientific.

[12] T. Toffoli, M. Biafore & J. Leao (eds.) Physcomp96, Cambridge: New England Complex Systems Institute; http://arxiv.org/abs/quant-ph/9701027

[13] Nagel, T. (1974) What's it like to be a bat?, Philosophical Rev., 83, pp. 435-450.

[14] Holland, P. R. (1995) The quantum theory of motion: An account of the de Broglie-Bohm causal interpretation of quantum mechanics, Cambridge: Cambridge university press.

[15] Cramer, J. (1986) The Transactional Interpretation of Quantum Mechanics, Rev. Mod. Phys 58, 647-687.

[16] Witten, E. (1996) Reflections on the fate of spacetime, Phys. Today, (April) pp. 24-30.

[17] Feynman, R.P. (1971) Lectures on Gravitation, Pasadena: California Inst. Technology.

[18] Eccles, J.C. (1992) Evolution of consciousness, Proc. Natl. Acad. Sci. USA Vol. 89, pp. 7320-7324.

[19] Dubois, D.M. (2001) Theory of incursive synchronization and application to the anticipation of delayed linear and nonlinear systems, in D.M. Dubois (ed.) Computing Anticipatory Systems: CASYS 2001, 5th Intl Conf., AIP Conf. Proceed. 627, pp. 182-195.

[20] Feynman, R.P. (1986) Quantum mechanical computers, Found. Phys. 6, pp. 507-531.

[21] Havel, T.F. & Doran, C.J.L. (2004) A Bloch-sphere-type model for two qubits in the geometric algebra of

a 6-D Euclidean vector space, arXiv:quant-ph/0403136v1.

[22] Makhlin, Y. (2002) Nonlocal properties of two-qubit gates and mixed states, and the optimization of quantum computations, Quantum Inform. Processing 1, pp. 243–252.

[23] Zhang, V.J., Sastry, S. & Whaley, K.B. (2003) Geometric theory of nonlocal two-qubit operations, Phys. Rev. A 67, p. 042313.

[24] Vlasov, A.Y. (1996) Quantum theory of computation and relativistic physics, in T. Toffoli, M. Biafore & J. Leao (eds.) Physcomp96, Cambridge: New England Complex Systems Institute; http://arxiv.org/abs/quant-ph/9701027, and additional material from private communication.

[25] Peebles, P. J. E. (1993) Principles of Physical Cosmology, Princeton: Princeton University Press.

[26] Peebles, P.J.E. (1992) Quantum Mechanics, Princeton: Princeton Univ. Press.

[27] Francis, G., Kauffman, L.H. & Sandin, D. (1993) Air on the Dirac Strings (video) http://www.evl.uic.edu/hypercomplex/html/dirac.html.

[28] Goertzel, B., Aam, O., Smith, T.F. & Palmer, K. (2007) Mirror Neurons, Mirrorhouses, and the Algebraic Structure of the Self http://www.goertzel.org/dynapsyc/2007/mirrorself.pdf

[29] Amazing Video, Walking of the Moai on Rapa Nui (Easter Island) http://www.youtube.com/watch?v=yvvES47OdmY.