Holographic Wormhole Drive: Philosophical Breakthrough in FTL 'Warp-Drive' Technology

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Skeptics say Faster than light (FTL) space travel is the stuff of Science Fiction, could take 1,000 years and require a Jupiter size mass-energy source to operate superluminal warp drive spaceships. The author solves this problem in a radical new approach called the “Holographic Wormhole Drive” resulting in the possibility of warpdrive technologies in the near term. The Alcubierre warp drive metric (considered most advanced) derived from Einstein’s General Relativity field equations by Miguel Alcubierre, in 1994 stretches space in a wave. Space ahead of a ship contracts & space behind expands, inhabitants of the warp-bubble travel along what astrophysicists call a ‘freefall’ geodesic, not moving locally inside the bubble at FTL velocities. But this model requires a negative mass-energy the size of Jupiter to operate. Amoroso uses a new spacetime transformation to cover the domain wall of the warp bubble with an array of mini-wormholes allowing an incursive oscillator to manipulate Alcubierre’s alpha and beta functions with minimal external energy input, i.e. the inherent infinite energy of the spacetime vacuum is used instead by a method of ‘ballistic’ spacetime programming. In "The Immanent Implementation of FTL Warp-Drive Technologies", from his book "Orbiting the Moons of Pluto, Amoroso solves major problems facing the Alcubierre metric based on principles of Holographic Anthropic Cosmology from another volume: "The Holographic Anthropic Multiverse". His solution is a 'Holographic Figure-Ground Effect' where the 'local' free-fall Warp Bubble separates from the holographic background by covering the domain wall of the free-fall warp-bubble with a system of mini-wormholes by 'programming mirror symmetry parameters of the spacetime vacuum'. Manipulating this figure-ground effect becomes the 'Warp speed factor'. Utilizing a higher dimensional (HD) polarized Vacuum and associated operationally completed forms of Quantum Field Theory the need for 'infinite exotic energy' is ameliorated by cyclically 'borrowing' inherent vacuum energy.

1 Overview and Current Status

Recent work exploring Faster-Than-Light (FTL) warp drive technologies has proven surprisingly interesting in that science fiction seems on the brink of immanent reality. Most of the new discussion has centered on the Alcubierre spacetime metric, a unique reverse solution derived from Einstein's General Relativity field equations. However these attempts have been troubled by critical problems such as the perceived requirement of near infinite negative or exotic mass-energy to power the FTL drive and creating a free-fall warp bubble containment field to overcome the theoretical limits imposed by Einstein's theory of Special Relativity. In this chapter we offer radical solutions to these conundrums albeit for the purposes of this sophomoric introductory overview primarily in conceptual form; however still bringing a glimpse of the feasibility for FTL warp-drive travel putatively to near term.

Skeptics say it may take 1,000 years and require an energy source the size of Jupiter to operate superluminal faster than light (FTL) warp-drive technologies. In this work we present ideas on how to change that scenario. We decided to call our FTL model the "Holographic Wormhole Drive" (HWD) for reasons that will become evident as the discussion progresses. Firstly the HWD name is coined after the Holographic Multiverse cosmology paradigm that in our view allows it to operate [1]. The second part *wormhole drive* is misleading because it is suggestive of those models that seek natural or propose creation of large wormholes to pass a spaceship through [2-4]. We define the term wormhole, which shares some general utility with both models, before we proceed further. Wormhole in general:

- A distortion of spacetime that links one location with another through a path or tunnel in the spacetime topology that acts as a shortcut in distance or time compares to the usual path in 3D Euclidean space.

The term wormhole was first coined by Wheeler in 1957 [5], but Weyl had already proposed the theory in 1921. Wormholes are also called Einstein-Rosen bridges or Lorentzian Schwarzschild wormholes after the solution to his field equations discovered by Einstein and Rosen in 1935 [6]. In 1962 Wheeler and Fuller showed that this type of wormhole is unstable, would pinch off instantly after forming so that even light could not pass through. However the existence of this Schwarzschild solution inspired Kip Thorne to consider holding the throat of a wormhole open by exotic matter with negative mass energy. The possibility of traversable wormholes in general relativity was first demonstrated by Thorne and Morris in 1988 [7,8]. This is the origin of the model of traversable wormholes held open by a spherical shell of exotic matter.

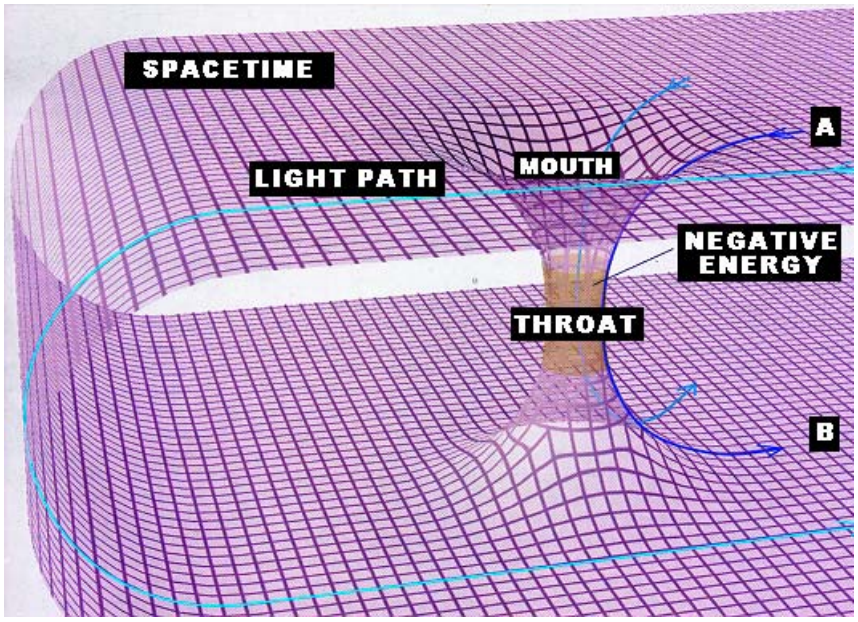

Figure 1. Illustration of a spacetime traversable wormhole [9]. It is a 2D conceptualization of what takes 4D or greater dimensionality to describe. Imagine folding a 2D surface into a third dimension that does not exist in the 2D surface space. This is somewhat reminiscent of a Klein bottle where the handle cannot be drawn free in 2D or as a 3D object. Special relativity only applies locally. Wormholes allow superluminal travel by ensuring that the speed of light is not exceeded locally in time because while traveling through a wormhole, subluminal velocities are used.

There are several constructs that make our model unique and to allow FTL warp drive theory to leap to the brink of practicality. Also it should be noted that FTL itself is also a bit of a misnomer; in the EPR sense nonlocal connectivity (as in Newton's law of gravitation) is considered instantaneous. There is still a 'Warp-Factor', however the HWD uses a figure-ground effect in this respect as will be explained in detail below. In the HWD model the local Galilean velocity "Warp-Bubble" is harmonically removed from the background of spacetime that reality is embedded in and dropped back in with a resonant beat frequency. The greater the amplitude and duration of the wave the larger the FTL distance traveled between harmonic beats; this is the warp factor as developed below.

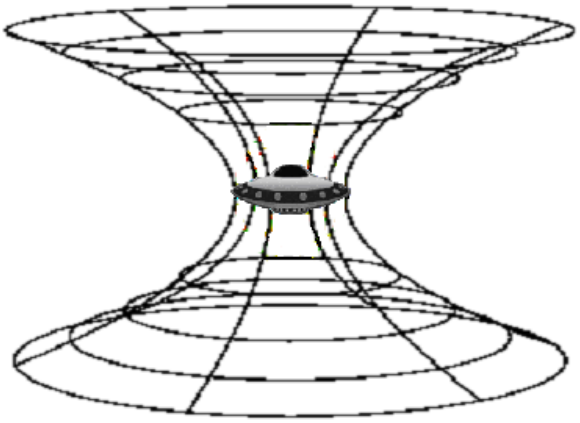

Figure 2. One major theoretical FTL method has been the utility of macroscopic wormholes created with a Jupiter size exotic matter (negative energy gravitational mass) or utilizing a natural traversable wormhole in the proximity of a black hole.

This is where the HWD wormhole concept enters in. The warp bubble boundary is covered by a layer of mini-wormholes created by resonant vacuum programming. This layer of mini-wormholes provides the grease so to speak for operation of the figure-ground effect. This figure-ground effect is somewhat reminiscent of the friction table demonstration used in elementary physics education. A puck pushed across the table has the highest coefficient of friction. Hundreds of tiny holes (conceptually our mini-wormholes) are drilled in the table. When air is forced through the holes the pucks then glides across the table with virtually no friction.

The HWD may seem farfetched at this point, but we will develop these new principles as we go along in our dissertation. The key [1] stems from a new 12D understanding of a scale invariant covariant Dirac polarized vacuum concept [1,10] that includes operationally completed models of de Broglie-Bohm-Cramer interpretations of quantum theory [11,12] and dual integrated form of Newton's and Einstein's gravity [1,13]. As in our description for universal bulk quantum computing by surmounting the uncertainty principle [1] most consider quantum computing as merely a fast form of computing utilizing entangled quantum states. This is by no means the case. Our model for universal quantum computing requires a 12D string theoretic background that allows the manipulation of reality itself. Aye there's the rub!

The other primary advance is that the HWD needs no Jupiter size negative energy mass. This feature is the other boon that comes from a greater understanding of the 12D Dirac vacuum [1,11]. Virtually infinite negative and positive energy in equilibrium is inherent in the background of infinite

potentia. This apparently is what holds the Multiverse and our individual Hubble sphere, H_R together and allows each H_R in the holographic anthropic multiverse to be fine-tuned.

2 The Alcubierre Warp-Drive Metric – Brief Review

In general the Alcubierre solution is used to create an expansion of spacetime behind a spaceship and a spacetime contraction in front of it. The Alcubierre warp-drive metric [14-16] as derived from Einstein's General Relativity field equations,

$$R_{\mu\nu} - (g_{\mu\nu}R)/2 + g_{\mu\nu}\Lambda = (8\pi G/c^4)T_{\mu\nu} \tag{1}$$

in general form is:

$$\begin{aligned} ds^2 &= -d\tau^2 = g_{\alpha\beta}dx^\alpha dx^\beta \\ &= -\left(\alpha^2 - \beta_i\beta^i\right)dt^2 + 2\beta_i dx^i dt + \gamma_{ij}dx^i dx^j . \end{aligned} \tag{2}$$

The Alcubierre solution is currently considered the most advanced model; and although the solution does not require a wormhole to traverse, it does require exotic matter to generate the spacetime distortion

To quote Alcubierre original paper:

> In this formalism, spacetime is described by a foliation of spacelike hypersurfaces of constant coordinate time, *t*. The geometry of spacetime is then given in terms of the following quantities: the 3-metric, γ_{ij} of the hypersurfaces, the lapse function, α that gives the interval of proper time between nearby hypersurfaces as measured by the "Eulerian" observers (those whose four-velocity is normal to the hypersurfaces), and the shift vector, β^i that relates the spatial coordinate systems on different hypersurfaces [14].

Using those quantities, Alcubierre generates the warped spacetime metric written above in Eq. (2) and Fig. 3 below.

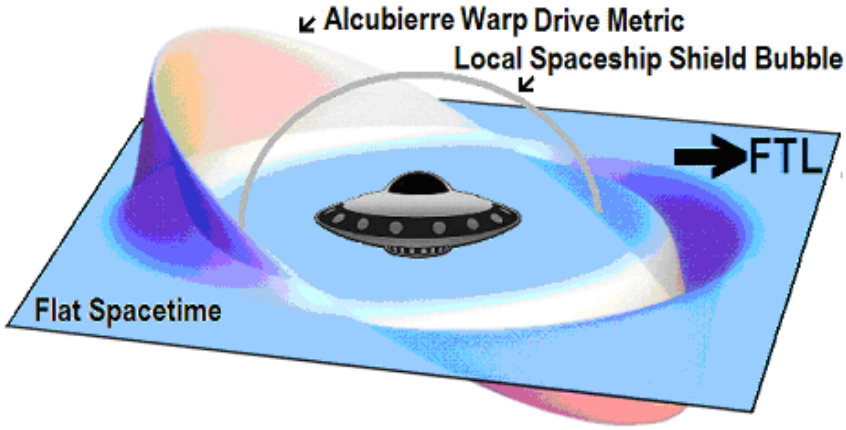

Figure 3. The original Alcubierre Warp Drive Metric. Showing how space stretches in a wave. Space ahead of a ship contracts and space behind expands. Inhabitants of the warp-bubble travel along a 'free-fall' geodesic, not moving locally relative to the ships FTL velocity.

3 The Philosophy of Potentia in a 12D Stringy Dirac Vacuum

The sub-quantum regime in the Copenhagen Interpretation has been called a stochastic foam, a domain within which time asymmetry is considered more fundamental than quantum theory. Time emerges from a more fundamental domain organizing the structure of and guiding the evolution of events in local reality [17,18]. In our extended interpretations the regime of infinite potentia can be coherently controlled and programmed in a manner essential to practical FTL warp-drive technology. This usage is beyond the usual meaning applied to Heisenberg potentia which only refers to the body of probabilistic states of the wave function before a local measurement is taken. We wish to align with those claiming nothing exists before 'measurement', but in a complex manner in that 4D Minkowski reality itself does not exist and arises from moment to moment as a form of "first collapse" creating the phenomenal basis of the Earth bound observers virtual reality (Fig. 4).

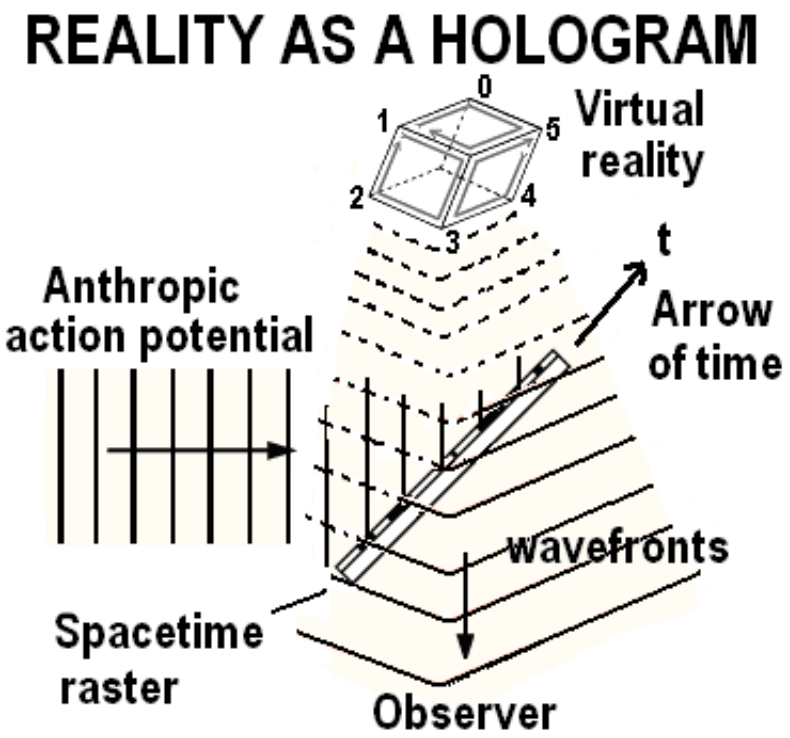

Figure 4. Reality is a hyperspherical hologram in an HD background of infinite potentia with the 'laser' being the teleological anthropic unified field action principle 'piloting' its continuous evolution with the unified field as a super-quantum potential.

This multilevel process has properties similar to wave-particle duality except that it applies to the dimensionality and topological boundary conditions of reality not just quanta. A combination of the Heisenberg uncertainty principle and the arrow of time (a subtractive interferometry) mediates this process keeping reality as a virtual subspace of a HD absolute space of infinite potentia. This is a major aspect of the continuous-state process inherent in the new Holographic Anthropic Multiverse (HAM) cosmological paradigm [1]. One could make correspondence to the Hawking-Dewitt model of the wave function of a closed universe only, $H\Psi = 0$ which in a multiverse would apply to our fine-tuned Hubble sphere. Boundary conditions forming reality are continuously created, with the Planck scale, $\hbar + T_0$ quantum stochasticity of matter as its lower bound, ψ_1 for example and the oscillating cosmological constant, $\Lambda + T_0$ as the upper bound, ψ_2.

Observed reality evanesces from a central hysteresis loop [1] of this action which is like an HD standing-wave in the Cramer Transactional Interpretation [7]. This is a radically new idea, that observed reality is an intermediate continuous-state collapse, containing an inherent 'Dirac spinor twist' as an intermediate stage for all the rest of what is considered the microscopic evolution of the quantum wave function to rest on (Fig. 15). This is metaphorically as the film in an analog movie projector, a 2D or 3D hologram strip and the bulb in the projector an anthropic laser producing the perceived 3D images on the screen perceived by the observer seated in the theatre.

This is not a popular view because not only does it give prime import to the role of the observer, but it also represents a dualist-interactionist model of awareness [19] unpopular among cognitive theorists who consider mind tantamount to brain because it includes an anthropic teleological action principle giving an inherent importance to the nature and role of the observer We believe this correct and have presented empirical models to support it [20,21].

We look at the zero-point field as interpreted in the Copenhagen Interpretation of quantum theory as 'fog over the ocean'; whereas we require the utility of the full depth of the ocean for our HWD FTL technology. We wish to stick with something that suggests a domain that is truly like a hologram in an HD sense because it seems theoretically the most efficient manner to operate an anthropic multiverse. Especially see our model of the vacuum exiplex which potentially solves numerous open questions in cosmology [1,13].

15.4 Domain Wall Boundaries and Emission-Absorption Advanced-Retarded Wave Loci

We shall consider a static thick domain wall constructed by a scalar field with self-interaction in a Schwarzschild singularity spacetime [22,23].

$$g = -\left(1-\frac{2M}{R}\right)dt^2 + \left(1-\frac{2M}{R}\right)^{-1} dR^2 + R^2\left(d\vartheta^2 + \sin^2\vartheta d\varphi^2\right) \qquad (3)$$

The metric of the background Schwarzschild black hole is written in terms of the isotropic coordinates, t, r, ϑ, φ, where the new radial coordinate, r is defined by

$$R = r\left(1+\frac{M}{2r}\right)^2. \qquad (4)$$

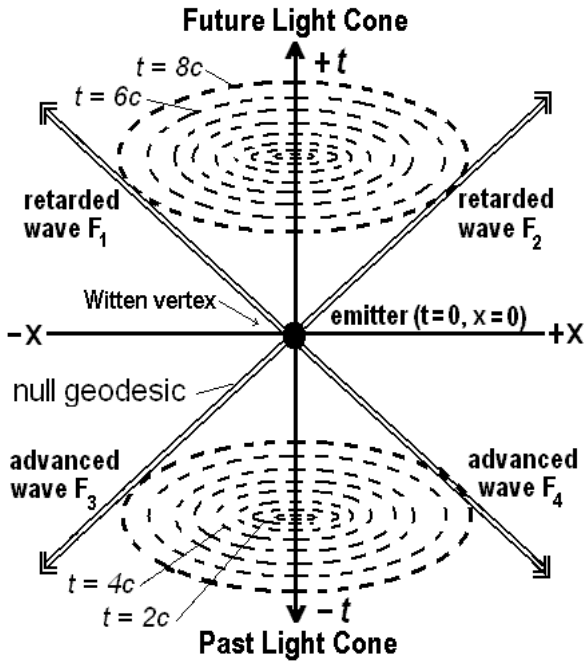

Figure 5. Cramer transaction emission locus at $x,t = 0,0$.We are concerned with the boundary conditions in the region outside the event horizon, where $r \geq M/2$ which are of interest even though here applied to a black hole because it might reflect scale invariant principles.

The scalar equation in spherical coordinates of wave motion in spacetime which has spherical symmetry [24,25].

$$\nabla^2\Phi - \frac{1}{c^2}\partial^2\frac{\Phi}{\partial t^2} = 0 \tag{5}$$

where Φ is the wave amplitude. The equation has two solutions

$$\begin{aligned}\Phi_{out} &= \frac{1}{r}\Phi_{\max}\exp\left(i\omega t - ikr\right)\\ \Phi_{in} &= \frac{1}{r}\Phi_{\max}\exp\left(i\omega t + ikr\right)\end{aligned} \tag{6}$$

which for the programming of spacetime can be applied to the propagation of

Cramer's advanced retarded waves from an emission locus at $x,t = 0,0$ by Eqs. (7) and Fig. 5.

$$F_{1-Ret} = F_0 e^{-ikx} e^{-2\pi i\omega t}, \quad F_{2-Ret} = F_0 e^{ikx} e^{-2\pi i\omega t}$$
$$F_{3-Adv} = F_0 e^{-ikx} e^{2\pi i\omega t}, \quad F_{4-Adv} = F_0 e^{ikx} e^{2\pi i\omega t} \tag{7}$$

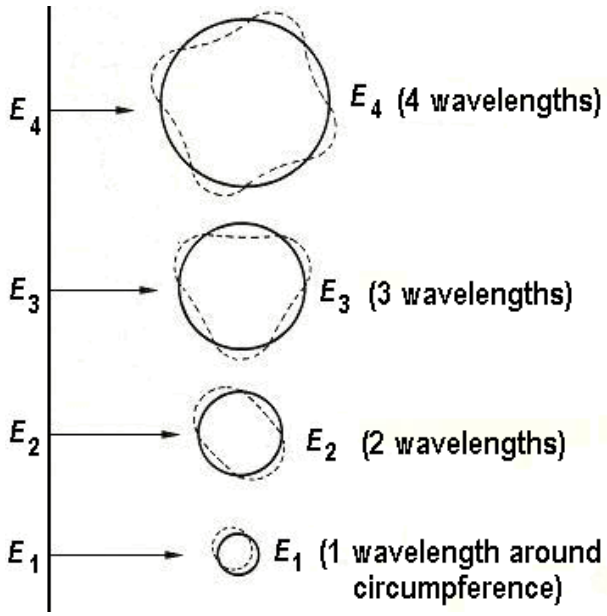

Figure 6. A Ring may vibrate with *n* standing wavelengths depending on the relationship of the circumference to the multiple number of whole wavelengths. Simplified here, it is suggested that the topology of spacetime and matter vibrate on and as hyperspherical surfaces.

Traditionally electron standing-waves oscillate about the atomic nucleus. Here we attempt to expand the wave nature of matter itself as static waves centered on the locus of least spacetime units as it is annihilated and recreated in the arrow of time relative to the observer. This requires a conversion of the de Broglie wave equation, $mvr = n(h/2\pi)$ to a static form amenable to the parameters of continuous-state cosmology [26,27]. For Hyperspherical Representation the magnitudes of the radial coordinates of a two-state wavefunction, $\psi(\vec{r}_1, \vec{r}_2)$ in hyperspherical representation are replaced by the hyper-spherical radius, *R* and the hyperspherical angle, α such that

$$R \equiv \left(r_1^2 + r_2^2\right)^{1/2} \quad \text{and} \quad \alpha \equiv \arctan\frac{r_2}{r_1} \tag{8}$$

in order that the symmetries may be more clearly shown. The hyperspherical radius, R represents the size of the two-state system and the hyperspherical angle, α is a measure of the radial correlation of the two-state system [28]. It is critical to note that when $\alpha = \pi/4,\ r_1 = r_2$; and when $\alpha = 0$ or $\pi/2$ one of the states is at a greater distance from the least-unit vertex than the other.

5 Ising Model Lattice-Gas Energy Increase from Constructive Interference Properties

In terms of the SUSY spacetime lattice represented by close-packed least units functioning as a Riemann 3-sphere Ising model spin lattice, where total energy, $E_T\{s_i\}$ is a function of the spin hysteresis loop

$$E_T\{s_i\} = \sum_i e_i(s_i) = E_0 - \sum_i h_i s_i \tag{9}$$

where $e_i(s_i)$ is the energy of an isolated individual least unit, E_0 the ground state and h_i the energy from spin orientation from the external field that allows coherent control of the Ising spin lattice [29]. The external field is the unitary action driving the evolution of the spacetime lattice structure as a putative self-organized complex system.

A surface of constant phase, $\underline{k}\cdot\underline{r} - \omega t = k_x x + k_y y + k_z z - \omega t = \textit{constant}$ is a wavefront [30]. For a surface of constant phase if any wave equation has a time harmonic (sinusoidal) solution of the form $Ae^{i\phi}$ where A is the amplitude and the phase, ϕ a function of position with (*x*,*y*,*z*) constant and phase difference 2π separated by wavelength, $\lambda = 2\pi/k$. The direction cosines of the planes of constant phase are proportional to *k* and move in the direction of *k* equal to the phase velocity where

$$\mu = \frac{\omega}{k} = \frac{\omega}{\sqrt{k_x^2 + k_y^2 + k_z^2}}. \tag{10}$$

Where $\lambda = 2\pi/k = 2\pi\hbar/p = h/p$ is equivalent to the de Broglie matter wave relations, $E = \hbar\omega,\ \mathbf{p} = \hbar k$ [31].

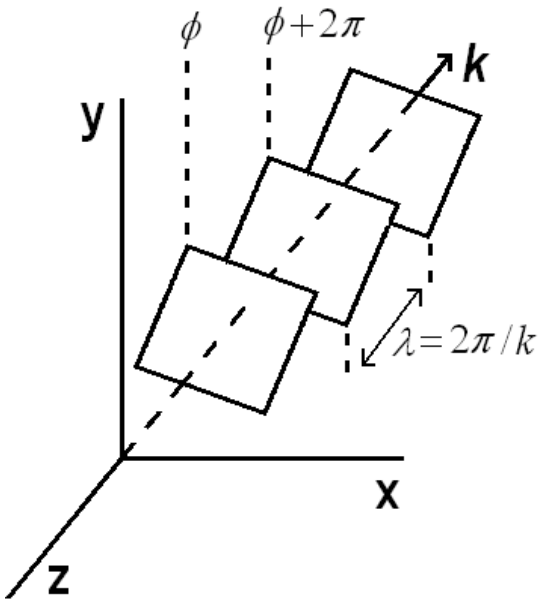

Figure 7. Surface of constant phase, in this case to represent orthogonal standing reality waves that can be utilized in figure-ground resonance effects.

6 Programmable Vacuum Cellular Automata Topology

Programmable matter is defined as a material that locally adjusts its response to external inputs through programmed control. Amorphous Ising model lattice-gas cellular automata can be used for programming spacetime if designed to mirror the spacetime structure utilized. Each independent computational element in the amorphous or stochastic (accepting all) medium is identically programmed on a topological surface which in this case conforms to the least-unit tori of spacetime. There are too many units to program individually so programming is achieved by neighbor connectedness. Toffoli formed a metaphor to describe this neighbor model [32,33]. Usually a marching band has a leader, this will not work for cellular automata where local self-assembly is internalized for each individual unit which acts as its own agent. This is a fundamental requirement for a massive ballistic response. The nanostructure of the defense shield materials must contain a computing substrate that is composed of fine-grained computing nodes distributed throughout space which communicate using only this nearest neighbor type of interactions [32-36]. According to Drexler [36] the closely

packed computational units may be constructed to simulate a fractal system that for us would mean has the required incursive properties.

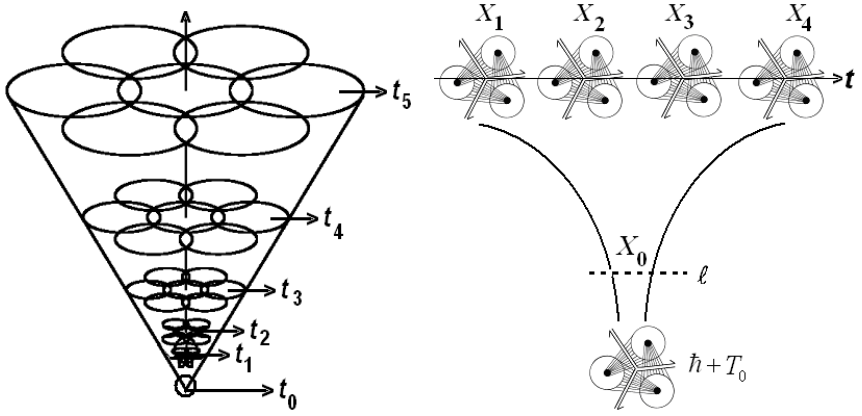

Figure 8. A mini-wormhole domain wall is created by coherently controlled conformal scale invariant constructive interference of least-cosmological unit phase relations [1]. The hierarchical nanoscale spacetime cellular automata programmable substrate of modulated cascades is built up into the warp bubble domain wall by static transduction of de Broglie matter-wave resonance configurations into a specified radius of macroscopic Minkowski space.

15.7 Manipulating de Broglie Matter-Waves

De Broglie by considering a material moving object of restmass, m_0 for a stationery observer suggested that a phase wave, or 'pilot' wave, accompanies a particle because the principle of inertia said it should possess an internal energy equal to m_0c^2 [37]. This phase wave arises as an inevitable consequence of de Broglie's assumption of the internal periodic phenomenon of the particle and the Lorentz transformation laws of the special theory of relativity

$$h\nu_0 - m_0c^2, \tag{11}$$

with $v - \beta c,\ (\beta < 1)$ for total energy $v - m_0c^2 / h\sqrt{1-\beta^2}$. De Broglie's result arose from a combination of the principle of Einstein's special relativity and the quantum relationship for the observer which he initially applied to a photon of nonzero restmass, $m_\gamma\ (<10^{-50}g)$ which because of its

associated internal motion he associated with a piloting phase wave of frequency, ν at each point in space.

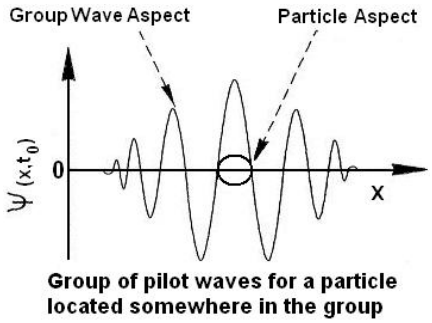

Figure 9. The group velocity of de Broglie waves is associated with the velocity of a particle.

MacKinnon [26,27,38] described the de Broglie wave packet for stationery states and nondispersive wave packets of a free particle. He states that the nondispersive wave packet, ψ is a solution of

$$\Box\psi = 0 \tag{12}$$

where

$$\Box = \nabla^2 - \frac{1}{c^2}\frac{\partial^2}{\partial t^2}. \tag{13}$$

From this MacKinnon shows that the nondispersive wave packet for a particle relative to the observer has the form

$$\psi = \sin\left(kr/kr\right)\exp\left[i\left(\omega t - k_0 x\right)\right] \tag{14}$$

where

$$k = m_0 c/\hbar, \quad r = \left\{\frac{\left(x - vt^2\right)}{1-\left(v^2/c^2\right)^{1/2}} + y^2 + z^2\right\}^{1/2}, \tag{15}$$

$$\omega = mc^2/\hbar \quad k_0 = mv/\hbar.$$

Equation (13) is a spherically symmetric solution to Eq. (11) after being subjected to the Lorentz transform as initially obtained by de Broglie.

Of critical interest to us is MacKinnon's work to set up a de Broglie wave packet for a stationery state. Although we are interested in relativistic waves,

our interest is not for the usual demonstration proving that particles or atoms in general are comprised of de Broglie matter-waves for particles in coordinate motion. Our interest is in de Broglie waves for stationery matter with internal 'continuous-state relativistic annihilation-creation advanced-retarded' effects.

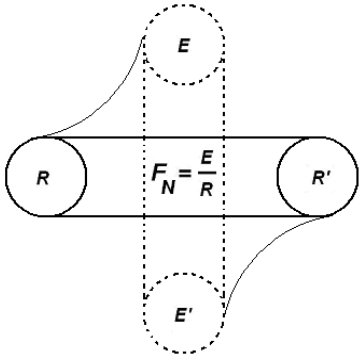

Figure 10. Ultimately the control mechanism for standing de Broglie waves depends on applying the noetic field equation, $F_N = E/.R$ to the other programming parameters for the ballistic programming of cellular automata phase modes.

Following MacKinnon consider two identical particles moving in opposite directions relative to an observer at x^* and t^*

$$\psi_1^* = A\cos\left(\omega t^* - kx^*\right), \quad \psi_2^* = A\cos\left(\omega t^* + kx^*\right) \qquad (16)$$

which represent standing waves when solved by the Schrödinger equation for a particle in a box and cannot depend on the reference frame [27]. MacKinnon concludes that these stationery states are static and for which Bohm postulated a quantum potential to account for it. MacKinnon carries this point further [26] to suggest that:

> The motion of a particle in spacetime does not depend on the motion relative to it of any observer or any frame of reference [and] if the particle has an internal vibration of the type hypothesized by de Broglie, the phase of that vibration at any point in spacetime must appear to be the same for all observers...Each observer or reference frame will have its own de Broglie wave for the particle. The phase of the particle's vibration must, by definition, be the same as that for all possible de Broglie waves at the point where the particle is. By superimposing all these possible de Broglie waves, a [nondispersive] wave packet is formed centered in space on the particle.

In his original work de Broglie could not properly form a wave packet able to localize a particle; but MacKinnon was able to construct a wave packet from de Broglie's original wave phenomena that is also nondispersive [26].

8 Coherent Control of Standing Matter-Waves

If it were possible to conceptually summarize everything required to develop a de Broglie matter-wave FTL Warp-Drive it is illustrated in Fig. 15.11 below which is an exploded conformal scale-invariant view of the continuous-state wave-particle seesaw leapfrog dynamics inherent in the topology of spacetime shown as a template within a brane topological hierarchy amenable to application of programmable resonance modes.

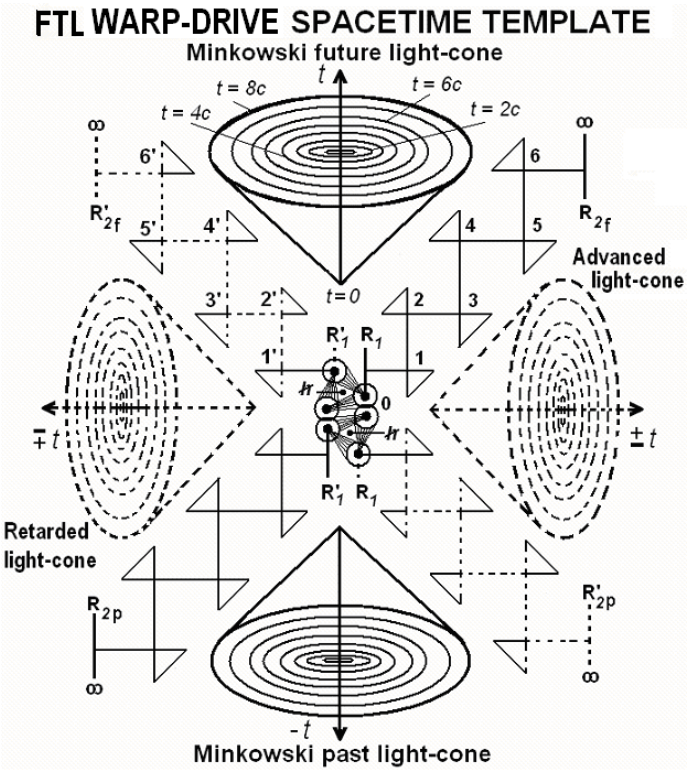

Figure 11. Conceptualized schema of the underlying spacetime structure utilized as a template for modulating the matter-wave resonance hierarchy mimicked in the programmable matter of the shield construction materials.

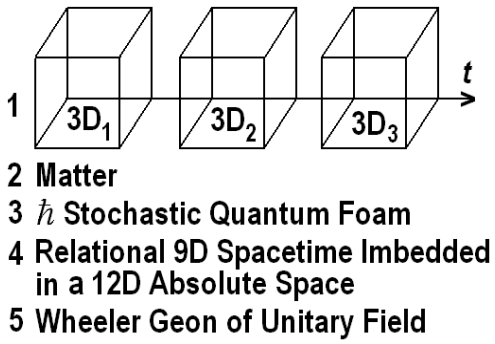

Figure 12. Reductionist hierarchic levels of HAM reality from the local standing-wave future-past eternal present to the atemporal geon of unitarity.

We insist up front that this warp-drive technology is impossible to any degree of power without Gödelizing outside the limiting domain of Copenhagen quantum theory into this 5th regime of Fig. 15.12 beyond spacetime to a degree where even the de Broglie-Bohm version is also unsatisfactory and needs further extension to the point of full ontological completion. One must get 'under' or 'beyond' spacetime in order to engineer or program the required full Ising lattice rotations that are able to utilize the 'infinite' power inherent in the vacuum by 'ontologically becoming the vacuum'. The other reason this Gödelization [39] is so important is the requirement not just to summation the phase of stationary de Broglie matter-waves (they are only level 2-3 on Fig. 15.12), but to also coherently control the phases of the topological hierarchy so the mean-free-path will ballistically compute [40,41] in a sufficiently HD regime. The full Gödelization process controls the symmetry of the arrow of time. The ontological foray into level 5 achieved by programming the geometric information of spacetime is before time at the level of the unified field. This is key to controlling the mean-free-path because it is this manipulation that allows the complete control of the Ising model hypersphere spin flips in a manner able to 'reflect the infinity' of the vacuum and be able to manipulate the array of mini-wormholes.

9 Reality as an Intermediate Collapse of Potentia

Cramer's transactional model of QT [12] has been ignored by most physicists but is a key element of HAM cosmology and fundamental to the understanding of the HWD. A *Cramer transaction* is based on the Wheeler-Feynman absorber theory of radiation [42] and entails future-past, standing-wave symmetry conditions which when extended to the HD SUSY regime of

Calabi-Yau mirror symmetry readily lend themselves to an HD extension of the Dirac polarized vacuum. Further we suggest this includes additional piloting or super-quantum potential [1] parameters associated with the unified field suggesting two forms, levels or regimes for quantum mechanics – that of the observed 4D phenomenological interaction associated with the uncertainty principle; and a new HD ontological 'piloting' or anthropic guidance regime wherein one is able to program operations that surmount the uncertainty principle. As illustrated in Fig. 15.11 reality itself is a continuous-state transaction phase Because the external world we observe is a limited subspace [1] of a larger contiguous reality some elements are removed from the perception of the observer by subtractive interferometry.

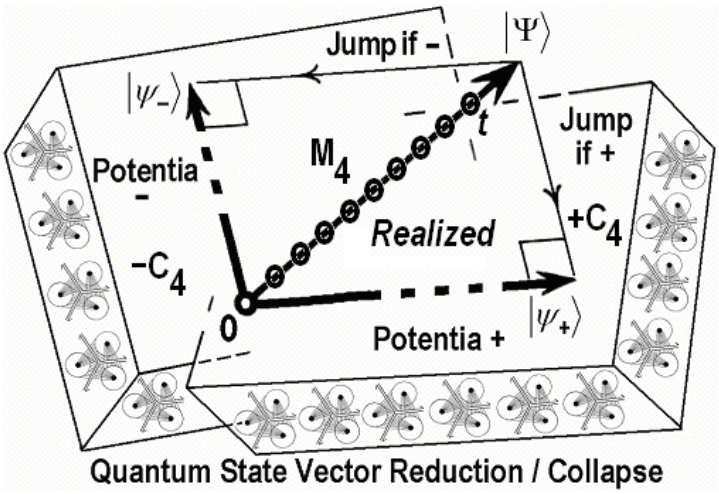

Figure 13. A way to look at a Cramer transaction as a collapse, $|\Psi\rangle$ to the 2D Euclidian plane from, in this case, an HD potentia of two possible orthogonal states, $|\psi_+\rangle, |\psi_-\rangle$. But in HAM cosmology this Planck scale action is considered as the microscopic lower bound of a duality whose upper bound creates macroscopic reality and the observed arrow of time.

In the standard Copenhagen Interpretation of QT an event emerges only as a result of measurement and objective reality is considered to be a probabilistic illusion. Cramer considers 'all off diagonal elements of the line element physically real' during the process of the offer-wave-confirmation-wave process preceding a transaction (event) [12]. We may call the final event a resultant of the conditions of Heisenberg Potentia. Here we still wish to consider reality illusory to the Minkowski observer.

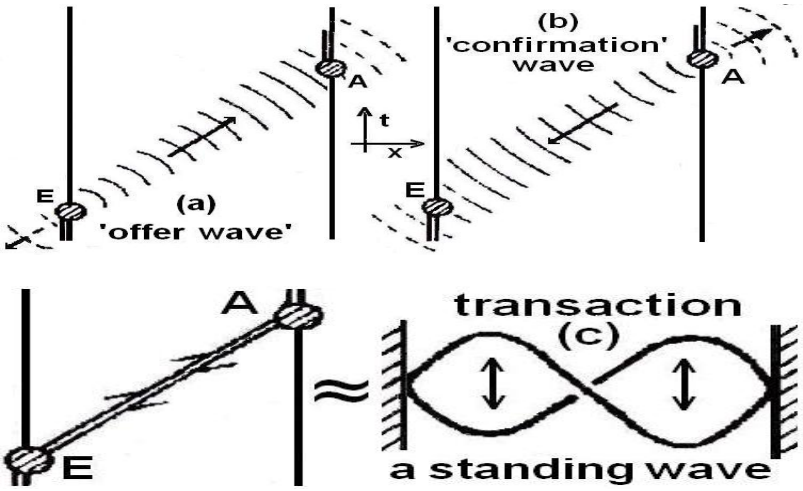

Figure 14. Transactional model. a) Offer-wave, b) confirmation-wave combined into the resultant transaction c) which takes the form of an HD future-past advanced-retarded standing or stationary wave. Figs. Adapted from Cramer [12].

Issues of the nature of the fundamental cosmological background continue to be debated with disparate views jockeying for philosophical supremacy; a scenario remaining tenable because experimental avenues for testing physics beyond the standard model have remained elusive. In a companion volume [1] we presented a putative empirical protocol for manipulating the so-called covariant Dirac polarized vacuum (DPV) providing a methodology for both surmounting uncertainty and low energy protocols for testing string theory. The DPV has a sixty year history in the physics literature [43-45] which has for the most part been ignored by the main stream physics community for a number of philosophical conflicts. The problem of surmounting uncertainty is solved by the utility of additional degrees of freedom introduced by utilizing a multiverse cosmology and the associated extended theoretical elements. This understanding allows one to engineer the vacuum.

Everything here relies on new or expanded properties of the covariant polarized Dirac vacuum:

- Programming the Least Cosmological Unit
- Continuous-State
- Dimensional Reduction
- Compactification
- Calabi-Yau Mirror Symmetry
- New Noetic Transformation

10 The Holographic Principle

10.1 *Usual Formulation of the Holographic Principle*

- The Holographic Principle first proposed by 't Hooft, and given a precise string-theory interpretation by Susskind, is a property of quantum gravity and string theory where a volume of space can be thought of as encoded on a boundary to the region.
- The theory also suggests the entire universe is a 2D information structure "painted" on the cosmological horizon, such that the 3D observed are only an effective description at macroscopic scales and at low energies.
- The holographic principle was inspired by black hole thermodynamics, implying maximal entropy in any region scales with $r2$, not $r4$ as expected. For a black hole, the description of all objects fallen in can be entirely contained in surface fluctuations of the event horizon. The holographic principle resolves the black hole information paradox within string theory.
-

10.2 *Extending the Holographic Principle*

- HAM Cosmology introduces a radical extension of the Holographic Principle - our virtual reality is a subspace of a new 12D absolute space.
- The Hubble Sphere is a 12D Hyper-Hologram
- In some interpretations of QT nothing exists before measurement. A duality exists here. Reality itself represents one stage of collapse relative the Earth observer.
- The other aspect of this duality is of course the usual Planck scale quantum effects.
- As seen shortly we will use the extended Holographic Principle as the basis for a ‘Figure-Ground Effect’ along with the new spacetime transformation to coherently control a ‘topological switching’ process of the space-like hypersurfaces inherent in the Alcubierre metric…

Newton claimed gravitational effects occurred instantaneously; but Einstein claimed gravitational influences were limited to the speed of light by the tenets of special relativity. Here we introduce a unified Geometrodynamics that is a duality of the two models. This is not farfetched if one considers the quest for a quantum gravity because as one knows by the EPR experiments nonlocal influence has been proven to occur instantaneously.

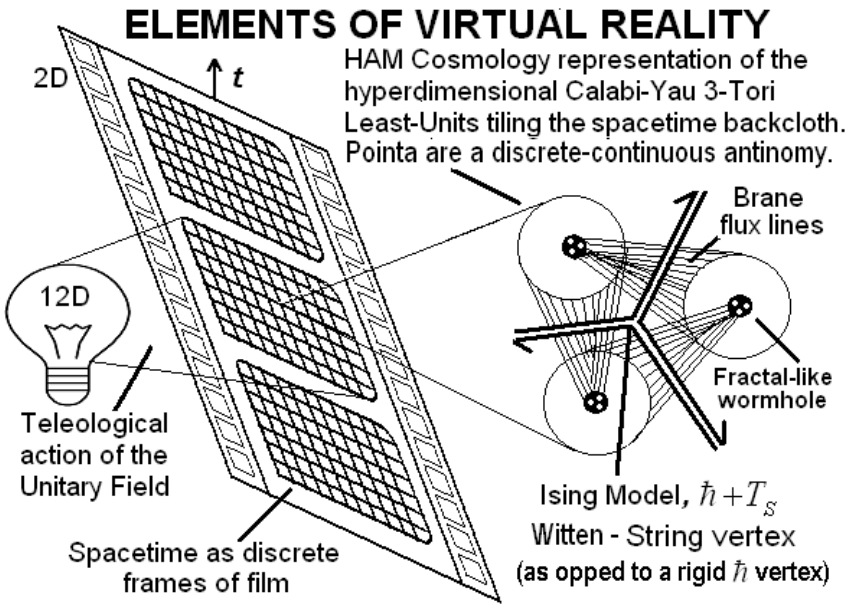

Figure 15. Spacetime is virtual in HAM cosmology and the least cosmological units tiling its backcloth are driven by a teleological anthropic action principle. Each 'point' is a continuous-discrete antinomy.

11 Essential Properties of Complex Noetic 12-Space

The spacetime programming model relies on a new 12D Absolute Space (AS) (ultimate arena of reality) from which properties of a Wheeler geon [1,5] or 'ocean of light' (unified noetic field) emerge. The noetic AS is an atemporal, highly ordered and symmetric harmonic superspace from which all other space relative to an Earth observer is a composite subspace. The geon domain (9D to 11D) is the first compactification regime; and because of coherence of the unitary field, railroad tracks would not recede but remain parallel.

A set of null lines (complex arrow of time), a loci of eternal points, remains hidden from local observed reality as an eternal present. This is part of the complex, $\pm C_4$ Wheeler-Feynman-Cramer duality of the future-past standing-wave comprising the continuous state present: "a relativistic spin-exchange dimensional reduction compactification process" which represents a new set of transformations beyond Galilean and Lorentz/Poincaré to describe the inherent dynamics of this unitary domain and create the arrow of time [1,13]. This condition results in our $E_3 \subset M_4$ domain being a subspace

of eternity; and the essential process for producing the 'synchronization backbone' inherent in the backcloth of HAM cosmology [1].

As in special relativity where *c* remains constant and independent of the velocity of the source; the 12D AS remains static and absolute whether matter is stationery or in relativistic motion. In this context there is a duality in terms of conservation laws, annihilation/creation, advanced/retarded potentials or between space and energy including an asymmetry between the future-past. The new set of transformations makes correspondence with M-Theory and is conceptually considered a higher dimensional extension of Dirac Spherical Rotation [1]. Thus issues of the historical controversy between relational and AS are pushed to the new 12D domain. Within the Classical limit the former 3D Euclidean AS remains relative to the eternal present [1] of the subjective observer. Einstein demonstrated that the application of special relativity to a 3(4)D Minkowski/Riemann manifold makes space relational. The new relational space extends Einstein's view from four to eleven dimensions. In the 12D noetic superspace, S_N the 11D unitary noetic field (and the local 3(4)D $B^{(3)}$ component of the *EM* field) translates longitudinally, but the space (as in water waves) remains fixed because the wave bumps against the close-packed spheres or least units [1,46] (like the water molecules) allowing only transverse displacement while the wave is locally present. This wave cyclically undergoes $m_\gamma = 0$ and $m_\gamma \neq 0$ plus $B^{(3)}$ for certain polarizations.

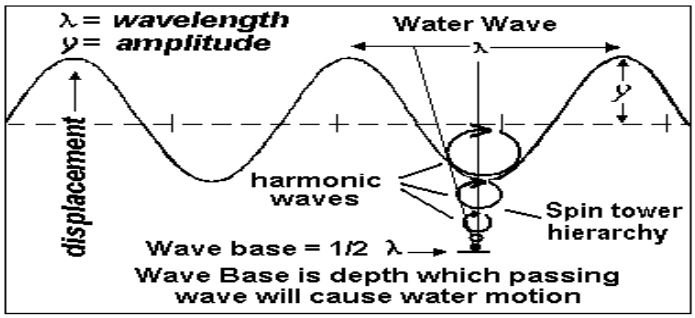

Figure 16. Symbolic representation of a 12D Ocean (Dirac sea) of Light (unitary field) modeled after the Wheeler Geon. The "ocean" provides a practical metaphor for 12D space in that polarization of the Dirac sea is believed to have properties similar to water waves.

Current thinking on the topology of space takes three general forms:

- The most commonly accepted 3(4)D Minkowski/ Riemann spacetime manifold; and two putative HD superspace additions,
- Calabi-Yau space preferred by M-Theory and

- Dodecahedral space.

Nature of the true vacuum remains an open question. The 3D absolute space of Newton became the 3(4)D relational spacetime of Einstein. The 12th D of Noetic cosmology represents a new form of absolute space, a periodic superspace where the eternal twelfth dimension has a Wheeler Geon [5] or ocean of 'light' (the unified field) as its $9 \rightleftarrows 11$D subspace. The relational 3(4)D Minkowski/Riemann spacetime manifold is a continuous state standing wave subspace of the 12D noetic superspace; it acts as a topological cover of an eternal present [1] which is not observed and continuously decays into spacetime.

"Space quantization" or the quantization of orientation of atomic systems observed empirically primarily by Stern-Gerlach and secondarily in other phenomena like the Zeeman Effect in an inhomogeneous magnetic field led to the basis for representing spin ½ fermions as a uniform Dirac spherical rotation through a 720º cycle [1] and the commutation relation for angular momentum in quantum theory. We explore extending these properties to 12D, 12D as required for UQC ontological operation.

If the noetic space water wave conception is correct, the continuous-state compactification process contains a tower of spin state Lie groups from spin 0 to spin 4. Spin 4 represents the unified field and makes cyclic correspondence with spin 0 where spacetime lattice Riemann sphere Ising lattice spin flips create dimensional jumps through the helicoids topology. Spin 0, 1/2, 1, & 2 remain in standard form. Spin three is suggested to relate to the orthogonal properties of atomic energy levels and space quantization. Therefore the spin tower hierarchy precesses through 0, 720º, 360º, 180º, 90º & 0 (∞) as powers of *I*, as conceptually illustrated below.

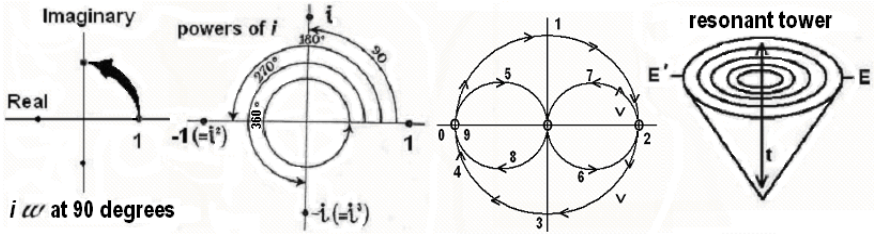

Figure 17. (a) Complex dimension at 90° from the real axis. (b) Powers of i from 90° to 360°. (c) Power of i at 720°. (d) Resonant hierarchy comprised of powers of i in conjunction with the topology of the Genus-1 helicoid "parking-Garage" of the string vacuum with either Ising model, logarithmic spiral or cyclotron resonance hierarchy parameters for applying ladder operators of the resonant modes required to ontologically operate the UQC model.

An instant t, for position $r \equiv (x, y, z)$ or for the light cone $r = xdt$, defines a point or event $d = \sqrt{x^2 + y^2 + z^2}$ in ordinary spacetime coordinates, a pseudo-Euclidian metric tensor [48] representing the sixteen points of a 4-sphere (Fig. 11.1c)

$$G_{\mu\nu} = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & -1 \end{pmatrix}. \tag{17}$$

In summarizing the observers relationship to the *Cosmological Principle* (that the universe is homogeneous and isotropic on average in the large-scale) events are idealized instants in spacetime defined by arbitrary time and position coordinates *t, x, y, z*, written collectively as x^μ where μ runs from 0 to 3. The standard line element is

$$ds^2 = \sum_{\mu\nu} G_{\mu\nu} dx^\mu dx^\nu = G_{\mu\nu} dx^\mu dx^\nu, \tag{18}$$

where the metric tensor

$$G_{\mu\nu}(x) = G_{\mu\nu}(x) \tag{19}$$

is symmetric. In local Minkowski form all the first derivatives of g_{ij} vanish at the event and equation (15.17) takes the form

$$ds^2 = cdt^2 - dx^2 - dy^2 - dz^2. \tag{20}$$

The Cosmological Principle generally suggests that the clocks of all observers are synchronized throughout all space because of the inherent homogeneity and isotropy. Because of this synchronization of clocks for the same world time *t*, for commoving observers the line element in (15.17) becomes

$$ds^2 = dt^2 + G_{\alpha\beta} dx^\alpha dx^\beta = dt^2 - dl^2, \tag{21}$$

where dl^2 represents special separation of events at the same world time *t*. This spatial component of the event dl^2 can be represented as an Einstein 3-sphere

$$dl^2 = dx^2 + dy^2 + dz^2 + dw^2 \tag{22}$$

which is represented by the set of points (*x, y, z, w*) at a fixed distance *R* from the origin:

$$R^2 = x^2 + y^2 + z^2 + w^2 \tag{23}$$

where

$$w^2 = R^2 - r^2 \quad \text{and} \quad r^2 = x^2 + y^2 + z^2 \tag{24}$$

so finally we write the line element of the Einstein 3-sphere as

$$dl^2 = dx^2 + dy^2 + dz^2 + \frac{r^2 dr^2}{R^2 - r^2}. \tag{25}$$

By imbedding Einstein's model of the three-sphere in a flat HD space, specifically as a subspace of a new complex 12D superspace, [1] new theoretical interpretations of standard cosmological principles are feasible.

Although the Newton and Coulomb potentials have similar forms the two theories have developed separately. For our purposes, following the Sakharov-Puthoff conjecture [45], that gravity is a product of fluctuation of the zero point field; we unify them with the Amoroso-Vigier methods [1,43] where both fields are represented by 4-vector field densities A_μ. Both phenomena are considered different types of motion within the same real physical field in flat spacetime as two different vacuum types of collective perturbations carried by a single vacuum field (unified).

Maxwell's equations traditionally describe only transverse elements that 'cut-off' at the vacuum. Here for HAM cosmology extended electromagnetic theory is utilized where the Einstein-de Broglie relation, $E = \hbar\nu = mc^2$ allows additional degrees of freedom such as longitudinal components $B^{(3)}$ and polarized vacuum conditions where $m_\gamma \neq 0$ suggests that the photon is piloted. These conditions suggest the need for both the standard *EM* field and extended $\mu\nu$ field coordinates; an understanding of which will be seen to be required for the ontological UQC operations.

In our original integration of *G* and *EM* we chose to fix the $\mu\nu$ field coordinates [1,44]. Here we go a step further. Dirac himself suggested by the rule of coordinate law that the pilot wave and the photon decouples [43]. The two sets of coordinates *EM* or $\mu\nu$ would normally be considered independent of each other. We integrate them in the topology of the Dirac polarized sea and alternate the fixing and decoupling of $\mu\nu$ and *EM* coordinates as an inherent 'leapfrogging' of the nonlocal-supralocal continuous-state standing-

wave present [1,12]. Like wave-particle duality of matter, HAM cosmology $EM-\mu\nu$ duality extends to spacetime itself in that the unified field harmonically discretizes into spatial boundary conditions of an Ising model Euclidian point. Two types of computer animation in terms of 'figure' and 'ground' illustrate this. First, the animated figure crosses (arrow of time) the stationery background from left to right, disappears off the screen and reappears cyclically with an inherent frame rate. Each L-R cycle can be considered as one discrete spacetime least-unit quantum to the external observer. However as well known, our so-called quantum is actually comprised of a number of discrete frames that appear continuous to the external observer because of the refresh rate. This could be considered as the properties of quantum phase space and that material Fermi surfaces appear smooth because of the relativistic velocity of the surface electrons.

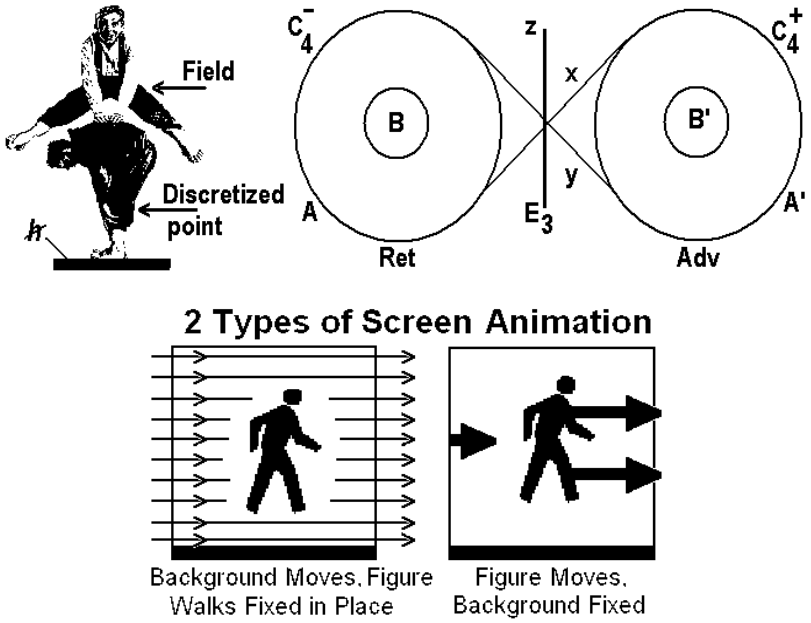

Figure 18. (a) Leapfrog metaphor of virtual reality. (b) Adds Ising Model spin-flip properties to the future-past Cramer type transaction Riemann sphere rotation. The central Euclidean point, E_3 is created and annihilated as a standing wave harmonic oscillator within the boundaries (denoted by A:B; A:'B') of two complex 4D tori. (c) The leapfrog duality of the $EM-\mu\nu$ metric also includes two types of spin exchange coupling-decoupling background–foreground interaction topologies. On the left the observer remains coupled, on the right the observer uncouples and reappears; this is part of the wave-boundary duality.

In the second case, the animated figure remains permanently fixed in the center of the screen and the background moves continuously from left to right (Arrow of time again) across the screen. For the sake of the metaphor one can say this latter case is introspective relative to the observer and the first case is objective (quantum) or external to an observer.

Neither of these two views offer a complete description of reality; as noted above, a third case of simultaneity is required. The apparent separateness of the two views; i.e. 'we live in a quantum universe' is the root of the problem because as proposed here we live in a continuous-state universe that is classical, quantum and unitary depending on perspective. The challenge here is to show that by adopting this view a model of vacuum spacetime automata programming can be achieved with coherent control of the continuous-state inherent spacetime synchronization backbone.

The leapfrog mechanism of Fig. 18a is essential to understanding Schwinger's concept of static and dynamic forms of the Casimir effect [1]. Metaphorically we like to call these HD topological boundary conditions 'casimirrors'. In our model of Calabi-Yau continuous-state future-past dynamics these conditions imply a cosmological form of the principles of wave-particle duality heretofore only used to describe quanta. But we wish to extend this model to the topological domain walls or boundary conditions of M-Theoretic brane dynamics as scale-invariant properties of the cosmological least-unit tiling the spacetime backcloth of the Dirac polarized vacuum during the continuous-state process. To our model this duality suggests open and closed, field-particle properties where the barrier or domain wall moment is an asymptotic Planck scale lower limit, $\hbar$ that is never reached. In conventional physics $\hbar$ is mathematical artifact of the fact that Gauge theory is an approximation. This continuous-state compactification cycling form large scale to Planck scale occurs with a holophote-like beat frequency in synchrony with the creation, annihilation and recreation of spacetime or space quantization of our virtual reality.

Noetic Space "leapfrogs" from holographic unitarity to discretized reality. This simplifies the boundary conditions and variables needed for UQC operations. The 12D Multiverse surface is considered a new form of Absolute Space (AS) and our observed Euclidian E_3 is a pseudo-AS or subspace of this regime. Because of the leapfrogging which we suppose is a fancy form of Witten's Ising flip [1] of the covariant string vertex. The E_3 pseudo-AS is a periodic discretization or 'frozen moment' of one 4D set of the 12D parameters (when time is included). This gives the least unit of the superspace the geometry of a torus; or in our Wheeler-Feynman future-past model [42] considered as two 4D advanced-retarded tori. This suggests the boundary conditions A:B; A':B' are HD boundary conditions of a harmonic

oscillator allowing coherent control of the UQC to be operated with 4D parameters. As well known the usual form of Maxwell's equations in vacuum with $m_\gamma \neq 0$ and $B^{(3)} = 0$ has infinite families of boundary free exact solutions with the Lorentz gauge vector potential $A_\mu = 0$; but in the noetic case with $m_\gamma \neq 0$ where Maxwell's equations do not cut off at the vacuum, there is only one family and one set of boundary conditions, a model justified empirically by existence of the Casimir and Zeeman effects. *EM* theory implies the effects of the *EM* vector four-potential A_μ on the phases, *S* of quantum mechanical waves

$$\Delta S = \frac{q}{h}\int \phi dt - \frac{q}{hc}\int \vec{A}\cdot d\vec{S}\,. \tag{26}$$

For the continuous-state integration the mass term, m_γ is introduced into Maxwell's equations. One may also describe gravity with a four-vector density A_μ^g so that the Newton and Coulomb potentials take the same form but with different coupling constants suggesting both are different aspects of the same fundamental (unified) field with $A_\mu A_\mu \to 0$ where A_μ denotes the total four-potential in a covariant polarized Dirac vacuum.

From the *EM* vector potential $A^\mu(x)$ where $F_{\nu\mu} = A_{\nu,\mu} - A_{\mu,\nu^*}$ the components of *E* and *B* form second rank dual antisymetric spacetime field strength tensors $F^{\mu\nu}$ (Adv), ${}^*F^{\mu\nu}$ (Ret) defined as $F^{\mu\nu} = \partial^\mu A^\nu - \partial^\nu A^\mu$ and ${}^*F^{\mu\nu} = \tfrac{1}{2}\varepsilon \exp \mu\nu\rho\sigma\ F_{\rho\sigma}$ respectively as matrices

$$F^{\mu\nu} \equiv \begin{pmatrix} 0 & -E^x & -E^y & -E^z \\ E^x & 0 & -B^z & B^y \\ E^y & B^z & 0 & -B^x \\ E^z & -B^y & B^x & 0 \end{pmatrix},$$

$$ {}^*F^{\mu\nu} \equiv \begin{pmatrix} 0 & -B^x & -B^y & -B^z \\ B^x & 0 & E^z & -E^y \\ B^y & -E^z & 0 & E^x \\ B^z & E^y & -E^x & 0 \end{pmatrix}. \tag{27}$$

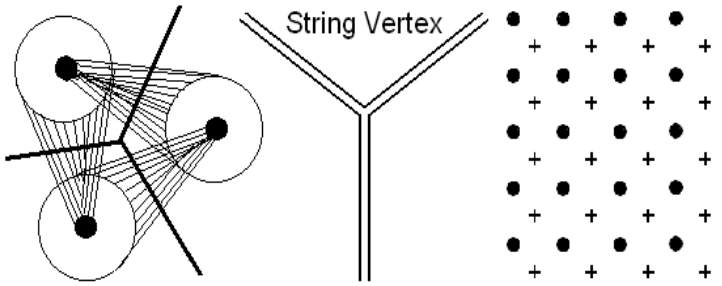

Figure 19. a) Least cosmological unit. b) Witten string vertex. c) Ising model background, descriptive elements of symmetry breaking and Riemann rotation.

If properties of the Dirac vacuum are expanded to conform with noetic cosmology Fig. 20b graphically represents the top of the Dirac sea where the central point is a space-like radial 4-vector $A_\mu = r_\mu \exp(iS/\hbar)$ with frequency $\nu = m_\gamma c^2/\hbar$. The oppositely rotating dipoles $\pm e$ correspond to gravity and *EM* with each individual subelement 4-momentum $\partial_\mu S$. Figure 20a represents one close-packed noetic hypersphere least-unit [1,46] just below this regime which is the vertex at 0 where further unification to the unitary field occurs.

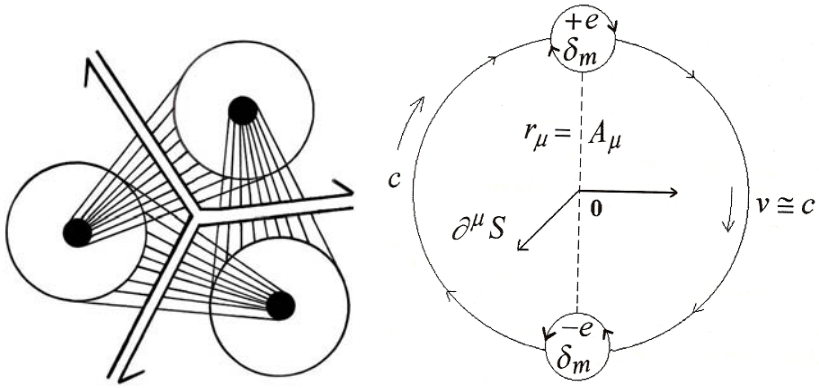

Figure 20. Models of least-unit points tiling the Dirac backcloth in the HAM cosmology of 12D noetic superspace. (a) Least cosmological unit with a classical discrete $\hbar$ vertex. Continuous vertex of string theory able to undergo Ising flips as in string theory. Triune nature of Ising least-unit. (b) Conceptualization of two oppositely charged vacuum subelements rotating at $v \cong c$ around a central point behaving like a dipole (+ e) EM 'bump' and (-e) G 'hole' on the topological surface of the covariant polarized Dirac vacuum.

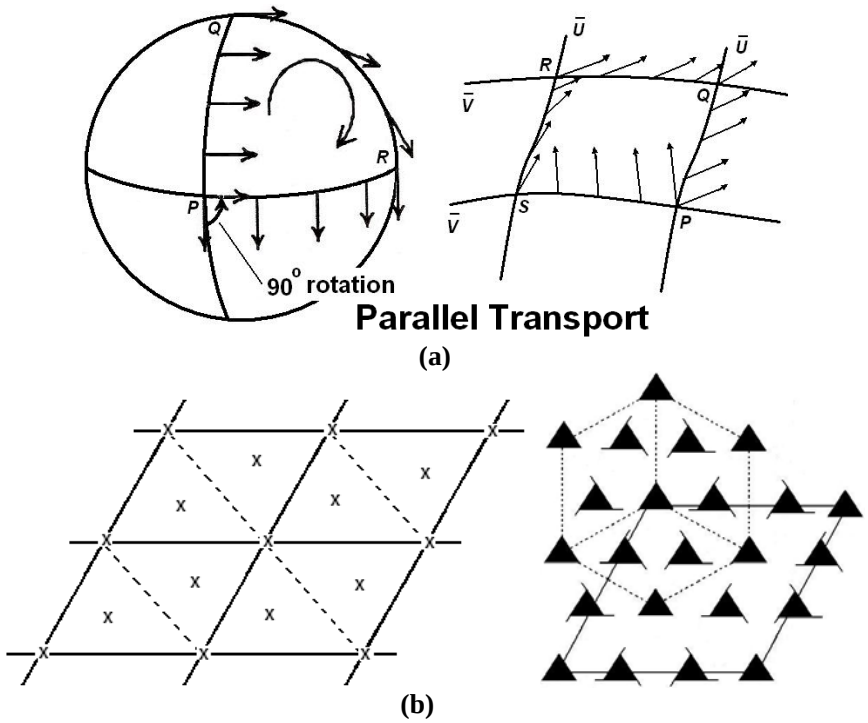

Figure 21. a) Parallel transport of a vector or spinor around closed paths generally results in a deficit angle, a mass defect where the vector does not return to the original position *P*. b) Tiling of the spacetime backcloth and projective geometry giving rise to higher dimensionality.

This is only a superficial account of the highly essential relevance of the complementarity of the $G_{\mu\nu} - F_{\mu\nu}$ coordinate systems. Suffice it to simplistically summarize here that the dynamics of the continuous-state SUSY symmetry breaking are key to the ontological properties of this putative model of bulk QC. The G-EM coordinates couple and uncouple fixing one and then the other in a dual seesaw-leapfrogging effect which is like a form of topological wave-particle duality. It is the utilization of this structural-phenomenology as a covariant resonant hierarchy that allows the ontological violation of the Copenhagen regime uncertainty principle. The triune geometry of Fig. 20a represents the point 0 in 20b shown as an Ising lattice array in Fig. 19c. This is similar to the vertex in string theory (Fig. 19b) able to topologically undergo spin flips of the Riemann sphere from zero to infinity (Fig. 20a). In these continuous-state points the Ising vertices as governed by the super quantum potential (unified field) as described by the noetic field equation [1]. There is a foreground and background duality where

the EM and metrics continuously "leapfrog" in the spacetime backcloth. These factors are imposed on spacetime geometry by the symmetry conditions of noetic cosmology. Traditionally parallel transport of a vector or spinor around a closed path P,Q,R (Fig. 21a) or P,Q,R,S (Fig. 21b) generally results in a deficit angle, a mass deficit that signifies the amount of curvature at that vertex when the Riemann tensor is $\neq 0$ [5].

Tiny loops approximated by a parallelogram of two tangent vectors $\vec{\mu}$ and $\vec{\nu}$ close (no deficit) if $\left[\vec{\mu},\vec{\nu}\right]=0;$ then the curvature operator is the commutator of covariant derivatives along $\vec{\mu}$ and $\vec{\nu}$, $R(\vec{\mu},\vec{\nu})=\left[\nabla_{\vec{\mu}},\nabla_{\vec{\nu}}\right]$ [5]. If $\left[\vec{\mu},\vec{\nu}\right]\neq 0$, $\left[\nabla_{\vec{\mu}},\nabla_{\vec{\nu}}\right]$ is subtracted from the commutator, the parallelogram doesn't close and the Riemann tensor is $\neq 0$.

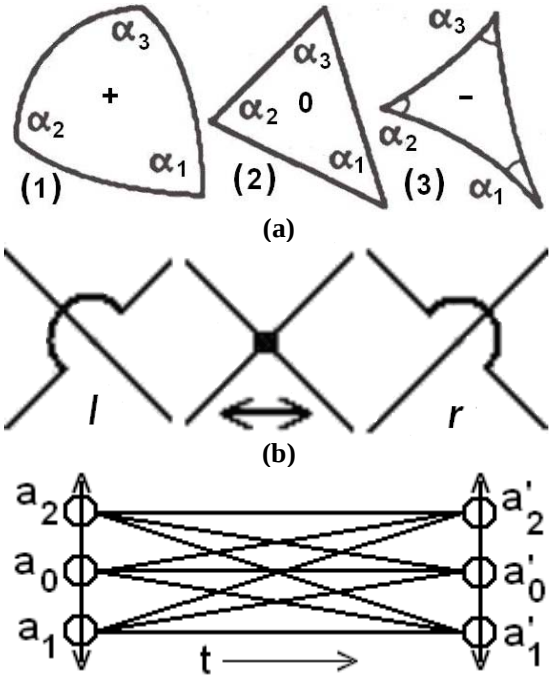

Figure 22. (a) Three types of geodesic triangles with Gaussian curvature. 1) Circumsphere with positive curvature, sum of internal angles $>\pi$. 2) Mesosphere, E^3 with zero curvature. 3) Insphere, internal angle sum $<\pi$ so curvature is negative. (b) Chiral properties of a vertex where the coordinate basis topologically switches from fixed to l or r open. (c) Triune elements of an HD transaction in noetic terms where the elements of a least-unit are tertiary.

In Fig. 15.22a, the sum of the three internal angles minus π is the Gaussian curvature integral $(\alpha_1+\alpha_2+\alpha_3)-\pi\int KdA$ where K is the Gaussian curvature. Taking Fig. 15.22 triangle (a) for example on a sphere of radius r with $\alpha_1=\alpha_2=\alpha_3=\pi/2$ the area of the triangle is $(4\pi r^2)/8$ and the Gaussian curvature would be $K=1/r^2$ which is positive [5].

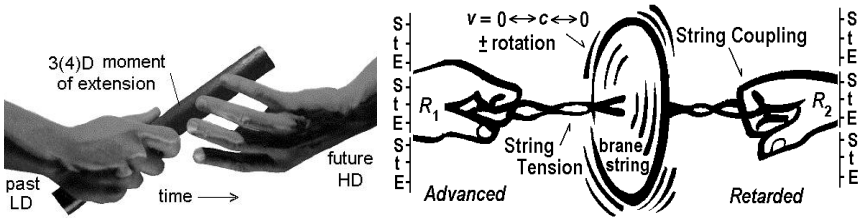

Figure 23. Spin Exchange properties (a) The spin exchange mechanism requires a coupling-decoupling moment between the $c\rightarrow q\rightarrow u$ components of the spacetime least-units like the passing of a baton in a relay race. (b) The spinning disk toy illustrates elements of the continuous-state. Imagine an array of disks as in Fig. 15.19c tiling spacetime. When the disk stops momentarily the Ising rotation occurs during the uncoupling, then recouples as spin continues in the opposite direction.

The spin-exchange hierarchy process has many components; more are shown in Fig. 24. This detailed plethora of components is what allows the vacuum to be programmed in a controlled manner to engineer the warp-drive parameters. The dominant view among cosmologists regarding extra dimensions is that if they exist they must be microscopic because they are not observed. In noetic cosmology extra dimensions are macroscopic and take part in the creation and recreation of spacetime, the arrow of time and observed macroscopic reality). This scenario arises during the inherent 'continuous-state spin-exchange dimensional reduction compactification process' by parallel transport within the additional context of a dual Dirac spherical rotation of the least-unit topology of subspace elements producing deficit angles during decoupling-coupling allowing relativistic subtraction of supralocal-nonlocal domain components producing the arrow of time. The scaling process begins in the microscopic backcloth without a physical arrow of time and ramps up the helicoid hierarchy to the virtual standing-wave macroscopic present. Because of its relativistic nature the 'baton' passing (coupling-decoupling) between domains appears smooth to the observer is meant to be synonymous with the lightcone rings where the leapfrogging domain frequency provides the context for assigning coupling parameters required for utilizing the synchronization backbone for the UQC.

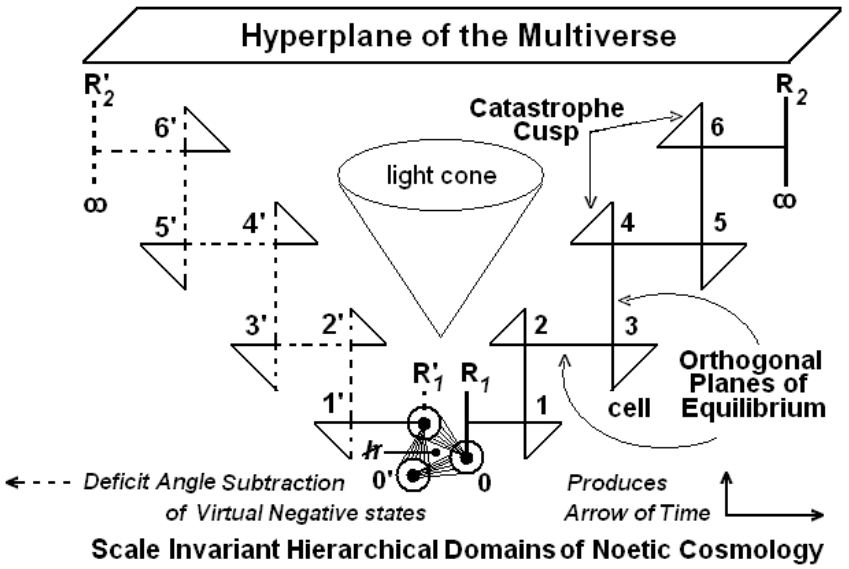

Figure 24. Covariant scale invariant hyperplane compactification domains in the hierarchy of continuous-state noetic superspace.

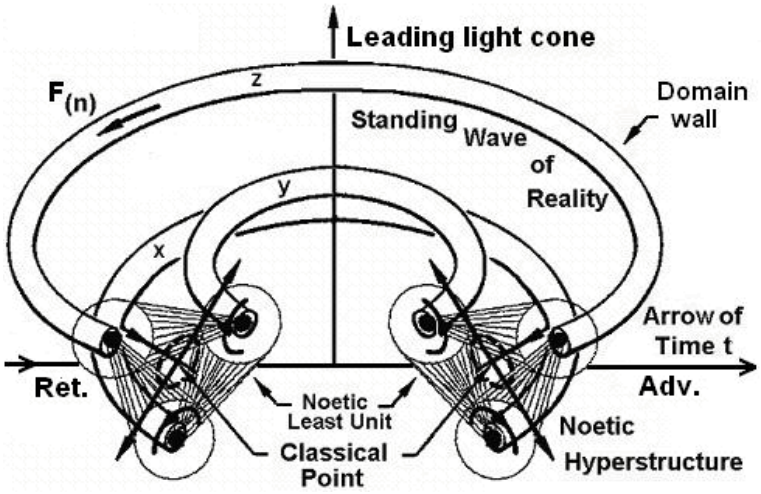

Figure 25. Following an extended Cramer transactional model applied to cosmology the Figure represents a single future-past, retarded-advanced Calabi-Yau mirror symmetry domain (brane vibrations) where the properties illustrated in Figs. 15.21,15.23 & 15.24 interplay to produce the observed macroscopic arrow of time by deficit angle subtractive interferommetry.

12 The Holographic Wormhole Drive (HWD)

Utilizing advanced principles inherent in a Holographic Anthropic Multiverse (HAM) [1], radical improvements to the Alcubierre warp drive model occur that could lead to FTL travel with existing technological prowess. Based on a radical extension of the Holographic Principle assuming a form of 'Heisenberg Potentia' inherent in an HD absolute space, simplistically the drive mechanism is a holographic figure-ground effect. The local spaceship (figure) is removed (put in free-fall relative to the background) from the infinite potentia. Then through manipulation of a 12D complex form of a covariant Dirac polarized vacuum (string theoretic) the external domain wall or interstice between the ships warp bubble and the Alcubierre metric becomes a coherently controlled stochastic barrier of leapfrogging mini-wormholes key to the drives operation:

- Shield (ship or warp bubble) constructed from inherent infinite vacuum energy by coherently controlled constructive interference of continuous-state 12D brane mirror symmetry resonance modes of the HAM close-packed cosmological least-unit backcloth structure.
- The Alcubierre solution is utilized with minimal curvature because of a new set of unified transformations beyond the Galilean-Lorentz-Poincaré.
- The mini-wormholes arise in a periodic gravitational shock-wavefront interference of the local relativistic (luminal form) and new nonlocal holographic (complex instantaneous form) of the duality of gravitational modes of unified theory. In this interpretation the 'Warp Factor' becomes a beat frequency tier of coupled-uncoupled modes of the spherical shell within the figure-ground leapfrogging oscillation, $R \leftrightarrow R'$.

This warp-drive model is called the Holographic Wormhole Drive, that FAPP does not require negative energy It is Based on a radical extension of the Holographic Principle assuming a form of 'Heisenberg Potentia' inherent in an HD absolute space, simplistically the drive mechanism is a holographic figure-ground effect. The local spaceship (figure) is removed (put in free-fall relative to the background) from the infinite potentia. Then through manipulation of a 12D complex form of a covariant Dirac polarized vacuum (string theoretic) the external domain wall or interstice between the ships warp bubble and the Alcubierre metric becomes a coherently controlled stochastic barrier of leapfrogging mini-wormholes key to the drives operation:

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In this interpretation the 'Warp Factor' becomes a beat frequency tier of coupled-uncoupled modes of the spherical shell within the figure-ground leapfrogging oscillation, *R –R'*.

The HWD model provides solutions to the major problems facing the Alcubierre warp-Drive metric based on principles of the Holographic Anthropic Cosmology [1]. The solution relies on a 'Holographic Figure-Ground Effect' where the 'local' free-fall Warp Bubble is separated from the holographic background by covering the domain wall of the free-fall warp-bubble with a system of mini-wormholes created by 'programming certain Calabi-Yau mirror symmetry parameters of the Dirac-type covariant polarized vacuum'. Holophote Manipulation of this figure-ground effect becomes the 'Warp factor'. By utilizing a higher dimensional form of the covariant polarized Dirac Vacuum and an associated operationally completed form of Quantum Theory the need for 'infinite exotic energy' is ameliorated by 'borrowing' the vacuums infinite inherent energy.
New concepts include:

- Operationally completed dual Newton/Einstein model of Geometrodynamics (not a form of quantum gravity)
- Operationally completed 12D form of Quantum Theory that utilizes the unified field as a form of "super quantum potential"
- Extended HD view of the Covariant Dirac Polarized vacuum
- Unique 12D String Theoretic Vacuum Topology
- Alternative utility of the Alcubierre warp-drive metric
- Utility of Mini Wormholes
- Radical utility of the Holographic Principle
- New Set of Noetic Transformations

This essentially entails a New Cosmological Paradigm From the realization that the limits of QT, GR, SR, and the Dirac equation etc. are all inseparable

from and rely on understanding cosmology.

13 Hyperspherical Holographic Figure-Ground Effect

Utilizing the figure-ground effect requires a new spacetime transformation [1] to cover the domain wall of an Alcubierre warp bubble with an array of mini-wormholes in conjunction with an incursive oscillator for manipulating Alcubierre's α and β functions with minimal external energy input. In considering the utility of wormholes for instantaneous or FTL travel between remote interstellar regions, until now they have been considered only in terms of giant wormholes as might be created near a neutron star or in the vicinity of a black hole in order to sufficiently bend spacetime to form an interconnecting corridor between remote spatial regions that shorten a trip by some light years. Our use of wormholes is very different. Imagine the middle school physics experiment where hundreds of tiny holes are drilled into a smooth table. When air is forced through these holes a heavy puck pushed across the table travels with nearly no friction because it is levitated on the cushion of air. This is not a perfect metaphor except in the sense that the holes represent mini-wormholes to remove the puck from the background, i.e. removing the friction coupling. As a point of interest a similar technique has recently been incorporated into submarine design to reduce drag.

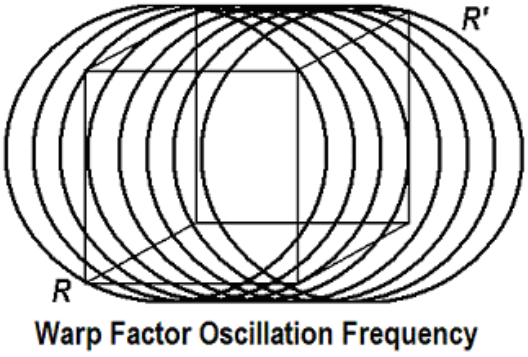

Figure 26. Figure-Ground Topological Switching model of warp factor Operation.

Holophote removal of the ship's warp bubble from the background relies on setting up a continuous-state resonant control hierarchy of the 12D Dirac vacuum. A domain wall of mini-wormholes comprised of cosmological least-units that through phase controlled constructive interference produce a

topological switching of spacetime topology. The beat frequency of this topological switching is related to both the warp factor and holophote figure-ground oscillation that removes the ship (figure) from the holographic background of the multiverse. A multimode multilevel resonance hierarchy operates the HWD. Some key elements are:

- Alcubierre Metric Orients Direction of Travel
- Creating the Warp Bubble
- Creating the Mini-Wormhole Domain Wall
- Operating the Holographic Figure-Ground effects
- Coherent control of the Warp-Factor Topological Switching Mechanism

14 Coherently Controlled Vacuum Drive Mechanism

Genus-1 helicoid 'parking garage' hierarchy representing the advanced-retarded future-past symmetry of a mirror symmetric Calabi-Yau dual 3-form K-K spin tower inherent in the continuous-state fabric of spacetime.

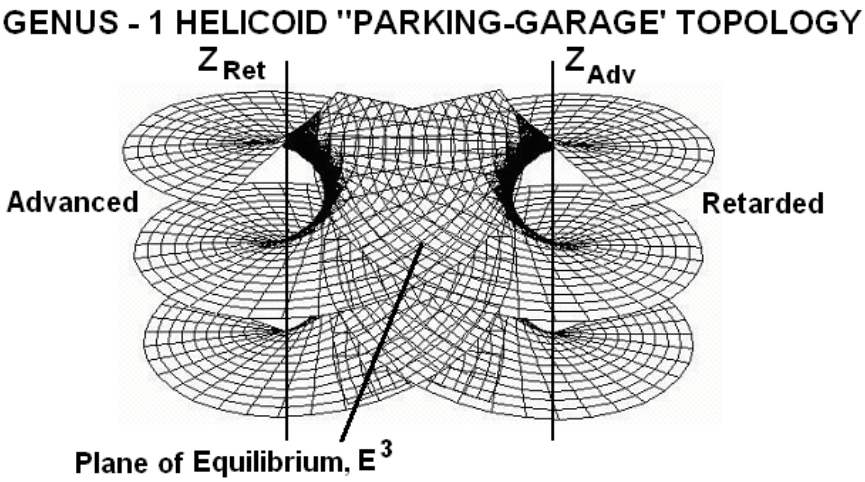

Figure 27. The Helicoid, a minimal embedded surface [19], is swept out by a line rotating about and moving down the z axis. Here a double Genus-1 Helicoid is joined into a "parking garage" ramp structure representing the future-past hierarchical topology of noetic space. An ordinary 2D plane can be twisted into a helicoid.

Domain Wall Boundary Conditions & Emission Absorption Loci

for Advanced-Retarded Waves

- We shall consider a static thick domain wall constructed by a scalar field with self-interaction properties as in the Schwarzschild black hole spacetime singularity solution.

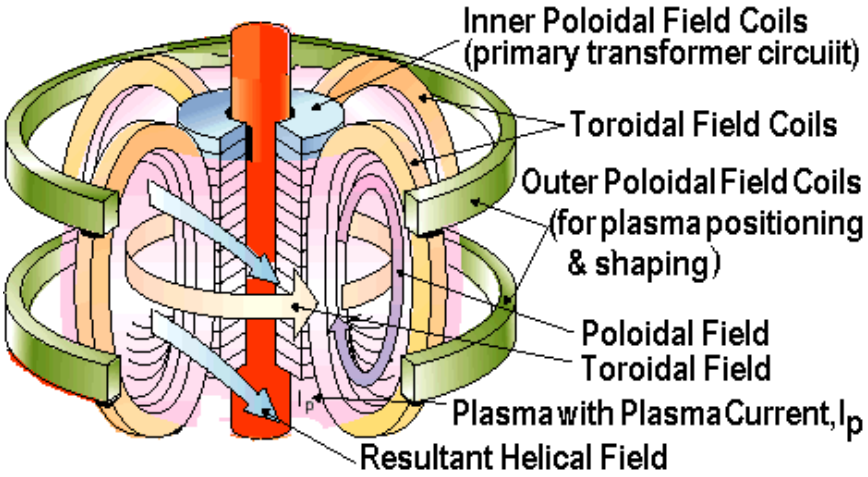

Figure 28. Spherical Tokomak reactor for powering the HWD.

Appendicitis

One of us, Amoroso calls himself a Noeticist, which means essentially that in addition to being a practicing physicist, he utilizes noetic insight or transcendence as a tool in scientific theory formation (see Chap. 14) [47]. This idea originates with the ancient Greek philosopher Plato who taught: 'no matter how vast ones intellect, or how deep ones wisdom, noetic insight is beyond this; it arises as transcendent entelechies from the Anthropic teleology of the cosmos! We risk making such bold claims because we believe now with the discovery of consciousness [47] it is possible to complete the tools of human epistemology: logic, empiricism and now transcendence and we wish to initiate debate on this possibility as a tool in scientific theory formation…

As an example Amoroso offers his path. His noetic side arises from practicing Zen, Hatha Yoga, decades of practicing a personal form of meditation and especially adherence to the strict discipline of being a High Priest in the LDS (Mormon) faith. See end of Chap. 14 for discussion on paths to transcendence. On that note, although obscure, it appears to be LDS doctrine that only agents of the Earth may serve the Earth. This appears to be

why stars are so far apart from each other; in order that 'Nazi' marauders like in the Hollywood film, Avatar cannot wreak havoc on other civilizations and interfere with their evolution. Thus putatively perhaps, when a civilization develops FTL technology their millennium begins and soon they are taken off planet. With that wryly said we have done our part in both bringing forward the Judeo-Christian Millennium and presenting a rudimentary design for implementable FTL travel. Of course carrying this reasoning to its penultimate form, once we are off planet we will not need FTL warp-drive technology because as in the Hollywood film, Indiana Jones and the Kingdom of the Crystal Skull, we can travel instantaneously through "inner space"!

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