Exploration

The Utility of Vacuum Energy: Toward the Prototyping of Directed Energy Beam (DEB) Technologies

Richard L. Amoroso[*], and Sabah E. Karam

Noetic Advanced Studies Institute, Utah, USA

Abstract

The Standard Models (SM) of particle physics and cosmology have been shown to be incomplete, suggesting that quantum mechanics can no longer be considered the *basement of reality*. Noted physicists such as Michio Kaku claim, *more than four dimensions are required to contain all of physics'*. Until now, the Uncertainty Principle has thwarted access to observation and technological innovation utilizing higher dimensional nonlocal phenomena such as vacuum energy. In this highly theoretical introduction, we outline putative requirements for an innovative form of Directed Energy Beam (DEB) technologies beyond the confines of the Standard Model. Two seemingly disparate examples are contrasted - Static Field Matter-Wave Defense Shields, and Phased-Array Pulsed Directed Energy Beam Weapons (DEW). These new technologies are based on unique M-theoretic Unified Field Mechanical (UFM) modelling. During the previous paradigm shift, over 100 years ago, Einstein stated his relativity theories affected the whole panoply of physics. The imminent shift to a 12D M-theoretic Einstein-like UFM, will likely pale all prior advancement in the history of science.

Keywords: Dirac polarized vacuum, directed energy beam, M-theory, manifold of uncertainty, nonlocality, semi-quantum limit, tight bound states, unified field theory.

In any field find the strangest thing and then explore it, Nobel Laureate J. A. Wheeler [1].

1. Introduction

Implementing DEB technology requires significant new concepts. Gauge theories, the basis of modern physics, are approximations, suggesting additional theory is required to complete the Standard Model (SM). Recently, QED a main pillar of physical theory, violated at the $\sigma 6$ level [2,3], suggests additional physics beyond the SM. We have designed required empirical tests [4-6] to access putative M-theoretic additional dimensionality (XD).

There are over 2-dozen forthcoming DEB technologies (Tbl. 1 [7]) all necessitating the utility of

Unified Field Mechanics (UFM). A concatenation of new parameters ushering in the looming paradigm shift is addressed:

- All require Universal Quantum Computing (UQC), with a 6D M-theoretic r-qubit in a geometric-topological form allowing the uncertainty principle to be supervened [8,9].

- The key UFM element: A dual structured Least Cosmological Unit (LCU) tessellates localized spacetime as embedded in the nonlocal-brane backcloth [8-10].

- An operationally complete form of quantum mechanics making correspondence to an M-theoretic Einsteinian Unified Field Theory (UFT) [11-13] incorporating aspects of the Wheeler-Feynman-Cramer Transactional Interpretation, where a present instant is a hyperspherical standing-wave of the future-past [14] and de Broglie-Bohm superimplicate coherence [15].

- A unique 12D UFM iteration of string/M-theory with a cyclical *continuous-state* parallel transport spin-exchange dimensional reduction compactification process [8,9].

- A technologically surmountable finite radius semi-quantum manifold of uncertainty (MOU) [8].

- Duality of localized OCRET (Optically Controlled Resonance Energy Transfer) [16] in tandem with nonlocal OCHRE (Oscillation Coupled Helicoid Resonance Emission) [7].

- Utility of Extended Electromagnetic Theory [17] for static-dynamic Casimir-Polder interactions [18-20] in a covariant polarized Dirac vacuum for applying Dirac Hole-Theory [21,22].

- Extending Dirac's electron hypertube model to include a Ballistic-like Mean-Free-Path for unrestricted M-theoretic instantaneous path to evanescence directed vacuum energy [23,24].

The harbinger of Vacuum Directed Energy Beam (VDEB) and Vacuum Directed Energy Weapons (VDEW) technology (VDET for short) becoming an active area of R&D is the successful completion of a single empirical test; resulting in development of a programmable *vacuum transistor* able to modulate the topology of higher dimensional (HD) space, [25], where HD space is an Additional Dimensional – Large Scale Additional Dimensional Duality (XD-LSXD). The interim provides prudence to prepare for the immense paradigm shift. Pragmatic utility of vacuum energy, like the discovery of electricity catapults engineering to numerous VDETs, (Tbl. 1 [7]). We contrast two: Static Field de Broglie Matter-Wave Defense Shields, and Phased-Array Pulsed Energy Beam Weapons. Key to implementation is access to cellular automata-like Least-Cosmological Units (LCU) tessellating space – a duality of 4D spacetime and the HD M-theoretic UFM bulk. Access to HD is achieved utilizing inherent properties of the LCU basis of the Dirac hypertube [23,24], Randall-Sundrum warped-throat [26] – a space-antispace correspondence of cyclic wormhole XD-LSXD duality, in concordance with a form of universal quantum computing (UQC) [8], utilizing an XD M-theoretic qubit basis facilitating

essential supervening of the uncertainty principle, removing the issue of decoherence in the process.

VDET modeling, inspired by Einstein's long quest for a final unified theory, is based on a UFM Ontological-Phase Topological Field Theory (OPTFT) [8,11] derived from modified M-theory, combining parameters of the Wheeler-Feynman-Cramer Transactional Interpretation of quantum theory, additionally with extensions of a de Broglie-Bohm Implicate Order super-quantum potential as a Unified Field *force of coherence* control factor. VDE devices are multiphasic. Operationally, vacuum energy superradiance occurs by nonlocal U_F phase interference nodes in dynamic-static Casimir-Polder resonant interactions pertinent to bumps and holes within a covariant polarized Dirac vacuum, a salient feature of cyclical harmonic coupling to mirror symmetric *nonlocal antispace* (vacuum), rather than currently employed semiclassical quantum phenomena in *localized* 3-space, as demonstrated by experimental studies of antispace incursive resonance.

Additionally, to achieve a ballistic mean-free-path constructive interference, beam emission requires a new dual class of nonlocal OCHRE (Oscillation Coupled Helicoid Resonance Emission) [7] in tandem with localized OCRET (Optically Controlled Resonance Energy Transfer) [16] to summate a ballistic-like conduction of vacuum energy by OPTFT transitions of cyclical resonant incursive oscillations within the structure of cellular LCU tessellating spacetime as a means of mediating the additional dimensionality (XD) of brane topological phase transitions in the *Bulk.* Finally, device operation requires an M-theoretic form of scalable UQC, a paradigm shift beyond confines of the locality-unitarity basis of presently standard Copenhagen quantum theory.

2. Necessity of Universal Quantum Computing

Proposed VDE technologies require bulk Universal Quantum Computing (UQC). In the pantheon of QC R&D, only single purpose logic gate systems have been deployed. If currently favored multi-million-dollar room-sized cryogenically cooled quantum Hall anyon bilayer graphene QCs [27,28] ever become universal, they would be reminiscent of the 1946 city block-sized Eniac. We predict true UQC cannot be achieved without 1) supervening the uncertainty principle (no decoherence) and 2) without implementing a radical new basis for the qubit. And as need be for viable VDE application, the model is room temperature, table-top, with QC processing units costing pennies [8].

Hermitian operators represent quantum observables; thus, currently used Pauli matrices as quantum logic gates, are mathematical objects spanning a 2D complex Hilbert space representing the observable corresponding to spin along the coordinate axis in 3D Euclidean space, $\square^3$. A 2-level quantum system (qubit), is generally represented by a 2D Bloch sphere (Fig.1), a semi-quantum state used to transform quantum logic gates in terms of the Paul matrices. Such gates are only able to leverage superposition and entanglement in a limited way.

A relativistic qubit (4D r-qubit) was first proposed in 1995. Ignored for twenty-five years, the r-qubit is now proposed in the emerging field of relativistic information processing [8]. But the scenario is more severe than this; quantum mechanics is based on the limiting principles of locality and unitarity. Just as Newtonian classical mechanics was falsified by quantum mechanics, we are now one experiment away from falsifying QM (locality and unitarity) with UFM. The three known fields are mediated phenomenologically by quanta (photon in EM, for example). For UFM, mediation is nonlocal, instantaneous and ontological. By ontological is meant, a holographic-like instantaneous energyless information exchange process – topological phase transitions, facilitated by topological charge [8,11]. This condition is merely an operational extension of the nonlocal EPR condition [29].
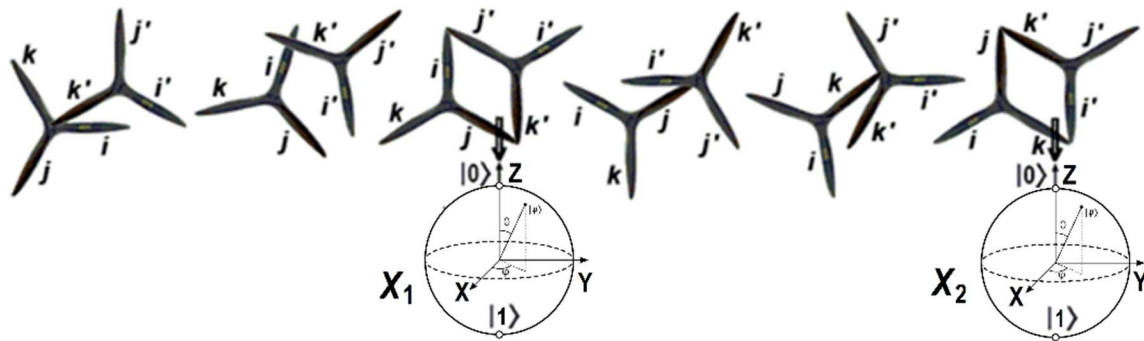
Figure 1. Spacetime, Space – Antispace duality. Points X_1 and X_2 represent infinitesimally separated Block 2-spheres (quantum bits) in spacetime. The six mirror symmetric *i,j,k* pairs exist in HD space hidden from observation by the uncertainty principle.

Considering Fig. 1 as a model of mirror symmetric dual quaternion knots spinning relativistically and evolving quantum mechanically in time space-antispace duality, or the initial step into additional dimensionality (XD); the two 2D circles (Bloch spheres) represented by points X_1 and X_2 as two 0D infinitesimally separated points, *s* in a simple Euclidean space line element in Cartesian coordinates, $ds^2 = x^2 + y^2 + z^2 - vt^2$, the standard designation of a point particle. Extend this to a mirror symmetric fermionic space-antispace duality in quaternionic notation (*i,j,k*). This potentia, not observed or accessible because the quantum uncertainty principle, collapses the gap between points X_1 and X_2 into a closed Planck-scale domain wall. Nodes in the cycle are sometimes chaotic (degenerate) and sometimes periodically couple coherently into resultant quantum states in Euclidean 3-space depicted in the figure as faces of a 3-cube reducing further to Riemann Bloch 2-spheres at the bottom.

D-Brane (Dirichlet membrane) Topological Quantum Computing (TQC) proposed by Velez [30], differs from our OPTFT UQC model in utility and definition of the fundamental properties of the M-theoretic brane-world. The Valdez model utilizes a standard qubit and compact dimensions, whereas we define a 6D mirror symmetric qubit in an XD-LSXD 12D brane-world. The simplistic reason for such a concatenation is the ability to supervene the quantum uncertainty principle, removing the issue of decoherence, the final barrier to UQC [8]. To implement UQC we utilize Feynman's technique for building QCs *on top of another quantum system* serving as a *synchronization backbone* [31,32]. This synchronization system, because of

LSXD causal separation, ensures the UQC system overcomes decoherence without processing errors at room temperature [8]. A new class of HD based algorithms are required [8,29].

3. Unified Field Mechanics

Fundamental physics reduces to explanation of structures and interactions of fermions, as 0D singularities not extended objects; but there is no obvious way of creating such structures within a 3-space of observation. However, the Dirac equation suggests fermions require double, rather than single, vector spaces, confirmed by the double rotation (720° to 360°) required by spin ½ objects, and effects. The second *space*, a mirror-symmetric *antispace*, contains the same information as real space, but less accessible. The two spaces cancel producing a nilpotent object (wave function collapse of Heisenberg potentia) with exactly the mathematical structure required by fermionic singularities [5]. This concept of matter in the SM, an issue because elementary quantum constituents of atoms having no inherent size or volume, interact as if located at 0D points not spreading into a 3-volume. Due to the exclusion principle and other fundamental interactions, fermionic point particles, composites and atoms, are at a forced distance from each other, creating the property of matter filling space.

Observation suggests we live in four non-compact dimensions. VDET modelling requires reality to consist of 4+n topologically non-compact dimensions, where the XD volume is infinite; albeit complicated by the effect the quantum uncertainty principle has shielding this from the observer. Spacetime is not fundamental but emergent. In 1908 Minkowski said, *Henceforth space ... and time by itself are doomed ..., only a union of the two will preserve an independent reality*. Full circle now from his statement to an imminent new age of discovery, understanding the natural world evolves from Newtonian Mechanics to 2nd regime Quantum Mechanics. On the threshold of 3rd regime UFM, a Planck-scale stochastic realm can no longer be considered the fundamental *basement* of reality, rather a porous manifold of finite radius supervening the sacrosanct Quantum Uncertainty Principle.

The stumbling block for String/M-theoretic efforts to reconcile General Relativity with Quantum Mechanics lies with the fact that there is no quantum gravity. Unlike Grand Unified Theory (GUT), where SM gauge interactions: electromagnetic, weak, and strong forces, merge into a single force; in the nascent UFM paradigm, the quantum manifold is not the regime of gravitational unification. It is instead integrated with the HD domain of the U_F where all forces of nature combine.
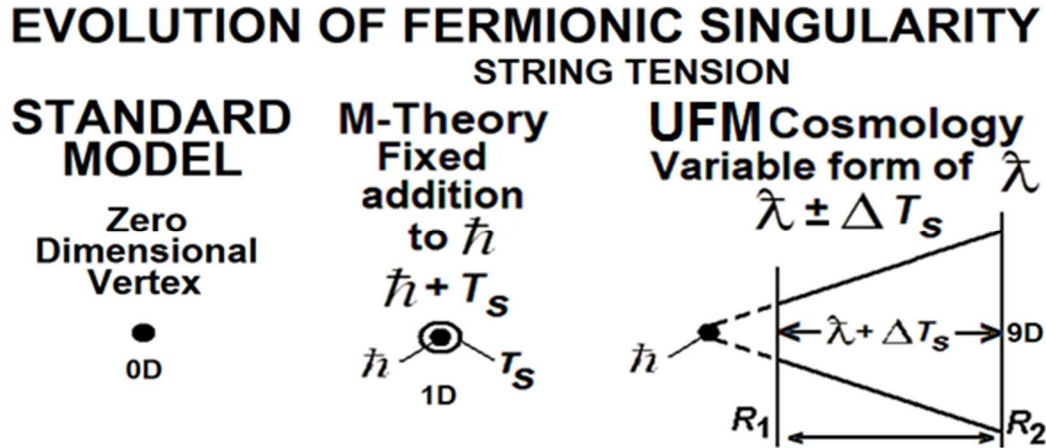
Figure 2. Evolution of the concept of a fermionic point-particle singularity from the 4D SM to 12D UFM.

Regarding Fig. 2: a) SM consideration of a fermion as a 0D point particle singularity (10^{-33} cm Planck-length object). b) A String Theory electron as a 1D vibrating string with fixed tension, T_S, an added factor to the Planck length, $\hbar + T_S$. c) UFM model reverting to original hadronic form of string theory with variable T_S, with continuous-state *cyclic compactification*. Extension is not a fixed point, but varies from virtual $\hbar$ (Stoney, $\lambdabar$ unit) to the Larmor radius of a Hydrogen atom, 10^{-9} cm with a variable radius MOU Dirac hypertube [23,24]. The original Stoney unit is utilized because it is electromagnetic. Hadronic string theory abandoned because it contained a tachyon considered unphysical, but as we show tachyon-tardon interactions are an essential part of Cramer's standing-wave transactional interpretation [5,14].

Quantum mechanics is considered the basement of reality guarded by the experimentally sacrosanct impenetrable barrier of the uncertainty principle. Attempts to discover HD are 1) Gravities Rainbow experiments at CERN LHC [33], could eventually have success with a powerful enough supercollider; but would have no other practical utility. 2) Discovery of synthetic dimensions in graphene bilayers [34]. In contrast, our model is tabletop, room temperature, allowing low-energy HD cross sections [4-8]. This work, based on radical extensions of the original hadronic string allows more than one temporal dimension [5] yielding experimental design parameters for accessing XD [4-8]. Matter in M-theory portrays the oscillating string as a 6D D-brane topology.

According to Dirac and Bohm [23,24], the interior of an electron is a region of space through which signals can be transmitted faster than light, making correspondence to EPR experiments demonstrating the existence of nonlocality. In crossing the dimensional barrier, description of the elementary constituents of matter is dramatically changed [8,13]. There is an inherent beat frequency in the spacetime MOU vacuum backcloth, demonstrated by manipulating a trapped hydrogen atom in a continuous state resonant Cavity-QED mode with an rf-pulsed resonance hierarchy.
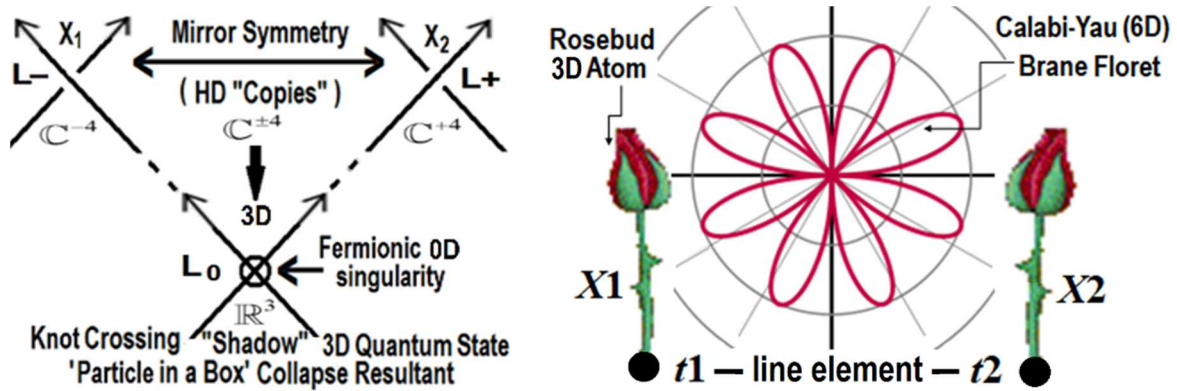
Figure 3. UFM models of matter. a) An oriented left-right (over-strand, under-strand) crossover link diagram; each component has a preferred direction as shown by the arrow. For a given crossing L_+, L_-, resultants L_0 and $\square^3$ change the diagram as proposed. Braid elements in the HD complex, $\square^{\pm4}$ brane world become a knotted shadow when projected onto Euclidean space, $\square^3$. b) Consider $X_1(t_1)$ and $X_2(t_2)$ as ends of a line element between two atoms depicted in 3-space as rosebuds. For a space-antispace configuration, X would only represent the knot shadow, fermionic singularity of observation in b) with Euclidean coordinates x,y,z.

Figure 3b is simplistic since the rosebud is only illustrated for an x coordinate; whereas a quaternionic space-antispace mirror symmetric representation, $\pm i, j, k$ would entail six buds continuously blooming and re-compactifying into the 3-space knotted shadows (3a). A knot projected onto a plane casts a shadow. We assume spacetime is tessellated by a cellular automata-like LCU array, a structured XD-LSXD duality. Dimensionality up to this semi-quantum limit is a finite radius XD MOU. Beyond which lies LSXD M-theoretic brane topological UFM transitions. Matter in that regime takes the form of dynamic highly symmetric Calabi-Yau florets. In the same manner quantum fields are manipulated by em-fields in 3-space; LSXD topological phase transitions may be operated on by cyclically interfering/modulating the U_F antispace LCU UFM energy.

Utilizing a 3rd regime UFM approach with correspondence to existing theory (primarily a modified hadronic form of M-theory; also, saliently to de Broglie-Bohm super-implicate order and Cramer's transactional interpretation). The core of VDE technology design is the transfer by cyclical vacuum phase transition generating a holophote (rotating lighthouse beacon) *Least-Unit dual OCRET-OCHRE* resonance field. This resonant coupling is achieved by amplified matter-wave space-antispace annihilation-creation phase oscillation cycles of alternating spacetime electron Tight Bound State (TBS) [6] adduction (pulls toward) antispace subduction (at convergent brane boundary edges cyclically trapped) zero modes. In order to make that concatenation intelligible, a new understanding of matter must be introduced. The explanation includes how a UFM M-theoretic reality of an inherent synchronization backbone is utilized in space-antispace constructive-destructive interference of this cyclic KK beat frequency of the Dirac polarized vacuum to implement UQC programmed *LCU dual OCRET-OCHRE* resonance field for adduction-subduction of brane bouquet topology. Of absolute utility is that the UQC operate UFM-based r-qubits requiring an XD-LSXD [8] duality able to surmount the uncertainty principle [13].
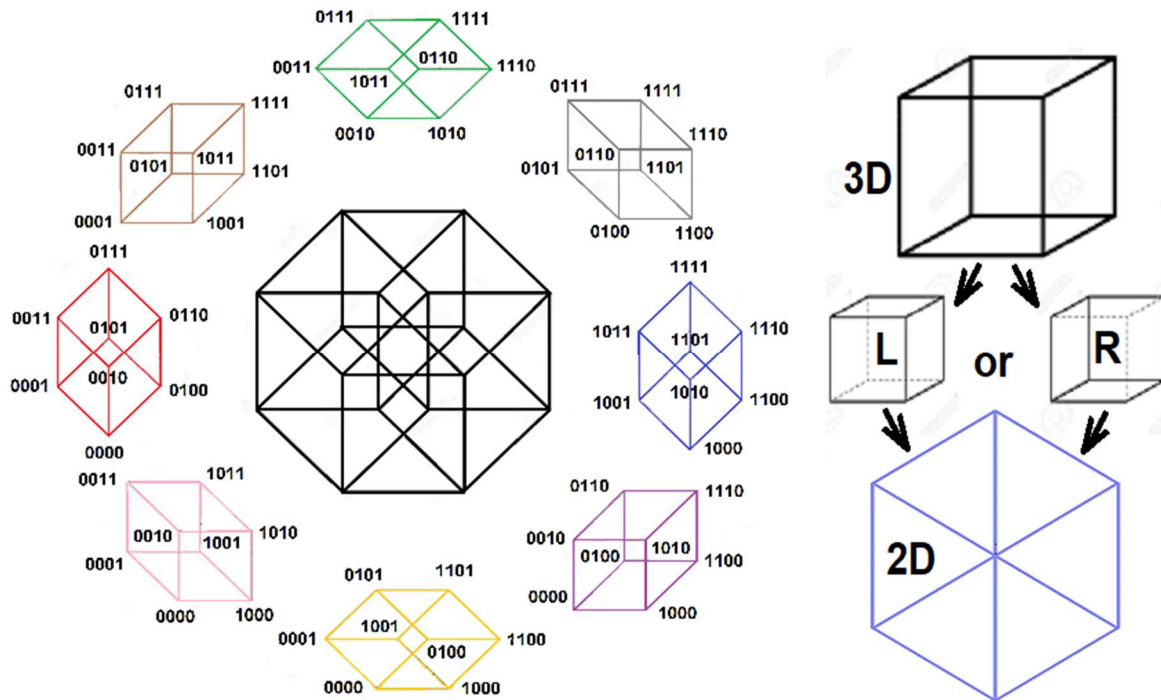
Figure 4. a) Exploded 4D hypercube, 64 overlapping vertices (4) or 16 subsets (16 x 4 = 64). One of four orthogonal configurations, with mirror symmetry another four. In terms of developing the required UFM transform, each 3-cube represents an ambiguous Necker (b) cube able to perform topological raising and lowering moves. The four cubes illustrated have interplaying vertex points, dotted – 0101:1011 and 0100:1010; solid – 0110:1101 and 0010:1001. b-bottom) Conceptualized view of the HD quadrupole photon-vacuum complex for *quadrupole* $\Leftrightarrow$ *dipole* interactions as elements of the U_F at the event horizon of Minkowski spacetime. b) Dimensional reduction.

Consider the rose petals in Fig.3b, the cubes in Fig. 4 and cubes/squares in Fig. 5 as same topological entities.

4. Least Unit - Key to Everything

Least unit, not only key to a theory of everything (TOE) - Einsteinian unified field theory (UFT), but fundamental basis of all new technology introduced. Observation suggests Reality is a 3-D spatial world. Since the same reference frame can be experienced at different times, we conclude spacetime is 4D. Planck's constant implies a universal metric. The precision of discrete metrical points in the spacetime vacuum, indicate a lattice defined by a fundamental metric with a least unit [9,35].

Consider Plato's analogy of the cave, in modern parlance as watching a film. The light of the projector is action of the U_F and reality the 2D image on the movie screen. Without

understanding the observer, an absolute notion of reality must be set aside in the same manner we ignore the discrepancy between nonphysical 0D point particles and 3D discrete matter.
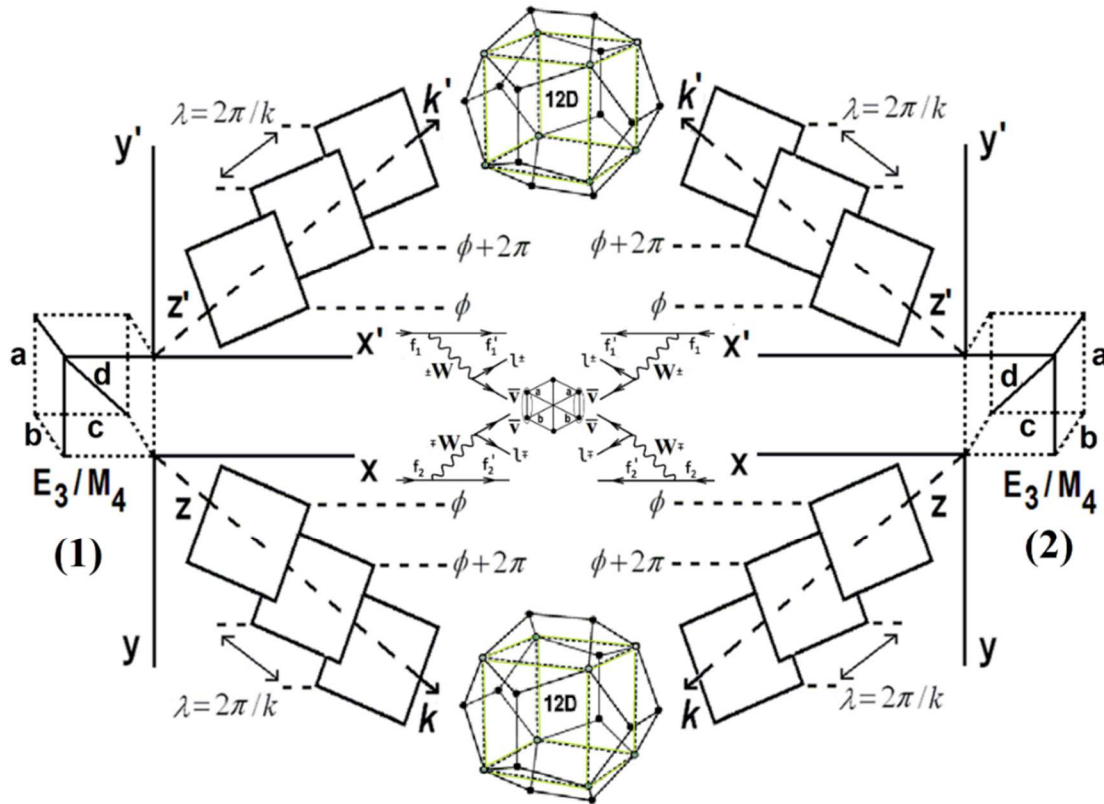
Figure 5. Calabi-Yau future-past mirror symmetry potentia dual 3-tori illustrated as tiered surfaces of constant phase, in this case to represent cyclic components evenly spaced orthogonal standing reality waves with the E_3/M_4 cubic (3-space) resultant line element points in t, localized left, x_1 and right, x_2. We do not know how to draw this yet; the center represents the 12D LSXD superspace *causally-free* copy of the local quantum state in 3-space.

There is order in the midst of chaos. The stochastic vacuum foam, one speculates qualifies, in conjunction with Feynman's synchronization backbone [31,32], as indicia of coherence hidden behind the veil of quantum uncertainty. Coherent injection of an eternity wave, $\aleph$ by holophote action of the unified U_F, not only provides an anthropic principle, but drives an arrow of time by topological phase transitions, [8,11]. Duality has become a primary principle in fundamental physics. In attempting to describe LCU tessellation, the principal duality is contained in the finite radius semi-quantum limit MOU XD-LSXD gating mechanism described by seminal properties of the Dirac electron hypertube model [23,24], Bohm's super implicate order structure [8,15] where inside a wave packet a super-quantum potential introduces nonlocal connectivity, and a Randall-Sundrum warped D-brane wormhole; are similar mechanisms for explaining how a wormhole throat cyclically opens and closes as hidden by HD behind the veil of uncertainty [8,9].

Recent thinking suggests we live, not only in a hologram, but a hologram within a hologram [37]. This is a hidden world beyond what we see in 3D/4D reality, with a Euclidean-Minkowski/Riemann 3(4)D $(+, +, +, -)$ spacetime configuration. Our purpose is to point the way to the Higher Dimensional (HD) regime $M \times X$, where M is SM 4-space and X a duality of XD – LSXD currently hidden behind the veil of uncertainty. This is a conceptual challenge, with dominant views suggesting, if XD exist, they are curled up microscopically at the Planck scale because they are invisible. This is not the only interpretation.
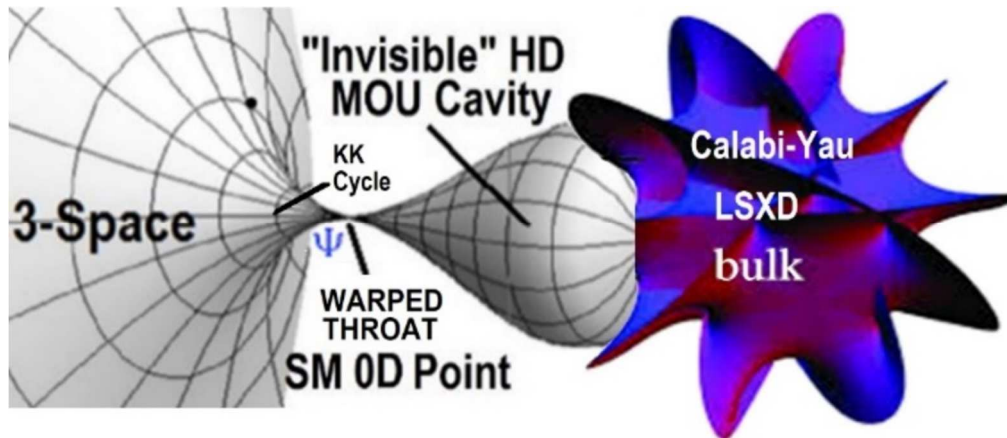
Figure 6. Depiction of SM 3-space topological phase transitions through a Kaluza-Klein (KK) cycle Randall-Sundrum modified warped throat manifold of uncertainty (MOU) of finite radius to LSXD UFM M-theoretic brane topology oscillations in the Bulk.

Perhaps the LCU conundrum can be understood simplistically from the two types of screen animation on a monitor. 1) Background remains fixed, and foreground (translating particle, or entity walking) moves off screen (right or left) is annihilated and reappears again cyclically into the foreground from the opposite domain wall. 2) Entity in standing-wave motion, remains at center screen, walking in place, while the background is in continuous translation left to right. The symmetry of these two types of figure-ground effects also have duality so both apply to the LCU background with a domain wall barrier (horizon).

According to Sundrum, [36] for 5D General Relativity, Einstein action for XD fluctuations has a dynamical XD radius (KK-cycle MOU cavity, Fig. 5). Randall and Sundrum [26] found an HD method for solving the hierarchy problem (discrepancy between scale of electroweak force and gravity) utilizing 3-branes with opposite tensions, residing at the orbifold fixed points, which they claim, together with a finely tuned cosmological constant forms a source for 5D gravity.

5. Exploring de Broglie Matter-Wave Defense Shields

Little work has been done other than empirically demonstrating the existence of de Broglie matter-waves [38-43]. The Wheeler-Feynman-Cramer transactional interpretation of QM defines a standing-wave resultant present instant of future-past Heisenberg potentia [8,14]. Matter-wave

antiballistic defense shield technologies are one experiment away (see below) from realization by application of an rf-pulsed Sagnac effect resonance hierarchy coherently controlling a new UFM concept of static de Broglie matter-wave topological phase transitions. Ballistic holophote vacuum energy emission is produced by programming a bulk UQC to constructively interfere (summate) the coherence length of topological charge contained in the cellular automata-like LCU cavities tessellating spacetime [10,12].

The proposed adaptation of M-theory to a UFM OPTFT [8,11,12], not politically correct, has been overlooked. In simple terms: 1) Gravity is not quantum, but integrates with UFM, 2) HD are not Planck-scale 10^{-33} cm units. At the semi-quantum MOU limit cyclical XD occur at the Lamour radius of the hydrogen atom (10^{-9} cm), beyond which in the Bulk, they are infinite size, 3) The spacetime vacuum is of the Dirac type – covariant and polarized [21,22], essential for rf-pulsed technical utility.

Operation of shield technologies relies on the central premise of de Broglie-Bohm modeling of quantum theory, which radically extends the Copenhagen interpretation. Matter is continuously created, annihilated and recreated physically real stationary waves embedded in the local fabric of spacetime. In the 4-space of quantum mechanics, this pilot wave-quantum potential, ontologically (no collapse of wavefunction) drives evolution of quantum systems. Carried to the LSXD UFM brane world, which Bohm defined as a super-implicate order [8,15], the quantum potential becomes a super-quantum potential synonymous with a force of coherence by which the U_F drives the evolution of reality itself.

We anticipate matter-wave antiballistic or radiation defense shield technologies appearing in three stages: 1) Coherently controlled constructive interference limited to the MOU level, strengthening aluminum to the density of depleted uranium. 2) Full incorporation of the LSXD properties of space, but still requiring more advanced vacuum programming algorithms. 3) Penultimate manipulation of spacetime, nanoscale programmable matter, antimatter phase configurations, energy efficiency and incursive nonlinear control of the nonlocal LCU coherence-length. We envision no physical reason why 3rd generation shields cannot completely withstand nuclear ordnance if UFM principles are fully incorporated in shield technologies – like an immoveable object meeting an irresistible force.

Salient concepts prototype antiballistic/radiation matter-wave defense shield technology require:

- Observed reality is a virtual HD standing-wave of future-past advanced-retarded parameters [14].

- Current SM limits, i.e. particle physics, cosmology or quantum theory is insufficient; we therefore emphasize that de Broglie matter-wave shield Tech cannot be built within these restrictions.

- In extended de Broglie-Bohm-Vigier causal stochastic interpretation of quantum theory, the wave function is a physically real *wave-particle* existing simultaneously. Properties of Dirac's electron hypertube is extended from SM concepts of matter confined in spacetime

domain walls to a LSXD UFM topology including the reality of the observer, all cyclically created-annihilated and recreated as a continuous-state process required for incorporating local-nonlocal dualism [23,24].

- The Dirac polarized vacuum is a programmable sea of infinite nilpotent potentia, a backcloth of *close-packed* LCUs with cellular automaton-like Ising model properties.

- Broglie matter-wave defense shielding needs ballistic programming the HD mean-free-path, not as a usual SM linear path, but for the whole static standing-wave LSXD LCU array simultaneously.

- A new set of UFM topological transformations beyond the SM Galilean-Lorentz-Poincairé with an HD qubit basis is required for vacuum programming [8,9].

6. The Possibility of Vacuum Directed Energy Weapons (VDEW)

Current DEW R&D is based on electromagnetic technology, where an optical cavity resonator produces standing-wave emission modes in 3-space [44,45]. In contrast, VDEW beam emission modes arise by coherent control of static-dynamic Casimir-Polder boundary conditions in the LCU spacetime cellular automaton cavities tessellating spacetime [18-20]. A brief summary of the perceived methodology for developing vacuum based UFM VDEW is presented. In the localized 3-space of QM, the underlying vacuum is a stochastic *zitterbewegung* of Planck-scale virtual particles popping in and out of existence for the Planck time. Such virtual particles and the vacuum manifold containing them are inaccessible by the uncertainty principle because standard methods of interaction collapse the wave function to an impenetrable barrier.

Operationally, nonlocal matter-wave interference nodes in dynamic-static Casimir-Polder resonant interactions pertinent to bumps and holes within a covariant polarized Dirac vacuum are the most salient feature for coupling mirror symmetric *nonlocal antispace* (vacuum) evanescent modes. Additionally, beam emission requires a new dual class of nonlocal OCHRE (Oscillation Coupled Helicoid Resonance Emission) [7] in tandem with localized OCRET (Optically Controlled Resonance Energy Transfer) [16] to produce ballistic-like conduction of vacuum energy by the summation of cyclical resonant incursive oscillations within the structure of cellular Least Units tessellating spacetime as a means of mediating the additional dimensionality (XD) of brane topological phase transitions in the *Bulk*. Finally, device operation requires an M-theoretic form of scalable UQC.

The energetics of LCU hysteresis excitation dynamics putatively allowing UFM energy to continuously summate with ballistically conductive DEB superradiance is illustrated in Fig. 6.
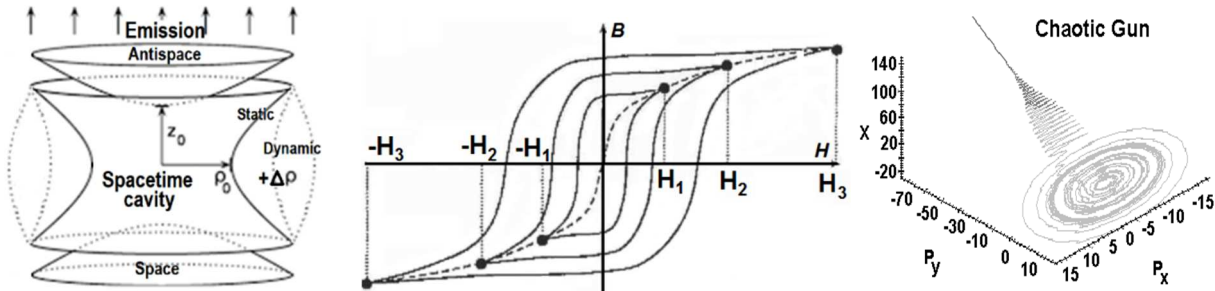
Figure 7. a) Model of spacetime MOU QED cavity as a static-dynamic Casimir of UFM charge. The cavity opens and closes; timing is crucial. b) Charge characteristics of nested Hysteresis loops used for modeling the cyclic cavity dynamics of fermionic space-antispace parameters. Our postulate is that the Dirac polarized vacuum can demonstrate hysteresis properties. c) Simplistic summation of UFM coherence for DEB operation.

Ballistic conduction of vacuum energy from cyclical evanescent modes along a mean-free path is key to the utility of VDEW technology. The applied field, the driving force, manipulates the Dirac polarized vacuum by Sagnac Effect incursive oscillation surmounting the uncertainty principle, only discovers by experiment, that coherent emission is a naturally occurring factor inherent in the holophote propagation of the U_F. This inherent synchronization backbone is like getting half the device for free. The synchronization backbone emission cycle is hidden from utility by the uncertainty principle. The applied field must cyclically on the one hand, destructively interfere with the annihilation-creation modes and constructively interfere for summation of U_F emission.
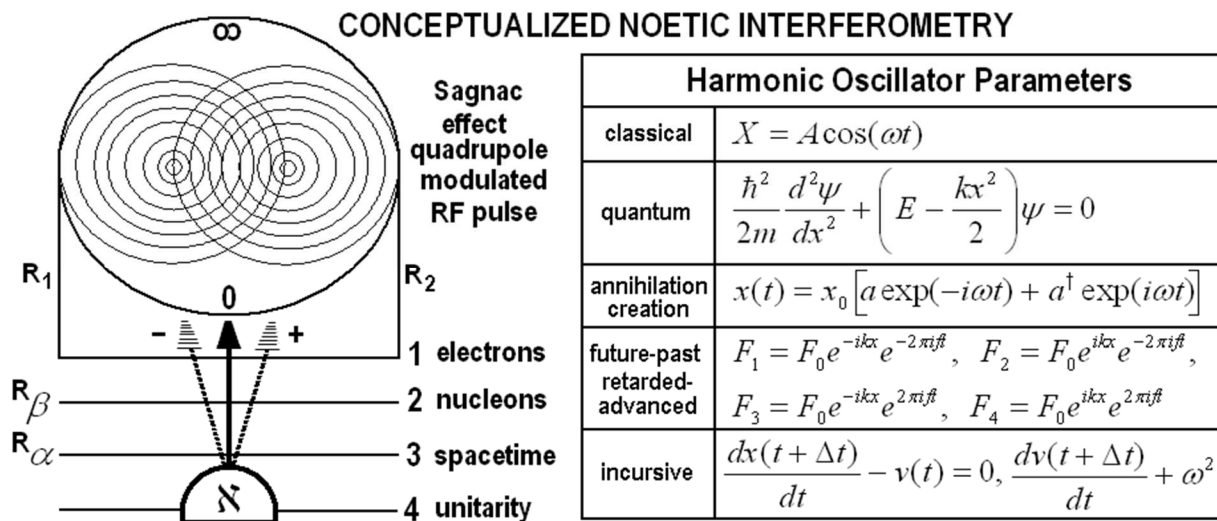
Restating, the duality in LCU rotation creates a tuned phase alignment in parallel transport cycles along the Mean Free Path (MFP), with periodic ballistic alignment opening LSXD channels that are LCU exciplex pumping mechanisms that summate and collect U_F topological charge along the coherence length of the array. The domain wall of the LCU cavity-QED is a static-dynamic Casimir hysteresis loop emission dynamic cycle with a beat frequency in the duality of the LCU structure, i.e. the semi-quantum finite radius MOU throat, and the nonlocal holographic instantaneity. It is important for the hysteresis UFM flux dynamic to have an exciplex substrate, for if the ground state cycled into the process, the uncertainty principle would block the OCHRE-OCRET VDEW process [7].

The dynamics of the propagation within the UFM regime is different in that there is an inherent periodic MFP inherent in the cyclicality of the topological phase transitions that can be resonantly coupled to an applied harmonic oscillator to produce evanescence with a programmable coherence length. Regarding the LCU tessellation of space, each close-packed LCU cluster has within it a mean-free path accessible by vacuum programming. Ultimately controlling standing de Broglie matter waves depends on programming LCU vacuum cellular automata in a manner that U_F parameters are modulated for coherently controlled alignment of the static-dynamic cycle producing spontaneous emission. Figure 7 illustrates properties of Cavity emission.

The oscillating static-dynamic Casimir-polder cavity walls, an OCHRE-OCRET Energy Transfer mechanism that together periodically confine the C-QED bumps and holes in the Dirac covariant polarized vacuum in resonance with the beat frequency of LCU KK cyclicality [46]. When the ontological phase transition path is *open*, ballistic conduction (with superradiance) may be directed to evanesce by OCRET-OCHRE duality at an energy directly corresponding to the coherence length of ballistic LCU alignment of commutative modes. The ballistic alignment modes must be periodic because the MOU is a regime of reality in the same respect as the existence and limits of the classical regime and the imminent utility of the regime of Einstein's U_F, the 3rd regime of natural science where ontological phase interactions occur [47-50].

7. Empirical Protocols for Supervening the Uncertainty Principle

The protocols confirm string theory, prove the existence of, and provide access to XD in the process, without need for Supercolliders like the CERN LHC which can only demonstrate the existence of XD, with no technological efficacy. Experiments enable a UFM regime in the progression – Classical Mechanics to Quantum Mechanics, creating a new field of physics able to test and manipulate the structure of matter with low energy table top devices, producing an explosion in technological innovation related to utility of the spacetime vacuum. The key element is the cellular-like automata structure LCU tessellating spacetime/space – the inherent cyclic duality, an XD/LSXD gate opening and closing into the UFM regime.

CONCEPTUALIZED NOETIC INTERFEROMETRY

Harmonic Oscillator Parameters	
classical	$X = A\cos(\omega t)$
quantum	$\dfrac{\hbar^2}{2m}\dfrac{d^2\psi}{dx^2} + \left(E - \dfrac{kx^2}{2}\right)\psi = 0$
annihilation creation	$x(t) = x_0\left[a\exp(-i\omega t) + a^\dagger\exp(i\omega t)\right]$
future-past retarded-advanced	$F_1 = F_0 e^{-ikx}e^{-2\pi ift}$, $F_2 = F_0 e^{ikx}e^{-2\pi ift}$, $F_3 = F_0 e^{-ikx}e^{2\pi ift}$, $F_4 = F_0 e^{ikx}e^{2\pi ift}$
incursive	$\dfrac{dx(t+\Delta t)}{dt} - v(t) = 0$, $\dfrac{dv(t+\Delta t)}{dt} + \omega^2$

Figure 8. a) Conceptualized cavity-QED multi-level Sagnac effect interferometer designed to *punch* a hole in spacetime to emit the UFM *eternity wave*, ℵ. b) Heuristic components of the applied rf-pulsed harmonic oscillator - classical, quantum, relativistic, transactional and incursive required to achieve coherent control of the cumulative resonance coupling hierarchy in order to produce harmonic nodes of destructive and constructive interference in the MOU spacetime backcloth.

Indicia of the multilevel operation of VDE technologies (static or beam) is evidenced by a simple demonstration. Referring to Fig. 1, assume a set of $i, j, k - i', j', k'$ *propellers* represent a space-antispace nilpotent fermionic vertex in cyclic beat-frequency rotation. Now, imagine placing a 3-blade ceiling fan in front of a mirror with a light shining from behind the fan. Periodically, when the blades align (face of square above the Bloch 2-sphere), a flash of light is seen by an observer in front of the mirror. This toy-model is merely the first stage in the dimensional ladder to full access of the LSXD ballistic mean-free-path to the programmable evanescence of vacuum energy.

1. Basic Experiment - Fundamental test that new OPTFT U_F principles is theoretically sound. A laser oscillated rf-pulsed vacuum Sagnac resonance hierarchy (Fig.8) designed to interfere with the periodic (continuous-state) structure of the inherent *beat frequency* of a covariant Dirac polarized spacetime vacuum to detect a new coherence principle associated with a cyclical holophote entry of HD U_F energy into 4-space by *poking a hole in spacetime*, discovering XD beyond the 4D SM. The remaining protocols are variations of parameters of this experiment (basis of all technologies).

2. Testing for and Manipulating Tight Bound States (TBS) - Vigier [6] has proposed TBS below the 1st Bohr orbit in the Hydrogen atom. Utilizing tenets of the original hadronic form of string theory [8] such as a variable string tension, T_S where the Planck constant, $\hbar$ is replaced with a version of the original Stoney λ [9], where $\hbar$ is an asymptote never reached, instead oscillating from virtual Planck to the Larmor radius of the hydrogen atom, i.e. the so-called Planck scale is a restriction imposed by the limitations of the Copenhagen Interpretation and is not a fundamental physical barrier. LSXD exist putatively behind the barrier of uncertainty and the oscillation of the Planck constant is part of the gating mechanism. Utilizing ontological-phase topological field theory (OPTFT) at the moment of spin-spin coupling or spin-orbit coupling an rf-pulse is kicked at various nodes harmonically set to coincide with putative phases in the cycle between local and LSXD cavity TBS properties [8-13].

3. Extended Quantum Theory - Test of causal properties of de Broglie- Bohm-Vigier quantum theory by utility of the *UF* holophote effect (protocol 1 parameters) as a 'super quantum potential' to summate by constructive interference the density of de Broglie matter waves.

Afterward

A simple low-energy tabletop empirical protocol is proposed to validate String/M-theory; that when accomplished could have far-reaching consequences producing an explosion in technical innovation. The experimental design is based on seminal efforts by French physicist Jean-Pierre Vigier on detecting new Tight-Bound State (TBS) spectral lines below the *lowest* Bohr orbit in HD hyperspherical cavities of the hydrogen atom. The result is achieved utilizing a modulated rf-pulsed Sagnac effect incursive oscillator applied to the polarized Dirac vacuum. Modulation of the protocols UFM topological phase transitions leads to bulk UCQ able to program the inherent cellular automata-like LCU array tessellating space to evanesce vacuum energy for standing matter-wave or focused particle beam VDE technologies.

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