Unified Field Mechanics: A Brief Introduction

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Recently we hear more and more physicists saying, 'spacetime is doomed', 'spacetime is a mirage', the 'end of spacetime', 'spacetime is not fundamental but emergent' etc. "*Henceforth space by itself and time by itself are doomed to fade into the mere shadows, and only a union of the two will preserve an independent reality.*" – 1908 Hermann Minkowski. We have come full circle from the time of Minkowski's 1908 statement to the brink of an imminent new age of discovery. The basis of our understanding of the natural world has evolved in modern times from Newtonian Mechanics to the 2nd regime of Quantum Mechanics; and now to the threshold of a 3rd regime - Unified Field Mechanics (UFM). The Planck scale stochastic quantum realm can no longer be considered the 'basement' or fundamental level of reality. As hard as quantum reality was to imagine so is the fact that the quantum domain is a manifold of finite radius; and that the 'sacrosanct - indelible' Quantum Uncertainty Principle can now be surmounted. For decades main stream physicists have been stymied by efforts to reconcile General Relativity with Quantum Mechanics. The stumbling block lies with the two theories conflicting views of space and time: For quantum theory, space and time offer a fixed backcloth against which particles move. In Einstein's relativities, space and time are not only inextricably linked, but the resultant spacetime is warped by the matter within it. In our nascent UFM paradigm for arcane reasons the quantum manifold is not the regime of integration with gravity; it is instead integrated with the domain of the unified field where the forces of nature are deemed to unify. We give a simplistic survey of the fundamental premises of UFM and summarize experimental protocols to falsify the model at this stage of the paradigm's development.

Keywords: Calabi-Yau mirror symmetry, Space-antispace, Unified field mechanics, Hadronic string theory, String tension, Tachyon

1. Précis

Einstein most likely failed in his quest for a unified theory simply because he was too far ahead of his time; and the higher dimensional framework needed to construct a unified field theory wasn't available before he died in 1955. The correspondence path to a unified theory began in 1919 [1,2] but it wasn't until the 1940's that the Kaluza-Klein theory was completed

$$\begin{aligned} \tilde{g}_{\mu\nu} &\equiv g_{\mu\nu} + \phi^2 A_\mu A_\nu , \\ \tilde{g}_{5\nu} &\equiv \tilde{g}_{5\nu} \equiv \phi^2 A_\nu , \quad \tilde{g}_{55} \equiv \phi^2 \end{aligned} \tag{1}$$

where index 5 is the 5th coordinate. This metric implies an invariant 5D line element:

$$\begin{aligned} ds^2 &\equiv \tilde{g}_{ab} dx^a dx^b = \\ & g_{\mu\nu} dx^\mu dx^\nu + \phi^2 \left(A_\nu dx^\nu + dx^5 \right)^2 \end{aligned} \tag{2}$$

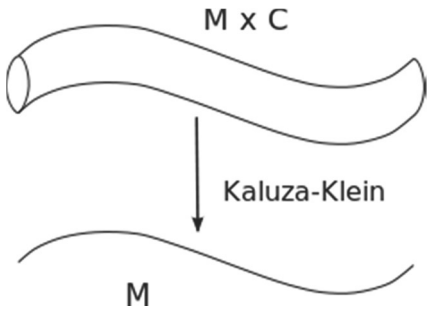


Figure 1. The Kaluza-Klein space, *M x C* is compactified over the set *C*; which after K-K decomposition produces a field theory over *M*.

In Tbl. 1 we simplistically list various UFM parameters for a Holographic Multiverse [3-5].

TABLE 1. Suggested Multiverse UFM Parameters

1) UFM suggests a 3rd physical regime in the progression: 3D Classical Newtonian Mechanics $\longrightarrow$ 4D Quantum Mechanics $\longrightarrow$ 12D Unified Field Mechanics (UFM).
2) Uncertainty is a manifold of finite radius that can now be experimentally surmounted [6,7].
3) Putative additional dimensions are not curled up microscopically at the Planck scale as originally thought.
4) Large-Scale additional dimensions (LSXD) of infinite size exist beyond the 'veil of uncertainty' [8].
5) Quantum - Gravity is not the regime of integration, rather the union occurs in the 3rd regime of UFM.
6) The unified filed is not a 5th phenomenological field (i.e. mediated by exchange quanta) but a 'force of coherence' based on topological charge with instead an ontological 'energyless' exchange called 'topological switching' [3].
7) Reliance on scale-invariant covariant Dirac polarized vacuum with minute photon mass, m_γ.
8) Reversion to original Hadronic form of String Theory with variable string tension, T_S, virtual Tachyons and a key unique 'Background Independent' string vacuum [3,9].
9) Additional Transform beyond the Galilean and Lorentz-Poincairé to handle LSXD UFM transformations.
10) Wave-Particle duality elevated to principle of cosmology.
11) Continuous-State 'spin exchange dimensional reduction compactification processes rather than fixed Planck-scale 'basement of reality' [3].
11) Not one unique compactification making correspondence to the Standard Model, rather continuous compactification mode from 12D to 0D with a '0 to infinity' rotation of the Riemann sphere Least Cosmological Unit (LCU) array.
12) Planck is a virtual asymptote never reached fundamentally that oscillates from asymptotic Planck to the Larmor radius of the Hydrogen atom, $\hbar + \Delta T_S$.
13) Spacetime not fundamental but emergent in a continuous-state process whereby annihilation-creation symmetry provides a 'beat frequency' to line element propagation.
14) Space is tiled with an array of Least Cosmological Units (LCU) the nilpotent structure of which constitutes the new UFM designation of a 'singularity' or Fermion vertex.
15) The universe is a Holographic Anthropic Multiverse where the Hubble Sphere is finite and closed in time, but open and infinite in the atemporal LSXD realm with room for an infinite number of causally separated nested Hubble spheres each with their own fine-tuned laws of physics.
16) Relies on completed versions of the de Broglie-Bohm and Cramer interpretations of Quantum Theory extended to LSXD.

Now more and more physicists have begun to take on Einstein's quest with the evolution of String/M-Theory which however did not begin until the 1990s after the troubled beginning in the 1970s and 1980s. Currently M-Theory (not without severe challenges and criticism) is considered the most promising approach. Preparation for the birth of a comprehensive UFT is just in time for the Einstein Centenary in November 2015. Our program to found UFM follows the format of the *Conseils Solvay,* taking place over five symposia from 1911 to 1927 that founded quantum mechanics; this is the second in the series of Vigier symposia geared toward founding UFM [4,5].

2. The LCU is the Key to Unified Field Mechanics

We claim unique insight into the required fundaments for implementing 'Unified Field Mechanics' (UFM). Firstly, the Universe is not quantum, which for the last 100 Years was merely a convenient stopping place in the progress of Natural Philosophy. The LSXD appear 'invisible' not because they are curled up microscopically at the Planck scale as Kaluza-Klein Theory proposed, but because of a form of 'subtractive interferometry' related to the nature of the virtual reality of the Observer's limits of observation to 3D.

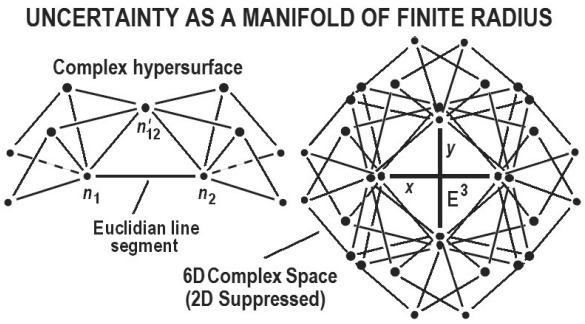


Figure 2. Conceptual view of the space-antispace nilpotent 'manifold of uncertainty' with 64 quaternionic elements (some suppressed) with Euclidean space, E_3 as the resultant subspace of virtual 'points' forming observed reality.

According to Rowlands the units of the Dirac algebra can, like the γ matrix products, be represented as a group of order 64, requiring only a *pentad* of 5 generators. Many sets of 5 generators can be derived, for example as in the asterisked units in the vector-quaternion set [15,16]:

i	***j****	***k***	***ii***	***ij***	***ik****	*i*	1
i	**j**	**k**	*i***i**	*i***j**	*i***k**	*i*	1

ii*	***ij***	***ik***	*i**ii***	*i**ij***	*i**ik***
ji*	***jj***	***jk***	*i**ji***	*i**jj***	*i**jk***
k*i**	**k*j***	**k*k***	*i***k*i***	*i***k*j***	*i***k*k***

The Standard Model seems to require one nilpotent set of space-antispace dual-quaternion nilpotent propagators $(\boldsymbol{ikE} + \boldsymbol{ii}p_x + \boldsymbol{ij}p_y + \boldsymbol{ik}p_z + \boldsymbol{j}m)^2 = 0$ [10]. Until it is known how to close-pack (see below) the array of LCU tessellating space (what spacetime

emerges from) we cannot readily postulate whether the manifold of uncertainty is 2D or 5D. In either case respectively the 3rd or 5th LSXD would be degenerate, i.e. the domain in atomic energy levels when the outermost electron acquires sufficient energy to escape to infinity. To clarify; if the manifold of uncertainty requires a single additional duality, degeneracy would occur at the 3rd LSXD and only two additional spectral lines would be found in hydrogen [4,5]. An additional anti-space duality could mean up to five additional spectral lines could be found. The reason for the complexity of the manifold of uncertainty is esoteric.

A radical paradigm shift will garner little attention/ respect from the physics community until it is empirically tested. For example even Einstein himself after his *annum mirabilis* when he was for all practical purposes 'Einstein'; was called an 'idiot and a moron' to his face when he proposed the photoelectric effect, an experiment that could easily today be performed in a kindergarten. Fortunately the noetic model provides a clear pragmatic path for falsification [3-5]. If the protocol is successful it will not only help found UFM but also be a boon to M-Theory (demonstrate existence of additional dimensionality) [3-5].

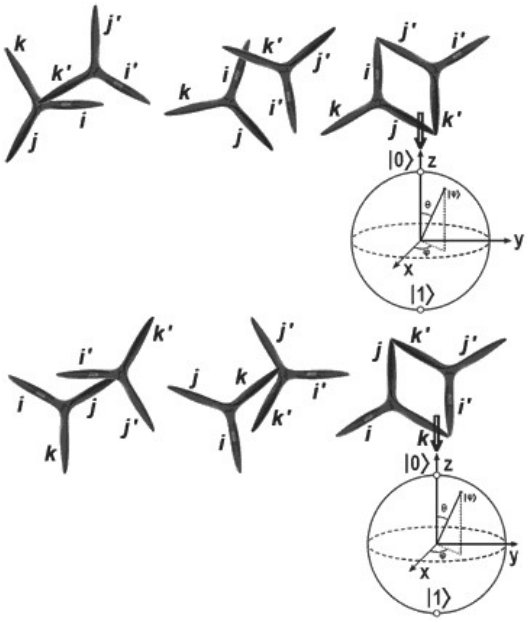


Figure 3. An alternative rendition of Fig. 2 in nilpotent quaternionic form. A locus of HD mirror symmetric Calabi-Yau 3-tori here depicted as dual quaternion trefoil knots spinning relativistically and evolving quantum mechanically in time. The space-antispace nodes in the cycle are sometimes chaotic (degenerate) and sometimes periodically couple coherently into resultant quantum states in Euclidean 3-space depicted in the figure as faces of a 3-cube that reduce further to the Riemann Bloch 2-sphere at the bottom.

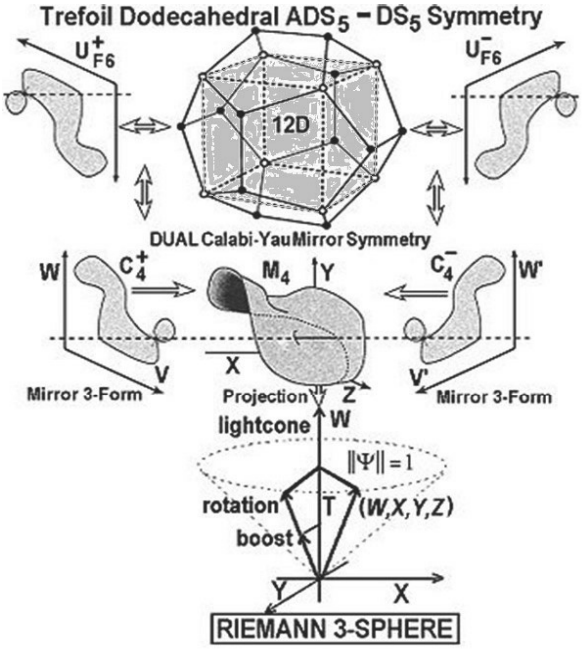


Figure 4. Complete LSXD regime of 12D HAM cosmology illustrating the hierarchy of its geometric topology. Dodecahedral involute properties, as well as the continuous-state exciplex 'hysteresis loop' of noeon injection not shown. It represents a unique M-Theoretic model of 'Continuous-State' U_F dynamics as it relates to the LSXD topology of UFM and the putative exchange quanta of the U_F called the noeon.

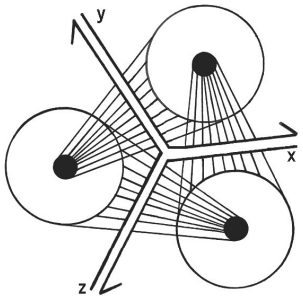


Figure 5. Triune structure of a solitary LCU that like an isolated quark does not exist in nature. The central parallel lines, *xyz* are the Witten string vertex with properties of a complex Riemann sphere able to continuously rotate from zero to infinity. The field lines represent the HD 'super quantum potential' of the unified field, restricting 3-space.

Understanding the Least Cosmological Unit (LCU) is the essential key to the development and testing of Multiverse UFM. This will remain a major challenge to progress until we know how to understand what geometrical/topological form its tessellation of space and spacetime is close-packed. The problem arises because we don't know what form(s) of close packing occurs; it could be square or hexagonal for example.

We suspect even if LSXD are orthogonal and evenly spaced continuous compactification might change the dimensional radius. Continuous-state spin-exchange dimensional reduction compactification is a key U_F process such that the force and dynamics of gravity are likely to be involved suggesting that periodic deficit angles will occur in parallel transport during cyclicality of the process. Extended de Broglie-Bohm Cramer contributions might restrict compactification pathways. Space charge may also contribute.

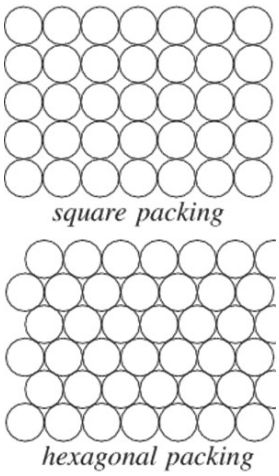


Figure 6. Possibility of square and/or hexagonal LCU close-packing.

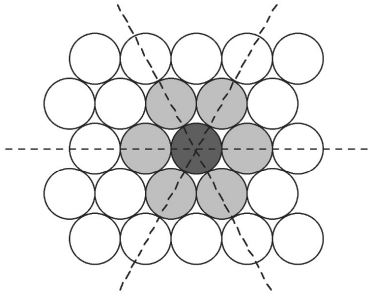


Figure 7. What symmetrical form of HD hyperspherical LCU close-packing does Euclidean 3-space emerge from?

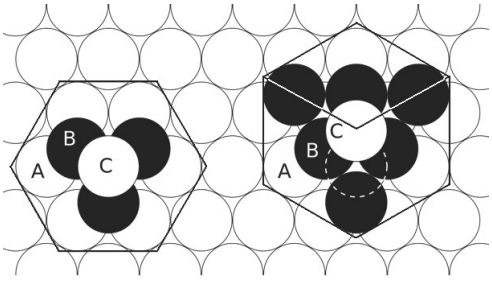


Figure 8. The continuous-state compactification process may modulate the cyclical geometry of close-packing.

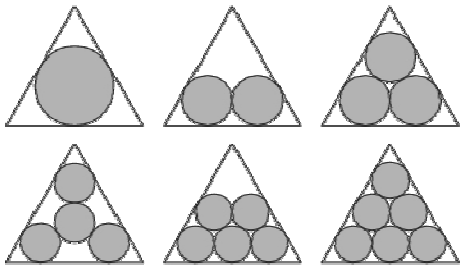


Figure 9. Topological Calabi-Yau mirror symmetric brane boundary conditions and space 'charge' itself may restrict the form or size of the evolution of LCU close-packing.

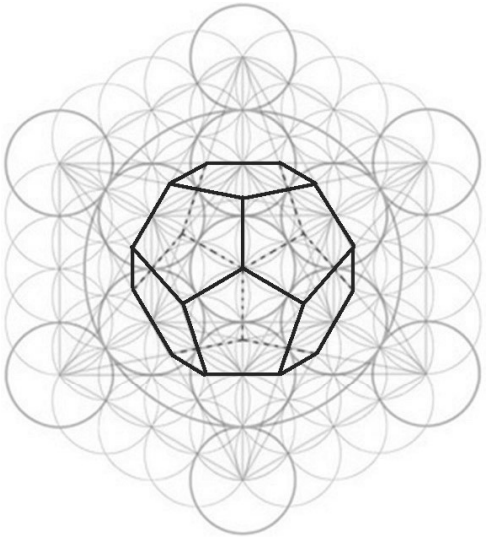


Figure 10. The intellectual appeal of oscillating AdS_5-dS_5 Dodecahedral 12D to 15D LSXD space shown in Fig. 4 suggests LCU close-packing could take the form shown here.

Recent Planck satellite observation data has not ruled out the fact that the multiverse could take AdS_5-dS_5 dodecahedral wrap-around form [11]. Einstein himself stated that 'if one could look far enough out into space one would see the back of one's head'.

3. Experimental Design and Procedure

Some experimental evidence has been found to support this view showing the possibility that the interaction of these extended structures in space involve real physical vacuum couplings by resonance with the subquantum Dirac ether. Because of minute photon mass, m_γ in the Causal Stochastic Interpretation (CSI) model, any causal description implies that for photons carrying energy and momentum one must add to the restoring force of the harmonic oscillator an additional radiation (decelerating) resistance derived from the em (force)

field of the emitted photon by the action-equal-reaction law. Kowalski showed that emission and absorption between atomic states take place within a time interval equal to one period of the emitted or absorbed photon wave [12].

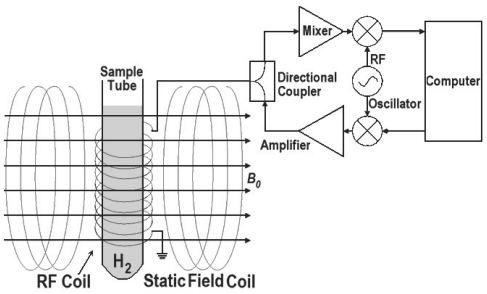
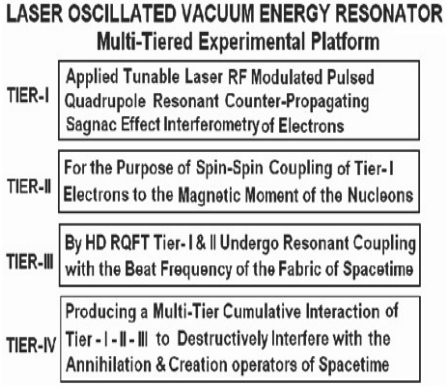


Figure 11. NMR apparatus designed to manipulate TBS in Hydrogen. The Fig. only shows possible details for rf-modulating TBS QED resonance, not the spectrographic recording and analysis components.

The corresponding transition time corresponds to the time required to travel one full orbit around the nucleus. Individual photons are extended spacetime structures containing two opposite point-like charges rotating at a velocity near *c,* at the opposite sides of a rotating diameter with a mass, m $=10^{-65}$ g and with an internal oscillation $E = m^2 = h\nu$. Thus a new causal description implies the addition of a new component to the Coulomb force acting randomly and may be related to quantum fluctuations. We believe this new relationship has some significance for our model of vacuum C-QED blackbody absorption/emission equilibrium.

The purpose of this simple experiment is to empirically demonstrate the existence of LSXD utilizing a new model of TBS in the hydrogen atom until now hidden behind the veil of the uncertainty principle. If for the sake of illustration we arbitrarily assume the *s* orbital of a hydrogen atom has a volume of 10 and the *p* orbital a volume of 20, to discover TBS we will investigate the possibility of heretofore unknown volume possibilities arising from cyclical fluctuations in large XD Calabi-Yau mirror symmetry dynamics. This is in addition to the Vigier TBS model. As in the perspective of rows of seats in an auditorium, rows of trees in an orchard or rows of headstones in a cemetery, from certain positions the line of sight is open to infinity or block. This is the assumption we make about the continuous-state cyclicality of HD space. Then if the theory has a basis in physical reality and we are able to measure it propose that at certain nodes in the cycle we would discover cavity volumes of say 12, 14, and 16. We propose the possibility of three XD cavity modes like 'phase locked loops' depending the cycle position - maximal, intermediate and minimal.



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