Y-Bias and Angularity:©

The Dynamics of Self-Organizing Criticality From the Zero Point to Infinity

by David G. Yurth and Donald Ayres

http://NovaInstituteofTechnology.com

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Abstract:

The quest of modern physics has been to develop a model which correctly describes the role and dynamics of the interactions by which Nature works. In order for the model which describes these interactions to be robust, it must not only accommodate phenomena which are known to occur, but must also accommodate all rigorously documented phenomena, predict phenomena which are as-yet undiscovered, and allow for the inclusion of all rigorously observed, impeccably documented, carefully reported data derived from all sources. To be adequate, any universally applicable physical model must also accommodate the contemporaneous interaction between Descartes' 'physical stuff' and 'spirit stuff' with equal cogency.

The current model fails to rise to this standard. It is based on a number of fundamentally flawed, incomplete and arbitrarily imposed assumptions. In the 35 years since the Standard Model was improved by the Copenhagen School, the reductionist methodology which typifies scientific research has run up hard against the most daunting of all Nature's mysteries. Experimental results provided by the most powerful microscopes, largest telescopes, fastest linear accelerators and other advanced devices, demonstrate that there is an underlying order in the cosmos which has not yet been understood. The shortcomings of the Standard Model are ameliorated by the application of the rules of Self-Organizing Criticality in complex, open systems [SOC][1] as integrated with the dynamics described as Y-Bias and Angularity.[2]

Concept: Y-Bias/Angularity & Self-Organizing Criticality (SOC):

The authors provide a simple, elegant model of scalar interactions, which accommodates phenomena not heretofore accommodated, by describing how the fundamental processes of ***Y-Bias Interactions*** [3] and optimal concomitant ***Angularity*** combine to operationalize the autopoietic processes found in ***Self-Organizing Criticality*** [4] [SOC] as described by Bak etal. These dynamics combine to produce the space-time continuum described by Minkowski as 4-space [L^4], defined in terms of time, matter, energy and Local-Linear/Non-Local, Non-Linear [L^2/N^2L^2] field effects.

Intrinsic to the process of unraveling this fundamental mystery is the authors' attempt to define three essential and heretofore inadequately defined components of the SOC process: (1) mass, (2) magnetism, and (3) gravitational field effects. In addition, the authors integrate the 'undulating waveform' attributes defined in Whittaker's famous 1903 formulation with Mandelbrot's fractal geometries and the Fibonacci Series to provide a model of organizational dynamics which resolves the cosmological issues defined as:

- The Antimatter Problem
- The Galaxy Formation Problem
- The Isotrophy Problem
- The Flatness Problem

Finally, the authors provide a scalar roadmap which describes how matter, energy, time and all other field effects arise from the Physical Vacuum [5] via the Zero Point [6] to constitute L^4 at ten distinct scales of quantum complexity. The schema posited here accommodates the concomitant role and dynamics of dissipative structures [Prigogine, Stengers etal] and self-organizing criticality [Bak etal] at each of the ten scales and, further, illustrates how matter, energy, time and field effects are generated as increasingly complex products of the Y-Bias interactions between charge ensembles occurring at the finest scales. Digital images of archetypal shapes and forms occurring at the Third through Tenth scales illustrate how Y-Bias interactions combine to

produce the effects found in all SOC systems throughout the cosmos. The interactions attributed to the first three scales are described in conceptual and mathematical terms, supported by examples of the behaviors and attributes associated with SOC evolution at the finest scales.

Background:

The Standard Model of Physics and the General Theory of Relativity [GTR] hold that all matter, energy and field forces were created at the instant of the Big Bang [e.g. Weinberg etal], and that time, gravitational force, electromagnetic forces, and the strong and weak [van der Waals] nuclear forces are distinct, mutually exclusive field effects acting *a priori* throughout all of L^4. In the alternative, Y-Bias and Angularity Theory proposes that matter, energy, time and all field effects are constantly being constructed and deconstructed from the Physical Vacuum, via the Zero Point, as a perpetual cycle of Self-Organizing Criticality and structural dissipation.

The authors posit that the critical dynamics which drive the operational mechanics of the SOC processes, which also operate to create/deconstruct L^4, can be defined in terms of the Y-Bias interactions occurring between virtual charge ensembles and virtual photons in the Physical Vacuum, via the Zero Point, and at all subsequent scales. Increasing complexity in the organization of matter and energy occurs at successive scales of organization to produce the observable phenomena which populate L^4. It is further posited that the degree of angularity between such interactions is definitive, determining at the primary scalar interaction [for example] whether time domain and spin-polarized charge ensembles will remain viable and robust [i.e., rise above the 1/f noise threshold quanta] and subsequently combine with other equally robust interaction products to increase organizational complexity and propagate field effects, or, in the alternative, fail to achieve coherence and thus deconstruct to their prior, virtual, and undifferentiated states in the Physical Vacuum.

For those interactions which achieve coherence at the primary scale, the angularity of the subsequent Y-Bias interactions determines whether the eventual manifestation will subsequently become observable as matter, energy, time and/or field effects. Y-Bias interactions define the

nature and extent to which all scalar interactions in the Physical Vacuum satisfy the SOC demands of fractal boundedness or unboundedness, which are observed to operate across the infinite expanses of time and space, in realtime. By this means, materiality in the physical world eventually unfolds and enfolds at all scales, as Bohm rightly suggested. While the dynamics and mechanics of SOC systems are neither widely addressed nor actually accommodated by the Standard Model, they are nevertheless rigorously observed and reported throughout scientific literature. The work of Bak and others demonstrates, and Y-Bias/Angularity Theory holds, that the cosmos is a single, open, complex SOC system at all scales.

Prigogine and Stengers [7] were awarded the Nobel Prize in Physics for their breakthrough work in the field of dissipative structures. Their work supported subsequent experimental and theoretical advancements provided by Bak [8] and his colleagues at the Brookhaven National Laboratories, which resulted in the explication and rigorous experimental verification of the set of rules which has come to be referred to in the literature as the Law of Self-organizing Criticality [SOC]. The significance of Bak's work is that it provides the definitive theoretical basis describing how the cosmos simultaneously and catastrophically annihilates and automatically organizes matter and energy at all scales, to create and deconstruct the physical universe we observe. SOC systems exhibit four uniform characteristics which have been rigorously shown to operate universally and uniformly at all scales throughout the cosmos. These include (1) logarithmic power law relationships between related events in complex, open systems or sub-systems, (2) punctuated equilibrium, (3) fractal geometries defined by the Fibonacci series and (4) $1/f$ quantum noise thresholds.

While the attributes of SOC systems are well known and have been rigorously documented by a global community of qualified researchers, the dynamics which operationalize the mechanics of such systems have not heretofore been clearly understood. Several reasons are cited for the general failure to develop a fully evolved model describing the primary scalar interactions intrinsic to SOC systems. D. Ayres etal has articulated and experimentally verified the nature, role and dynamics associated with the magnitude and angularity of SOC interactions. His

observations and writings identify this body of knowledge as "Y-Bias and Angularity Theory." [9]

According to Ayres etal, all interactions in the cosmos can be described in terms of (1) the magnitude of the weighted waveform and vector velocities exerted along the Y-axis of one interacting component upon the X/Z axis trajectory of another, (2) the angle of intersection between them, and (3) described in terms of the resultant weighted waveform and vector velocities, time domain and spin-polarization effects which are manifest as the product of their interaction. The authors assert that this dynamic, which has heretofore not been incorporated into the Standard Model, provides the missing link to understanding how nature works as an SOC system at all scales.

Entropy Conversion and Dissipative Structures:

In their seminal book ***Order Out of Chaos***, Nobel laureates Ilya Prigogine and Isabelle Stengers [10] provide a road map for man's new dialogue with nature. Their work broke totally new ground when it was published because it brought a simple, elegant order to the search for an answer to the question,

> *"If the universe operates in a perpetual state of chaos* [which was what was believed before the book was published]*, why hasn't it self-destructed long before now?"*

The corollary to this question is equally compelling. It asks,

> *"If entropy is the primary dynamic which operates to determine the nature of the cosmos, how can autopoiesis* [self-organization in open, complex systems] *be simultaneously accommodated?* [11]

The underlying phenomena which give rise to this question revolve around a condition described in mathematical constructs as "entropy". Entropy is a mathematical construct used to describe the state of chaos which exists in a given system as the result of irreversible dissipative processes. [12] The work of Stengers and Prigogine did not address similar effects arising from internally

generated self-organizing quantum interactions, all of which taken together constitute the entire set of dynamics which are known to drive autopoietic SOC systems. In any system which has not reached a state of self-organizing criticality [defined as the point at which creative and/or catastrophic events occur spontaneously within the system, without the intervention of outside forces], the rules of chaos and entropy operate with predictable consistency.

The Origins of Entropy

The coherent integration of disordered virtual energy [undifferentiated information] which operates in the Physical Vacuum, and the conversion of this virtual energy into observable energy at the primary scale [via what has come to be referred to in the literature as the Zero Point], is the process by which the field of constructive entropy [specifically, the Physical Vacuum], expressed as an infinite realm of self-referential statistical probabilities [Kafatos and Nadeau describe this field as 'the background reality-as-it-is] [13], is converted to deconstructive entropy, as observed in L^4. Bearden's hypothesis suggests this process occurs as follows [14]:

- At the scale of the Physical Vacuum, a charged scalar virtual ensemble *continuously absorbs* disordered virtual photon energy from its seething vacuum energy exchange.
- The energy $\mathbf{\Delta E}$ [1] of each virtual energy photon absorbed is transformed into a virtual change $\mathbf{\Delta m}$ [2] in the *mass* of the charged particle, by $\mathbf{(\Delta E)/c^2 = \Delta m}$ [3].
- Since mass is *unitary*, its successive virtual energy state causes $\mathbf{\Delta m_i}$ to integrate *coherently*, shown as $\mathbf{\Delta m = \Delta m_1 + \Delta m_2 + \ldots + \Delta m_i + \ldots}$ This process *reorders* the absorbed disordered energy, but as a summation change $\mathbf{\Delta m}$ of mass-energy until the quantum threshold is reached.

[1] ΔE: In mathematical expressions, this term contains two elements. Δ is referred to as 'delta.' It connotes a change or difference between states. E is used an abbreviation for energy.
[2] Δm: In mathematical expressions, this term contains Δ, the 'delta' or change value, as well as the symbol conventionally use to connote 'Mass.'
[3] $(\Delta E)/c^2 = \Delta m$: This expression is read as 'delta [change] in E [energy] divided by the square of C [speed of light] equals an equivalent change in mass. When rearranged in simple algebraic terms, by multiplying both sides of the equation by the value 'c^2', we derive Einstein's famous equation $E = MC^2$.

- When sufficient virtual mass-energy change $\mathbf{\Delta m}$ is accumulated, there is sufficient mass-energy excitation $\mathbf{1/f = \Delta E = (\Delta m)c^2}$ [4] for emitting an *observable* photon.
- Because it is incessantly perturbed by vacuum fluctuations (zitterbewegung), once the quantum threshold ($\mathbf{1/f}$) is reached, the excited charged particle abruptly and forcibly decays by emitting a real, observable photon. At that moment, the coherent integration of virtual energy into observable energy has been accomplished.

Bearden's schema suggests that interactions at the primary scale, which produce the set of results [time, matter, energy, field effects] observed to arise from the primary set of causal dynamics, occur at the Zero Point. What is not described in Bearden's hypothesis is the set of rules which govern (1) the unitary nature of mass, (2) how virtual energy is absorbed by virtual charge ensembles, (3) how virtual ensembles interact to exhibit the characteristics of charge, (4) why some charge ensembles become robust and others do not, and (5) how the conversion of virtual energy by charge ensembles eventually becomes differentiated as matter, energy, time domain polarity or field effects at the primary, secondary and tertiary scales, and so on.

The authors posit that the determining dynamics which operate to facilitate and regulate the absorption of undifferentiated virtual energy and the conversion of this positive entropy to constitute matter, energy, time and field effects, all of which continuously demonstrate entropy [emission of real photons] above the tertiary scale of evolution, are defined as the Y-Bias Effect, as determined by the Angularity of virtual charge ensemble interactions.

[4] $1/f = \Delta E = (\Delta m)c^2$: this expression means that when the quantum-defined minimal level of noise is equal to the change in energy, it is also equal to the concomitant change in mass.

Issues:

Not-Accommodated Phenomena

In contrast to the simple, elegant, uniformly applicable and universally observed set of phenomena defined by Bak/Ayers, the architecture of the Standard Model fails to accommodate a number of important recent discoveries. Additionally, theoretical models recently developed to describe the dynamics which govern scalar interactions have thus far failed to accommodate rigorously documented phenomenological anomalies such as non-local effects at a distance, [15] scalar non-local field effects,[16] inertial mass reduction in non-linear gyroscopic oscillations,[17] consciousness interactions with primary particle and photon behaviors and beams of laser light, [18] delayed-choice experiments in astrophysical observations,[19] super-luminal data transport rates,[20] non-local field effect persistence,[21] over-unity plasma discharge effects[22], and the energy $\mathbf{\Delta_E}$ generated by the separation and recombination of Hydrogen atoms in a vacuum.[23] Recent astronomical observations such as the behaviors of black holes, temperatures in excess of 100 million degrees F at the core of newly formed stars and galaxies, observed variations in the speed of light, and other naturally occurring phenomena not accommodated by the Standard Model, are both accommodated and predicted by the new model described here.

Standard Physical Model:

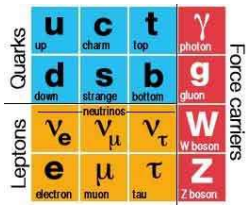
R. Santilli, in his widely recognized and published work, has described the Standard Model as follows[24]:

> *In the 1950s and '60s scientists faced a bewildering array of particles coming from particle accelerators as they pushed to ever higher energies. Order was offered in the 1960s when several scientists proposed what is now called the Standard Model.*
>
> *In it, six types of Quark (and corresponding anti-Quark) are the building blocks for heavy particles. Mesons (middleweight particles) are made of two Quarks (or*

antiquarks). Baryons (heavyweights, including Protons and Neutrons in the nuclei of atoms) are made of three Quarks (or antiquarks).

Electrons, described as buzzing in clouds around the nucleus, are in a separate category called Leptons (lightweights). There are only six Leptons: Electrons, muons, and taus, plus three corresponding neutrinos. Leptons are their own fundamental particles. Like Quarks, Leptons are believed to be fundamental particles with no underlying structure.

Figure 1



One of the fundamental question which remains unanswered by the Standard Model is compelling, when stated as follows:

If Einstein's GTR [General Theory of Relativity] is admitted as the defining standard for all field effects which operate in the cosmos, and given that the relativistic attributes of C [the speed of light] constitute an absolute upper limit to the rate of information transport velocities in the 4-dimensional universe, by what combination of primary interactions is the cosmos able to operate in realtime, across 15- 20 Billion light years, as an SOC system?

This question, in turn, gives rise to a discussion of other fundamental issues, including (1) the nature of the set of properties currently referred to as mass, magnetism and gravitational forces, as reflected in the Alpha Constant[25]; (2) the nature and dynamics of the class of phenomena currently referred to as "primary field effects;" and (3) the incompatible operative dynamics encompassed by current formulations of electromagnetism [as reformulated by Myron Evans, Lawrence Crowell etal] [26], quantum expressions of the gravitational forces and the laws of thermodynamics [as clarified by M. Melehey] [27], and the reformulation of Hadronic Mechanics [as produced by Santilli etal].

Intrinsic to this set of issues are the ancillary issues related to the role and nature of (1) hadronic spinors [Cartesian torsion as defined by Santilli's reformulated model of Hadronic mechanics] [28], (2) non-local scalar field effects [as experimentally verified by Gisin, Aspect, Wheeler, Poponin and others] [29], and (3) the coupling of consciousness with hadronic interactions, photonic effects, local and non-local field effects and related phenomena [as experimentally verified by Drexler University, Eyring Research Institute, Aluminum Research Center, and others [30], and Dr. Dean Radin, UNLV] [31].

One fundamental shortcoming of the Standard Model illustrates how severely crippled this model has become. The Standard Model of physics takes for granted the often-stated "fact" that while a fixed primary charge produces a set of resultant fields and field effects, which are radiated directionally, in terms of varying weighted vector velocities, time and spin polarization, angular momentum and waveforms [as measured in Fermi units of 10^{-13} cm], usually in the form of photons, as a consequence of its interaction with surrounding charges and its locale, the dynamics of its interactions have not yet been adequately explained. Further, the Standard Model does not illuminate the paradox that while the charge ensemble produces energy as a result of its interactions with other charge ensembles or field effects, experimental evidence demonstrates that this interaction takes place in spite of the fact that no observable energy is input to the source charge.

Again, in Bearden we find,

Experiment establishes there is no observable energy input to the source charge. Yet charges continuosly pour out energy and establish all EM [electromagnetic] fields, potentials, and their energy quanta. Classical EM and electrical engineering models accept that the associated charges are somehow the sources of all EM fields, potentials, and their energy output. But the models assume that the charges create those fields and potentials and their energy, from nothing at all, because they assume there is no dynamic energy input to the charge. Thus, present electrical power engineering uses a seriously flawed EM model that assumes total violation of the conservation of energy law. [32]

Second, Bell's Theorem and the General Theory of Relativity predict non-local effects at a distance.[33] Gisin's 1997 experimental verification of Bell's Theorem at CERN demonstrates conclusively that non-locality at a distance is an intrinsic attribute of Electron-Positron pairs.[34] Nevertheless, non-locality and well documented anomalies involving non-local field effects, such as those referred to in the literature as Poponin's Phantom DNA Effect[35], are prohibited by the current model of physics as universally occurring, natural scalar phenomena.

Third, the current notion, embodied in the GTR and EPR [Einstein, Podalski, Rosen] formulation of gravitational effects, is that gravitational force, electromagnetic force, the strong and weak nuclear forces are primary, pre-existing and mutually exclusive.[36] Y-Bias/Angularity Theory suggests that the traditional field effects identified by the Standard Model are neither primary nor mutually exclusive.[37] Rather, when viewed in the context of Y-Bias interactions, all local-linear [L^2] and nonlocal/nonlinear [N^2L^2] field effects are found to be derivatives of the same set of primary scale Y-Bias interactions occurring at the Zero Point, as defined and governed by Bak's autopoietic rules of self-organizing criticality.

Fourth, while the work of Bak etal rigorously validates the operative dynamics of autopoietic interactions in SOC systems, physics as a convention and Science as an institution have thus far failed to integrate this seminal information into the fabric of the Standard Model. The absence of

a cogent cosmology, based on SOC rules, renders the Standard Model both incomplete and fundamentally flawed because it cannot accommodate any of the naturally-occurring non-local effects at a distance -- phenomena which have been observed, documented, rigorously verified and consistently reported for more than 100 years, and which are the fundamental constituent attributes of the fabric of the cosmos.

Fifth, the Second Postulate of the STR [Special Theory of Relativity] sets an arbitrary upper limit to the relative velocity of both physical and virtual photons operating in L^4. Nevertheless, rigorously disciplined experimental evidence demonstrates that semantic information [in both digital and analog forms] can be propagated and received at least 10^9 C [5] [this refers to capital C as a relativistic value, as opposed to 'c', which is accepted as an absolute value in current formulations of field forces][38], without attenuation by any known interposed materials or distance.

Sixth, the General Theory of Relativity [GTR] and the exceptions provided in the 2nd Postulate of the Special Theory [STR], which describe quantized radiation of virtual photons, are inconsistent with a rigorous analysis of photographic imaging conducted during the past decade by the Hubble Space Telescope. According to the GTR,[39] Hubble should not be able to snap sharply focused pictures of far distant objects. Nevertheless, Hubble's images are crisp and sharply focused, regardless of the absolute distance to the light-emitting source. According to Ragazzoni etal, whose team studied Hubble pictures of a galaxy more than 5 billion light-years away and, separately, an exploding star 42 million light-years distant,

When light arrives from a distant object, some parts of the light's wave should be retarded with respect to others, because each would take slightly different paths through the "foam." [ref: "quantum foam' as found in Superstring and M Theory]. Light will appear to come from positions around the actual source, causing a blur.[40]

[5] 10^9: This mathematical expression means that the underlying factor [C, the speed of light] is multiplied by the number ten, followed by 9 zeros, or the number 10,000,000,000.

> *"You don't see a universe that is blurred," he said. "If you take any Hubble Space Telescope Deep Field image you see sharp images, which is enough to tell us that the light has not been distorted or perturbed by fluctuations in space-time from the source to the observer."*

According to GTR, light is said to move in very small but measurable quanta. Time is presumed to move in correspondingly miniscule quantum bits. The bits are assumed to comport with Einstein's theory of general relativity, which describes physics at the large scale of the universe. In the final analysis, Einstein asserted that time, gravity and the fabric of space are all different manifestations of the same underlying phenomenon.

However, in recent years, theorists and rigorously verified experimental evidence have shown that a pair of quanta, consisting of a virtual photon of the Planck length and a similarly miniscule packet of Planck time, should be the smallest measurable physical components in the cosmos. Below these thresholds things should become undifferentiated [e.g., at the scale of the Physical Vacuum]. If light's travel is quantized as described in GTR, it could not, according to current theory, be variable in units below the Planck limit.

> *"If time doesn't become 'fuzzy' beneath a Planck interval, this discovery will present problems to several astrophysical and cosmological models, including the Big Bang model of the universe."* [41].

One challenge for proponents of the Standard Model, if the studies by Lieu and Ragazzoni are on track, is that the instant of the Big Bang would have involved an infinitely hot and dense condition, which is specifically prohibited by the Standard Model and current theory. This anomaly strongly suggests that Time, as a quantized element of L^4, and as predicted by Y-Bias/Angularity Theory, does not exist at the Zero Point. This suggests, in turn, that Time, as a mutually distinct dimension demonstrating its own energy density, is therefore a product of the primary scalar interactions which occur at the Zero Point, which serve to convert virtual charge

ensembles with positive entropy to actual charge ensembles with dualistic properties demonstrating dissipative entropy.

Since this element of the new model is supported by rigorously validated mathematical expressions and verified by observable phenomena, the nature of the cosmos, including all its attributes in L^4, must be fundamentally different than that which is described by the GTR and the Standard Model.

Field Effects - Flaws and Myths

The current notion, embodied in the GTR and EPR formulation of gravitational effects, is that gravitational force, electromagnetic force, and the strong and weak nuclear forces are the only forces in operation in the cosmos. Further, it is held that these field effects are primary, pre-existent to any interactions at any scale, and mutually exclusive.[42] This dictum requires that the four 'primary' field effects must be invariant; that is, wherever they are observed, they must operate with absolute linear consistency at all scales. The literature is now replete with impeccably documented evidence which demonstrates that none of these fields are invariant at any scale. Further, experimental evidence currently demonstrates that each of these field effects can be arbitrarily mitigated by the application of suitably engineered experimental macroscopic techniques which are the product of their mutual interactions.

Rigorously disciplined experimental reports demonstrate, for example, that the speed of light in a local and universal sense is neither invariant nor restricted to either upper or lower limits[43]; that gravitational force can be mitigated in a targeted locale[44]; that information transport velocities can operate in excess of 10^9 times C under controlled conditions[45]; and that the disciplined exercise of human choice exerts a repeatable, demonstrable, quantifiable effect on matter, energy and the four 'primary' field effects[46].

While the phenomenological evidence is no longer arguable, no cogent explanation has yet been supplied in the context of the Standard Model to describe these interactions in a way which is

consistent, experimentally verifiable or universally applicable. The authors posit that if the field effects described in the Standard Model are primary, no manipulation of a product of their interactions or effects at any scale can have the effect of mitigating them. Mitigations of all known field effects at all scales are now shown to comprise a ubiquitous set of localized exceptions to the generally accepted rules. This insight demands that the four 'primary' field effects be recognized as derivative effects which are manifestations of [and therefore subject to the dynamics of] an underlying set of quantifiable primary causes.

Y-Bias Theory holds that the traditional primary field effects are neither primary nor mutually exclusive.[47] Rather, the local-linear and nonlocal/nonlinear [referred to hereafter as L^2/N^2L^2] field effects observed, verified, reported and described in the literature are all derivatives of the same primary Y-Bias interactions occurring at the Zero Point, governed by SOC dynamical rules, and carried from the most finite to the largest scales as primary, intrinsic, self-referential, and autopoietic attributes of Nature itself.

Definitions - Self-Organizing Criticality:

Criticality is mathematically defined as the state of highest efficiency in a complex system.[48] At the point of criticality, catastrophic events happen in a big way, all at once, and not by gradual degrees. This is as true of rush hour traffic jams as it is of mass extinctions and major weather events. When we understand this aspect of complex systems, we also begin to understand something fundamental about the way Nature works. When it is understood that this set of rules operates at all scales, it then becomes possible to develop a model which explains the observable phenomena which are not accommodated by the Standard Model. It also becomes possible to predict the existence of phenomena not yet discovered, which can be logically presumed to operate according to these rules at larger and smaller scales than previously imagined.

The structure of the cosmos, as observed in L^4, is assumed to be universally coherent in terms of SOC rules. These rules provide that as undifferentiated "virtual" information originating in the Physical Vacuum [and emerging via the Zero Point] coalesces with other virtual ensembles to create fundamental pairings [which demonstrate duality, polarity, spin and time domain

properties], the process of coalescence adheres to four primary conditions. According to Bak, all four conditions operate simultaneously and ubiquitously at all scales.[49]

The Role of Criticality

Bak's investigation of SOC system dynamics began as an attempt to model the self-organizing behaviors associated with catastrophic avalanche events. The definitive experiment viewed this set of dynamics as embodied in a randomly organized pile of uniform grains of sand. As Bak and his team constructed each sand pile, they realized that there comes a time when the sand pile can no longer be considered just a stack of single, unrelated grains. As the mound of sand reaches the point of criticality [that point at which the quantum I/f threshold has been breached and the power laws become operative], the sand pile becomes a single, integrated, self-organizing system. As soon as this happens, it is no longer possible to predict the magnitude, location or frequency of any single avalanche event within the system. As the experimental evidence shows, even if we simultaneously know everything there is to know about every single grain of sand comprising the pile, the nature of open, complex and self-organizing SOC systems is such that we cannot improve the consistency, accuracy or reliability of our predictions regarding its behaviors in any locale. In SOC systems as they operate in Nature, there is no linear, 1-to-1 relationship between events occurring in the past and those which are anticipated in the future.

We can predict only what the power laws permit. The importance of this insight cannot be overstated. It means, among other things, that in spite of all the best technologies and instrumentation we will ever devise, we will never, under any circumstances, be able to reliably predict the magnitude, location or timing of any events which occur as part of any complex, open SOC system[50]. This includes earthquakes[51], solar flares, stock market behaviors, mass extinctions, meteor strikes, weather, geologic events or the behaviors of human interactions such as the Internet. If our way of thinking about the world we live is modified to comport with the way the cosmos really works, instead of the way the world is described by the Standard Model, our approach to exploring the mysteries of the cosmos must be altered in ways that are still largely unimaginable.

Complex, Self-organizing SOC Systems

For the purposes of this discussion, a complex, open, self-organizing system is defined as one which demonstrates the characteristics of the condition known as criticality. For purposes of illustration, at the grandest of scales, the Milky Way Galaxy [like all galaxies found in the cosmos] is a complex, open, self-organizing system[52].

Figure 2

Hubble/NASA example of Celestial Organization

The fact that this is universally acknowledged to be true presents some intriguing problems which cannot be accommodated by the Standard Model of physics currently in general use.

At a finer scale, the same is true of the solar system. In every sense, it demonstrates all the characteristics, attributes and behaviors associated with self-organizing systems.[53] So does our planet. Taken by itself as a single comprehensive unit, the Earth and its sub-systems all demonstrate the attributes of self-organizing criticality at every scale, from the release of virtual photons produced by energetic interactions to the Earth's participation as a member of the solar system set[54]. All these systems operate, as Capra[55] has rigorously reported, in an integrated, indivisible aggregation of inextricably inter-related constituents which, in the final analysis, comprise a single overall SOC system.[56]

Simple, Elegant Rules:

According to the experimental data developed by Bak etal, it is evident that open, complex, self-organizing SOC systems simultaneously and universally demonstrate all four of the following attributes:

1. ***Punctuated Equilibrium:*** Criticality is defined as the point in SOC system evolution at which an observable event occurs. Between each event or "avalanche" there are relative periods of apparent stasis which are punctuated from time to time by other "avalanches" of various magnitudes. These avalanches can be literal, as in the case of Bak's sand pile [or the catastrophic rush of a field of snow down a slope], or they can take the form of mass extinctions, the rises and falls of the stock markets, the occurrence of solar flares, earthquakes, tornados, hurricanes or floods, wars, the evolutionary cycles of the Internet, the evolution of languages, etc. The phenomenon of punctuated equilibrium is an intrinsic dynamic comprising the quantum functions which have been observed to operate at all scales in Nature. In this view of SOC behaviors, the geological effects demonstrated by the Grand Canyon, for example, are the product of a series of catastrophic avalanche events rather than the gradual grinding down of geological strata by hydro-dynamic erosion over millions of years.
2. ***Power Laws:*** The relationship between the magnitudes, frequencies and locale of individual avalanches can be expressed in terms of a simple exponential equation. There are no singular explanations for large events - the same forces which cause the Dow Jones Industrial Average to rise 5 points on one day also caused the crashes of 1929, 1987 and the Dot.com crash of 1999. Wherever we find that a logarithmic relationship exists between a series of catastrophic events, which can be plotted on a set of X-Y coordinates as straight line with a slope, we can be absolutely certain that the system which produced it is a self-organizing SOC system. The logarithmic relationship which characterizes the power laws governing SOC processes is primary to the formation of matter, energy, Time and all the field forces which operate in the cosmos. All of Nature, at all scales, manifests uniform compliance with this rule.

3. ***Fractal Geometry:*** First expressed by Benoit Mandelbrot[57] of IBM, fractal geometry is a mathematical construct which illustrates that where a complex, open, self-organizing system exists anywhere in our space-time continuum, it is self-similar at all scales. Fractals are the natural record of the evolution of natural, open, complex, self-organizing systems of all kinds. In this context, Y-Bias/Angularity Theory holds that the "boundedness – unboundedness" attributes manifest by the aggregations of scalar components, occurring at the Zero Point, define the eventual form each event will become at each subsequent scale of organization.

   Boundedness, the conceptual construct reflected by the self-similarity which characterizes fractal geometry, occurs as the result of the interaction of scalar components beginning at the primary scale and extending throughout the micro and macrocosm. The formula which describes the fractal properties of SOC interactions is shown as

   $$Z \Leftrightarrow Z^2 + C \quad ^{(6)}, \qquad \textit{Formula 1}$$

   the nature, extent and dynamics of which are a subject of this discussion. By its nature, fractal geometry serves to organize discrete quanta of information into aggregations which are either bounded [as Z] or unbounded [as $Z^2 + C$], in a way which preserves the primary data sets found at the Zero Point throughout each quantum-defined scale of subsequent organization. The fractal formula suggests that SOC dynamics are self-referential, as shown by the function '$\Leftrightarrow$', which connotes interaction rather than equivalence. This is the primary function identified by Kafatos/Nadeau which renders 'background reality-as-it-is' self-referential at all scales. This function is also the operative dynamic which drives the Implicate Order postulated by Bohm.

[6] $Z \Leftrightarrow Z^2 + C$: This formula contains the term 'Z' which means an angle of incidence between two interacting data sets or physical events. The symbol $\Leftrightarrow$ depicts a realtime feedback loop in which each expression feeds information back to the other at a rate which is equal to the square of the speed of light. This interaction suggests that when until the information fed from the left side of the equation meets or exceeds a minimal quantum limit, shown in Self-organizing criticality as the function $1/f$, it remains bound by a nexus considered to be a zero point or 'seed' in fractal geometry. When the noise threshold $[1/f]$ is breached, however, the data or resulting physical phenomenon then becomes self-sustaining until the next noise threshold is reached.

When a complex system evolves to a state of self-organizing criticality over any increment of time [Δt], the physical record of its evolutionary history can only be described in terms which are fractal. The shape of a riverine delta, the variegated slopes of a mountain range, the shape of a coral reef, and the corrugated features of the human brain are all records of the evolution of self-organizing systems manifest in fractal form. It is because fractal geometry constitutes the natural expression of the evolution of SOC systems that analysts have been able, for example, to develop applications which efficiently identify non-fractal patterns found in the natural landscape.

4. ***I/□ Noise:*** In order for any observable event to occur within an SOC system, the interactions between individual components and field effects must exceed quantum-defined scalar "noise" $[1/f]$ thresholds. For an aggregation of components at any scale to become self-organizing, the number of components, their aggregate properties and the Y-Bias/Angularity effects they exert on each other must combine to breach the minimal noise thresholds. By definition, this set of interactive properties and dynamics demands that all such interactions must be accompanied by and combine to create a concomitant set of harmonic resonances, regardless of the scale at which they occur. The nature and importance of harmonic resonance in this regard is addressed later under the sections which discuss the Fibonacci Series and its relationship to Gravitational Forces.

Entropy as Broken Symmetry

As Bearden rightly shows,[58] in particle physics every charged ensemble polarizes the locale of L^4 contiguous to it. Each charge is surrounded by virtual charges of opposite sign, resulting in a dipolar ensemble and a highly energetic exchange between the charge and the active vacuum from which it emerges.

The asymmetry of opposite charges (and thus of any di-polarity) is a proven broken symmetry.

- *For a broken symmetry that is discovered, something virtual has become observable. In this case, that "something that has become virtual" is virtual energy evolved from the vacuum.*
- *Virtual EM [7] energy from the vacuum is continuously input to the charge's polarization ensemble, absorbed as a differential change in mass by the charged mass, coherently integrated as that differential mass change, and then re-emitted as observable EM energy.*

By extension, this aspect of Y-Bias/Angularity in SOC systems at the Zero Point serves as a universal energy pumping mechanism. This concept provides the mechanism by which energy evolved from the Physical Vacuum is subsequently delivered to and retrieved from all subsequent scales of SOC development and deconstruction at all scales throughout the cosmos. As a whole, the universe operates as a single, complex, open, self-organizing system which is always in total balance.

Primary Scale

This is the scale at which the Zero Point interfaces with and first manifests the organization of ensemble interactions arising within the Physical Vacuum. During the 20th Century, our knowledge regarding finite scales and the properties of the Physical Vacuum has evolved somewhat but is still largely incomplete. The vacuum is popularly considered to be a void, an emptiness, or 'nothingness.' This is the definition of a bare vacuum [59]. However, as science has learned more about the properties of space, a new and contrasting description has arisen which physicists call the Physical Vacuum.[60]

Descriptions of the Physical Vacuum

Two competing theories describe the behavior and characteristics of the Physical Vacuum and the Zero Point. These are referred to in the literature as the ***Quantum Electro-Dynamic*** (QED) model [61], and the somewhat more recent ***Stochastic Electro-Dynamic*** (SED) model [62]. Both

[7] EM: in this expression, EM is the term used to connote electromagnetic field effects.

models arrive at the same conclusions, so the choice between them is one of aesthetics rather than substance. In some cases, the QED model gives results that are easier to visualize, while in other cases the SED model is more useful. Importantly, both come to the same conclusion. Even at absolute zero, the Physical Vacuum exhibits an inherent energy density. The QED model maintains that the Zero-Point reveals its existence through the effects of the fifth scale sub-atomic real particles [Hadrons & Leptons] which emerge from it. By contrast, the SED approach affirms that the Zero Point exists as an interface between the physical world [L^4] and the Physical Vacuum's undifferentiated 'sea' of electromagnetic fields or waves.[63] In String or 'M' Theory, this 'sea' is referred to as the 'quantum foam.'

Casimir Effects

There is further evidence for the existence of the zero-point energy in this model, as manifest by a phenomenon referred to in the literature as the Casimir Effect. This phenomenon was predicted in 1948 by Hendrik Casimir, a Dutch scientist, and confirmed nine years later by M. J. Sparnaay of the Philips Laboratory in Eindhoven, Holland [64]. The Casimir Effect is demonstrated by juxtaposing two metal plates very close together in a vacuum. When they are as close as possible, a small but measurable force becomes evident that acts to push them together. The SED theory explains this by suggesting that as the metal plates get closer, they end up excluding all wavelengths at the Zero Point between the plates except the very short ones that are sub-multiple harmonics of the plates' distance apart. In other words, all the long wavelengths of the Zero Point are seen to act on the plates from the outside. The combined radiation pressure of these external waves is said to act to force the plates together.[65]

The surface Casimir Effect demonstrates the existence of the Zero Point as a function of the interaction of electromagnetic waves. Interestingly, Haisch, Rueda, Puthoff and others point out that there is a more microscopic version of the same phenomenon. In the case of closely spaced atoms or molecules, the all-pervasive Zero Point produces short-range attractive forces that are described in the Standard Model as the van der Waals forces. It is these attractive forces that permit real gases, for example, to be turned into liquids. When an 'ideal' gas is compressed, it

behaves in a precise way. When a real gas is compressed, however, its actual behavior deviates from the ideal equation.

The common objections to the actual existence of the Zero Point center around the idea that it is simply a theoretical construct. However, the presence of both the Casimir Effect and the Zitterbewegung, among other observational evidence, proves the reality of the Zero Point. What is not explained by either of these two models, however, is the set of dynamics by which the interactions they describe actually operate at the primary scale. Further, neither model provides mathematical expressions which address phenomena operating at scales more minute than the level of Fermions, Hadrons or Leptons. When applied to the observed interactions associated with Sub-Quarks [tertiary scale] and Quarks [fourth scale], neither model finds sufficient traction to be useful. The topology intrinsic to the architecture of the models described by Quantum Mechanics is fundamentally limited to the leveled topology allowed by the imposition of the Lorenz Transforms and its reliance on vector mathematics. Again, in Bearden we find,

> *In its concept of the zero vector, vector mathematics discards zero-vector summations of active systems of vectors. It replaces such a summation with a zero vector. This is fine for mathematics as an abstract system, but it is in error when applied to real electromagnetic force fields of nature.*
>
> *In the abstract mathematics, a vector zero summation is made the "absence of all finite vectors". Further, all vector zeros are made equal. No concept of the "internal stress" of the zero vector exists in abstract vector mathematics.*
>
> *However, physically the zero summation or "balancing" of vector forces in a medium represents stress in that medium. In the physical case, a vector zero summation system of non-zero vectors has a dynamic substructure, and this substructure is an individual attribute.*[66]

Einstein's Vector Magnetic Potentials

Einstein introduced the concept that only the vector magnetic potential has a physical reality in electrodynamics. He postulated that the electric and magnetic fields are merely concepts we have developed to accommodate the reciprocity observed in field interactions between charge ensembles. Most modern physicists still do not accept this assertion. This remains true, even though more recent experimental research [the Aharonov-Bohm experiment] conclusively demonstrates that the A field is real (the experiment shows that A can alter the quantum wave function) [even] when all other EM effects have been completely shielded out.[67]

For years a controversy has raged around the Aharonov-Bohm effect, which demonstrates the reality of the Einstein vector potentials, among other things. In 1986, most physicists finally accepted the AB effect with its implications (see Physics Today, Jan. '86). However, in the intervening 20 years since his work was completed, no changes have yet been made to EM theory or the basic classical approach to electrical physics and engineering[68] as taught in colleges and universities.

Whittaker's Electrodynamic Potential

In E.T. Whitaker's classical 1902-1903 proofs [69], we find a categorical statement about the nature of Zero Point interactions. Whittaker's formulation addresses the fundamental issue of the scalar parameter referred to in the literature as 'Potential.' In mathematics, potential is described in terms of the intensity of some field or between interacting fields. Whittaker showed that any scalar EM potential is composed of a harmonic set of bidirectional phase-conjugated longitudinal EM wave pairs. He further showed that any EM field or wave, etc., can be decomposed into differential functions which are comprised of two scalar potentials. By applying Whittaker's 1903 decomposition of the scalar potential to the two scalar potentials described in his 1904 paper, and then applying the proper differential dynamics, we find that all EM fields, potentials, and waves are composed of internal structure and moving internal parts continuously being 'replaced', as described in Van Flandern's analogy [70]. This description provides a valuable insight into the conundrum described by Bearden which constitutes a broken symmetry.

Whittaker's concept of potential is structured to show 'potential' as a **bi-directional energy flow.** [71] In his book ***Gravitobiology***, T.E. Bearden [72] writes,

> *"Space-time in a sense may be regarded as a conglomerate of potentials - including the scalar EM potentials [as described by Whittaker]. Therefore, the simplest structure of EM scalar potentials (trapped EM energy) is also nominally composed of such spin-2 gravitons.*[73]*"*

According to this construction, the structure of the scalar EM potentials which operate in the Physical Vacuum, as described by Whittaker, consists of coupled photon/anti-photon pairs. These are the virtual ensembles referred to elsewhere in the literature. The concept of the anti-photon has been posited by Bearden, Santilli and Evans as the embodiment of the reverse-time process. Therefore, any potential field can be considered as a bi-directional electromagnetic process/anti-process. Accordingly, power can be produced by means of fluctuations of field potential only in terms of an **inner field structural imbalance.** Bidirectional energy flow can be mathematically presented in terms of the equation

$$\mathbf{0 = A + B} \qquad \text{F.2}\ ^{(8)}$$

where zero balance [0] is created as a product of the interaction of two opposite processes [A] and [B]. If one of the processes [for example, A] is deemed the source of power (Zero Point vacuum EM potential as the power source), then according to the thermodynamic formula which describes the dynamics of chronal gradients and chronal pressures [$\mathbf{E = grad\phi(t)}$], the other part of the balanced system, defined as process B, must also be changed.

The interaction between virtual ensembles which interact to create potential can therefore be described in terms of the following equation:

[8] F.2: 0 = A+B. This expression means that two equivalent processes [A] and [B] which each flow in opposite directions produce the net result of zero.

$$\mathbf{0 = \frac{\Delta A}{\Delta t} + \frac{\Delta B}{\Delta t}} \qquad \text{F.3}\ ^{(9)}$$

and in another view

$$\mathbf{\Delta A/\Delta t = - \Delta B/\Delta t} \qquad \text{F.4}\ ^{(10)}$$

If the time attribute exhibited by **B** is considered as reversed time $\mathbf{t_r}$ and the time attribute exhibited by process **A** is considered to be direct time $\mathbf{t_d}$, we obtain the equation for a total energy conservation law that takes into consideration the interactions of **direct time** and **reversed time** as energy processes,

$$\mathbf{\frac{\Delta A}{\Delta t_d} = \frac{\Delta B}{\Delta t_{ry}}} \qquad \text{F.5}\ ^{(11)}$$

When this equation is considered carefully, we can draw no other conclusion except that the amount of power which can be tapped from the Physical Vacuum via the Zero Point is **unlimited.** Since entropy, and therefore 'time' as a linear expression of entropy, does not operate at the Zero Point, it must also follow that there is no limit to the power extraction potential via the Physical Vacuum, if a change of value in **A** is always offset by a corresponding change in the value of **B**. As Melehey rightly suggests, then, the conservation laws as applied to energy must become an expression of the **conservation of time balance at the Zero Point.**

This formulation leads us to a single, unequivocal conclusion:

[9] F.3: This expression says that as field A changes direction over an increment of time, if field B also changes direction in the opposite sign over the same increment of time, the net product of their interaction is zero.
[10] F.4: This expression simply expresses the algebraic equivalence of the two field effects by moving one to the other side of the equation.
[11] F.5: This formula describes the $\mathbf{\Delta t}$ in terms of its direction. The sub-script **d** suggests that time is moving in a forward, direction vector. The sub-script **r** suggests that time is moving in a reverse direction.

> *The Energy of all processes in direct time must be equal to the Energy of all processes in reversed time.* [74]

This formulation constitutes a unification of Newtonian mechanics (action - reaction) with current formulations of conservation laws. In the general view, it can properly be viewed as the Law of Energetic Balance. It is important to note in this context that zero is not nothing. It is an expression of a totally balanced structure. While we recognize that the structure of time can be described in more complex terms than as simply a bi-directional "time/reverse-time" function, we also recognize that this simplified expression is apt.

> *The abstract concepts found in the ancient literature reflect this attribute of natural processes. The ancient Chinese symbol of the 'Yin/Yang' represents the embodiment of balance, framed within the construct of the zero. In the Vedas, as well as in the ancient literature of the Egyptians, the Kabala and the secrets of the Pythagoreans, we find analogues to this expression.*[75]

The fundamental point to be made here is this: at the Zero Point, where virtual ensembles interact to create the field potentials which then self-organize to form L^4 at all subsequent scales, the amount of energy available to support the physical structures and functions of the material world is unlimited. Further, it is evident that the primal attributes of timeless balance are intrinsic to both the structure and function of everything which emerges, organizes and operates beyond the Zero Point. This insight gives us a wholly new vantage point from which to consider how Bohm's Implicate Order and Bell's 'Non-local Effects at a Distance' actually operate in the macrocosm.

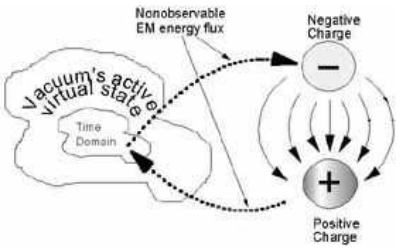
Secondary Scale

This is the scale at which virtual ensembles of undifferentiated, self-referential potential interact to become data in the semantic sense. This is the scale at which Time first becomes operative as

a separate and distinct dimension with energy density of its own. Additionally, this is the scale at which the SOC rules become fully operative.

In Bearden we find,

Figure 3



Professor Emeritus Dipak K. Sen, Department of Mathematics at the University of Toronto has said of this analysis,

> *The source charge problem –"the most difficult problem in classical and quantum electrodynamics" – has been solved by Bearden.*[76]

Dynamics:

At the secondary scale, the interactions of charge ensembles create time, as an expression of the dissipation of energy [entropy]. When entropy is reversed, by definition time must also be reversed. At the secondary scale, we observe a number of phenomena which are not accommodated by the Standard Model. As Y-Bias/Angularity Theory suggests, for a wide range of situations, it is useful to interpret all field effects as derivative polarized expressions arising from the primary scalar potentials.

A primary attribute of primary charge ensembles is the rotational behavior referred to as 'spin.' For example, while it may be true that the spin polarization states S_L and S_R [spin left and spin right] contradict a rule of quantum mechanics referred to as the Pauli Prohibition[77], where both attributes are found in the same ensemble, we beg the question by suggesting that under quantum mechanical conditions at finite scales, the fundamental laws of quantum physics as described in the Standard Model operate in ways we do not yet really understand [78]. If it were not so, Murray Gell-Mann would not have been awarded a Nobel Prize for the discovery and description of Quarks, which also violate the Pauli Exclusion Principle, by definition.

The fact that the mathematical structure Gell-Mann ascribed to the operational states of Quarks violates the EPR formulations of gravitational effect, coupled with the fact that his mathematical model prohibits the existence of any smaller class of sub-atomic particles, does not speak well of the adequacy of the Standard Model. In 1997, for example, Gell-Mann's former colleagues at FermiLabs announced the discovery of Sub-Quarks [79], the constituent pairs of sub-atomic particles which are now known to comprise all six known Quark and Anti-quark particles. Presumably, these structures also violate the Pauli Exclusion Principle, since they operate at finer scales than either Quarks or Anti-quarks. The concept of a Physical Vacuum and the operation of five fields which are shown as derivative expressions of Y-Bias interactions [arising from interactions via a single undifferentiated field] cannot reasonably be excluded unless the discovery of Quarks and Sub-Quarks is also excluded.[80]

Secondary Scale Interactions & Attributes

A sizable list of attributes has been experimentally identified which demonstrates that interactions in the secondary scale operate concomitantly as holographic expressions, manifesting non-local/non-linear [N^2L^2] attributes, without regard to time and distance, and as fractals, evincing local-linear attributes in L^4. Operations at this scale are characterized by a variety of behaviors which have been described conceptually, experimentally and mathematically as functions of time domain and spin polarity, angular momentum, weighted waveform vector velocities and so on.

In August 1999, Dr. Myron Evans, Dr. Lawrence Crowell, Tom Bearden and a team of sixteen other physicists, engineers and mathematicians published the first reformulation of Maxwell's field equations in over a hundred years [81]. Contained in their extraordinary work are reformulations of the entire family of formulas which have been developed over the past 100 years to describe the attributes, functions and dynamics which characterize the characteristics, properties and mechanics of electromagnetic fields. Their seminal work demonstrates that the functions and attributes of the fields operating at this scale, including N^2L^2 field effects, can be expressed in terms of parallel geometricized equations.[82]

A careful analysis of the basic formulas developed by Akimov[83], Schwartz[84], Anastasovski[85], Trefilov[86], Reed[87], Santilli[88] and others, is extremely revealing – the most stunning thing about them is the discovery that the characteristics of all four primary fields and the 5th field [which we have called the N^2L^2 field] appear to be completely accommodated by the set of functions which comprise spin polarity in linear, longitudinal and transverse wave functions, and angular momentum at both the quantum and macrocosmic level. While there is still much work to be done here, it seems more than coincidental that these attributes are precisely what cause the N^2L^2 field to operate as it does. The formulas referred to include the Fermi-Pasta-Ullam Lattice [89], Einstein's equations, the Young-Mills equations[90] and Geisenberg's equations.[91]

It has been categorically shown that information is conveyed via the N^2L^2 field at a rate which is at least 10^9 times faster than the speed of light. This revelation, which is largely due to the ground breaking work of Russian scientist V.A. Dubrovsky up to 1985, has now been confirmed by at least six other laboratories in the former Soviet states,[92] by Prof. Dr. Guenter Nimtz and his colleagues at Cologne University[93], and Lijun Wang[94], Alexander Kuzmich and Arthur Dogariu of the NEC Institute[95]. The group velocity of N^2L^2 field waves has also independently been shown to be at least 10^9 times the speed of light.[96]

The litmus test regarding this issue is found in the recent award by NASA of a contract to develop a N^2L^2 field communications system. The award was announced on August 19, 1999, under the title, **NASA Glenn Announces Breakthrough Propulsion Physics Selections**.[97]

A practical set of experiments which reveal just how important this concept is has been conducted both in the US and in the former Soviet states. In the United States, Bill Ramsay[98] describes an experiment in which scientist Greg Hodowanec was able to record information produced by the occurrence of a solar flare more than eight and a half minutes before it was confirmed by NOAA, when the photons and particles liberated by the event entered the earth's atmosphere. He was able to measure the magnitude of the event, in real-time, as it occurred [99], more than 90,000,000 miles away. Candace Pert identifies a similar phenomenon in her exhaustive investigations and reporting of virtually instantaneous information transport in biological systems.[100]

Nick Anthony Fiorenza and Alistair Couper have both reported on the use of gravimetric devices to record the actual transit locations of the planet Pluto, orders of magnitude faster than was possible using measurements based on conventional light wave sensing devices.[101] The devices used by Fiorenza and Couper have been employed by Russian astronomers to determine the precise real-time locations of stellar formations and planets [102]. The results of their work bears heavily on the assumption that information contained in any single location in the cosmos can be instantaneously obtained at any other locale, regardless of the extent to which events are separated by time, space or distance. This assumes that the means of observation are engineered to comport with N^2L^2 field dynamics rather than relying on the data transfer rates associated with radio frequency emissions [light].

We have reason to believe, based on the ground breaking work of V.A. Ablekov, David Bohm and Karl Pribram [103], that the N^2L^2 field is holographic and operates ubiquitously, by definition, throughout the cosmos. The combination of the features identified by their research suggests that the phenomena associated with Bohm's 'Implicate Order' and Pribram's 'Holographic Model of Human Consciousness', which are otherwise inexplicable, can now be accommodated.

Unlike electromagnetism, where analogous charges repel and opposite charges attract, in N^2L^2 fields similar charges attract and opposite charges repulse.[104]

As a N^2L^2 field is generated by the classical spin of a magnetic plate, we can observe and measure the precise effects of the alteration of spin state on the object or system which is encompassed by it. At the Institute for Problems of Materials Science in Kiev, scientists have for more than 25 years used N^2L^2 field generators as an essential component of the apparatus used to manufacture exceedingly exotic materials, for which we have no comparable products in the West. These include mono-molecular powdered metals, solid state energy accumulators, textiles comprised of woven basalt fibers, and certain varieties of atomically engineered carbon.[105]

N^2L^2 field emissions are non-dissipative and are not attenuated by the interposition of mass or the effects of distance. N^2L^2 fields cannot be screened by any known materials except aluminum, nor any known combination of materials or fields.[106] The results of the 1986 Moscow M-2 N^2L^2 field wave communications experiments have been widely distributed. In this demonstration, a directional N^2L^2 field was modulated with a simple variation of the Morse code. The signal was instantaneously received at a point more than 22 kilometers distant, using a simple low power gravimetric signal detection device. The signal was passed through steel reinforced concrete more than 50 meters thick, after having been propagated through a mountain more than 10 kilometers wide. Variations of this experiment have been successfully performed in a number of other locations in the former Soviet states and by the US Department of Defense since that time. [107]

The total absence of loss of signal strength, referred as attenuation, during the spread of a N^2L^2 field wave group, suggests that long-distance communication may one day be possible with the use of very low transmission power and unlimited bandwidth. The fact that N^2L^2 field waves are not attenuated [weakened] by any known material substances or fields suggests that we may one day be able to devise systems which are capable of communicating through water or any density of physical material [108]. This concept also suggests that we should be able to devise

communications systems capable of supporting real-time communication without regard to the vast distances of space.

Since all known substances possess a non-zero collective spin state [this means, in simple terms, that everything is always in motion at all scales], then all substances must also operate within their own localized N^2L^2 fields. The expanse and frequency structure of any substance is determined by its chemical composition and the expanse structure of its molecules or crystalline lattice. A clear understanding of these mechanics in the context of Y-Bias interactions enables us to design-engineer energy storage devices which have energy conversion characteristics well in excess of gasoline [650 watt hours/kg].[109]

At the Institute for Problems of Materials Science located in Kiev, Republic of Ukraine, a scientific team led by Academicians Trefilov, Tovschuk and Kovalyuk created a solid-state energy cell which produces 850-1040 watt-hours/kilogram, in laboratory prototypes. This is at least 35-50 times the energy density of any known conventional energy storage devices developed in the West. The reliability of their claims regarding this technology has been verified by INEEL, DARPA and the AMTL. A key element of their crystalline lattice deposition method relies on the effects of a N^2L^2 field beam technologies.[110] Russian scientists have now completed applications-engineering exercises which harness this phenomenon in the form of 'super-capacitors.'[111]

It has been shown that N^2L^2 fields demonstrate persistence. This attribute is referred to in the literature as a "residual field effect."[112] A N^2L^2 field source of a defined expanse and frequency has been consistently shown to polarize the localized region of the Physical Vacuum. Once the energizing space-spin source has been put in motion and a N^2L^2 field has been created, and then removed to another place, the space which surrounded the N^2L^2 field generator continues to exhibit the effects of the N^2L^2 field for as long as several hours. Poponin definitively demonstrated N^2L^2 field persistence in a faraday-caged light-scattering chamber for periods in excess of 31 days.

In the context of Y-Bias and Angularity, the authors delineate the dynamics which cause the persistence of residual field effects. By this means they explain the functional dynamics associated with dowsing, magnetically effected molecules of water and so on.[113] A clear and present example of the applications made possible by this information is illustrated by the work of a team of physicians from the CIS. Using the work of V. Kronin as the basis for their treatment modality, a team of Russian physicians has been working at the laboratories of the Centers For Disease Control in Atlanta, Georgia, and Baylor University Medical Research Center in Houston, Texas, since 1998. Their project demonstrates a revolutionary new medical treatment modality which capitalizes on this attribute of N^2L^2 field mechanics, to fundamentally cure patients infected with the hepatitis-C virus.[114]

Teams of scientists from more than 50 laboratories have shown that it is now feasible to deliberately perform a wide variety of carefully calibrated functions using N^2L^2 field devices.[115] We can build N^2L^2 field generators of both static and radiating types.[116] We can select, adjust and fine-tune frequencies modulated into the field with a high degree of precision.[117] We can modulate into and retrieve data out of a N^2L^2 field, including via two dimensional spin matrices.[118] We can operate efficiently in a variety of different modes of signal radiation.[119] We can adjust and smooth the intensity of the S-waves and we can operate in both left and right S-wave chiral helicities.[120]

N^2L^2 fields can be detected, generated and switched on and off (such as in communications applications).[121] We have demonstrated that a N^2L^2 field can be designed to interact with laser beams [122], to modulate light frequencies and perform other functions. N^2L^2 fields have been demonstrated to have a specific effect on biological processes [123] and have been shown to be generated by certain melting and solidifying materials.[124] N^2L^2 fields affect the oscillation of quartz crystals [125], affect the functional characteristics of some Electronic components [126], and have been shown to have verifiable, measurable and predictable effects on gravity.[127]

Experimental/ Observations:

The seminal experimental verification of this principle has been provided by N. Gisin and his team at CERN, Geneva. [128] A team of physicists at the CERN particle accelerator facility in Geneva, Switzerland, led by Dr. Nicolas Gisin, demonstrated that there is a N^2L^2 field effect which conveys information instantaneously, regardless of time or distance, at least 10^9 times faster than C, the speed of light.

C.E.R.N. Non-Locality Experiments

In 1996, Dr. Nicolas Gisin and his colleagues at Geneva's CERN linear particle accelerator facility made an incredible breakthrough related to Bell's Theorem and its predictions. Bell's predictions regarding non-local effects at a distance in a quantum system had never been verifiable because the physical devices needed to measure the instantaneous occurrence of two identical events at a distance had not yet been developed. But in 1996, Dr. Gisin and his colleagues performed an experiment which has significant implications.

Gisin etal succeeded in separating the twin particles of a Positron-Electron pair [via potassium-niobate crystal separation] and then sending them off in two opposite directions through more than 30 kilometers of fiber optic cable. As one of the particles was exposed to an electromagnetic field which altered its spin polarity, the second particle instantaneously accommodated this alteration by modifying its own spin polarity to compensate, in the same manner as it would have if the pair had not been separated.

After verifying this experiment a number of times, the team published a report which made the observation that the information which was shared between the two particles could not have been transmitted by light because the velocity of the information exchange occurred at least one order of magnitude (ten times) faster than the speed of light. They further suggested that the information must have been conveyed by a mechanism which is not known to science or accommodated by our current model of quantum mechanics. They have called their result “Simultaneity – Non-Local Effects at a Distance.”

This experiment goes to the heart of the matter. The standard model does not accommodate this result despite the fact that it is specifically predicted by Bell's Theorem. In fact, despite repeated validation of the phenomenon at increasingly greater distances, the scientific community in general has thus far refused to accept the inescapable fact that nothing in current formulations of scalar dynamics can be relied on to explain how and why this phenomenon operates. The authors posit that this concept is entirely understandable when considered in the context of Y-Bias, Angularity and SOC systems theory.

The direction of spin and charge polarity exhibited by interactions at the Zero Point are primary attributes of charge ensembles which are first manifest at the secondary scale. At this scale, as Frolov rightly suggests, time operates in both forward and backward directions, at all times maintaining a balanced condition. The following conditions illuminate this consideration:

1. Time is a dimension with energy density of its own, and [129]
2. The balanced time-as-energy component is an intrinsic attribute of real ensembles operating at the secondary scale, and
3. This attribute continues to operate without attenuation at all subsequent levels of organization, and
4. Electrons are not [as the standard model insists] 'their own primary particles', but are, rather, aggregations of virtual ensembles which are, as Maris rightly observes, themselves comprised of finer stuff [e.g., Leptoquarks], and
5. This set of properties is ubiquitous to and invariant within the fabric of the entire universe.

We now can explain how the information that defines the net sum values of charge, time-domain and spin polarity in primary and secondary scale interactions is transmissible throughout the cosmos, without regard to space or time. At this scale, because these interactions are by definition holographic, neither distance nor time impinge on the relationships or interactions between the ensembles.

In fact, at the secondary scale, Time operates with forward and backward balance as a self-organizing feature. In this sense, then, when any of the characteristics exhibited by one charge/spin ensemble with respect to its partner is altered, the attributes exhibited by the partnering ensemble MUST instantaneously respond in order to maintain the time-energy balance which operates at this scale, regardless of the distance which may separate them. In terms of Y-Bias and Angularity theory, in order for the SOC processes to operate as they do, the results predicted by Bell and experimentally verified by Gisin and Aharonov/Bohm must be so by definition.

Third [Tertiary] Scale

This is the scale at which differentiated time-domain and spin-polarized charge ensemble pairs interact to create the first fully integrated components of the physical universe. The CDF Collaboration at FermiLabs refers to these primary components as Sub-Quarks of two specific varieties. This is the scale at which the attractive effects exerted by spinors are first observable as magnetic field effects which demonstrate polarity [130]. The headline reads, **FERMILAB MEDIA ADVISORY 2/7/96, *CDF Results Raise Questions on Quark Structure.*** An article scheduled to appear in the February 9 issue of Science describes results contained in a paper submitted to ***Physical Review Letters*** by the 450-member Collider Detector collaboration at Fermilab. The CDF paper reports results that appear to be at odds with predictions based on the current theory of the fundamental structure of matter. The paper, submitted January 21, 1996, reports the collaboration's measurement of the probability that the fundamental constituents of matter [e.g., Quarks and Anti-quarks] will be deflected, or will "scatter," when very high energy Protons collide with anti-Protons, according to CDF spokesmen William Carithers and Giorgio Bellettini.

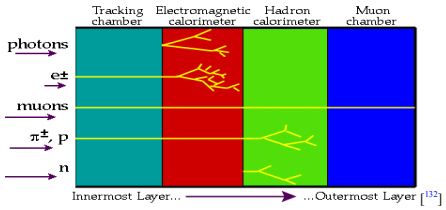
Dynamics:

The nature of the Sub-Quark [and other lesser-known and perhaps more esoteric sub-atomic units such as Neutrinos] has proven to be somewhat troublesome to scientific purists.[131] The

Sub-Quark demonstrates a most peculiar behavior, both physically and mathematically. As each Sub-Quark matches the spin and polarity of its partner [in the same way that defines the attributes of the interactions between Positron-Electron pairs], it demonstrates a distinct phased pulsing behavior, a 'quantum frequency' if you will, which shows up on a photographic emulsion plate as a series of dashes separated by discrete spaces. As the film plates developed at FermiLabs show, the first track of a Sub-Quark separated from its paired partner looked like this:

_____ _____ _____ _____.

Figure 4



When pressed to explain this phenomenon, the CDF team at first suggested a variety of possible alternatives: Perhaps the particle was so much smaller than the grain density of the photographic film emulsion that it could not be consistently displayed. This was considered a distinct possibility until the uniformity/regularity of the pulsating oscillation was established. Perhaps it was so much smaller than the quarter-wave frequency used by the scanning Electron microscope to capture the image that its image was incorrectly displayed. Perhaps there was something about the way the Sub-Quark was spinning, or was polarized at the time of impact, that distorted its

magnetic field or unaccountably refracted the EM wave functions used to capture the image of its passage across the screen.

After years of work and the introduction of significant refinements to the image capturing process, the report published by the CDF Collaboration convincingly demonstrates that the attributes demonstrated by the dash-space-dash-space signature of the Sub-Quark are the result of a fascinating set of attributes which appear to be unique to Sub-Quarks. This behavior has only been observed in the hard vacuum environment of a high-speed linear particle accelerator, under carefully controlled conditions, with one notable exception.[133]

In the context of Y-Bias/Angularity theory, the set of attributes which operate at the tertiary scale to create Sub-Quarks is the product of four sets of interactions:

- Y-Bias angle of intersection of the secondary scale charge ensembles,
- Weighted waveform vector velocities of the secondary scale charge ensembles,
- Angular momentum of the secondary scale charge ensembles, and
- Chiral Helicity [angular momentum defined as quantum spin direction] of the intersecting charge ensembles.

In recent iterations of M Theory, the QED/SED hypotheses, and in accordance with Bell's Theorem and Whittaker's proofs, the quantum frequency and energy states of Sub-Quarks must by definition represent the cumulative aggregate effect of all these interacting time-domain polarization, spin polarity, Y-Bias angularity and EM polarity vectors. In Y-Bias/Angularity terms, the SOC behaviors and attributes demonstrated by these essential building blocks constitute the set of derivative effects exerted by the exercise of SOC dynamical rules.

Further, and perhaps more importantly, when taken as an aggregate expression of SOC organizational dynamics, Sub-Quarks become the first paired combinations of spin-polarized actual charge ensembles to demonstrate quantum waveform coherence, at a wide variety of

frequencies, each of which appears to be consistent with the quantum frequency demonstrated by correlated sixth order [fully formed atoms] aggregations comprising the elements of the Periodic Table and their isotopes. The telling indicator which leads to this conclusion is that upon close examination of the CDF's experimentally and rigorously reported results, Sub-Quarks appear to manifest elemental quantum signatures in ranges which are harmonic with respect to certain frequencies [e.g., the elements of the periodic table and their isotopes] but which are dissonant with respect to no others.

This result is consistent with the results rigorously observed and experimentally verified by J. Hait and his research team at the University of California at San Diego, in which the amplifying and canceling patterns produced by the overlapping of the interference fringes surrounding two identically propagated beams of laser light demonstrate the dynamics of resonant and dissonant harmonics operating at the tertiary scale. This phenomenon operates in the context of a holographic image to perform all seven of the Boolean logic functions intrinsic to digital data processing [134]. This discovery now provides the basis for the evolution of a truly photonic computational architecture which can operate without the interposition of optoelectric crystals.

The Importance of the Sub-Quark

First, the reported experimental results suggest that the dash-space-dash-space quantum frequency signature demonstrated by Sub-Quarks may be unique to each elemental material rather than a Sub-Quark attribute in general. Researchers are still investigating whether this constitutes a kind of Sub-Quarkian fingerprint by which elemental materials could be conclusively identified as they form. If it can be verified, this would provide a result with implications reaching far beyond the domain of the current state-of-the-art of particle physics.

Second, and perhaps equally intriguing, is the realization that the Sub-Quark film track almost certainly demonstrates the time-domain polarization attributes of this sub-atomic unit, as predicted by Y-Bias/Angularity theory and as described by Bearden *et al.* The Sub-Quark's track looks the way it does because the particle exists and then does not exist, exists and then does not

exist, in L^4, as a function of its energy pumping and self-organizing, self-sustaining nature. With the discovery of the Sub-Quark, we observe for the very first time a scientifically verified instance of self-organizing criticality and dissipative structural behaviors in a single measurable physical component.[135]

Experimental/ Observations:

In 1996, Anastasovski experimentally verified that under certain carefully controlled conditions, photons of real light can be shown conclusively to demonstrate properties of measurable mass. This heretical idea is explained in Anastasovski's extraordinary book, ***Quantum Mass Theory Compatible With Quantum Field Theory***.[136]

These two rigorously verified experimental protocols, coupled with the leading edge work of Humphrey Maris, lead us to conclude that the nature of Sub-Quarks, Quarks, Leptons/ Fermions and light itself is not adequately described by the Standard Model. Indeed, in the context of Y-Bias/Angularity and SOC theory, Sub-Quarks are an inevitable and indispensable component in the evolutional process by which matter, energy, time, all field effects and light itself are brought into being. Armed with this fundamentally new way of 'seeing' how nature works at finer scales, we can both accommodate phenomena which have heretofore remained unexplainable and predict the discovery of other phenomena which have not yet been observed [or at least admitted] by mainstream science.

Fourth [Quaternary] Scale

This is the scale at which organized charge ensembles first demonstrate entropy, weighted waveform vector velocities, chiral helicities and other complementary attributes, which combine to create six known varieties of Quarks and their Anti-quark complementary opposites. This category of sub-atomic ensembles does not include the Leptoquark [believed to be a constituent of electrons, neutrinos, etc.] or the Pentaquark [a theoretically supportable quark structure only recently experimentally observed]. At this scale, the standard model imposes what has come to be known as the Pauli Exclusion Principle, to explain why some sub-atomic particles are

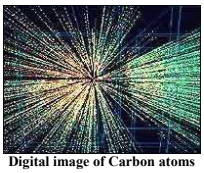
prohibited from occupying the same space and/or energetic state while others are not. In the strictest sense, Quarks specifically violate the Pauli Exclusion Principle because, by definition, they are presumed to never operate or exist as singularities, and occupy precisely the same space as the Hadrons and Baryons which are supposed to be subject to the same exclusionary rules.

Penta-Quarks – Unexplained Anomalies

Physicists recently verified the existence of a class of subatomic particle that provides unexpected insights into the fundamental building blocks of matter. The discovery involves Quarks - particles that make up the Protons and Neutrons usually found in the nuclei of atoms. The new particle is the so-called Pentaquark - five Quarks in formation [137]. Until now, physicists had only seen Quarks packed into two- or three-Quark combinations. The discovery of this new particle should have far-reaching consequences for our understanding of how the universe is put together.

Until recently, no firm evidence of Pentaquarks existed, even though physicists have searched for these objects for over 30 years. In 2002, the first tentative evidence of the Pentaquark was put forward at an international scientific conference in Japan. In July 2003, a report of this work was submitted for publication to the journal Physical Review Letters. According to Dr. David Whitehouse, Science Editor for BBC News Online, the report says that Pentaquarks were created by blasting carbon atoms with highly energized X-rays. The work was performed by a Japanese team, led by Takashi Nakano of Osaka University. Other evidence for the Pentaquark has recently been reported by other experimenters, with perhaps the strongest evidence coming from the Jefferson Lab in Virginia, USA.

Figure 5



Digital image of Carbon atoms being bombarded by X-rays.

Physicist Ken Hicks of Ohio University, who took part in both the experiment and the confirmatory work at the Jefferson Lab, says it took him two months to convince himself that the Pentaquark was real. For a long time, scientists have been puzzled as to why only the Quark combinations formulated by Gell-Mann etal existed. Some predicted other combinations such as the Pentaquark, which consists of five Quarks, including an anti-Quark.

Figure 6

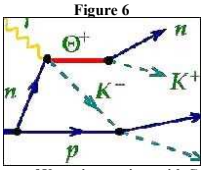


Diagram of X-ray interactions with Carbon atoms to produce Pentaquark components.

This diagram of the particle interactions which produced the results contained in the report validates an important thesis of the Y-Bias/Angularity Theory. It demonstrates, for example, that the Y-Bias angle of intersection between the interactive components is consistent throughout the structure and operates at the 54^0 - 56^0 optimal angle predicted by Y-Bias author D. Ayers. This angle, which is intrinsic to the semantic structure of the Fibonacci Series, is reflected in the structure of matter and field interactions at all scales. The discovery of the Pentaquark, also known as a new exotic Baryon state, should have far-reaching consequences for our theory of particle interactions, which attempts to explain the structure of matter in terms of its Y-Bias and Angularity attributes.

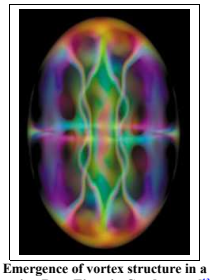
Archetypal Forms

At the Quaternary scale and beyond, we observe the operation of archetypal forms everywhere in the cosmos. Why this is so and what it means about the way Nature works has never been adequately addressed by mainstream science. The authors posit that this phenomenon occurs because the cosmos operates according to a set of simple, elegant organizing principles which can be expected to find expression at every scale. For example, Y-Bias and Angularity Theory holds that topological variations of the Torus, seen as a Soliton in photonics and a Vortex in electromagnetism, should be found at every scale of systemic evolution throughout L^4. Beginning with the Quark, the presence of such forms is rigorously reported in the literature of numerous scientific disciplines.

Bose Einstein Condensate

The Y-Bias and Angularity vectors which operate to create a torus are known, particularly in a highly negatively charged locale [138]. At the Fourth Scale, we see them in standing waves [Solitons], as found in the Bose-Einstein Condensate [D. Jin, JILA/BEC].

Figure 7



Emergence of vortex structure in a rotating Bose-Einstein Condensate [139]

As this image amply illustrates, the coherent organization of disordered virtual energy ensembles which organize themselves to form the observable structures found in L^4 is a process which operates consonant with $1/f$ quantized SOC interactions. The Y-Bias angle of interaction between the disordered virtual photons arising from the Physical Vacuum is a fundamental determiner of the extent to which virtual photons and energy quanta couple to create matter, energy and/or field effects. The resultant product of this primary interaction is referred to here as the 'Bose Einstein Condensate.' In this illustration of Fourth Scale SOC behavior, the Y-Bias orientation of the charge ensembles with respect to each other are clearly consistent and uniform. The angle of incidence of the respective intersections is measured at 22.5^0 and 54.75^0 respectively, which is consistent with the optimal angle of incidence found in variations of the Fibonacci Series and the Cherenkov Angle at various scales.

Quarks and Gravitational Force

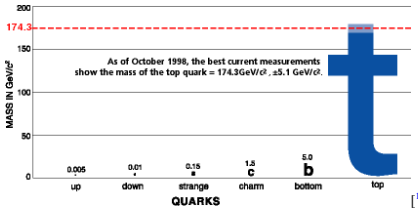
In addition, it has been rigorously reported and experimentally verified that Quarks are not subject to gravitational field effects. It was for this reason that Santilli and others strenuously objected to the postulation of Quarks provided by Gell-Mann and his collaborators at MIT. What this suggests about the structure of the cosmos and the true nature of mass as described by the

Standard Model is profound. If gravitational field effects are primary, mutually exclusive and intrinsic to the fabric of the cosmos at all scales, nothing in the evolutional structure of L^4 should be exempt from its effects. The verification that Quarks are not subject to gravitational field effects suggests that such forces are derivative of evolutional interactions rather than primary and mutually exclusive. In fact, this is precisely what Y-Bias/Angularity theory predicts.

Dynamics:

Quarks are described by the Standard Model as a type of sub-atomic particle found inside Protons or Neutrons. The model holds that Hadrons and Baryons, the building blocks of nuclear architectures, are each comprised of three Quarks. Six kinds of Quarks are described by Gell-Mann. They are variously described as **up, down, strange, charm, bottom and top.** The bottom and top Quarks are sometimes called 'beauty' and 'truth' Quarks. Protons are shown to be made up of two 'ups' and one 'down' Quark. Neutrons are believed to be comprised of one 'up' and two 'down' Quarks, although one branch of astrophysics insists that Neutrons are the product of the combining of one Proton with a single Electron. Further, the standard model holds, despite the experimental results published by the CDF, that single Quarks have never been detected. They are believed to be always combined with other Quarks. By this reasoning, mainstream science has concluded that Quarks are the primary, indivisible building blocks of L^4. Presumably, that is why Gell-Mann was awarded the Nobel Prize for the physical verification of two types of Quarks.

Figure 8



[140]

Nevertheless, rigorous experimental evidence conclusively demonstrates that current descriptions of the nature, dynamics, attributes and behaviors of Quarks, as found in the Standard Model, are both insufficient and incorrect. What is not explained by Gell-Mann and the Standard Model is perhaps more important than simply knowing that Quarks exist. Why, for example, is more than 99.9% of all the known matter in L^4 comprised of only two of the six Quarks postulated by Gell-Mann? What is it about the nature and interaction of Quarks that causes them to behave as they do? What about the other four kinds of Quarks? If they are known to exist, and demonstrate the attributes ascribed to them, why don't they interact in ways which are consistent with the dictates of the GTR, EPR and the Standard Model? Why do the rules which apply to all other forms of matter require special conditions and exemptions in order for the Quark construct to be accommodated? And what about the Leptoquark and the Pentaquark? While their existence has been postulated, and Maris' work calls for them, nothing in the Standard Model or Gell-Mann's formulations accommodate or predict them.

In terms of Y-Bias, Angularity and Self-Organizing Criticality Theory, the family of Quarks possesses characteristics which are derivatives of interactions which have occurred at finer scales, which, when taken together, comport with the underlying set of rules which operate uniformly and consistently throughout L^4, at all scales, without exceptions or special conditions. The underlying interactions which combine to create Quarks demonstrate harmonic resonance, even at the finest granularity of structure, as predicted by Plotnikov and Anastasovski. The angularity of the internal Y-Bias interactions of the Sub-Quarks, combined with all four of the

SOC rules we have identified, cause the Quarks to manifest the spin-polarity, color, electrical charge and other characteristics which define their natures.

In Y-Bias/Angularity theory, two Quarks make up 99.9% of the matter found in L^4 because these two Quarks combine at Y-Bias angles which optimally match spin, polarity, and electrical charge attributes in a way which satisfies the rules of SOC dynamics. Y-Bias/Angularity Theory predicts, in addition, that all six Quarks demonstrate a quantum oscillation frequency signature which is element and isotope specific. Quarks are not just generic aggregations of a general set of quantum-defined characteristics. Rather, Quarks of matching quantum signatures combine naturally to comprise Hadrons and Baryons which already carry some of the constituent-identifying characteristics, which eventually evolve to comprise the natural elements and their isotopes.

When viewed from this perspective, isotopes represent the less-than-optimal results of Y-Bias/Angularity interactions between Hadrons, Baryons and Leptons which are less stable, less balanced and less 'harmonically balanced' than their elemental sources. As a matter of practical consideration, this interpretation of the structure of matter and the field effects, energetic properties and interactions which manifest the behaviors of the materials identified in the periodic table of elements and isotopes, makes it possible to explain why the application of integrated waveform and frequency signatures can be combined to mitigate or amplify all the basic properties manifest by matter in L^4.

Experimental/ Observations:

The Standard Model asserts that Quarks possess what is known as “Quark color charge." This property is named after primary colors but is ascribed to the Quarks by analogy. The Standard Model does not provide a means for describing this set of properties in a way that can be directly attributed to the intrinsic nature of Quarks. Rather, the concept of 'color charge' is a mathematical convenience which is intended to explain the nature of Quarks by naming their attributes rather than describing how and why these attributes arise and operate as they do.

According to this model, there are three such charges. Taken together, as a matter of mathematical convenience, these 'color charges' are held to be the causative attributes by which Quarks stick together to make larger particles, and which cause Protons and Neutrons to stick together despite the electrical repulsion between Protons. The 'charge colors' are called blue, green, red and anti-blue, anti-green and anti-red.

Work recently performed at the Stanford Linear Accelerator suggests that while there may be six varieties of Quarks, as Gell-Mann suggests, little has been done to reconcile the inexplicable conflicts between predictions made by the Standard Model and rigorously observed phenomena produced in their own facility, at FermiLabs and Brookhaven National Laboratories. The primary example of the extent to which the Standard Model is crippled is found in the failure of any laboratory to validate the Standard Model's predictions regarding the attributes and behaviors of a fundamental type of sub-atomic particle named the Muon.[141]

As Santilli rightly suggests, and as experimental evidence amply demonstrates, quantum mechanics becomes increasingly approximate as a means of describing interactive behaviors at increasingly finer scales. This is true because quantum mechanics is, itself, the product of a combination of flawed mathematical assumptions. Perhaps no one is better qualified nor more widely recognized as an authority on this subject than Rugerro Santilli. His reformulation of hadronic mechanics supplies the missing links which ameliorate the predictive errors intrinsic to the mainstream quantum mechanical approach. According to Santilli's model, when observable phenomena are rigorously reported so that all experimentally obtained data is included in an experimental analysis, Y-Bias/Angularity Theory can be applied to describe anomalous findings in terms of the extent to which they represent a range of Y-Bias interactions across the scale.

Fifth Scale

This is the scale at which Quarks combine to create Hadrons of 26 types and Leptons of two known varieties. [142] It is at this scale that the phenomena referred to as gravitational field

effects, electromagnetism and the nuclear forces are first evinced. Additionally, this is the scale at which the binding forces which combine Hadrons and Leptons to create atoms first become operative. These binding forces are measurable in the form of photons, energy quanta with distinct wave form attributes, physical particles with energy densities [mass] and non-local field effects. This is the scale at which the Standard Model first fails to provide reliable predictive indicators with respect to the physical attributes of L^4.

Three issues become paramount at this scale.

- First, this is the first scale at which gravitational effects become evident. Why this is so, and what it means for any cosmology which seeks to explain how gravitational effects operate, can now be considered from a fundamentally different perspective when viewed through the lens of Y-Bias and Angularity Theory.

- Second, this is the first scale at which the property of mass referred to as the "permanent magnetic vector" is found in six members of one family of elements. In the absence of a cogent model which explains what magnetism is and how it works, it is not possible [for example] to understand why some materials are naturally magnetic while others are not. Neither is it possible to understand how permanent magnetic fields exert a definitive effect on non-magnetic materials. More importantly, without a cogent explanation for this phenomenon, it is not possible to understand many of the phenomena which are known to exist but are nevertheless prohibited by the Standard Model.

- Third, and perhaps most importantly, this is the first scale at which the physical attributes referred in the physics literature as 'mass' are observed. Again, it is possible to define what mass is in the context of Y-Bias and Angularity theory in a way which is not possible within the context of the Standard Model. This facilitates a more robust understanding of sub-atomic particle interactions and provides a sound basis for explaining how Nature works.

Accordingly, the authors provide a context for describing these phenomena by explaining what they are and how they operate in L^4, as manifestations of SOC behaviors operating at quantum-defined scales of self-organized criticality. While this discussion is not intended to be exhaustive, it is hoped that the application of the Y-Bias/Angularity concepts to these ambiguous constructs will serve to better integrate our understanding. Further, it is hoped that this approach will stimulate further investigation and research into these avenues of inquiry.

Gravitational Fields, Magnetism and Mass

Gravitational Field Effects

In personal correspondence with scientist Gary Vesperman, noted Russian physicist Dimitriy Plotnikov has posited that the Law of Gravitational Effects can be stated in quantum mechanical terms as follows:

F.6

$$C(X,Y)=\frac{((2*B*\cos((2*E0)/h)*\exp(-i*t*(E0-A)/h)*(\cos(2*k*R*\cos(Z))+\cos(2*k*R*S\ IN\ (Z))))^{\wedge}2}{M1*M2*1/R^2}$$ [12]

As in Whittaker, Anastasovski and Frolov, we find two aspects of this equation worthy of further consideration. The first part of the equation corresponds to the proportionality of the masses, = M1*M2. This suggests, among other things, that until the organization of Quarks reaches a minimal level of complexity, the aggregated set of properties and attributes which constitute Mass are not yet found to exist. Before this scale of organization is achieved, gravitational field effects are not found to operate on constituent spinors.[143] While Gell-Mann and his colleagues at MIT argue that this is not consistent with their findings, the evidence amassed since 1986 by

[12] The Plotnikov formula of gravitational effects contains three expressions which are of interest here. The first, which is preceded by the expression [C(X,Y)] means that the interaction between the two masses X and Y, operate instantaneously. The second, the letter Z, connotes an angle of incidence between the field effects exerted by the masses X and Y on each other. The third, shown as [M1*M2*1/R^2] suggests that the strength of the interaction between the masses decreases by a value expressed as the square of the radius which separates them.

many other teams of investigators clearly demonstrates that quarks do not exhibit any behaviors suggesting they are effected in any way by gravitational forces.

Second, and perhaps equally compelling, is the notion represented by the new factor '**Z**'. According to Plotnikov's analysis, gravitational field effects correspond to the inverse proportionality of the square of the distance between masses, as a function of harmonic resonance(s) between them. Accordingly, a new value appears - the incidence angle '**Z**' - which reflects the angularity quotient for the energy exchanged between the masses within a radius **R**.

If the gravitational interaction between the bodies depends on the distance separating them as a harmonic function, then at certain values of **R** the amplitude of the probability of the energy exchange between the two masses must become zero. That is, certain areas will be seen to emerge in the space between interacting masses where gravitational interaction between the masses is dissonant and therefore non-organized. On the other hand, certain areas will be seen to emerge where the resonance [Y-Bias/Angularity] of the interaction is maximal, which in some cases is evidenced by highly concentrated aggregations of matter.

Fractal Substitution

In the context of Y-Bias and Angularity Theory, the characteristics of this interaction can be further illuminated by the substitution of Mandelbrot's primary operator defining harmonic resonance $[Z \Phi Z^2 + C]$ for Plotnikov's constant $[Z]$. This substitution is warranted because the universe is observed to be fractal at all scales. This substitution yields two operators not identified by Plotnikov or Anastasovski. First, the nature of harmonic resonances operating between two masses becomes a dynamic interaction, the strength and value of which is defined as a Y-Bias interaction operating at an angle of incidence between them. This interaction works to create harmonic effects ranging from minimal to optimal, depending on the magnitude of the Y-Bias function and the Angularity of the interaction, as illustrated [for example] by the structure of the galaxy known as M51 and billions of other similarly structured galaxies. Accordingly, gravitational field effects are shown to not be invariant at any scale. Rather, as

Anastasovski rightly holds, excitation of the field between masses must be seen in terms of a standing wave function, whose attributes demonstrate amplitude, frequency, angular momentum, weighted waveform vector velocities, periodicity, phasing and so on, which interact harmonically in the context of a realtime fractal [SOC] feedback loop.[144]

This paradigm can be applied with respect to an analysis of the distribution of mass in the solar system. As predicted by Plotnikov and Whittaker, the Fibonacci relationships demonstrated by the energy exchange between the mass of the Sun and those of the orbiting planets [for example] occur only in maximal areas of Y-Bias and Angularity. In the areas between the planetary orbits, the probability amplitude diminishes to values which approach zero. In these areas, we find little or no mass, as predicted. Consider the motion of planets, represented by the formulation

$$W = \frac{\Delta C}{\Delta t} = \frac{(\Delta)}{\Delta t} \cdot C(Z), \qquad \text{F.7}^{(13)}$$

with the angular velocity responsible for the motion of planets shown as the component [***Z***]. This equation and the whirlpool structure of galaxies [for example] illustrate the range of conditions which operate across the range of Y-Bias interactions to create optimal and minimal gravitational field effects in space. This function operates to change the co-ordinates of these interactions over time as the complexity of such structures evolves. As Y-Bias and Angularity Theory predicts, the masses have nothing to do but roll down to the areas of maximum Y-Bias/Angularity effect in order to find stasis in stable orbits.

Fibonacci relationships

The Fibonacci numbers have been known since ancient times. These are not random numbers but, rather, are members of the following sequence:

[13] F.7: In this formula, the field strength exerted by two rotating planets on each other is expressed in terms of their relative rate of spin, which is referred to in physics as their angular momentum. The expression Z occurs again, as an expression of the way in which the gravitational field effects are effected by the angle of incidence between the two masses.

0 1 2 3 5 8 13 21 34 55 89 144 233 377 610 987 1597 2584 4181 etc.

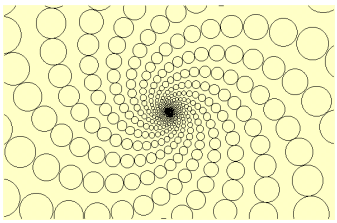
This sequence is known as the Fibonacci Series, and is well known in mathematics. Each number is the sum of the previous two. The ratio of successive pairs tends to the so-called golden section (GS) = 1.618033989, whose reciprocal is 0.618033989, so that we have a resultant product mathematically defined as:

$$1/GS = 1 + GS \qquad \text{F.8}$$

The following diagram represents the range of values from **N = 0** to **N = 1000,** including the **F** numbers **377, 610** and **987**, rescaled by dividing the vertical values by **N**, to show the multiple harmonics of the 'Golden Mean' more clearly. These are shown by blue horizontal lines. The short blue lines mark the two golden section (**GS**) points in each segment. If the length of a long blue line is taken as 1, then the three segments have lengths GS^2, GS^3 and GS respectively. GS^2 and a GS^3 add to GS.

In a vertically integrated view, the plot of these functions appears as follows:

Figure 9



The values represented by the resultant function are -

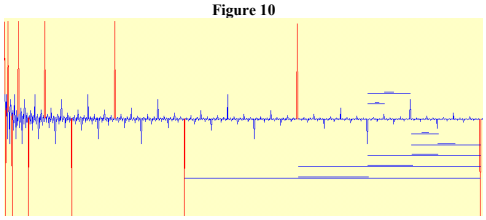
GS = 0.618033989

GS^2 = 0.3819659

GS^3 = 0.2360678

The bar-graph diagram derived from the same number set and values is rather like a one-dimensional fractal. Each element contains all the information contained in the entire expression, regardless of the smallness or largeness of the scale.

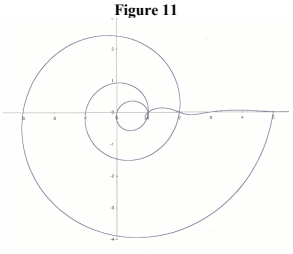
Figure 10



When plotted as an X-Y graph, the X-axis spiral intersects the Y-Bias at the values shown as 1 2 5 13 [etc.] on the positive axis, and 0 1 3 8 etc on the negative axis. The oscillatory part crosses

at 0 1 1 2 3 5 8 13 [etc.] on the positive axis. The resulting curve is the analogue of SOC structures found at virtually all scales, the magnitude and strength of which vary as a function of the extent to which the intersections approach the optimal angulature defined by the Fibonacci Series. This is not surprising, since the spiral of the curve demonstrates its logarithmic nature as it expands.

Figure 11



The form and shape of this plot is precisely what Prigogine/Stenger's Dissipative Structures, Bak's SOC rules and Y-Bias/Angularity Theory describe. The fact that the relationships and attributes demonstrated across the scales of the cosmos demonstrate adherence to this same set of simple, elegant rules, suggests that our view of 'How Nature Works' must be substantially modified if we are to really understand its mysteries.

Dark Matter

If this assessment is correct, current notions about gravitational field effects which have occasioned the search for all the 'dark matter' and 'dark energy' thought to be missing in the cosmos must be obviated. In the alternative, Y-Bias and Angularity Theory suggests that the matter you see is the matter you get. There is, in all likelihood, no such thing as Dark Matter or Dark Energy. What is needed, instead of a feckless search for something that is not there, which is little more than a desperate attempt to defend a set of questionable conclusions drawn from a

severely crippled model, is to develop a wholesale modification of the assumptions which have heretofore been used to describe gravitational field effects in the first instance.

Astronomers are finally tracking down the whereabouts of most of the baryonic ('normal') matter that is postulated to have been created in the Big Bang but doesn't show up as stars or gas in the galaxies. The Chandra X-ray Observatory has discovered two huge intergalactic clouds of diffuse hot gas: They are the best evidence yet that a vast cosmic web of hot gas contains the long-sought Dark Matter - about half of the atoms and ions in the universe. Computer simulations of the formation of galaxies and galaxy clusters had indicated for some time that the missing baryons might be contained in an extremely diffuse web-like system of gas clouds from which galaxies and clusters of galaxies formed.

These clouds have defied detection because of their predicted temperature range of a few hundred thousand to a million degrees Celsius, and their extremely low density. Evidence for this warm-to-hot intergalactic matter (WHIM) had been detected around our Galaxy, or in the Local Group of galaxies, but the lack of definitive evidence for WHIM outside our immediate cosmic neighborhood made any estimates of the universal mass-density of baryons unreliable. The discovery of much more distant clouds came when Chandra took advantage of the historic X-ray brightening of the quasar-like galaxy Mkn 421 that began in October of 2002. Two Chandra observations of Mkn 421 in October 2002 and July 2003, yielded excellent quality X-ray spectral data.

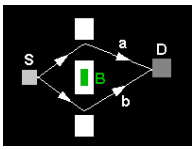
These data showed that two separate clouds of hot gas at distances from Earth of 150 and 370 million light years were absorbing X-rays from Mkn 421. The X-ray data show that ions of carbon, nitrogen, oxygen, and neon are present, and that the temperatures of the clouds are about 1 million degrees Celsius. Combining these data with observations at ultraviolet wavelengths made it possible to estimate the thickness (about 2 million light years) and mass density of the clouds. Assuming these clouds are representative of a universally dispersed phenomenon, the first reliable estimate of average mass density of baryons in such clouds throughout the universe was then possible: It is consistent with the mass density of the missing baryons.[145]

Secondly, and by extension, when examined in terms of an interactive harmonic resonance operating between two masses, whose constituent building blocks are comprised of time and spin-polarized energy ensembles, the resultant force vectors described by Whittaker's formulations must also apply. This means, by extension, that gravitational forces operate in precisely the same manner between masses as two intersecting beams of laser light [e.g., time-energized photons demonstrating standing wave attributes], which exchange information across the interference fringe [Hait's Y-Bias/Angularity as a function of $[Z \Phi Z^2 + C]$] to create patterns of resonance and dissonance at the point of intersection in a hologram. The prime operator in this interaction is the fractal function '**Z**', as used by Plotnikov and Bak.

Einstein's Vector Magnetic Potential

Perhaps the final and most widely accepted authority on the matter should be allowed to inform this dialogue. Einstein posited that only the vector magnetic potential has a physical reality in electrodynamics. He believed [and his work amply demonstrates] that electric and magnetic fields are merely concepts we have developed to explain the reciprocity of field interactions. Most modern physicists still do not accept Einstein's assertion, despite the fact that more recent experimental research [e.g., the Aharonov-Bohm experiment] shows that the A field [the N^2L^2 non-local/non-linear field described by Kafatos and Bohm, as demonstrated by Gisin] is quite real. Their seminal experiment shows that the A field can alter the quantum wave function [even] *when all other EM effects have been completely shielded out.*[146]

Figure 12



Schematic Diagram of the Bohm-Aharonov experimental protocol.

In classical mechanics, the motion of a charged particle is not affected by the presence of magnetic fields in regions from which the particle is excluded. The motion of classical particles emitted by the source ***S*** is not affected by the magnetic field ***B*** because the particles cannot enter the region of space where the magnetic field is present. For a quantum charged particle there can be an observable phase shift in the interference pattern recorded at the detector ***D***. This phase shift results from the fact that although the magnetic field is zero in the space accessible to the particle, the associated vector potential is not. The phase shift depends on the flux enclosed by the two alternative sets of paths ***a*** and ***b***. But the overall envelope of the diffraction pattern is not displaced, indicating that no classical magnetic force acts on the particles. The Aharonov-Bohm effect demonstrates that it is the electromagnetic potentials, rather than the electric and magnetic fields, which are [as Einstein correctly intuited] the fundamental quantities in quantum dynamics. [147]

E. T. WHITTAKER - On the Differential Equations of Physics

In the famous paper published by Physics Letters in 1903-04, E.T. Whittaker provided a mathematical proof which demonstrates that gravitational field forces are not only 'undulatory' [which we interpret in a semantic context to mean harmonic and interactively resonant], but are also the result of field force interactions occurring between masses in the Y axis. The following summary taken from Whittaker's work suggests that the Y-Bias model is perfectly on target in this regard.

Equation 5 - Gravitation and Electrostatic Attraction explained as modes of Wave-disturbance.

The result of [formula 1], namely that any solution of the equation[14]

[14] This equation identifies four dimensional constructs, which are identified in terms of the X axis, Y axis, Z axis and ***t***, time. It says that the sum of the square of the first three dimensions, expressed as a function of their relative wavefront velocities, is equal to the wavefront velocity of time, when time is multiplied by some constant ***K***.

$$\frac{\partial^2 V}{\partial x^2} + \frac{\partial^2 V}{\partial y^2} + \frac{\partial^2 V}{\partial z^2} = k^2 \frac{\partial^2 V}{\partial t^2} \qquad \textbf{F.9}$$

can be analysed into simple plane waves, throws a new light on the nature of those forces, such as gravitation and electrostatic attraction, which vary as the inverse square of the distance. For if a system of forces of this character be considered, their potential (or their component in any given direction) satisfies the equation on the differential equations of physics. [15]

$$\frac{\partial^2 V}{\partial x^2} + \frac{\partial^2 V}{\partial y^2} + \frac{\partial^2 V}{\partial z^2} = 0 \qquad \textbf{F.10}$$

and therefore *a` fortiori* it satisfies the equation

$$\frac{\partial^2 V}{\partial x^2} + \frac{\partial^2 V}{\partial y^2} + \frac{\partial^2 V}{\partial z^2} = k^2 \frac{\partial^2 V}{\partial t^2} \qquad \textbf{F.11}$$

where ***k*** is any constant. It follows from [1] that this potential (or force-component) can be analysed into simple plane waves in various directions, each wave being propagated with constant velocity. These waves interfere with each other in such a way that, when the action has once been set up, the disturbance at any point does not vary with the time, and depends only on the coordinates (**x, y, z**) of the point.

It is not difficult to construct, synthetically, systems of coexistent simple waves, having the property that the total disturbance at any point (due to the sum of all the

[15] This derivative substitutes zero for the equivalent function of the differential integral represented by the right hand set of values. What this implies is that the interaction of the three physical dimensions when viewed as interactions between masses occurs in zero time, or instantaneously.

waves) varies from point to point, but does not vary with the time. A simple example of such a system is found in the following.[16]

Suppose that a particle is emitting spherical waves, such that the disturbance at a distance r from the origin, at time t, due to those waves whose wave-length lies between $\frac{2\pi}{\mu}$ and $\frac{2\pi}{\mu+d\mu}$, is represented by $\frac{2\pi}{\mu}$ *and* $\frac{2\pi}{\mu+d\mu}$,

is therefore represented by

$$\frac{2d\mu}{\pi\mu}\,\frac{\sin(\mu Vt-\mu r)}{r} \qquad \textbf{F.12}$$

where V is the velocity of propagation of the waves. Then after the waves have reached the point r, so that $(Vt - r)$ is positive, the total disturbance at the point (due to the sum of all the waves) is

$$\int_0^\infty \frac{2d\mu}{\pi\mu}\,\frac{\sin(\mu Vt-\mu r)}{r}\,. \qquad \textbf{F.13}$$

Take $\mu Vt - \mu r = y$, where y is a new variable. Then this disturbance is

$$\frac{2}{\pi r}\int_0^\infty \sin y\,(dy) \qquad \textbf{F.14}$$

or, since

$$\int_0^\infty \frac{\sin y}{y}\,(dy) = \frac{\pi}{2} \qquad \textbf{F.15}$$

[16] The formulas which follow contain a number of discrete elements which are expressions of the various properties of the waves which are being propagated between two masses. Whittaker's formula is intended to portray in mathematical terms "…the total disturbance at any point (due to the sum of all the waves) varies from point to point, but does not vary with the time." The use of the differential integral symbol [∫] suggests that the range of interactions extends from **0** to Infinity [**∞**], suggesting in turn that while the velocity [*V*] of the waves extends across this range, the value for time [*t*] does not vary. This provides the basis for describing simultaneous, interactive wave propagation which is both infinite in expanse, instantaneous at all distances, and which 'undulates' to create addresses along the intersecting points where the wave interact, amplify and nullify each other as a function of their interference patterns.

it is

$$\frac{1}{r} \qquad \textbf{F.16}$$

Therefore, the total disturbance at any point, due to this system of waves, is independent of the time, and is everywhere proportional to the gravitational potential due to the particle at the point.

It is clear from the foregoing that the field of force due to a gravitating body can be analysed, by a "spectrum analysis" as it were, into an infinite number of constituent fields; and although the whole field of force does not vary with the time, yet *each of the constituent fields is of an undulatory character, consisting of a simple wave-disturbance propagated with uniform velocity*. This analysis of the field into constituent fields can most easily be accomplished by analysing the potential $1/r$ of each attracting particle into terms of the type

$$\frac{\sin(\mu Vt-\mu r)}{r} \qquad \textbf{F.17}$$

as in the example already given. To each of these terms will correspond one of the constituent fields. In each of these constituent fields the potential will be constant along each wave-front, and consequently the gravitational force in each constituent field will be perpendicular to the wave-front, i.e. *the waves will be longitudinal*.

But these results assimilate the propagation of gravity to that of light: for the undulatory phenomena just described, in which the varying vector is a gravitational force perpendicular to the wave-front, may be compared with the undulatory phenomena made familiar by the electromagnetic theory of light, in which the varying vectors consist of electric and magnetic forces parallel to the wave-front. The waves are in other respects exactly similar, and it seems probable that an identical property of the medium ensures their transmission through space.

This undulatory theory of gravity would require that gravity should be propagated with a finite velocity, which however need not be the same as that of light, and may be enormously greater.

Of course, this investigation does not explain the *cause* of gravity; all that is done is to show that in order to account for the propagation across space of forces which vary as the inverse square of the distance, we have only to suppose that the medium is capable of transmitting, with a definite though large velocity, simple periodic undulatory disturbances, similar to those whose propagation by the medium constitutes, according to the electromagnetic theory, the transmission of light.

A New Gravitational Formulation

Therefore, as Whittaker conclusively demonstrates, gravitational field effects arising from Mass interactions are rigorously shown to conform to SOC-mandated $1/f$ quantum thresholds operating in harmonic resonance between masses, in a way which corresponds to Mandelbrot's fractal formula, as driven by the Fibonacci Series. The interaction between the masses operates as a self-referential live feedback loop between them, which is optimized as a function of the Y-Bias and Angularity values they exert on each other. Notwithstanding the commonly invoked arguments which suggest that this notion is invalidated by the aggregate values seen at larger scales [called 'granularity'] [148], it is nevertheless logical to suggest, therefore, that gravitational effects are a derivative expression of the Y-Bias/Angularity values exchanged between masses which exhibit properties referred to in the literature as 'harmonic resonance'. The resultant effect is demonstrated across the scales of the cosmos as an analogue of the Fibonacci series.

The structure of M51, The Whirlpool Nebula, illustrates how Whittaker's formulation actually appears in the heavens. The underlying set of interactive dynamics he described in 1903 operate across hundreds of thousands of light years to produce a typical self-organizing pattern of effects.

Figure 8

Whirlpool Nebula [Hubble/NASA]

M51 (also known as Arp~85 and VV~1) comprises the large spiral galaxy NGC5194 and its smaller, barred and more amorphous companion NGC5195. M51 was the first astronomical object in which spiral structure was discerned, discovered by the Third Earl of Rosse in 1845. The spiral arms are perhaps the most perfect `textbook' example in any nearby galaxy of Y-Bias/ Angularity SOC dynamics as expressed by the Whittaker and Plotnikov formulations. This archetypal architecture is found at all scales above the Quaternary Scale and is a clear example of the observable effects attributable to the harmonic resonance function [$Z \Phi Z^2 + C$] found in the Y-Bias derivative of Plotnikov's formulation of gravitational effects.[149]

Precessing Gyroscopes

The acid test of this conclusion can be established by investigating the extent to which gravitational field effects can be mitigated in any region or locale by deliberately varying the Y-Bias and Angularity values which operate between the masses. For example, consider the widely reported experimental results which demonstrate inertial mass reduction in the case of a free-falling gyroscope which is precessed at an optimal angle. Widely published experimental results reveal that gravitational force is not mitigated in free-fall by a stable, non-precessing gyroscope. However, so long as precession is present, gravitational field effects are rigorously shown to be diminished. Sir Eric Laithwaite, inventor of the Magnetic Levitation technologies currently in widespread use in Germany and Japan, understood this principle. His work is both illustrative and compelling.[150]

According to Euler's equations, the composite force vectors in the **Y** and **Z** axes are perpendicular to the **X** axis of the rotor's rotation. The inertial value of the vertical component [+ on the **Y** axis] is always exactly identical to the downward force of gravity [minus on the **Y** axis] due to the weight of the gyroscope in the Earth's gravity, which keeps it from falling. The forward component is the precession-causing component.

The following set of relationships is proposed to describe this interaction:

F.18

$$\frac{\text{forward component}}{\text{upward component}} = \frac{\text{gravitationally caused downward moment}}{\text{angular momentum of gyroscope}} = \frac{M}{I * \omega} \quad (17)$$

Again, experimental evidence bears this out. According to Y-Bias Theory, gravitational field effects are locally mitigated as a function of and in proportion to the Y-Bias angle exerted by the gyroscope on the inertial plane created by its angular momentum. This effect is the product of an interruption of the harmonic resonance which operates between the meta-dynamic system represented by the gyroscope and the planet. Because the interaction between masses operates in conformity with the fractally-deterministic SOC dynamics, the precession of the gyroscope exerts a perturbation on the Y-Bias which results in a discontinuity in the standing wave coherence between them. The effect of this interaction is to diminish the gravitational field effect, which is measured in terms of latency in the acceleration rate, demonstrated as reduced acceleration by the falling gyroscope.

As Laithwaite demonstrated, a precessing gyroscope can move appreciable mass through space. In his writings, he says

[17] For the purpose of clarity and simplicity, we have substituted the linguistic description of the dynamics of gyroscopic precession for the more complex differential expressions. For mathematicians and scientists, these formulas are ubiquitously available. For non-scientists, the point to be made by this section is that a precessing gyroscope provides us with a way to examine and analyze all the dynamics associated with gravitational effects in a small, controlled, easily observable phenomenon.

> *'The spinning top showed us that all the time, but we couldn't see it. If the gyroscope does not produce the full amount of centrifugal force on its pivot in the centre then indeed you have produced mass transfer.'*
>
> *'It became more exciting than ever now because I could explain the unexplainable. Gyroscopes became absolutely in accordance with Newton's laws. We were now not challenging any sacred laws at all. We were sticking strictly to the rules that everyone would approve of, but getting the same result -- a force through space without a rocket.'*[151]

Laithwaite demonstrated that as the angular momentum of the gyroscope diminishes below the $1/f$ threshold point, this variable becomes so low as to require an extremely high precession rate to maintain this relationship. At that point, the rotational energy exhibited by the gyroscope is no longer capable of counteracting the force of gravity, and the gyroscope suddenly falls. Notice that the experimental results show that the gyroscope does not fall at a greater gradual velocity as its angular momentum dissipates. Rather, as the angular momentum falls below the $1/f$ threshold, the gyroscope falls at a velocity which is fully accelerated by the gravitational field. This is consistent with the SOC-mandated behavior referred to in the literature as 'Punctuated Equilibrium,' which is always in compliance with the $1/f$ quantum threshold requirements.

A rigorously conducted experimental verification of this interaction between masses suggests, among other things, that inertia, as a measure of the relative values resulting from the interaction between two masses, can be deliberately mitigated by the application of a suitably engineered device which employs Y-Bias and Angularity vectors to interdict the harmonic resonances [i.e., gravitational field effects] which operate between them. This is a profound insight because if it is correct, it suggests that anti-gravitational effects can be deliberately engineered in the context of Y-Bias and Angularity dynamics.

Inertial Mass Reduction: Electro-Gravitic Devices

It has long been held that gravitational field effects cannot be mitigated because the phenomenon known as Gravity is a primary field effect. The fact that gravitational field effects can be consistently, repeatedly mitigated in a defined locale by exercising more than a dozen experimentally validated protocols, suggests that something is fundamentally amiss with the Standard Model. Such effects are specifically prohibited by the model and not accepted for publication in mainstream scientific journals, despite the fact that in the United States, the DOD has been employing electro-gravitic effects to enhance the flight performance of the B-2 Stealth Bomber for more than a decade.

Nevertheless, the phenomenon of locally mitigated gravitational field effects is now so ubiquitously recognized [even if unofficially] in mainstream scientific circles that it is time for science as a community to supply a cogent model which both explains what gravitational field effects are and demonstrates how they work. With such a model in hand, it will then become possible to not only understand how gravitational field effects operate, but to design-engineer applications which act to exert correctly structured Y-Bias vectors, at optimal angles, to produce the anti-gravitational or hyper-gravitational effects. In order to accomplish this, we must first understand what Mass is.

Mass – What It Is

Background:

The Standard Model fails to define what 'Mass' is. Instead, when we discuss the concept of mass, we are compelled to think about it in purely circular terms. 21st Century physics holds that Mass is a fundamental property of an object, a numerical measure of its inertia, as well as a fundamental measure of the amount of matter found in an object.[152] Justification for this kind of circular thinking is based on the assertion that Mass is such a fundamental quality of matter that it is not possible to define it without referring to its properties. The authors posit an alternative definition of Mass in terms of Y-Bias and Angularity Theory, which suggests that Mass is not an

a priori intrinsic property at all, but rather a product of underlying scalar interactions arising from the Physical Vacuum via the Zero Point, which create the effects identified by science, in compliance with SOC rules and dynamics.

The way we apprehend this issue is not trivial. The primary conundrum encountered by the Standard Model of Physics is artfully expressed by Trefil,[153] who posits

> *"...after the beginning of the particle era... there is no known process which can change the net particle number of the universe... by the time the universe was a millisecond old, the balance between matter and antimatter was fixed forever."*

The Big Bang Model of the universe

If we follow this line of reasoning, it is not surprising that the Big Bang model of the universe should find widespread support. This model, as described by Nobel Laureate Steven Weinberg and others, suggests that within the first three minutes following the primary event, all matter and energy came into existence.[154] According to this model, the four 'primary field forces' existed *a priori*, as well as the field effect by which entropy is measured, called Time. The Big Bang model is predicated on three sets of observations, which include.[155]:

- The observed/suspected expansion of the universe (18)
- The 3K background radiation
- The hydrogen-helium abundance.

As of the beginning of the 21st Century, several unresolved issues have been identified which call the Big Bang model into question because it appears to suffer from a number of unsupportable, inexplicable inconsistencies, which include:

[18] This assumption presumes that the speed of light [**C**] is invariant throughout the cosmos. This assumption has now been called into serious question by various investigators.

- The Antimatter Problem
- The Galaxy Formation Problem
- The Isotrophy Problem
- The Flatness Problem

The four basic issues which call the sufficiency of the Big Bang model into question are all related by a single consideration – without a cogent understanding of the nature of Mass, it is not possible to resolve any of them.

Y-Bias and Angularity Theory challenges the assertion held by the Big Bang Theory which holds that

> "*… by the time the universe was a millisecond old, the balance between matter and antimatter was fixed forever."* [156]

Sunspots – Clues to the Nature of Mass

Alternatively, Y-Bias/ Angularity Theory posits that matter of all kinds, energy, time, all field forces and time domain polarized photons are the products of a continuous, self-sustaining, self-organizing cycle of aggregation and dissipation which erupts from the Physical Vacuum via the Zero Point to create L^4. The set of astronomical observations which bear this out can now be found in digital images supplied by Thunderbolts.org, which depict self-organizing SOC behaviors [for example] such as those found in the formation of previously unobserved structures in sun spots.[157]

Figure 13

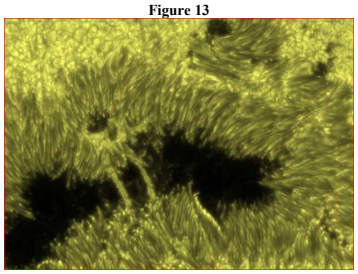


Figure 1 - Sunspots Add Exclamation Points to the 'Electric Sun' [David Talbott]

> *In the extreme close-up photograph of a sunspot shown above, we observe the rope-like filaments of the penumbra, or margins of the sunspot. For many years solar physicists have claimed that these filaments were convection cells or rapidly rising columns of heated gases. But the higher-resolution details shown here, including the twin bridges across the sunspot, do not support traditional theory. All of the structure shown is consistent with the principle of anode tufting, a plasma discharge effect expected of a positively charged electric Sun.* [Talbott]

High-resolution images of the penumbra filaments reveal the distinctive characteristics of tornado-like charge vortices. The structures found beneath the tops of the rotating discharge columns illustrate the columns' explosive rise from below as they heat and project plasma upward into the bright photospheric granules. This phenomenon is neither accommodated nor anticipated by the Standard Model.

What is the real significance of this discovery? It speaks to the most fundamental assumptions intrinsic to our understanding of what matter is and how it is formed. To illustrate just how profound this consideration is, consider the work of the Stanford Collaboration.

Stanford Collaboration – Creating Mass From Light

In the Spring of 1997, a team consisting of more than 20 scientists from half a dozen of the finest physics labs in the United States, gathered at the Stanford Linear Accelerator facility in California. Their objective was revolutionary -- they sought nothing less than to create particles of measurable mass using nothing but coherent beams of visible light.[158] To do so, they knew they would have to defy a fundamental tenet of mainstream particle physics. The notions underlying this principle are described in Einstein's Second Postulate of the Special Theory of Relativity, made famous by the equation $E=MC^2$, which appears to be nullified by their work. Their work was scorned as the quintessence of scientific heresy by the organs of the physics industry. None of the mainstream scientific journals would publish their results - instead, their work was first reported by ***Discover Magazine***. Here is what they did and why it is important.

The Stanford Collaboration team succeeded in creating Electron-Positron pairs, with measurable density and particle mass, by crashing two high-intensity laser beams of monochromatic light together in a vacuum. Their experiment was not an accident – they set out to do it deliberately and kept working at it for more than six months until they succeeded. Why is this event significant? Because the conventional model of Quantum Mechanics and the Second Postulate to Einstein's Special Theory of Relativity specifically prohibit the creation of matter from nothing more than photons, in any environment, under any circumstances.[159]

In Y-Bias/ Angularity Theory, this behavior is not only accommodated but predicted. The vortex structures found in the sun spot image and the results produced by the Stanford Collaboration both demonstrate all the SOC dynamics intrinsic to the formation, attributes and behaviors of Mass, as provided for in the Y-Bias model, including the SOC nature of spinors, autopoietic structures, focused scalar intensity at the nexus, fractal orientation to self-similar structures, $1/f$

noise threshold breaches, punctuated equilibrium and self-sustaining criticality at a macro-scale of evolution.

The behavioral dynamics found in this image are found at all scales above the Zero Point, because in each instance, at each scale, the Y-Bias/Angularity and SOC dynamics which govern the creation and dissipation of all such forces are universally consistent. What this suggests, in turn, about the nature of Mass is profoundly different than the notions iterated in the Standard Model.

As Talbott rightly suggests,

> *"The electric explanation of sunspots, like that of the penumbra, is rooted in the observed behavior of plasma discharge. In laboratory experiments, a torus forms above the equator of a positively charged sphere. Discharges then fly between the torus and the mid- to low-latitudes of the sphere. In the electric model, the Sun is the positively charged focal point of an electric field. And now we know that the Sun is indeed surrounded by an equatorial torus, as seen in the polar UV image of the Sun here:"*

Sunspots are the direct evidence that electric discharges punch holes in the photosphere to deliver electrical current directly to lower depths, exposing a view of the cooler interior. Nothing ever observed on the Sun supports the idea of heat transfer from inside the core, where standard theory places the nuclear fusion "furnace". In the electric model, nuclear fusion is an effect generated by Y-Bias/Angularity interactions, where the most energetic events occur, in the fierce electric tornadoes found in the sun spots.[160]

This 'outside to inside' behavior typifies the fundamental assumptions intrinsic to the Y-Bias/Angularity and SOC model. It demonstrates, for example, that the formation of Mass is a dynamic process, not a condition antecedent to the organization of matter or the emission of energy, light and so on, as held by proponents of the Big Bang theory. Why do sun spots exhibit

the same archetypal structural dynamics as the weather patterns found on the surface of Jupiter and the Earth? Because these phenomena are products of the same underlying set of scalar and dynamic processes.

Mass – A Product of Tertiary Scale SOC Interactions

According to the alternative model posited by Y-Bias/Angularity and SOC behaviors, Mass becomes physical in L^4 as a product of the dynamic interaction of charge ensembles which combine at the Tertiary Scale to create Sub-Quarks. Sub-Quarks are the first product of SOC interactions to manifest the property referred to as 'Inertia.' The authors posit that Inertia is not a rigorously complete description of the phenomenon, because it ignores important aspects of the SOC processes by which Mass is formed.

Inertia is conventionally defined as follows:

> *(Physics) That property of matter by which it tends when at rest to remain so, and when in motion to continue in motion, and in the same straight line or direction, unless acted on by some external force, sometimes called vis inertiæ. The* ***inertia*** *of a body is proportional to its mass.*[161]

This definition, provided by the 1913 edition of Webster's International Dictionary, has not changed in more than a century. It tells us what Matter, taken as an aggregation of Masses, does, how it behaves, and gives the observed phenomenon a name. In physics, the model does not explain, however, why matter behaves in this way nor does it explain why matter fails to consistently behave in this way when subjected to a variety of conditions found ubiquitously in nature. On the one hand, Mass is held to be a fundamental, *a priori* attribute of matter, but on the other is found not to be invariant.

In the context of Y-Bias/Angularity and SOC Theory, Mass is held to be a product of the dynamic interactions occurring between charge ensembles which operate to create Sub-Quarks.

Below this scale, Mass is not found nor is it predicted. In quantum mechanics, Mass is characterized as an aggregation of one part Planck mass quanta and one part Planck time quanta. However, in Maxwell's Quaternions, as verified by Whittaker's formulations, Mass is found to be a product of time domain and spin-polarized interactions occurring between charge ensembles, and not a precursor to them.

In the microcosm, we find the same SOC behaviors occurring at the Tertiary Scale [e.g., as evinced in sun spots] as described by Talbott *et al.*

Figure 14

Decay of a Soliton in a Bose-Einstein Condensate
Fourth Scale manifestation of condensed mass [image credit NIST]

The phenomenon demonstrated by this digital image of a Bose-Einstein Condensate, illustrates the release of negatively charged electrical energy from an equatorial torus, which then flows

inward towards a spinning, positively charged center. This is an archetypal manifestation of SOC behaviors occurring at all scales above the Tertiary Scale.

As rigorously verified physical evidence illustrates, the vector values of the Y-Bias and the angle of incidence [Angularity] comprising such interactions are deterministic factors which serve to either drive punctuated equilibrium to a point of criticality, from one scale of organizational complexity to another, or cause the dissipation of previously aggregated dynamical structures to lower energy states at finer scales. This model accommodates the problem set which obviates the validity of the Big Bang model of the cosmos.

The Antimatter Problem

Physicists have struggled to understand the predominance of 'matter' over 'antimatter' in the observable universe. When viewed from within the narrow confines imposed by the Standard Model, as typified in Trefil, this problem cannot be resolved so long as the underlying nature of Mass cannot be explicated. Physics holds that in order for antimatter to exist at all, a fundamental but as yet not understood asymmetry must exist. CP Symmetry, which examines violations in the decay of neutral Kaon particles, as a function of dissipation of the van der Waals force, is supposed to hold the answer. The fact that Kaons decay with an observable asymmetry in their CP Symmetry is cited as evidence that an asymmetry exists, but little progress has been made in this context to understand why this behavior occurs.

In the context of Y-Bias/Angularity and SOC Theory, however, the asymmetry phenomenon is explained as a function of the extent to which antimatter achieves self-sustaining criticality as a product of scalar Y-Bias interactions occurring among the class of time domain and spin-polarized charge ensembles which interact to create anti-matter at the Tertiary Scale. The asymmetry posited by proponents of the CP Symmetry hypothesis is a product of SOC dynamics, which operates to create a limited class of fractally defined types of matter which cannot achieve sustainable levels of criticality beyond certain scales, and which are therefore by definition restricted to a limited range of expression.

Calculations generated within this framework to describe antimatter asymmetry must be robust enough to accommodate both L^2 and N^2L^2 field effects, including those which are representative of the time domain polarization attributes demanded by Whittaker's formulations, as described by Bearden. The current iteration of quantum calculus cannot be relied on to adequately provide this description because the topology-leveling effect imposed by the imposition of the Lorenz transforms ignores the role of the underlying stressors and time domain vectors which are at the root of the processes.

The Galaxy Formation Problem

According to those who seek to validate the EPR model of gravitational forces by positing the existence of dark matter and dark energy, random non-uniformities in the structure of the universe are insufficient to allow for the formation of galaxies. When considered in the context of the Big Bang model of the cosmos, the gravitational attraction described in the EPR formulation of gravitational field effects is too slow for galaxies to form with any reasonable model of turbulence, as a product of the expansion of the universe itself. Trefil's response to this conundrum typifies current thinking.

> *"...the question of how the large-scale structure of the universe could have come into being has been a major unsolved problem in cosmology…we are forced to look to the period before 1 millisecond to explain the existence of galaxies."*[162]

The EPR formulation of gravitational forces is an expression which demands that gravitational effects exerted by two bodies on each other must be invariant, uniform and linear. The authors posit, on the contrary, that the structure of the cosmos exhibits all the attributes of a self-organizing, open, complex system which is harmonically resonant, and therefore dynamically variant at all scales. The behaviors of the structures found in the observable universe bear testimony to the fact that the cosmos is in every respect an SOC system, which operates across vast distances to demonstrate behaviors which occur without respect to time and which are not

attenuated by distance. The inability of mainstream science to recognize this fundamental shortcoming to accommodate what is undeniably occurring in the heavens is one of the most stunning of all scientific failures.

To accommodate this fact set, the EPR formulation must be modified, as Plotnikov and Anastasovski suggest, to incorporate time domain polarization and spin polarity as scalar attributes of mass and energy, including the harmonic resonances and non-linear, non-local field effects which are evident in gravitational interactions. In the context of Y-Bias/Angularity and SOC systems, the same dynamic which operates to instantaneously convert an inert pile of sand to a self-organizing system evincing criticality also operates at all scales across the expanse of the cosmos. The A-field information exchange functions which Gisin demonstrates to accommodate externally imposed alterations of spin and charge polarity in electron-positron pairs, without respect to time or distance of separation [Simultaneity – Non-local Effects at a Distance], is the self-same information exchange mechanism predicted by Bell's Inequality and Bohm's Implicate Order. It operates to organize the structures observed in the cosmos, in real time, without respect to time and distance.

Gravitational field effects are the product of aggregated SOC interactions occurring at the primary, secondary and tertiary scales, which are found everywhere in the cosmos. Gravitational field effects are the observable product of Y-Bias interactions between masses, manifest as products of the set of SOC attributes intrinsic to each mass, which interact at angles relative to each other to cause self-organization or dissipation of their intrinsic property sets.

In this context, the structure of the cosmos exists precisely as it is predicted to be. In the absence of a singularity event such as the Big Bang, the Y-Bias/Angularity model suggests that the universe should be asymmetrically populated by evidence of SOC aggregations of matter and energy at numerous scales, evincing archetypal forms, demonstrating Fibonacci relationships, and operating in realtime as an aggregation of open, complex, self-organizing system components.

According to this model, we should find evidence at all scales of areas of little or no mass where the gravitational field effects cancel and produce dissonance between masses. We should find evidence of matter aggregating into stars, solar systems, galaxies, meta-galaxies, and so on, with great expanses of nothingness between. We should find SOC systems deconstructing from stars to lesser energy state configurations, black holes of varying sizes which conform to the power laws, neutron stars with extremely high mass densities, quasars, RF and X-ray emitting stars, and a variety of other stellar configurations which fill out all the fractally-defined probabilities which SOC aggregations of matter and energy can potentially and sustainably exhibit.

We should find evidence of the existence of black holes so large as to consume or deconstruct entire areas of the universe. We should find evidence of stellar bodies exhibiting internal temperatures so high that nothing but a plasma of undifferentiated information survives. We should find that all these classes of observable phenomena can be mapped in terms of their logarithmic relationships with each other, in terms of their intensity, magnitude, frequency and fractal distribution throughout the universe.

In fact, this mapping exercise has already become substantially complete. Long term studies conducted by teams of certifiably competent scientists around the globe provide ample, rigorously reported evidence that the SOC model of the cosmos is precisely on target with respect to its presumptions about how Nature works. [163]

The forms of autopoietic organization predicted by the Y-Bias Model are neither accommodated nor anticipated by mainstream science but are in widespread evidence nevertheless. And as a final act of heresy, the Y-Bias/ Angularity model predicts that we must find stellar formations which demonstrate velocities in excess of C.[164] While this evidence is specifically prohibited by GTR and STR, the interpretation of reality-as-it-is provided by the GTR Model is so severely flawed as to become meaningless at the finest and largest scales. Indeed, extensive astronomical studies performed by teams of Russian scientists, directly sponsored by the Russian Academy of Sciences during the 80's and 90's, document numerous instances of superluminal trajectories exhibited by massive stellar objects and entire galactic systems.[165]

One important item of interest should be noted here. The methodology employed by the Russian Academy of Sciences to determine relative velocities demonstrated by astronomical bodies involved the design-engineering and production of a class of sensors which are referred to in the literature as 'scalar interferometers.' These devices measure the A-field attributes exhibited by specific bodies or aggregations of bodies in the heavens to determine where they are now, in realtime, as opposed to where they used to be [which is what is determined by mapping the astronomical locations provided by light detection methods]. This is problematical for Western scientists because (1) the ubiquitous existence of the A-field is not accepted in the Standard Model, and (2) all information about the heavens is by definition limited to information transported at the speed of light.

In a comical twist of events, agents acting on behalf of the Russian Academy of Sciences have undertaken a vigorous campaign in the West to discredit any research published by anyone who was not directly involved in the Russian Astronomical Inventory Studies. While the political implications of such an initiative go far beyond the scope of this treatment, it is nevertheless interesting to note that what is accepted as scientific 'fact' has almost as much to do with who discovered, experimentally verified and reported it as it does with the value of the fact itself. The imposition of cultural and political agendas to skew public perception of what is 'true' and 'not true' about scientific matters is a tactic we observe occurring with greater frequency and more catastrophic results than anyone would have predicted. The authors deplore this trend because it serves only to prevent everyone from understanding how Nature really works by preserving the special interests of those who prefer to protect their elite status. .

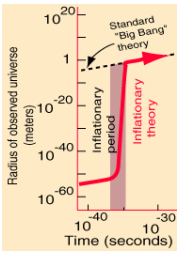
The Isotrophy Problem

The recent discovery that background radiation in the microwave range is isotropic within 0.01%, across a radius of 20 thousand million light years, has been interpreted as evidence that the universe we now observe is a product of a Big Bang event, postulated to have occurred perhaps 20 billion years ago. This interpretation is problematic, however, since it is also held

that in order for thermal equilibrium to occur uniformly throughout the cosmos, the vast expanses of space would have to be able to somehow 'communicate' this information from one region of space to another almost instantaneously, without respect to distance. Since the GTR specifically prohibits information transport velocities at a rate in excess of C, isotropic thermal equilibrium is also specifically prohibited. Clearly, the data and the model are in substantial conflict here.

In an effort to salvage the integrity of the Standard Model, and in support of the Big Bang model of cosmological forces, Alan Guth developed what has come to be known as the 'Inflationary Hypothesis.' [166] This theory suggests that an extraordinary inflationary phase occurred 10^{-36} – 10^{-32} seconds after the Big Bang event. This is a greater rate of expansion than in the entire 14 thousand million years since the supposed event. Guth suggests, further, that the inflationary epoch may have expanded the size of the universe by 10^{20} or 10^{30} times in this incredibly brief time. The inflationary hypothesis offers a way to deal with the isotrophy problem and the flatness problem found in current cosmological models by specifically violating the rules held by the Standard Model, in an effort to preserve it.

Figure 15



In a popular article written for Time Magazine[167], Lemonick and Nash describe inflation as an "amendment to the original Big Bang" as follows:

> *"...when the universe was less than a billionth of a billionth of a billionth of a second old, it briefly went through a period of supercharged expansion, ballooning from the size of a proton to the size of a grapefruit (and thus expanding at many, many times the speed of light). Then the expansion slowed to a much more stately pace. Improbable as the theory sounds, it has held up in every observation astronomers have managed to make."*

This explanation for thermal isotrophy throughout the universe presumes that we are able to observe these effects because we are 'inside' the bubble of expansion. This explanation fails, however to explain why the early stages of inflation operated at velocities far greater than the speed of light, but are now restricted to the arbitrary upper limits suggested by the Second Postulate to the Special Theory of Relativity.

Y-Bias/Angularity Theory proposes a different solution. According to this model, the universe is an open, complex, self-organizing system. Its behaviors are consistent at all scales because SOC dynamics are both isotropic and holographic. Contrary to the litany of restrictions arbitrarily imposed by the Standard Model, the Y-Bias model holds that the following conditions are ubiquitously applicable throughout the cosmos:

- Complementarity is a fundamental attribute of Minkowski 4-Space [L^4]. This means that wherever local-linear field effects are found to be operative, we must also find non-local/non-linear field effects, at all scales.
- The cosmos is self-referential, both fractally [local-linear] and holographically [non-local/non-linear] at all scales.
- C is not the upper limit to information transport velocities, nor is it the only means by which information can be transported in L^4.
- Simultaneity [non-local effects at a distance] occurs at all scales and across the infinite expanse of the universe without respect to ΔT.
- With respect to the total potential energy available via the Physical Vacuum, the cosmos is always in perfect equilibrium.
- With respect to SOC dynamics operating at each locale and at each scale in the cosmos, all SOC sub-systems within the cosmos exhibit compliance with the requirements of criticality, and are therefore in a condition approaching criticality and punctuated equilibrium, which is by definition asymmetric.
- All forms of matter, energy, time, light and field forces are constantly being organized and annihilated at the Zero Point, as a manifestation of the organizational imperative [negentropy] arising from the Physical Vacuum.

Taken in the aggregate, this set of dynamical considerations leads to a fundamentally different set of conclusions about the nature of the cosmos than that which is currently in vogue. According to the Y-Bias model, there is no need for a singularity event such as the Big Bang to explain the beginnings of the universe. If the Y-Bias model is correct, there is no beginning and

no end to the cosmos. Taken to its logical extensions, for example, the Y-Bias model suggests that while there may have been a catastrophic avalanche event which involved the entire observable universe at some far distant time [14-20 thousand million years in the past], it is equally likely that this event was but one of a series of such events which have repeatedly occurred across the vast, infinite expanse of time. As D. Wilcock aptly points out, this is yet another universally observable example of the harmonic, oscillating behaviors predicted by Whittaker.

The Y-Bias model further posits that rather than coming from 'nothing' [as the Big Bang model suggests], what we may be observing now is what happens at the business end of a black hole of such cosmic proportions that it literally disaggregated all the matter and energy found in a prior iteration of the cosmos, into a single point of infinite compression. That such an event could happen is inconsistent with the dictates of current thinking, but it is thoroughly consistent with the Y-Bias model and observed phenomena. This is a fundamentally different model than the Big Bang model because it operates according to an entirely different set of underlying dynamics, including but certainly not limited to the conditions cited above.

In the Y-Bias model, thermal isotrophy is a mandatory, defining condition of every self-organizing system, regardless of its size. This phenomenon is accommodated by recognition of the fact that simultaneity is an intrinsic attribute of all SOC systems. It has now been irrefutably established by impeccable scientific rigor that information transport is not limited to the speed of light, as found in GTR and the STR. The real challenge of this interpretation of past events is the requirement that science develop a more robust means of expressing SOC dynamics and describing how they operate at the Zero Point and through the various scales of increasingly complex organization. This will require the development of a differential calculus capable of accommodating $Z \Phi Z^2 + C$ rather than $E=MC^2$.

The Flatness Problem

It has become fashionable among physicists at the beginning of the 21st Century to suggest that the amount of matter found in the universe is less than 1/10th the critical amount needed to mitigate the observed expansion of the universe. This thinking suggests that the universe is either barely open or very nearly closed. This 'flatness' is problematical to cosmologists because it is interpreted to mean that there is insufficient matter in the universe to mitigate an infinite rate of expansion across the infinite expanse of the cosmos, as the EPR formulation of gravitational forces demands.

In Y-Bias Theory, however, this 'problem' is taken as evidence that the Standard Model is so fundamentally flawed as to be essentially useless as a predictive tool in a cosmological context. The observable universe is not finite. If the Hubble Telescope has taught us anything, it is this: regardless of how powerful our best telescopes may become, we will never find the end of the universe. All the evidence generated by observational science suggests that this is a valid, rational and supportable assumption. According to the Y-Bias model, what we observe in the heavens through a telescope, and at the fundament of L^4 through the most powerful microscopes, is evidence of the same set of dynamic behaviors operating with consistent uniformity across all the various scales in Nature.

Contrary to the dictates of Cartesian thinking, we are not impartial, detached observers of Nature. We are 'inside' the hologram which constitutes the cosmos and cannot in any meaningful sense presume to observe it with detachment. In this regard, the Maharishi model of the universe is quite correct.[168] Using the rigors of scientific inquiry, even though the community of science has long known how to locally access information embedded in the hologram, we have chosen, for reasons which are beyond the scope of this discussion, to deny the existence of the hologram itself. As a result, as a community of scientists, we have developed mathematical formulations which attempt to explain the artificially limited amount of information we have retrieved from the observable universe in ways which are equivocal, arbitrary and culturally limited.

The Flaw of A Priori Effects

The notion that there is insufficient matter in the cosmos to mitigate an infinite rate of expansion is an unsupportable conclusion drawn from a faulty assumption. The EPR formulation of gravitational field effects holds that gravitational force is an *a priori* condition, that it is invariant, that it is local/linear with respect to masses but infinite in its propagation, and that it operates without respect to other field effects because it is primary and mutually exclusive. In the context of this model, it is inevitable that an inventory of the amount of matter found in the observable cosmos should prove insufficient to cause it to behave as it should. Therefore, it is held, there must be some additional, mysterious, previously unobservable quotient in existence throughout the universe which somehow acts to hold the cosmos together. Accordingly, instead of fixing the model, scientists are now fecklessly looking for dark matter and dark energy, along with evidence of the ghostly particle called the 'Graviton', which is somehow supposed to carry out the functions attributed to gravitational forces across the universe.

Y-Bias holds that gravitational field effects are not *a priori* but are, rather, derivative effects produced by scalar SOC behaviors occurring at increasingly finer scales. It holds that gravitational field effects are not invariant, but rather operate according to SOC mandated dynamics which are themselves the product of Y-Bias interactions, which in turn demonstrate measurable variance across a scale of potential outcomes, as a function of the angularity of the interactions between them. Y-Bias holds that gravitational field forces are not linear and invariant, but rather produce observable effects as a function of the extent to which masses exert field effects on each other, which are more or less harmonic and resonant.

According to this model, just as we find that the interference patterns produced by intersecting laser beams can be used to produce 3-D images in free space, gravitational field effects exerted by masses on each other produce areas of massive concentration and areas of virtual nothingness. We see evidence of this harmonic resonance at all scales in the cosmos, including the structure of galaxies, meta-galaxies and high density electron charge clusters. If the Y-Bias model correctly reflects the underlying dynamics which operate ubiquitously throughout the cosmos, there is no

such thing as Dark Matter, Dark Energy or any such thing as a particle like the Graviton. Such things are inventions designed to accommodate the flaws extant in the model at the expense of discovering how Nature really works. From this analysis, we move up the evolutionary ladder to the Fifth Scale.

Fifth Scale Dynamics:

The Fifth Scale is the scale at which hadrons, leptons and fermions are formed. At this sub-atomic level, quantum mechanics and the standard model begin to find traction but are unable to predict behaviors within any except the most nominal limits. Much has been written to date about interactions occurring at the Fifth scale. Santilli's reformulation of Hadronic Mechanics explains why, for example, Quantum Mechanics as presently constituted fails to predict or accommodate fifth scale interactions within nominal probability limits of more than 70% [169]. Quantum mechanics prohibits interactions which are now clearly known to operate at this scale, including the splitting of Electrons into constituent waveform and particle components [Maris etal], over-unity photon emissions arising from electron plasma discharge in Hydrogen pumps [Langmuir, Naudin etal], and the SOC aggregation of electrons in a plasma to form toroidal high density charge clusters [Shoulders, Jin *et al*].

High Density Charge Clusters [EVO]

Notwithstanding the fact that phenomena such as EVO's are specifically prohibited by the Standard Model, all of these rigorously reported phenomena are accommodated by Y-Bias and Angularity Theory. For example, Shoulders *et al.* has demonstrated that when Leptons [in the form of clouds of free Electrons] interact at an optimal angle and with sufficient angular momentum and vectored velocities to breach the $1/f$ SOC-mandated noise threshold, stable clusters of Leptons automatically self-organize themselves to form toroidal clusters, measuring one micron in diameter [170]. It is not coincidental that we find evidence of this archetypal form at all scales above the third scale, as demonstrated by the figures which follow.

Experimental/ Observations:

Shoulders has been awarded two patents by the USPTO during the past 15 years for his work in what has come to be known as the phenomenon of high density charge clusters [171]. Shoulders, Jin and others have subsequently developed both the experimental protocols and mathematical formulations which describe these interactions. As far as Quantum Mechanics and the Standard Model are concerned, such things are simply not possible. If Dr. Frank Goldner of DOE is to be believed, such things Low Energy Nuclear Remediation using high density charge clusters are specifically prohibited, both scientifically and politically. Nevertheless, high density electron charge clusters [referred to in the recently published paper by Shoulders as Extraordinary Voltage Objects, or EVO's] are not only known to exist, but have been produced in repeated experimental protocols in the US, China and the CIS [172], as well as in the laboratories of S-X Jin and Shoulders himself. Images of EVO's follow in a later section.

S-X Jin, once ranked as the most important particle physicist in the People's Republic of China [before he escaped to work in the US], has pioneered techniques for experimental verification and charting of the EVO interactions in solutions containing radioactive Thorium 227, an isotope of Thorium which is known to emit high levels of beta electrons in its oxalate form. After bombarding a 40% solution of Thorium 227 suspended in distilled water, Jin repeatedly and consistently remediated radioactive emissions to ambient levels of electron [beta] and gamma emission using only EVO propagation driven by a high voltage, low amperage circuit.[173] Photographs and a detailed explanation of the photographic results obtained with the use of a tunneling Electron microscope can be evaluated at Dr. Shoulder's web site, found at http://www.svn.net/krscfs/.

Figure 16

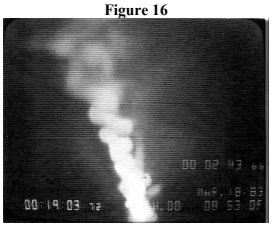


Fig. 5 Pinhole Camera Side View of Dual EVO Flight Through Vacuum

Coming from the EVO source at the lower portion of the pinhole camera image, the EVO is seen to follow a helical pattern of motion and decomposing into the individual electrons as it moves at a rate of 1/10 the velocity of light to the top of the photo. The length of the EVO run in this photo is approximately 0.1 inches. This type of charge motion produces a chirped spectrum of radiation sweeping from higher to lower frequencies. **[174]**

The importance of this increasingly robust experimental protocol is that it demonstrates compelling evidence supporting the predictions made by Y-Bias and Angularity Theory. The EVO toroids generated by Shoulders and Jin etal are self-organizing across at least three specific scales [1 micron, 20 microns, 50 microns], are stable across significant distances, and can be used to perform deliberately engineered work functions [e.g., remediation of radioactive emissions resulting from spent nuclear fuels and radioactive isotopes] at far lower levels of energy consumption than can be accommodated by quantum mechanics.

In a linear particle accelerator, for example, upwards of 3.5 million electron volts [shown as 3.5 MeV] are required to propel a Proton [1,835 times more dense than an electron] to a velocity of 10% C, the speed of light. In sharp contrast to this level of energetic expenditure, clusters of electrons measuring one micron [one millionth of a meter] in diameter, containing 6.02 X 10^{23} electrons [Avogadro's number], can be propelled at the same velocity by exciting the field with 2.5 thousand electron volts [shown as 2.5 KeV], which is 1,000 times less than that which is

required to accelerate Protons to the same velocity in a linear accelerator. What is remarkable about this phenomenon is that when propelled through a Proton-rich environment [e.g., Deuteride gas] toward a positively charged target, EVO's are known to attract and capture 1 Proton for each 100 million Electrons. Positively charged Protons are mathematically shown to be held in the negatively charged center of the toroid formed by the self-organizing electrons and propelled at the same rate as the cluster itself without requiring additional input of energy. [175]

This phenomenon is borne out by repeated experimental validation and predicted by Y-Bias and Angularity Theory, despite the fact that it is specifically prohibited by the Second Law of Thermodynamics, as currently held. Accordingly, when the millions of Protons held in the center of the EVO charge cluster impact the nuclei of the atoms making up the target material, the cumulative kinetic effect exerted by the Protons on the nuclear particles is sufficient to temporarily break the weak nuclear force. However, at this velocity [.1 C] the kinetic energy exerted by the Protons at the point of impact is not sufficient to cause a fully catastrophic fission event because, by design, it fails to totally breach the $1/f$ threshold imposed by the van der Waals nuclear force. What happens instead, as predicted by Y-Bias/Angularity Theory, and as demonstrated in the extensive work performed by Shoulders, Jin and others, is that the nuclear particles temporarily form a plasma, a disorganized 'soup' of nuclear particles in the locale where the nucleus used to be.

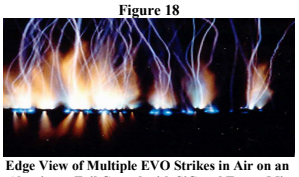
Figure 17

EVO Plasma Discharge [Jin][176]

In this instant, prodigious amounts of energy are liberated as a result of the impact of the protons against the nuclear target material, estimated to be in the range of up to nine times the energies required to accelerate the EVO in the first place. Light, in the form of photons, and heat, in the form of liberated electrons, as well as some Neutrons and gamma rays, are emitted as the plasma is formed. In the few nanoseconds following the collision, however, the nuclear particles re-organize themselves into smaller, more energetically stable nuclear configurations, each manifesting a demonstrably lower steady state than that of the original atoms found in the target material. The half-life of radioactive actides have been reduced by 50% by this method in controlled laboratory experiments [Hoagy *et al*].

By definition, this alteration of the configuration of atomic nuclear structure constitutes transmutation. That is, the creation of another kind of matter, exhibiting a different atomic number, from the basic building blocks which originally comprised the target material, which was impacted by the Proton-bearing EVO's. Jin's experimental results demonstrate the presence of a number of atomically pure elemental materials in the EVO residue after such an impact which were not present in any of the original target materials, as verified by a gas diffusion mass spectrometer, prior to the procedure.

Figure 18



Edge View of Multiple EVO Strikes in Air on an Aluminum Foil Coated with SiC and Epoxy Mix

The multiple EVO strikes [shown in Shoulder's Fig. 18] are caused by an induction coil driven electrode being scanned along the top side of the foil with a spacing of about .75 inch. In some regions the EVO penetrates the 0.02 inch thick

coating and 0.001 inch thick foil carrying the fluid out the back side showing as a flare in the photo. In other cases, the EVO penetrates the coating and foil and then reverses direction carrying the fluidized SiC out the entry direction with high velocity.

The ability to penetrate is tied to having an electrical impedance match for the EVO upon emergence into the space beyond the foil. Deep penetration of the materials depends upon having a form of impedance match between the EVO and the material being bored. The EVO matches the impedance of earth and concrete structures. It does not match highly conductive metals. [Shoulders, 29 June 2005] [177]

The implications of this rigorously demonstrated technology are profound, particularly for those who seek to remediate radioactive emissions emanating from spent nuclear fuels. What this work suggests is that radioactive emissions may be mitigated to ambient background levels with the application of a carefully engineered stream of EVO's in a controlled, proton-rich environment, without the risk of precipitating catastrophic fission events or generating dangerous alpha particles and gamma ray emissions. If developed by competent design-engineering and applications management protocols, devices based on this phenomenon could be employed to safely, permanently resolve the waste nuclear fuel problem on a global scale.

What is more important, however, is the suggestion that materials of one kind or another can be deliberately engineered to form other elemental or isotopic materials, using Y-Bias and Angularity Theory as a context. Using this approach, it should be possible [for example], to fundamentally alter many of the assumptions intrinsic to materials science, including the design-engineering and production of meta-materials exhibiting super-conductive properties. Y-Bias/Angularity techniques should be applicable to research initiatives which seek to create Meisner Fields in conductive metals, produce super-magnetic attributes in alloyed ceramics, and produce transparent aluminum. The notion that a recurring archetypal form of autopoietic

organization can be employed at various scales to deliberately engineer our own reality [in a material sense] is both compelling and onerous.

Maris – Splitting the Electron

Much has been written about prohibited phenomena occurring at the scale of sub-atomic particles, but perhaps no subject has created as much consternation in the citadels of 21st Century physics as the work of Scottish physicist Humphrey Maris, professor of physics at Brown University. [178] In a paper published August 1, 2000, in the Journal of Low Temperature Physics, Maris proposed that under suitable conditions electrons can undergo a form of fission. He has also discovered there is a significant amount of experimental evidence to support his theory.

Physicists consider that matter in the world is composed of a large number of elementary particles. Some of these particles, such as the electron and the proton, are shown to carry an electric charge, while others, including the neutron and neutrino, are electrically neutral. Although some elementary particles can decay into other particles, it has been regarded as a general principle of physics that an elementary particle cannot be broken into two pieces. Thus, for example, although a neutron can decay into a proton plus an electron and a neutrino, the Standard Model holds that it can never be broken into two half-neutrons.

According to quantum theory, the state of a particle is described in terms of its wave function. The probability that the particle will be found in any position with respect to the nucleus is proportional to the square of the wave function at that point in space. Maris' theory considers what happens to electrons when they are immersed in liquid helium at a temperature of one degree above absolute zero. This is the same set of assumptions which were used to verify and photograph the structure of the Bose-Einstein Condensate. Previous experiments have shown that an electron in helium becomes trapped in a bubble approximately 100-billionths [10^{-10}] of an inch in diameter. The bubble drifts through the liquid with the wave function of the electron confined inside it.

Maris shows that when the bubble is illuminated with infrared light, the bubble can divide into two smaller bubbles, each containing a part of the wave function of the electron. These two bubbles can then move independently through the liquid and become separated from each other.

In the 1970s, researchers at Bell Laboratories and the University of Michigan performed experiments on the effect of light on electrons in liquid helium. These researchers were unable to explain their surprising results. Maris realized that these old experiments, together with more recent measurements made at the University of Lancaster, could be understood in terms of his theory and provided support for his ideas. Further experiments to test the theory are under way at Brown University in work supported by the National Science Foundation.

Again, while specifically prohibited by the Standard Model of physics, this phenomenon nevertheless demonstrates that Leptons are almost certainly constituted of finer aggregations of information. This insight has resulted in a race among particle physicists around the world to prove the existence of what has come to be known as the Leptoquark – the Quark which combines with other Quarks of complementary attributes to form electrons [as negatively charged particles] and neutrinos [as neutrally charged particles]. Contrary to the proscriptions imposed by the Standard Model on such interactions, Y-Bias and Angularity Theory predicts and explains how and why this phenomenon occurs.

Again, the implications of this insight are profound. Virtually every aspect of the modern world depends on the production, propagation and consumption of electrical energy in one form or another. If Y-Bias/Angularity Theory is correct, Maris' insight comports specifically with the enigmatic applications developed by Tesla to produce electrical power from the Zero Point and transport it without wires to far-distant, location-specific destinations. That he could accomplish this feat is no longer the subject of any conjecture. How he accomplished it is no longer known, since all his notes, logs and records were stolen at the time of his death and mysteriously disappeared.

Sixth Scale & Beyond

This is the scale at which atoms of 116 varieties and their various isotopes are formed from the basic components generated at the first five scales. This is the scale at which the Lorentz Transforms, Quantum Electrodynamics, Quantum Mechanics and Galileo's Geometries first become reliably applicable.

Archetypal Forms – Vortexes, Toroids and Solitons

Experimental observation spanning three centuries provides unequivocal evidence that Self-Organizing Criticality is a universal, scalar phenomenon. That the processes are fundamental and universally consistent is borne out by a series of images which span the observable spectrum from the Tertiary Scale to the Tenth. Images which illustrate the scalar uniformity of SOC processes provide important clues to the fundamental role played by the dynamics identified in Y-Bias and Angularity Theory as L^4 becomes increasingly complex in its organization. The following illustrations show, with equal poignancy, that these processes operate to deconstruct SOC structures from the Tenth Scale back to the Zero Point. The shapes evidenced by these dynamic phenomena manifest physical and energetic characteristics which are archetypal.

Dynamics:

The authors illustrate that self-organizing phenomena at the Galactic and Interplanetary scales consistently exhibit fine scale SOC behaviors. Low temperatures created in the laboratory have been successfully employed to replicate conditions found elsewhere in the cosmos. Extremely low temperatures introduce several ancillary effects, including super-conductivity and a suitable environment for standing wave [Soliton] phenomena. At the Fourth Scale, we find the torus of a Soliton, demonstrated by the collapse of a Bose-Einstein Condensate:

This digital image, provided courtesy of the National Institute for Science and Technology, is extraordinary for a number of reasons, not the least of which is that we are able to have access to such images at all. The phenomenon of the standing wave Soliton has been observed since the

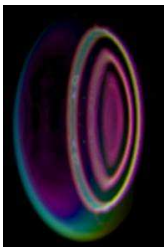
beginning of Man's experience on the planet. Smoke rings of varying sizes have always fascinated us. The importance of the discovery that this specific, archetypal shape is found as an attribute of the most fundamental forms of matter, at the finest scales, cannot be over-emphasized.

As we examine this image, we discover several important things about the way it is constructed. First, the rings which surround the center are spaced relative to each other in precise accordance with the Fibonacci relationships. Second, the collapse of the standing wave produces a new topology, which can only be described as the beginning of a vortex. Third, while the Soliton itself does not demonstrate angular momentum or 'spin,' it is clear that each of the rings surrounding the center accretion disk are energized and oscillating in one direction or the other around the center. In this case, Zero is not nothing. If ever we needed to observe the dynamics of self-organizing criticality in action, this image perfectly illustrates the fact that even at this fine scale, the Y-Bias, Angularity and SOC rules of organization, motion and interaction are already well developed in a stable, archetypal form.

Fourth Scale: Bose-Einstein Condensate

The Bose-Einstein Condensate [BEC] only occurs at temperatures of less than $.5^0$ Kelvin, which is .5 degree K above absolute zero. This extraordinary image, produced by NIST, demonstrates several critical attributes predicted by Y-Bias Theory. First, we note that the most stable conformation of the BEC is exhibited in the form of a standing wave or Soliton. Second, we observe that the inert focal point at the center is surrounded by a series of energetic rings, each of which appears to be stabilized at the requisite Fibonacci distance from the center, and all of which are clearly energized by underlying stresses. Third, and most interestingly, we observe that this stable form constitutes the springboard from which various other mutually exclusive and distinct masses instantly emerge when the temperature is allowed to increase above the $1/f$ quantum noise threshold. This behavior occurs all at once and not gradually, as the standard physical incorrectly predicts.

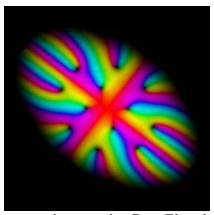
Figure 19



Decay of a Soliton in a Bose-Einstein Condensate [NIST etal]

In Figure 20 we observe the stunning resemblance between the intrinsic architecture of the BEC and the interference fringe patterns produced by intersecting beams of laser light in a hologram [e.g., Hait etal]. That this phenomenon is intrinsic to the very nature of matter, as a scalar attribute of SOC dynamics, is borne out by evidence of similar structures found at successively higher scales.

Figure 20

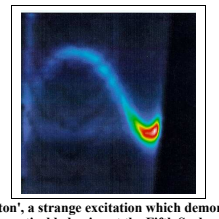


Twelve-vortex array in a rotating Bose-Einstein Condensate

Fifth Scale: Rotons – Hadron Dissipation in a Plasma Discharge

At the Fifth Scale, where Neutrons, Protons and other sub-atomic particles are formed, we find evidence of similarly prototypical Y-Bias behaviors, exhibiting the same archetypal shapes and dynamics, as those found in the Third and Fourth scales and at all subsequent scales. Note that the data path exhibited by the Roton is a vortex rather than a straight line. This archetypal behavior suggests that this fifth scale component is responding to a Y-Bias effect generated by other masses present in the medium in which it was generated.

Figure 21



The 'Roton', a strange excitation which demonstrates vortical behavior at the Fifth Scale.

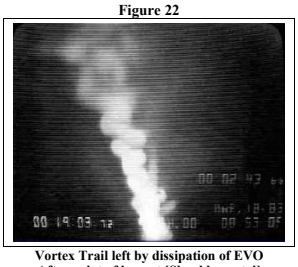
The image in Figure 21 shows raw inelastic neutron scattering data recorded with the use of an IRIS high resolution spectrometer at the ISIS facility at the Rutherford-Appleton Laboratory in the United Kingdom. This data exhibits neutron scattering from helium in 90% porosity silica aerogel. The phonon-maxon-roton portions of the dispersion curve are clearly identifiable and similar to [those found in] the bulk liquid (qualitatively).[179]

Sixth Scale - Shoulder's EVO's

At the Sixth Scale, where free electrons emitted by a highly energized probe form a plasma, toroids measuring 1 micron in diameter are propelled towards a target material. Figure 21 was

developed from a film image of an EVO captured by a tunneling electron microscope. This figure demonstrates the dissipation of the EVO as it spins through a Fibonacci series of vector values.

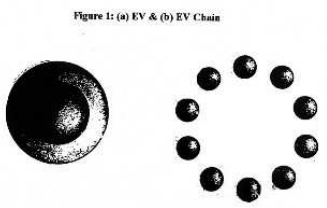
Figure 22



Vortex Trail left by dissipation of EVO
After point of impact [Shoulders, etal]

At the Sixth Scale we find the archetypal forms demonstrated in the form of Shoulders' EVO's [at 1 µm, 20 µm, and 50 µm diameters]. These images were recorded using a scanning, tunneling electron microscope.

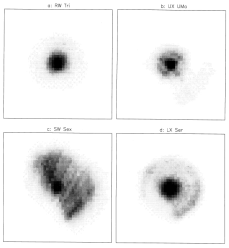
Figure 23



Shoulders Figure 1: (a) EV & (b) EV Chain

At the Sixth Scale we find the same archetypal phenomena in the form of disk accretions surrounding ionized atoms, as illustrated by the images produced in a scanning, tunneling electron microscope.

Figure 24

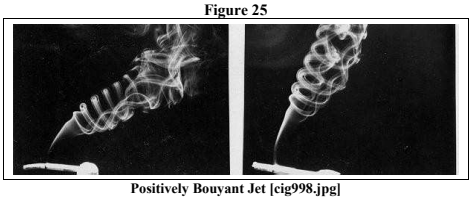


Maps of electron accretion disks at 4410 A^0 [NIST Archive]

Seventh Scale - Smoke Rings & Vortexes

At the Seventh Scale, where atoms combine to form complex molecules, the behavior of the Soliton as an SOC expression of the Fibonacci Series is again found in abundance.

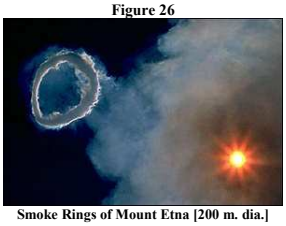
Figure 25



Positively Bouyant Jet [cig998.jpg]

In a dramatic series of images produced by photographers who witnessed the recent eruption of Mount Etna, we find Solitons measuring 200 meters in diameter.

Figure 26

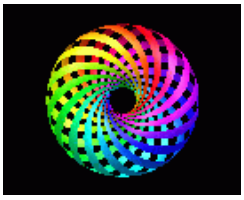


Smoke Rings of Mount Etna [200 m. dia.]

The dynamics which operate to create Solitons measuring 200 meters in diameter, as well as the vortexes which similar phenomena spawn in the form of tornados, hurricanes and water spouts, are consistent across all scales in L^4, regardless of the scale at which they operate. With Y-Bias and Angularity-based formulas, we are able to integrate these dynamics to create images which are striking in their resemblance to naturally-occurring phenomena.

The net effect of the mathematical formulations developed by Bak *et al.*, when supplied with optimal Y-Bias values, results in the creation of a virtual Soliton, a fractally defined torus displaying all the attributes associated with the evolution of this archetypal form. This is precisely the shape described by Shoulders and Jin in their widely published writings on EVO's.

Figure 27



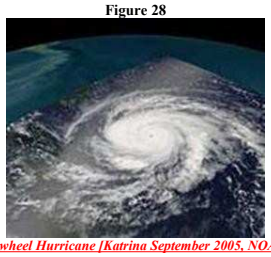
T. Banchoff – Flat Torus in 3-Sphere [180]

This image was produced by T. Banchoff and his colleagues at the University of Illinois, in concert with N. Thompson at Brown University and D. Banks of the University of North Carolina and Langley Research Center. It is of no small interest to the authors that this figure was produced with Y-Bias and Angularity data as an expression of a topological model.

Tornados – Eighth Scale Toroids

Figure 28 is a photograph of Hurricane Katrina, a Force 5 hurricane which recently devastated New Orleans [2005] and surrounding areas of the Gulf region. At the Eighth Scale, where complex systems interact to create entire families of architecturally similar phenomena [e.g., weather systems], the archetypal shapes found at all finer scales are also in evidence.

Figure 28

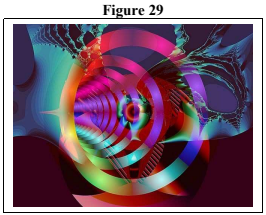


Pinwheel Hurricane [Katrina September 2005, NOAA]

While many other similarly constructed weather phenomena could be included in the lexicon of photographic images to illustrate this point, suffice it to say that the point is clearly made. What makes this point important is the fact that the entire range of phenomena represented by this event comport with the fundamental rigors found in the rules of Self-Organizing Criticality. Primary among these rules is the requirement that SOC systems are driven by fractal geometries, which are in turn defined by the Fibonacci Series relationships occurring in the Y-Bias and Angularity of the interactions.

Figure 29 is a fractally generated image which demonstrates how significant this insight is. In this image we find precisely the same information-based organizational features which typify the organization and deconstruction of Solitons and vortexes at all scales.

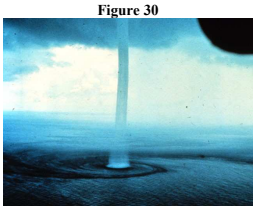
Figure 29



Underwater Vortex – Fractal Image
Generated by Y-Bias/Angularity Functions

The architectural similarity between this virtual vortex and the attributes exhibited by the ascending column of smoke found in Figure 25 is not coincidental. In fact, when water spouts, as shown in Figure 30, are analyzed, the same self-organizing dynamics found in the Soliton structures illustrated in the virtual image appear.

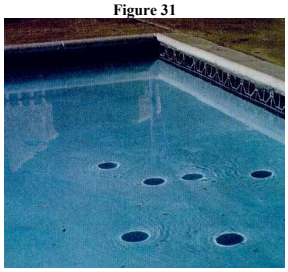
Figure 30



APOD 2005 Jan 20 – Waterspout off the Florida Keys
[image credit NOAA]

Even more importantly, we find incontrovertible evidence that Soliton dynamics do not operate in isolation, but are manifestations of self-organizing systemic attributes which are scalar and archetypal. In Falaco Solitons, for example, we find a phenomenon which exhibits fourth scale attributes at the eighth scale of organization.[181]

Figure 31



Falaco Solitons [image credit CSDC, Inc.]

Falaco Solitons are topological defects in a discontinuous surface. [Kiehn (1986)]. The phenomenon is easily reproduced by placing a half-submerged circular disc (e.g., a Frisbee) in a swimming pool, then stroking the plate slowly in the direction of its oblate axis. At the end of the stroke, extract the plate from the water, imparting kinetic energy and distributed angular momentum to the fluid in the form of a pair of Rankine Vortices. In a few seconds, in bright sunlight, the concave Rankine depressions, with visible spiral arm caustics, will decay into a pair of convex dimples of negative Gauss curvature, which can be observed via their Snell projections as black spots on the bottom of the pool. In a few tries you can become expert at this technique, and the spots will persist for many minutes in a still pool.

Figure 32

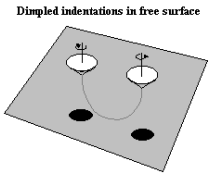


Figure 2. The Falaco Soliton

Falaco Solitons are long lived topological defects which operate in a discontinuity-free environment such as the surface of water. They have remarkably long life times and will persist for 15 to 30 minutes. The black disks seen in Figure 32 are created from the Snell refraction of a surface of rotational symmetry with negative Gauss curvature.

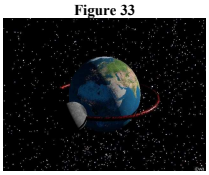
The surface distortion appears as a pair of dimple-like depressions of a few millimeters diameter. Unseen to the eye is a one dimensional defect or string that appears to connect the pair of surface two dimensional defects at their vertices. The stable shape of the connecting string is in the form of a circular arc. The 1-dimensional defect, or string, is made visible by injecting dye drops near a dimple vertex. The dye drop executes helical transverse wave motion about the thread which acts as a guiding center. The dynamic of this vortex is driven by the same Y-Bias effects which create the action of 'whistler waves' of charged particles demonstrating helical motion along the earth's magnetic field line. A drop of dye is observed to go down, then back up, a number of times until finally the transverse helical motion sweeps out the entire circular arc connecting the two vertices. If the string is dynamically severed, as with the confinement problem for hadrons, the two surface defects (which are analogues of Quarks at a higher scale of complexity in their development) cannot be separated. They disappear with a non-diffusive pop.

Ninth Scale: Solar Systems, Moons & Accretion Rings

At the Ninth Scale, where massive bodies interact to form planets with moons, solar systems and accretion rings, we find ample evidence of the operation of self-organizing criticality at work. Figure 33 illustrates how the same set of organizing rules work to create planets with moons and accretion disks, solar systems and other similar astronomical architectures.

As with other planets in our own solar system, the earth and its single moon interact to produce a dynamic Soliton – a standing wave in which the less massive object orbits around the greater mass. The interaction between the planet and its moons, accretion disks and other objects qualifies as a Soliton because (1) it is formed by the same dynamics which form the Soliton exhibited by the Bose-Einstein Condensate, and (2) the combination of planet and objects operates in L^4 as a single, self-organized unit.

Figure 33



The Earth and Moon interact as a single Soliton

In the same way, and in compliance with the same set of self-organizing principles, Saturn and Uranus demonstrate how Soliton behaviors operate between masses to create accretion disks consisting of more finely particulated matter.

Figure 34

Accretion disks formed around Uranus and Saturn illustrate SOC-driven Soliton behaviors

When viewed in this perspective, the solar system of which earth is a member demonstrates compliance with the same set of organizational rules. When viewed in the context of SOC system development, it is instructive to note that the relative distances of the planets from the sun demonstrate a vivid example of planetary compliance with SOC-mandated Fibonacci relationships. The solar system currently operates within a tolerance of 0.00043 degrees of variance from the ideal Fibonacci Series.

Figure 35

Planet	Mean distance in million kilometers per NASA	Relative mean distance where Mercury=1
Mercury	57.91	1.00000
Venus	108.21	1.86859
Earth	149.60	1.38250
Mars	227.92	1.52353
Ceres	413.79	1.81552
Jupiter	778.57	1.88154
Saturn	1,433.53	1.84123
Uranus	2,872.46	2.00377

Neptune	4,495.06	1.56488
Pluto	5,869.66	1.30580
Total		16.18736
Average		1.61874
Phi		1.61803
Degree of variance		(0.00043)

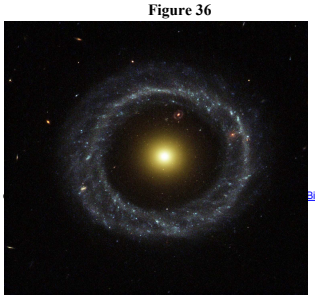
The average of the mean orbital distances of each successive planet in relation to the one before it approximates phi.[182] We sometimes forget about the asteroids when thinking of the planets in our solar system. Ceres, the largest asteroid, is nearly spherical, comprises over one-third the total mass of all the asteroids and is thus the best of these minor planets to represent the asteroid belt. (Insight on mean orbital distances contributed by Robert Bartlett.)

Tenth Scale: Galaxies, Meta-Galaxies and Black Holes

At the Tenth Scale, we find examples of self-organization in open, complex systems in galactic formations such as the 'Sombrero Galaxy' and the wonderful side-on shot of a galaxy within a galaxy called 'Hoags Object'. Figures 36 and 37 are illustrative of the widespread evidence found in the infinite reaches of the cosmos of the same set of autopoietic dynamics which serve to create matter, energy and field effects at the Zero Point. NASA's Hubble Image Galleries contain hundreds of high resolution images of star systems, star fields, galaxies, meta-galaxies and other astronomical formations which provide extraordinarily consistent evidence that self-organizing criticality operates universally throughout the visible cosmos. In these images, we find evidence of SOC processes in every stage of evolution which has been predicted by Y-Bias and Angularity Theory, ranging from creation of the most primary structures to the catastrophic deconstruction of every sort of archetypal architecture.

Figure 36

Hoag's Object [183]: A Wheel Within a Wheel Image Credit: NASA and The Hubble



Heritage Team (STScI/AURA)

A nearly perfect ring of hot, blue stars pinwheels about the yellow nucleus of an unusual galaxy known as Hoag's Object. This image from NASA's Hubble Space Telescope captures a face-on view of the galaxy's ring of stars, revealing more detail than any existing photo of this object. The image may help astronomers unravel clues on how such strange objects form. [184]

This unusual galaxy was discovered in 1950 by astronomer Art Hoag. Hoag thought the smoke-ring-like object resembled a planetary nebula, the glowing remains of a Sun-like star. But he quickly discounted that possibility, suggesting that the mysterious object was most likely a galaxy. Observations in the 1970s confirmed this prediction, though many of the details of Hoag's galaxy remain a mystery. The galaxy is 600 million light-years away in the constellation Serpens. The Wide Field and Planetary Camera 2 took this image on July 9, 2001.

Figure 37

Hubble Mosaic of the Majestic Sombrero Galaxy
Image Credit: NASA and The Hubble Heritage Team (STScI/AURA)

NASA's Hubble Space Telescope captured the image shown in Figure 37 of one of the universe's most stately and photogenic galaxies, the Sombrero galaxy, Messier 104 (M104). The galaxy's hallmark is a brilliant white, bulbous core encircled by the thick dust lanes comprising the spiral structure of the galaxy. As seen from Earth, the galaxy is tilted nearly edge-on. We view it from just six degrees north of its equatorial plane. This brilliant galaxy was named the Sombrero because of its resemblance to the broad rim and high-topped Mexican hat. [185]

At a relatively bright magnitude of +8, M104 is easily seen through small telescopes. The Sombrero lies at the southern edge of the rich Virgo cluster of galaxies and is one of the most massive objects in that group, equivalent to 800 billion suns. The galaxy is 50,000 light-years across and is located 28 million light-years from Earth.

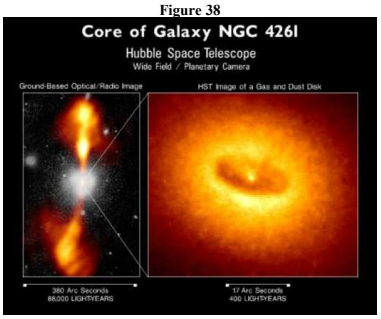
Hubble easily resolves M104's rich system of globular clusters, estimated to be nearly 2,000 in number -- 10 times as many as orbit our Milky Way galaxy. The ages of the clusters are similar to the clusters in the Milky Way, ranging from 10-13 billion years old. Embedded in the bright

core of M104 is a smaller disk, which is tilted relative to the large disk. X-ray emission suggests that there is material falling into the compact core, where a 1-billion-solar-mass black hole resides.

The Hubble Heritage Team took these observations in May-June 2003 with the space telescope's Advanced Camera for Surveys. Images were taken in three filters (red, green, and blue) to yield a natural-color image. The team took six pictures of the galaxy and then stitched them together to create the final composite image. One of the largest Hubble mosaics ever assembled, this magnificent galaxy has an angular diameter of nearly one-fifth the diameter of the full moon.

Also at the Tenth Scale we find evidence of black holes of gargantuan proportions such as NGC 4261.

Figure 38



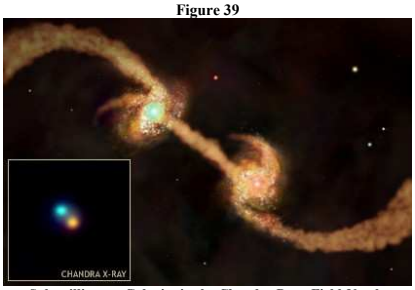
Elliptical Galaxy NGC 4261 [186]

Figure 38 is a Hubble Space Telescope Image of NGC 4261, a giant disk of cold gas and dust which fuels a black hole at the core of the galaxy. Estimated to be 300 light-years across, the disk is tipped enough (about 60 degrees) to provide astronomers with a clear view of the bright hub,

which presumably harbors the black hole. The dark, dusty disk represents a cold outer region which extends inwards to an ultra-hot accretion disk within a few hundred million miles from the suspected black hole. This disk feeds matter into the black hole, where gravity compresses and heats the material. Hot gas rushes from the vicinity of the black hole's creating the radio jets. The jets are aligned perpendicular to the disk, like an axel through a wheel. This provides strong circumstantial evidence for the existence of black hole "central engine" in NGC 4261.

As Bak and Prigogine/Stengers predicted, the same dynamics which serve to organize matter and energy to create increasingly complex architectures also serve to deconstruct such structures. In Figure 39 we find striking evidence that the same forces which combine to create tornados and hurricanes also operate to create new stars and galaxies.

Figure 39



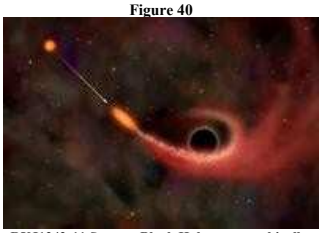
Sub-millimeter Galaxies in the Chandra Deep Field-North
(SMG 123616.1+621513): Era of Galaxy and Black Hole Growth Spurt Discovered
Credit: X-ray: NASA/CXC/IoA/D.Alexander et al.;
Illustration: NASA/CXC/M.Weiss

The illustration shows two young galaxies in the process of merging. The merger has triggered a prodigious burst of star formation and is providing fuel for the growth of the galaxies' central super-massive black holes. The inset shows an image from the Chandra Deep Field-North of two central black holes in merging galaxies (known as SMG 123616.1+621513). Although the black

holes appear to be very close in this image, they are actually about 70,000 light years apart. The different colors in the image are due to differences in X-ray absorption by gas and dust around the black holes with blue indicating more absorption than red.

In Figure 40 we find evidence of the bi-directional nature of time and the operation of the dissipative structures which serve to keep the cosmos in balance. This figure illustrates how a black hole acts to catastrophically destroy a star system.

Figure 40



RXJ1242-11 System, Black Hole catastrophically destroys a star system [187]

Thanks to two orbiting X-ray observatories, astronomers now have the first strong evidence of a super-massive black hole ripping apart a star and consuming a portion of it. The event, captured by NASA's Chandra and ESA's XMM-Newton X-ray Observatories, had long been predicted by theory but never confirmed.

Astronomers believe a doomed star came too close to a giant black hole after being thrown off course by a close encounter with another star. As it neared the enormous gravity of the black hole, the star was stretched by tidal forces until it was torn apart. This discovery provides crucial information about how these black holes grow and affect surrounding stars and gas.

While other observations have hinted stars are destroyed by black holes (events known as "stellar tidal disruptions"), these new results are the first strong evidence. Evidence already exists for

super-massive black holes in many galaxies, but looking for tidal disruptions represents a completely independent way to search for black holes. Observations like these are urgently needed to determine how quickly black holes can grow by swallowing neighboring stars.

Conclusions & Observations

During the 50-odd man-years required to accumulate, analyze and make sense of the materials referred to in the construction of the Y-Bias model, we have stumbled upon information that appears to be universally applicable. The fact that we are human means by definition that in order to make sense of what we see, we are compelled to attribute meaning to our experiences. When we do so, we automatically limit our ability to discuss all the information actually contained in the data sets we observe and collect. This is a regrettable but irremedial result of the human need to rely on semantic languages to describe abstract ideas and concepts. It would be wonderful if a pure, unambiguous language could be created because this would make it possible to discuss the kinds of issues which have been identified during our analysis, in a way that is categorical, absolute and conclusive. Unfortunately, no such language exists.

Indeed, if we understand the nature of self-organizing criticality at all, unambiguous linguistic expressions are simply not possible in the universe we populate. Nevertheless, mathematics has long been held by its practitioners to fill this role because the notion that Nature is a clockwork mechanism still defines our thinking, despite the contributions of all the Albert Einstein's of the 19th and 20th Centuries. The fact of the matter is that (1) there is no one-to-one relationship between the symbols used to convey mathematical concepts and their correlates in Nature, (2) mathematical symbology conveys abstract concepts and is therefore subject to the rules of complementarity and ambiguity which apply to all kinds of information, and (3) high order mathematics is no less ambiguous than any other language.

However, the fact remains that mathematical expressions constitute a more or less universally recognized, and therefore convenient, set of symbolic constructs which are understandable by everyone, regardless of their linguistic traditions. This makes it possible for us to describe L^4

phenomena in a way that is generally understandable by people from a wide range of cultural backgrounds. But the issue remains problematic because in order to make sense of the mathematics, we are obliged to discuss the concepts they embody in linguistic terms. Because our ability to perceive and interpret abstract concepts is defined [and therefore limited in important aspects] by the structure of the languages we speak, all interpretations of high order mathematical expressions are bound to differ in direct proportion to the idiomatic differences between the languages used to discuss them.

This is important because it suggests several things about any conclusions we may draw from the data we have collected and evaluated. As a result, fundamentally different conclusions can be drawn from the same data sets by people using differing languages, even if the mathematics they employ are identical. This is why, for example, scientists in the former USSR were able to calculate, measure, validate and harness the attributes of non-local field effects to create seven new branches of science, twenty-seven totally new technologies never before seen in Western science, and 103 materials for which Western science has no equivalent names, during the period spanning between 1951 and 1991. Scientists supported by the USSR observed the same phenomena, collected data from the same sources, used much of the same math and had access to vastly inferior support structures and other resources as compared with their counterparts in the West. But the results were sometimes so extraordinary and unique that they might as well have come from another planet.

If this tells us anything it ought to suggest that many conclusions can be drawn from the same data sets, depending on the linguistic biases which are used to filter the meaning carried by the information itself. As we are able to 'see' patterns of the sort made possible by the development of the Y-Bias model, it should become increasingly obvious that the way we apprehend natural phenomena is at least as important as the stuff we observe. If we have derived different conclusions from the same data sets relied on by mainstream science, it is not necessarily because Science and mainstream scientific interpretations of the data are wrong. Rather, it is just as likely that we are simply seeing things that were already obvious but undetected because we are looking at them through a different set of conceptual filters.

Conclusions

From our analysis of the data we have gathered, we believe the following conclusions about the world we live in and the universe which surrounds us are reasonable and supportable:

- The universe is not a clockwork mechanism at any scale.
- Nature operates according to a set of simple, elegant, universally applicable rules which are consistent at all scales, from the Zero Point to the infinite expanses of the cosmos. These rules include:

  1. Y-Bias effects,
  2. Angularity, and
  3. Self-organizing Criticality, as defined by

     - Power laws – logarithmic relationships between similar events
     - Punctuated equilibrium
     - $1/f$ Noise Thresholds [e.g., quantum dynamics]
     - Fractal Geometries
     - Fibonacci relationships
- There was no 'Big Bang' to mark the beginning of the universe. The universe is infinite, boundless and timeless in L^4. If a seminal, universal phenomenon did occur 15-20 billion years ago, it was almost certainly one of a series of similar, recurring phenomena of its type which have also occurred over the eons in the past and will eventually happen again at every scale.
- The fundamental physical attributes upon which the standard physical model is based are not invariant at any scale, including:
  1. Speed of Light [C] and photons generally
  2. Mass
  3. Gravitational Force
  4. Electromagnetic Forces
  5. Nuclear Forces
  6. Time
- No field forces, including mass or time, exist prior to the local organization of L^4 at the Zero Point. Rather, all field forces, mass and time are the products of Zero Point scalar interactions of increasing complexity, which are occurring everywhere, all the time, in every address encompassed by the cosmos.
- Non-local/non-linear field effects are complementary and operate everywhere local-linear field effects are found, at all scales.

- The Physical Vacuum exists and evinces self-organizing criticality in measurable, quantifiable, replicable and reportable behaviors, attributes and effects.
- The Zero Point is the gateway between the Physical Vacuum and L^4. The Zero Point is measurable, quantifiable, replicable and reportable in terms of its behaviors, attributes and effects.

Observations

At some point in our considerations, we are obliged to accommodate the effects exerted by the exercise of deliberate, conscious choice on the behaviors of material substances in L^4. That such phenomena have been rigorously observed, documented, repeated and independently validated by empirical methods is no longer arguable. However, the dynamics by which such interactions occur are simply not accommodated by the standard physical model.

At some point in our discussion, we are compelled to ask the fundamental question, the only one that really matters.

> *"Is consciousness, as reflected by Descartes' **Cogito, ergo sum**, merely a manifestation of a sufficiently sophisticated complexity in matter, or does matter arise from a causal plan, a Source, such as the one described in the ancient Hindu book of verses known as the Vedas?"*

This is not the question asked by science. Instead, science operates ***a priori*** on the premise that 'physical stuff' is, by definition, fundamentally distinct from what Descartes called "spirit stuff." After three centuries of thinking and working in this way, we have inherited a deeply embedded cultural prejudice which altogether denies that physical stuff and the stuff of Consciousness are in any way related.

Before we can engage in this dialogue, it is appropriate to define our terms. As a matter of practicality, the authors have opted to define Consciousness in terms which attempt to embrace

both scientific and metaphysical conceits. For the purposes of this discussion, consciousness is defined as

> *"…an underlying, primary field comprised of undifferentiated information which is characterized by infinite potential, operating in a manner which is self-referential in all-where/all-time at all scales."*

In the language of the ancient Eastern traditions, this is referred to as the One. In the language of physics, it is referred to by Maxwell and Whittaker as the primary field of infinite scalar potential. In terms of Y-Bias and Angularity Theory, the Source is referred to as the Physical Vacuum. According to this physical model of Consciousness, the authors posit that

- Consciousness is speciated and individuated in the same way, according to the same organizing principles, as Time, matter, light and all other aspects of Descartes' 'physical stuff' found in L^4.
- Consciousness is expressed in terms of non-local/non-linear attributes which are known to couple with the local-linear physical aspects of L^4 via known coupling constants.

If these findings approach a reasonable level of correctness, it is consistent to posit a number of interpretations based on them.

1. The universe we see is not similar in reality to the universe described by mainstream science, as found in the standard physical model. While the standard model can be relied on to describe some phenomena occurring above the fourth scale of organization, it is fundamentally limited by its reliance on a number of unsupportable presumptions.
2. The source of potential energy available in any locale in the cosmos from the Physical Vacuum, via the Zero Point, is accessible and absolutely unlimited.
3. Understanding how the fabric of L^4 is woven makes it possible to engineer the derivative SOC effects we have defined as matter, energy, field effects and time by harnessing the Y-Bias, Angularity and other principles embodied in Self-organizing criticality, as they

operate in L^4, to create and deconstruct the cosmos, as part of an infinite, never-ending cycle, to satisfy our own requirements.

Implications

The implications arising from these insights are profound. What difference does our view of physics make with respect to how we live and what we are able to do? For one thing, it frames how we view our relationships with each other and the planet in a context so fundamentally different than the one we rely on now that the results may scarcely be recognizable. Here are some of the areas where the Y-Bias/Angularity model can be applied immediately to enlighten the practice of science and enhance the human experience:

1. **Energy:** According to the Y-Bias/Angularity model, energy in the form of heat and light is literally pumped from the Physical Vacuum via the Zero Point to fuel the myriad SOC interactions which characterize the increasingly complex organization of matter and energy which constitutes L^4, at every locale, throughout all the scales of evolution found in the universe. As Bearden rightly points out, the amount of energy produced by scalar interactions is rigorously observed to be limitless. Feynman knew it and so did Einstein, so this is not a new insight. But if this assessment is correct, why is the human community still held hostage to energy producing technologies which contaminate the environment and endanger the equilibrium of the entire planet?

   In the closing years of the 19th Century, Irving Langmuir demonstrated conclusively that the amount of energy liberated by recombinant mono-atomic Hydrogen atoms is at least 20 times greater than the amount of energy required to break the nuclear forces which bind Hydrogen atoms together to form molecules of Hydrogen gas [H_2]. After more than a century, no one has yet provided a cogent explanation, in the context of the standard physical model or any other model, that describes how and why this happens. Today, we know that water molecules can be separated into constituent elements using inert permanent magnets with life expectancies of more than a hundred years, with no additional input of energy. The resultant Hydrogen which arises from this interaction is mono-atomic. As mono-atomic Hydrogen atoms recombine with other Hydrogen atoms

to form Hydrogen gas, enormous quantities of energy in the form of heat and light are produced.

On his internet web site, eminent French scientist Jean-Louis Naudin lists more than two dozen techniques currently being investigated, which have demonstrated over-unity energy production in controlled trials. One of these, the MAHG Project [Nicholas Moller's Atomic Hydrogen Generator], is accompanied by laboratory test data which demonstrates over-unity energy production ranging from 1.2 to 21 times input energy. The device has not been perfected and does not operate at an over-unity level consistently or for long periods. Nevertheless, the reason this device is important is that it demonstrates conclusively that it is quite possible to produce prodigious amounts of net electrical power by efficiently tapping the perpetual energy pump provided by the Physical Vacuum, without combusting fuels and without emitting exhaust into the environment.

What does this mean for the human experiment? For one thing, it means there is no longer any reason to burn fossil fuels, dam rivers, or create more nuclear fuel waste materials to produce the energy needed to support human endeavors.

2. **Medicine:** In the 21st Century, modern medical science is based almost entirely on the same presumptions which support the standard physical model. Indeed, physicians pride themselves on their right to don the mantle which permits them to claim they are scientists. The physical stuff of our biology is considered in the same scientific framework as Descartes' "physical stuff". In the 240 years since the birth of modern science, the 'spirit stuff' which makes us what we are has been fundamentally excluded from modern medical treatment protocols because medical schools have excluded it from their curricula. The body and its functions are still viewed as clockwork mechanisms, characterized by chemical interactions at various scales, which can be broken down into their primary, indivisible physical components, and manipulated by pharmaceutical preparations, surgical procedures or irradiation with nuclear substances. "The body as a

test tube" model still reigns supreme in the medical sciences, virtually devoid of any understanding about what constitutes Consciousness or how it couples and interacts with our "physical stuff".

It is almost unimaginable that medical schools still teach burgeoning young physicians that the body is comprised of separate and distinct organs, tissues, and other physical components which have little or no relationship to each other. Surgeons still remove organs without regard for the effect their removal will exert on other parts of the human system. It was not until 1991 that the first generally accepted medical texts were produced for use in medical schools, showing that the organs of the body had any direct, systemic relationship with the immune systems. Despite the discovery of neuropeptides and the explicit scientific evidence that they are the physical components of human emotional responses, medical schools still do not include this information in their curricula.

Indeed, except for the kinds of studies which are permitted within the rigorously defined framework of medical science, research designed to investigate the nature of Consciousness is not just discouraged by the medical establishment. Medical practitioners who persist in such research are commonly ridiculed, ostracized, stripped of their professional credentials, prevented from publishing the results of their research, deprived of essential resources and, in some cases, actually imprisoned. As a result, the range of medical modalities currently available in the West are almost entirely restricted to the 'cut, burn and poison' techniques which have come to typify modern medicine.

What difference would it make to the practice of modern medicine if physicians really understood the nature and dynamics of naturally occurring non-local, non-linear field effects in human biology? How would an informed paradigm about Consciousness affect the way we treat disease, injury, genetic defects and illness? If the Y-Bias Model is correct, the practices of modern medicine can be changed in ways which are largely unimaginable to most of us. When viewed as an organized aggregation of information

sets, which operate in compliance with SOC principles, the human condition presents us with alternatives which have simply never been considered by medical science, much less put into practice. A perfect example is the impeccably documented work of French physician, engineer and scientist Antoine Priore`.

During the decade of the 70's, Dr. Priore` designed, built and tested an apparatus which was shown to repeatedly cure the most noxious and malignant of diseases, correct genetic errors in DNA coding, heal physical injuries and eliminate a wide variety of viral and bacterial illnesses. There are those who dismiss Dr. Priore`s work as nothing more than a carefully crafted scam, but no one who has examined the voluminous files created by his laboratory team has ever concurred in this assessment. His work was supported by the French Academy of Science because it adhered to the disciplines of the best of modern science. All the records associated with his undertakings were impeccably documented and filed by certifiably competent people.

How did his treatment system work? It was the essence of simplicity. He recognized that the human body and its functions constitute an information system whose form and functions are governed by the ultimate software engine – DNA. He recognized the role and importance of non-local field effects on the way the human body functions, and came to understand how the local-linear [chemo-synaptic] functions interface with the non-local/non-linear field effects produced by each coil of DNA found in every cell of the body. The Russian Academy of Sciences and Dr. Vladimir Poponin independently verified this aspect of Priore`s research, as reported in their seminal paper which refers to this phenomenon as the 'Phantom DNA Effect.'

His device did nothing more than produce non-linear/non-local field effects in the presence of carefully engineered electromagnetic fields, which served to override the data errors which are the causative factors in illness and disease. He learned how the master fractal works in the human condition and was able to devise a way to override data errors found in the body and replace them with corrected data sets. He developed a technique

for erasing viruses of all kinds by identifying and canceling their energy signatures. Although rejected out of hand by mainstream science, when examined in the context of Y-Bias Theory, Dr. Priore`s treatment modality is perfectly understandable. It probably constitutes the most important advancement in the identification and treatment of disease, illness, injury and genetic defects in the entire history of medical science.

Why isn't anyone using this system? Because so many companies are making so much money by capitalizing on the treatment of illness, injury, disease and genetic defects that no one is willing to give up their territorial imperative to profits in order to really heal their patients. As a consequence, modern medical science does not heal or cure – it 'treats' illness, disease, injury and genetic defects. The technology needed to relieve pain and physical suffering in the human experience has been immediately available for more than 30 years, but colleagues of ours who have attempted to reconstruct Priore`s methodology and commercialize it have been murdered, professionally assassinated or driven to the brink of despair by those who are intent upon preventing any technology from replacing their death grip on the marketplace. At the risk of appearing overly dramatic, this suicidal behavior typifies the enlightened practice of science and medicine in the 21st Century.

3. **Communications:** Einstein's famous formula $E = MC^2$ insists that nothing can travel through L^4 at a higher velocity than the speed of light. All the technologies we currently use to provide communications links are engineered with this concept as their prime directive. The only problem with this notion is that it is based on a number of false conclusions. Even though Maxwell's quaternions and Whittaker's proofs provide categorical evidence that non-local effects are everywhere naturally operative in the universe, unaffected by any known forms of matter or field effects, we still build our communications links on the basis of a lexicon of modern electrodynamic derivatives which would have been unrecognizable to Maxwell and which geniuses like Tesla and Bose rejected altogether.

The categorical prohibition of any naturally-occurring non-local/non-linear field effects, as a fundamental precept of the standard physical model, eliminates even the conceptual possibility that point-to-point communications can occur at any rate faster than the speed of light. Consequently, every communications link in the world is engineered in a way that subscribes to this arbitrarily imposed dictum. As a result, we cannot 'see' what is happening at great distances or communicate across the vast distances of space without waiting for light-speed radio waves to travel back and forth. The limitations imposed by this approach on our ability to communicate with each other are self-evident.

What difference would it make if we could communicate instantaneously across the infinite distances of space, with no time delays, without bandwidth restrictions, and with absolute safety and security? For one thing, we wouldn't need to send humans out into space to explore far distant worlds or investigate interesting physical phenomena unless/until we had already established a scientifically cogent baseline using remote controls. Nor would we need to worry any longer about whether we are alone in the cosmos. What if we could communicate anywhere in the world at any time with unlimited bandwidth, without stringing wires or raising antenna towers, under the oceans and through any kind of materials? Has anyone ever done this? How could such a thing even be possible?[188]

If the Y-Bias model is correct, the attributes, dynamics and mechanics associated with the use of non-local fields as communications links becomes clearly understandable. What do we know about this already? We know the Soviets successfully conducted non-local communications experiments in 1982 by sending Morse Code through 22 kilometers of solid mountain, from a transmitter to a receiver located in a cave, which was isolated behind 30 meters of steel-reinforced concrete, and surrounded by multiple layers of Faraday cage EMF protective fields. We know how they did it because that information is publicly available from the archives of the Russian Academy of Sciences. Now that we have a model which explains how to engineer applications to harness this insight for the benefit of everyone, why haven't we seen evidence of it in the marketplace?

4. **Transportation:** All transportation technologies are designed to accommodate the notion that gravitational field effects can neither be escaped nor mitigated. Contrary to the edicts embodied in the standard physical model, inertia, mass, resistance, and their interactive products are all derivative effects generated by scalar Y-Bias interactions. If we know how these interactions operate, if we understand the dynamics, mechanics and implicit rules which interact to produce them, what prevents us from engineering devices, enabling technologies and strategies to mitigate these effects?

What difference would it make if Y-Bias and Angularity theory were successfully applied to unwind the scalar interactions which combine to create gravitational field effects? Everything we think about in terms of transportation applications would be fundamentally different than they are now. If reliance on the standard model is allowed to prevent us from engaging in this kind of design-engineering, we will always find ourselves held hostage to energy and fuel shortages. However, if recent discoveries by dedicated scientists and technicians can be augmented by a liberal application of Y-Bias principles, there is no scientific or technological reason why zero-gravity applications cannot be quickly engineered and ubiquitously distributed for the benefit of everyone. We know it is possible, and that such technologies have been successfully developed by others, because we have hard physical evidence and detailed research reports amassed by hundreds, if not thousands, of disciplined scientists over the past century to consider.

Laithwaite's magnetic levitation technologies are just the tip of the iceberg. As with most other advancements involving the application of important insights in the fundamental sciences, this area of consideration is the bastion of political and economic rather than scientific prerogatives. We know how to do the science now. Will we be permitted to do so? If the death of Dr. Gene Mallove is any indication, we need to look very hard at the political realities which surround this area of investigation before we make any hard commitments.

Nevertheless, it is clear that gravitational force can be locally mitigated with predictable, consistent results, using simple technologies and materials. Viktor Schauberger's Implosion Vortex technologies were successfully employed by the engineers of Albert Speer's Third Reich Technical Works to power heavier than air machines by mitigating gravitational forces. Since that time, for more than 60 years scientists in the US and elsewhere have been working assiduously to develop electro-gravitic devices for use in all sorts of applications.[189] They are succeeding, despite the resistance and interference mounted by agencies of government and powerful private interests, who wish to prevent these technologies from appearing in the public markets.

The Y-Bias model provides the essential insights which are needed to make this kind of technological development a straightforward applications-engineering exercise. Now that we understand how and under what conditions gravitational forces are created, now that we understand what gravitational forces are and how they work, and now that the mystery about what matter is and how it operates to exert gravitational and magnetic effects on other masses has been solved, there is absolutely no scientific reason why engineers equipped with this information cannot develop applications to step beyond the local limitations imposed by Einstein's formulation of gravitational field effects.

5. **Politics:** At its core, politics is the human behavior which serves to engineer societies and conserve power in the hands of the controlling classes. In our opinion, particularly in the West, political control over human affairs has evolved as the result of the ways in which three scarce commodities are distributed to satisfy increasing levels of demand throughout the world.

   Viewed in this context, the Y-Bias model is a fundamentally disruptive innovation. Any technology which facilitates the removal of energy production from the social engineering equation, by making it so ubiquitously available and inexpensive that it is not economically viable to even meter its distribution, threatens to turn the entire supply and demand equation on its head. This is true because a technological breakthrough which

provides energy to everyone, outside the control of a small group of elitists, could be used to facilitate the elimination of all other kinds of scarcity in the world by definition as well.

It therefore precipitates what is described in self-organizing criticality theory as the potential for a truly catastrophic 'avalanche' event, the annihilation of the financial and political power structure by an act of punctuated equilibrium. This is consistent with everything we know about self-organizing criticality, so we ignore this verity at our own risk. In political terms, then, we are presented with an irreconcilable conundrum: if we possess the knowledge to solve any of the primary scarcity problems which political institutions have been formed to manage for human societies, how do we implement the enabling technologies in a way that does not create a bigger problem than it solves? Can this be accomplished by any means without precipitating a catastrophe?

6. **Science:** In the lexicon of mainstream Science we find only vague hints about what really causes Nature to function as it does. The only way genuine innovation finds its way into the lexicon of mainstream science in the 21st Century is when enabling technologies based on new discoveries become so essential to commerce that they cannot be resisted. When this happens, science as an institution simply realigns itself by claiming that the new discoveries are not new at all, but were actually known all along. We have witnessed this cycle for more than 200 years as scientists competing for fame, recognition and capital rewards have battled with each other to establish intellectual territories which are then vigorously defended despite new breakthrough discoveries. History is replete with examples of this phenomenon. Consider for example, the history of heavier than air flight and the seminal breakthroughs in 'impossible technologies' achieved by the Wright Brothers.

   What this suggests to us is that one certain way for the Y-Bias model to become fully integrated into mainstream science is to develop enabling technologies based on its findings which are so irresistible that they simply cannot be ignored. This happened when

Linus Pauling developed the polio vaccine. It happened when Edison invented the electric light bulb. It happened when Tesla developed alternating current and it happened when Fritz Diesel developed the revolutionary fuel which still bears his name.

While the consequences for humanity resulting from these discoveries have been largely positive, both Tesla and Diesel died as a result of their work. Tesla's work was confiscated and secreted away while he was totally and deliberately deprived of the means for survival. He died penniless and abandoned, a broken, discredited man. Fritz Diesel's body was found floating in the English channel scarcely two months after he introduced his new fuel at the World's Fair. Their stories are not unique and should temper our enthusiasm for developing disruptive innovations to the marketplace. This can be a dangerous undertaking.

Candace Pert's discovery of the role of neuropeptides in human biology and Vladimir Poponin's discovery of the organizing effects of the non-local fields propagated by DNA still have not exerted any meaningful effect on either mainstream science or the practice of medicine, but one day they may. And in the meantime, if engineers, scientists and technicians succeed in their efforts to improve, refine and re-introduce Priore`s medical technologies to the marketplace, we may be privileged in our own lifetimes to witness the eradication of HIV/AIDS, polio, malaria, influenza and any number of other illnesses, diseases, genetic defects, cancers and so on.

This, in turn, may serve to improve the adequacy of the standard physical model and alter human history, but it will not relieve us of the ultimate responsibility to decide and govern our own affairs in the context of moral and ethical choices. In the final analysis, neither science nor technology can answer the ultimate questions for us. And as long as we continue to arrogate to ourselves the right to ultimately decide who lives and who dies, we will always be faced with imponderable, irreconcilable choices.

Footnotes, Endnotes, Commentary, Hyperlinks, & Suggested Readings

[1] Bak, Per, ***How Nature Works***, Springer-Verlag (New York @ Copernicus) 1996.
[2] Ayres, D., Y-Bias and Angularity, ref.
[3] Ayres, ibid
[4] Bak loc.cit.
[5] Physical Vacuum – definition [QED, SED]
[6] Zero Point – definition [10^{-33} cm, Planck distance $\boldsymbol{h}$ + Planck unit of time $\boldsymbol{t}$]
[7] Prigogine, I., Stengers, I., ***Order Out of Chaos:*** **Man's New Dialogue With Nature**, Bantam, New York (April 1984) ISBN 0-553-34082-4.
[8] Bak, ibid
[9] Ayres Y-Bias/Angularity files, ref.
[10] Prigogine, I., Stengers, I., ***Order Out of Chaos:*** **Man's New Dialogue With Nature**, Bantam, New York (April 1984) ISBN 0-553-34082-4.
[11] **AUTOPOIESIS** = the process whereby an organization produces itself. An autopoietic organization is an autonomous and self-maintaining unity which contains component-producing processes. The components, through their interaction, generate recursively the same network of processes which produced them. An autopoietic system is operationally closed and structurally state determined with no apparent inputs and outputs. A cell, an organism, and perhaps a corporation are examples of autopoietic systems. See allopoiesis. (F. Varela) Literally, self-production. The property of systems whose components (1) participate recursively in the same network of productions that produced them, and (2) realize the network of productions as a unity in the space in which the components exist (after Varela) (*see* recursion). Autopoiesis is a process whereby a system produces its own organization and maintains and constitutes itself in a space. E.g., a biological cell, a living organism and to some extend a corporation and a society as a whole. (krippendorff)
[12] Entropy – definition sources, ref.
[13] Kafatos, M., Nadeau, R., ***The Conscious universe***, by,(1990) Springer-Verlag New York, Inc . See also Alred Korzybsky, ***Science and Sanity:*** **an Introduction to Non-Aristotelian Systems and General** Semantics (1995) 5th Edition, Institute of General Semantics. See also J. Campbell, ***Grammatical*** Man: **Information, Entropy, Language and Life,** Simon & Schuster, New York (1982).
[14] Dr. Tom Bearden, President of the Society of Distinguished Scientists in the United States.
[15] Ref Gisin etal
[16] Ref. Poponin etal
[17] Ref. Plotknov etal
[18] Ref. Aspect etal ; see also Drexler University @Faust et al ; see also Eyring Research Institute [Spoon Bending Studies] ref.
[19] Ref. Wheeler etal
[20] Nimtz etal, Yang etal, Hodowanec etal
[21] King etal
[22] Ref. Shpilman etal. See also Langmuir's Hydrogen recombinant energy differentials.
[23] Langmuir, I., ***Hydrogen Atom EMF Behaviors***, ref: see also, ***Armagnac***, A.P., ***Magic With Magnetism***, Popular Science, June 1944.
[24] Santilli, Il Grande Grido, ref. See also Prof. Ruggero Maria Santilli
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Tel. +1-727-934 9593
Mob. +1-727-421 7976
Fax +1-727-934 9275
E-address <ibr@gte.net>
Web sites
http://www.i-b-r.org
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http://www.hadronicpress.com
http://www.i-b-r.org/ir00006.htm

[25] Why Constants of Nature May Be Changing, 25Nov03, Northeastern Univ.
[26] Evans, M. etal, Reformulation of Maxwell's Electrodynamics, ref
[27] Melehey, M., reformulation of the Laws of Theromodynamics, ref
[28] Santilli, R., reformulation of Hadronic Mechanics, JNE ref
[29] Poponin, ibid. Also Aspect, ibid. Also, Wheeler, ibid. Also, Gisin, ibid. See also D. Faust/ Drexler University Karen Gersten Effects.
[30] Crussard, C., Pechiney Ugine Kuhlmann, Paris; J. Bouvaist, Pechiney Aluminum Research Center, Voreppe, ***Study of Certain Seemingly Abnormal Deformations and Transformations of Metals***, A Translation of "etude de quleques de formations et transformations de Metaux", C. Crussard & J. Bouvaist, "Memoires Scientifiques Revue Metallurgie", February 1978. Translation Reviewed and Edited by Herve de Maigret and Pamela Maigret, in cooperation with Charles Crussard of Pechiney Ugine Huhlmann of Paris, France, with Eugene Kovalenko and David Faust of the Eyring Research Institute, Provo, Utah, November 1978, revised after final review by Charles Crussard, March 1979. From the introduction,

"...Thus, the selection which we are presenting is the result of a lengthy and rigorous screening process. In only 20 of 150 test samples which [were] deformed or transformed in front of us or our collaborators, could we positively confirm the "abnormal" nature of the effects observed. In this report, we will describe eight of the most important cases. It must be pointed out that a majority of the tests which were eliminated were most certainly valid. We used a very strict screening process in eliminating the demonstrations which did not follow a pre-defined protocol. Other tests with extensometric gauges will be published later.

Thus, our concern for rigor led us to eliminate some rather remarkable observations concerning deformations at a distance, deformations of objects or test samples in the hands of observers who were above any suspicion, or those held on one side by J.P. Girard and on the other by an observer. The tests which will be described were conducted under our responsibility with the authorization of Pechiney-Ugine-Kuhlmann."

This is the forward to the definitive report, published and prepared by the Eyring Research Institute, accompanied by extensive film footage taken under rigorously controlled conditions, which describes the use of human consciousness alone to deform, transform and exert other measurable effects on both metallic and non-metallic substances, at a distance. While portions of the study remain classified, the report referred to here has never been classified by the United States Government. Our thanks to David Faust for providing this publicly available information.

[31] Radin, D., ***The Conscious universe***, ref.
[32] Ref. Bearden etal
[33] Ref. Bohm etal implicate order, Goedel's inequalty principle
[34] ibid Gisin/ CERN
[35] V. Poponin, "Phantom DNA Effects," ref.
[36] Ref. Plotnikov – the physics of gravity
[37] Anastasovski etal, quantum gravitational effects, geometricized field forces
[38] Gisin, ibid. Nimtz, ibid. Wang, ibid. Hodowanec, ibid.
[39] The newest study was led by Roberto Ragazzoni of the Astrophysical Observatory of Arcetri, Italy and the Max Planck Institute for Astronomy in Heidelberg, Germany. Ragazzoni told SPACE.com the expected quantum effect is like a subtle version of the blurring caused by Earth's atmosphere, which makes stars twinkle.
[40] Ref. Ragazzoni article
[41] Ref. Lieu etal
[42] Ref. Plotnikov – the physics of gravity
[43] Observed variations in C, ref's. Also, reduction of C to 40 mph at Cal Tech, ref.
[44] mitigation of B field effects, ref's.
[45] Soviet M-2 experiments, ref. Nimtz experiments, ref. Wang etal, Princeton, ref's. Hodowanec gravimetric sensors, ref.
[46] Aspect, Wheeler, Drexler Univ., ref's
[47] Anastasovski etal, quantum gravitational effects, geometricized field forces
[48] P.Bak, ibid.
[49] ibid Bak etal
[50] Bak, P., ibid. pp 160-164. "Only fools, charlatans and liars predict earthquakes." Richter (father of the Gutenberg-Richter Law and the Richter Scale for measuring earthquake magnitudes).v

[51] Bak, P., ibid.
[52] Wheeler, J.A., ***Einstein's Vision***, Springer-Verlag, 1968, page 112. See also A. Dolgov, Yu. Zel'dovdich, M. Sazhin, Cosmology of the Early universe, ***MGU Publ***., Moscow 1988, page 200 (in Russian). See also M. Lavrent'ev et al, On Remote Action of Stars on Resistor, ***Doklady AN SSSR***, 1990, vol 314, no 2, page 352 (in Russian). See also A. Pugach, A. Akimov, "Astronomical Observations by N. Kozyrev's Methodology: Preliminary Results," in the press (in Russian).
[53] Flyvbjerg, H. Sneppen, K. and Bak, P. ***Mean Field Theory for a Simple Model of Evolution.*** *Physical Review Letters, 71 (1993) 4087. See also,* Sheldrake, R., ***Seven Experiments That Could Change The World:*** **A Do-it Yourself Guide to Revolutionary Science,** Riverhead Books, Inc. NY (1995) ISBN: 1-57322-14-0.
[54] Capra, F., ***The Turning Point:*** **Science, Society and the Rising Culture.** Bantam/ Simon & Schuster, New York (1982).
[55] F. Capra, ***Turning Point***, ref
[56] Wilcock, D. Personal Notes: "Consider the Nineveh Constant, discovered by NASA scientist Dr. Maurice Chatelain – where all the planets' orbits are some form of harmonic division of a master time cycle of roughly 6.5 million years, or 70 multiplied seven times by 60 in seconds. (Vol. 3, Convergence, Divine Cosmos.) The second, as a time quantum, is a basic "beat" frequency of the universe, whose macroscopic structures are the byproduct of harmonic oscillation of the PV, creating stable fields that appear as nested, rotating spheres (i.e. the planetary orbits) with Platonic geometries that are formed by the vibrational nodes on the surface of each sphere – thus explaining many different geometric phenomena I have explored at all levels of scale. Consider Roschin and Godin's replication of the Searl Effect and the nested magnetic spheres that were detected when it was in operation as one of many examples showing these fields at work. I also have yet-unpublished data showing these nested spheres emerging as zones of redshift variance (correlated with PV density levels by Aspden) in galaxies. It appears that the in-progress interplanetary climate change I am documenting is a byproduct of our entrance into a higher density of PV in the galaxy, causing a moment of "punctuated equilibrium."
[57] Mandelbrot, B., ***Fractal Geometry of Nature***, WH Freeman & Co., (August 1988) ISBN: 07 16711869.
[58] Bearden, "The Source Charge Problem: Its Solution and Implications"
[59] Timothy H. Boyer, *"The Classical Vacuum"*, **Scientific American,** pp.70-78, August 1985.
[60] Robert Matthews, *"Nothing like a Vacuum"*, **New Scientist**, p. 30-33, 25 February 1995.
[61] P. W. Milonni, *"The Quantum Vacuum: An Introduction to Quantum Electrodynamics"*, Academic Press, New York, 1994.
[62] Timothy H. Boyer, *"Random Electrodynamics: The theory of classical electrodynamics with classical electromagnetic zero-point radiation"*, **Physical Review D**, Vol. 11:4, pp.790-808, 15 February, 1975.
[63] Mikel Bowuer, "Vacuum Energy, Problems and Perspectives," **About-Nature.net**
[64] Casimir Effect, ref.
[65] B. Haisch, A. Rueda, and H. E. Puthoff, *"Physics of the Zero-Point Field: Implications for Inertia, Gravitation and Mass"*, **Speculations in Science and Technology,** Vol. 20, pp. 99-114, 1997.
[66] Bearden, T., ***Fer de Lance***: **Vector Mathematics Has a Fundamental Problem.** 2nd ed. 2002
In the physical case, several changes to the axioms of abstract vector mathematics are required. (1) the "potential" of a vector zero must be taken into account, such as is represented by the sum of the squares of the magnitudes of its vector components. (2) the specific deterministic pattern of the vector components comprising the zero must be taken into account. (3) The dynamic variation in both the deterministic directions and deterministic magnitudes of the components and of the overall pattern must be taken into account. (4) Frequencies of the changes in the direction, magnitude, and actual makeup of the vector zero must now be accounted for. That is, time and wavelengths are rigorously aspects of the vector zero, and these may be deterministic variables. Since time itself is now a variable aspect of the vector, the vector zero system can affect its "rate of time flow" in the observer's system. (5) Since a "reference vector zero" can be established at any point of a vector magnitude, then individual vectors themselves may have dynamic substructures inside a special "zero reference" in and on the vector. The patterned potential of a vector is a reality.
This leads to a system of "vectors nested inside vectors" ad infinitum. In other words, it leads to an infinite-dimensional system, and the "opening" of every finite closed vector system through its vector zeroes.
[67] http://www.enterprisemission.com/moon6.htm
[68] In 1959, Aharonov and Bohm published a fundamental paper in Physical Review which pointed out the QM implications of potentials as the real entities, while force fields were derived effects. They showed that, even in the presence of zero EM force fields, the potentials may still exist and produce real effects in physical systems. They also suggested experiments to prove these predictions.[from Bearden's "***Fer de Lance***]
[69] E. T. Whittaker, "On the Partial Differential Equations of Mathematical Physics," Mathematische Annalen, Vol. 57, 1903, p. 333-355; --- "On an Expression of the Electromagnetic Field Due to Electrons by Means of Two Scalar Potential Functions," Proc. Lond. Math. Soc., Series 2, Vol. 1, 1904, p. 367-372
[70] Van Flandern, Analogy ref.

[71] On the Expression of the Electromagnetic Field due to Electrons by Means of Two Scalar Potential Functions, by E.T.Whittaker, 1903, Published in Proceedings of the London Mathematical Society, Vol.1, 1904, p.367-372. Also it is included in Annex C, Gravitobilogy, T.E.Bearden, p. c-1.
[72] Gravitobiology, by T.E.Bearden, 1991, Tesla Book Company, P.O.Box 121873 Chula Vista, CA 91912, USA. Library of Congress Catalog Card Number 86-50553.
[73] Bearden, ***Gravitobiology,*** ref.
[74] Frolov, A.V., ***Report on the International Conference "New Ideas in Natural Sciences",*** St. Petersburg, June, 1996.
[75] Frolov, A.V., ibid.
[76] http://www.cheniere.org/techpapers/Fact_Sheets/Fact%20Sheet%20-%20Source%20Charge%20Problem10.doc
[77] Wheeler, J.A. ***Einstein's Vision***, Springer-Verlag, 1968, page 112. See also A. Dolgov, Yu. Zel'dovdich, M. Sazhin, Cosmology of the Early universe, ***MGU Publ***., Moscow 1988, page 200 (in Russian). See also M. Lavrent'ev et al, On Remote Action of Stars on Resistor, ***Doklady AN SSSR***, 1990, vol 314, no 2, page 352 (in Russian). See also A. Pugach, A. Akimov, "Astronomical Observations by N. Kozyrev's Methodology: Preliminary Results," in the press (in Russian)
[78] Santilli, R. *Il Grande Grido*:A Cry in the Wilderness loc.cit.
[79] ***"Inclusive Jet Cross Section in pbar p Collisions at sqrt s = 1.8TeV***," F. Abe et al., The CDF Collaboration, FERMILAB-PUB-96/020-E. Submitted to *Phys. Rev. Lett.* January 24, 1996 -- Abstract, Paper
[80] R. Santilli, loc. cit.
[81] ***The New Maxwell Electrodynamic Equations:*** **New Tools for New Technologies.** A Collection of 60 papers from the Alpha Foundation's Institute for Advanced Study. *Journal of New Energy*, Winter (1999) ISSN: 1086-8259
[82] L.B. Crowell, "*Quantum Electrodynamics of NonAbellian Electrodynamics in a Cavity,"* Journal of New Energy, Volume 4 No.2, page 70-81, (Summer 1999).
[83] Akimov, A.E., Finogenov, V."P Experimentainiya Proyavleniya Torsionnykh Polei i Torsionnye Tekhnologii" ("Experimental Manifestations of Torsion Fields and Torsion-Based Techniques"), Moscow: ***NTTs*** "Informatekhnika," 1996, 68 pages, published by Sci-Tech Center "Informatekhnika."(in Russian).
[84] Swartz, M.R. "Generality of Optimal Operating Point Behavior in Low Energy Nuclear Systems," ***Journal of New Energy,*** Vol. 4, No. 2, pp. 218-229.
[85] Anastasovski, P.K., Benson, T.M. ***Quantum Mass Theory Compatible With Quantum Field Theory,*** Nova Science Publishers, Inc. (1995) ISBN: 1.56072-157-X.
[86] Trefilov, A. etal I.N. Frantsevic Institute For Problems of Materials Science, Anthropos Files ref/
[87] Reed, D. "Torsion Field Research and Implications for New Physics and Energy Technologies," ***Journal of New Energy,*** Vol. 4, No. 2, pp 151-164 (Summer 1999).
[88] Santilli, R., ***Il Grande Grido***, loc.cit.
[89] Iooss, G., Traveling Waves in the Fermi-Pasta-Ulam Lattice, in Nonlinearity, Vol. 13, No. 3, 2000, pp. 849-866 (18), Institute of Physics Publishing. **Abstract:**

We consider travelling wave solutions on a one-dimensional lattice, corresponding to mass particles interacting nonlinearly with their nearest neighbour (the Fermi-Pasta-Ulam model). A constructive method is given, for obtaining all small bounded travelling waves for generic potentials, near the first critical value of the velocity. They all are given by solutions of a *finite-dimensional reversible ordinary differential equation*. In particular, near (above) the first critical velocity of the waves, we construct the *solitary waves*(localized waves with the basic state at infinity) whose global existence was proved by Friesecke and Wattis, using a variational approach. In addition, we find other travelling waves such as (a) a superposition of a periodic oscillation with a non-zero uniform stretching or compression between particles, (b) *mainly localized waves*which tend towards a uniformly stretched or compressed lattice at infinity, (c) *heteroclinic solutions*connecting a stretched pattern with a compressed one.
[90] Young-Mills Equations, ref.
[91] Akimov, A.E., "An Heuristic Discussion of an Issue of a Discovery of New Long Distance Interactions," ***EGS-Concepts***. **MNTC VENT**, pre-print N7A, page 63 (in Russian); Akimov, Shipov, "Torsion Fields And Their Experimental Manifestations," Journal of New Energy, Vol. 2, No. 2, page 68, Summer 1997.
[92] Dubrovsky, V. "Elastic Model of a Physical Vacuum," ***DAN USSR,*** vol 282, no 1, 1985 (in Russian).
[93] Nimtz, G. **Superluminal Signal Velocity,** Annalen der Physik **7**, 618 (1998); see also G. Nimtz, W. Heitmann, **Superluminal Photonic Tunneling and Quantum Electonics,** Progress in Quantum Electronics, vol. 21, 81 (1997); see also, A. Enders, G. Nimtz, "Photonic Tunneling Experiments," **Physics Review,** B 47, 9605 (1993) regular paper; see also, A. Enders, G. Nimtz, **On Superluminal barrier Transversal, Journal of Physics (France)**,vol. 2, at pp. 1693 (1992); see also, G. Nimtz, A. Enders, H. Spieker, **Photonic Tunneling Experiments: Superluminal Tunneling,** Trani Workshop, 24-30 September 1992, Waves and Particles in Light and Matter. A.v.d. Merwe and A. Garuccio (eds.), Plenum Press, NY (1994).

[94] G. M. Wang, E. M. Sevick, Emil Mittag, Debra J. Searles, and Denis J. Evans, "Experimental Demonstration of Violations of the Second Law of Thermodynamics for Small Systems and Short Time Scales," *Phys. Rev. Lett.*, 89(5), 29 July 2002, 050601. The authors experimentally demonstrate some new results for the integrated transient fluctuation theorem, which predicts appreciable and measurable violations of the second law of thermodynamics for small systems over short time scales. Entropy consumption is experimentally demonstrated over colloidal length (micron size) and time scales for up to two seconds. (We point out that a cubic micron of water, e.g., contains some 30 billion molecules. So this is an appreciable effect indeed, having very powerful implications for chemistry, and it has been surprising to most physicists).

[95] Associated Press, Light Can Break Its Own Speed Limit..., July 20, 2000.

[96] Bunin, V.A. "Newest Issues of Gravitation in the Light of Classical Physics," ***Proceedings 4th Astro-Geological Meeting Geographical Society of AS USSR***, L. 1962, page 88 (in Russian). See also V.A. Bunin, "Unitary Electra-Gravitation Equations of Mathematical Physics," Auto-repherates of speeches in the section entitled MOIP, 1965, no 1, p 4 (in Russian).

[97] Quantum Fields, LLC – Press Releases. Current NASA news is found at http://www.grc.nasa.gov/Doc/news.htm. On August 19, Quantum Fields, LLC, received word from NASA that their proposal submitted to the breakthrough propulsion physics program was selected for funding. A copy of the press release follows, along with a link to a summary of the proposal. See the URL at http://www.quantumfields.com/EPRproject.htm

(2) Jordan Maclay (Quantum Fields, LLC) Richland Center, WI) and MEMS Optical, Inc. (Huntsville, AL) proposed an experimental and theoretical study of quantum vacuum energy. The experiments will use micro-electromechanical devices to test force and energy effects by quantum electrodynamics.

FEASIBILITY OF COMMUNICATION USING QUANTUM CORRELATIONS

For all space missions, it is imperative to have reliable communication links to transmit data, computer codes, or other information. The current electromagnetic communications technologies (including laser, RF, X band, S. band) do not scale well as the mission distance increases. With current methods, the power, weight, cost and complexity increase rapidly with distance, while the transmission reliability decreases. We propose to explore the possibility of a revolutionary approach to communications based on recent theoretical and experimental developments in quantum physics, in particular based on quantum correlations between entangled atoms or ions (EPR pairs). Recent experiments have verified the existence of quantum correlations between entangled atoms photons, in which the polarization measurement of one photon is always correlated with the measured polarization of another, distant photon (*this is a specific reference to the work of Nicolas Gisin and his team at CERN, Geneva).* Theory indicates it is not possible to use standard quantum mechanical measurements on entangled systems, such as polarization correlations of photons, for communications. Current theory restricts but may not deny the possibility of using quantum mechanical correlations in small movements or adiabatic perturbations of entangled atoms as a communication means. Further, if non-linear modifications to quantum mechanics suggested by Nobel Laureate S. Weinberg are present, then EPR communications is clearly allowed. If experiment verified that the use of EPR pairs was viable, it should be possible to develop an almost ideal communications system, a compact, low weight, communication architecture in which no broadcast power or antenna is required, no environmental noise is present, the signal does not fall off as the inverse square of the distance, and high data rates with complete security are possible. The purpose of this effort is to investigate the possibility of using quantum correlations in the adiabatic movements of atoms as a means of communication, to perform an initial theoretical feasibility analysis, identifying the key issues with such an approach, and to propose an experiment to resolve some of the fundamental questions.

[98] Ramsay, B. "Generic Gravity Wave/ Scalar Detector," ***Journal of New Energy***, Proceedings of the 5th INE Symposium, Vol.4, No. 2, Summer 1999, pp 148-150.

[99] Hodowanec, G. ***Hodowanec's Rhysmonic Cosmology***, a collection of notes, papers and articles authored by G. Hodowanec, reflecting some of the theoretical and experimental findings, as well as the 1985 monograph ***Rhysmonic Cosmology***. Available c/o B. Ramsay Publisher, 563 29 ¼ Road #3, Grand Junction, Colo, 81504, (970)241-5863. See also Bill Ramsay, "Fixed Rate Scanning, Enigma or Research Tool?", unpublished paper August 1997. See also, Bill Ramsay, "Exploring the Aethers: Adventures Inspired by Hodowanec's Discoveries," ***Proceedings of the International Symposium on New Energy***, Denver, Colorado, May 12-15, 1994

[100] Pert, C. "***Molecules of Emotion***", ref.

[101] Fiorenza, Nick Anthony "Gravitational Wave and Planetary Correspondence," Argo Navis, Inc., 288 Bluff St. Suite 474, Boulder, Colorado, 80301, 1994. See also Alastair, "Measuring Gravity," 181 Star Route, Hana, Hawaii, 96713. See also aquarius@t-link.net .

[102] Matveyenko, L.I. "Visible Superlight Speeds of Components Scattering Extra-Galactic Objects,"***UPhN,*** 1989, vol. 140, no. 3, p 469 (in Russian).

[103] Hameroff, S. etal, "Tubulin Dimers" ref/

[104] Akimov, Shipov et al, "Torsion Fields And Their Experimental Manifestations," ***J. New Energy***, vol 2, no 2, page 72, 1997.

[105] Yurth, D. ***The Anthropos Files*** loc.cit.

[106] Akimov, Shipov et al, "Torsion Fields And Their Experimental Manifestations," ***J. New Energy***, vol 2, no 2, page 74, 1997.

[107] Akimov, A.E."Torsion Communications of the Third Millennium," Papers of the International Conference "Modern Telecommunication Technologies," Moscow, May 1995 (Russian). See also A. E. Akimov, G.I. Shipov, "Torsion Fields and Their Experimental Manifestations, ***Journal of New Energy***, Vol.2No2. 1997 @ page 78.

[108] Akimov, Shipov et al, "Torsion Fields And Their Experimental Manifestations," ***J. New Energy***, vol 2, no 2, page 72, 1997.G.

[109] Convegno Internazionale: "Quale Fisca per 2000?" Bologna, 1991. See also D. Yurth, ***Anthropos Files***, ibid.

[110] Yurth, D., ***The Anthropos Files***, ref.

[111] Super capacitors, ref. found at http://www.esma-cap.com/?lang=English

[112] Akimov, A.E., Binghi, V. "Homeopathy, Quantum Physics and Torsion Fields," ***Proceedings of the Congress of the International Homeopathic Association,*** Kiev, Sept. 25-29, 1991, page 143 (in Russian). See also V. Binghi, "Induction of Metastable States of Water within the Framework of Torsion Field Concepts," ***CISE VENT***, 1991, preprint no 3, page 35. (in Russian).

[113] Harvalik, Z.V. ***The American Dowser***, 1973, vol 13, no 3, page 85, 87. See also D. Chadwic, L. Jensen, **Utah Water Research Lab., College of Engineering, Utah State Univ.**, Logan, 1971, page 120. See also S.W. Tromp, "Experiments on the Possible Relationship Between Soil Resisting and Dowsing Zones," ***Oegatgeest***, 1956.

[114] The frequency signature of the Hepatitis-C virus was mapped using infra-red spectrometry, a specially designed scalar interferometer and MRI technologies. The complex waveform which is mutually exclusive to the Hep-C virus was then fed into a desktop computer and converted to a waveform which was its phase conjugated opposite. The resulting waveform information was then fed to a NL2 fieldt generator which was used to irradiate a .5% molal solution of NaCl (Ringer's) for a period of 30 minutes. The ionic salt solution emitted a phase conjugated signal when fed into the patient's system. The solution was infiltrated into the vascular system of 15 patients diagnosed with advanced cases of Hep-C. After 30 days of three-times-per-week treatment, 14 of the 15 patients were diagnosed as being completely free of any sign of infection. The 15th patient died during treatment from complications arising from an extremely advanced, chronic case of the disease. The technology is now being tested under double blind protocols by Dr. Robert Pennington and virologists at the Baylor University Medical Center.

[115] Sciama, D.W. "The Physical Structure of General Relativity," ***Rev. Mod. Phys.***, 1964, no 36, page 463. See also D. Ivanenko, P. Pronin, G. Sardanashvilli, Calibrating Gravitation Theory, ***BGU Publ.***, Moscow, 1985, page 143 (in Russian). See also Ya Zeldovich, "Interpretation of Electrodynamics as Consequences of Quantum Theory," ***Pisma v. ShETF***., 1967, vol6 no 10, page 922 (in Russian). See also A. Sakharov, Vacuum Quantum Fluctuation in Curved Space and the Gravitation Theory, ***DAN***, 1967, no 1, page 70 (in Russian). See also V. Bellin et al, "On Quantum Gravitation Effects in Isotrope universe," ***ZhETF***, vol 6, 1980, page 2082 (in Russian).

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[117] ibid.

[118] ibid.

[119] Ivanenko, D., Pronin, P., Sardanashvilli, G. "Calibrating Gravitation Theory," ***BGU Publ.***, Moscow, 1985, page 143 (in Russian).

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[121] Fox, H., Ramsay, B. "The Super-Luminal Velocity of Gravity Waves," Trenergy, Inc., Salt Lake City, Utah, 1998, 4 pages with references.

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[123] Zhvirblis, V.E. "Playing Bubliks," ***Chemistry and Life***, no 5, 1995, pages 10-15. See also V.A. Sokolova, "Investigation of the Plant's Response to the Action of Torsion Radiation," preprint no 48, Moscow: ***VENT***, 1994, 32 pages. See also V.F. Panov, B.V. Testov, A.V. Klyuev, T.D. Afonina, ""Effect of Torsion Radiation on Mammals Organism," in: Reports Theses, PERM State Medical Academy, Scientific Session of 1997, PERM, (Russia), thesis no 159. See also [28]

[124] Kichigin, V.I., Klyuev, A.V., Kurapov, S.A., Panov, V.F.,. Khaldeev, G.V., Borisova, T.F. "Torsion Fields and Eelctrochemical Processes at Metal-Electrolyte Interface," ***Journal of New Energy***, vol 1, no 2, 1996, pages 27-31. See also V.P. Mayboroda, A.E. Akimov, G.A. Maximova, V.Y. Tarasenko, V.K. Shkholniy, "Influence of the Torsion Fields in Tin Melt," ***MNTP, VENT***, pre-print no 49, Moscow: 1994, 13 pages (in Russian). See also V.P. Mayboroda, A.E. Akimov, G.A. Maximova, V.Y. Tarasenko, V.K. Shkholniy, N.G. Palaguta, G.M. Moltchanovskaya, "Structure and Properties of Copper Inherited From a Melt After Applying to it a Torsion Emission," ***MNTP, VENT,*** pre-print no 50, Moscow: 1994, 11 pages (in Russian).

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[126] Reed et al., "Super-Luminal Velocity of Gravity Waves," loc.cit.

[127] Obukhov, Yu., Pronin, P. "Physical Effects in Theory of Gravitation With Torsion," Moscow: ***VINITI***, 1991, page 5 (in Russian).

[128] Gisin, N. "Simultaneity – Non-Local Effects at a Distance," loc.cit

[129] Wilcock, D. Comment: I highly recommend that you check out RST – Reciprocal System Theory – first put forth by Dr. Dewey Larson. They posit a balanced universe with three dimensions of space and three of time, and with a very small set of assumptions they can build a solid cosmology that covers just about everything missing in the classical models. Dr. Bruce Peret has further modified classic Larsonian thinking in what I believe to be a valid direction, by invoking the idea of "counterspace" and "projective geometry" as being the characteristics of the time domain. You need more than one dimension to account for the helical nature of torsion waves and the geometric substructures that can form within the PV itself. I have always known that the ultimate unification theory would integrate Russian torsion-field studies, geometric phenomena and Larsonian thought. Unfortunately none of these categories of thinkers are familiar enough with each other's work to perform this unification.

[130] ***"Inclusive Jet Cross Section in pbar p Collisions at sqrt s = 1.8TeV***," F. Abe et al., The CDF Collaboration, FERMILAB-PUB-96/020-E. Submitted to Phys. Rev. Lett. January 24, 1996 -- Abstract, Paper

[131] **FERMILAB MEDIA ADVISORY 2/7/96, *CDF Results Raise Questions on Quark Structure.*** An article to appear in the February 9 issue of Science describes results contained in a paper submitted to ***Physical Review Letters*** by the 450-member Collider Detector collaboration at Fermilab. The CDF paper reports results that appear to be at odds with predictions based on the current theory of the fundamental structure of matter. The paper, submitted January 21, reports the collaboration's measurement of the probability that the fundamental constituents of matter will be deflected, or will "scatter," when very high energy Protons collide with antiProtons, according to CDF spokesmen William Carithers and Giorgio Bellettini.

[132] Particles and their decay patterns, sub-quarks as illustrated by the CDF Collaboration, found at http://www-cdf.fnal.gov/events/pic/decay_chart.gif

[133] Phillips, S., "The Extrasensory Perception of Quarks," loc. cit.

[134] Hait, J. ***Information Exchange Attributes of Standing Wave Lasers at the Interference Fringe,*** ref.

[135] Wilcock, D., Comment: This brings to mind Dr. Paul LaViolette's discussions of the Belousov-Zhabotinsky effect – which is a macro-level event of a similar type in his definition. Also the "ball lightning" in Hessdalen, Norway, which I wrote about in Divine Cosmos, blinks "on" and "off" at times but is still detectable in the infrared spectrum when it is "off", thus suggesting that it is going into another domain whose fingerprints are still visible in infrared.

[136] Anastasovski, ref:

[137] **http://news.bbc.co.uk/1/hi/sci/tech/3034754.stm**

[138] Shoulders, K. Appendix 1 ref.

[139]This visualization of the interior of a rotating Bose-Einstein condensate shows an array of 12 spontaneously appearing vortices. Bright regions correspond to low condensate density, and color denotes the phase of the condensate wave function. Experimental and theoretical developments in Bose-Einstein condensation are discussed in articles by Wolfgang Ketterle (page 30) and by Keith Burnett, Mark Edwards, and Charles Clark (page 37). (Image courtesy of David L. Feder and Peter Ketcham, NIST, Gaithersburg, Maryland.)

[140] FermiLab CDF Collaboration, "Mass of Quarks" diagram found at http://www-cdf.fnal.gov/events/pic/6q_mass.gif

[141] FermiLab/Brookhave Muon results, ref. found at http://d0server1.fnal.gov/projects/Muon_Electronics/web_page/Muon_par.pdf

[142] The **Pauli exclusion principle** is a quantum mechanical principle which states that no two identical Fermions may occupy the same quantum state. Formulated by Wolfgang Pauli in 1925, it is also referred to as the "exclusion principle" or "Pauli principle."
The Pauli principle only applies to Fermions, particles which form antisymmetric quantum states and have half-integer spin. Fermions include Protons, Neutrons, and Electrons, the three types of elementary particles which constitute ordinary matter. The Pauli exclusion principle governs many of the distinctive characteristics of matter. Particles like the photon and graviton do not obey the Pauli exclusion principle, because they are bosons (i.e. they form symmetric quantum states and have integer spin) rather than Fermions.

[143] Santilli, R., ***Il Grande Grido – A Cry in the Wildnerness***, Ref.

[144] Anastasovski, Ref

[145] http://www.astro.uni-bonn.de/~dfischer/mirror/286.html

[146] http://www.enterprisemission.com/moon6.htm

[147] http://rugth30.phys.rug.nl/quantummechanics/ab.htm

[148] Jagnow, A., ref [gary vesperman]

[149] http://www.noao.edu/image_gallery/html/im0063.html

[150] Laithwaite, E., http://www.alternativescience.com/eric-laithwaite.htm

[151] Laithwaite, ibid.

[152] Ref. found at http://www.hyperphysics.phy-astr.gsu.edu

[153] Trefil, ***The Moment of Creation,*** ref.

[154] http://hyperphysics.phy-astr.gsu.edu/hbase/astro/c1

[155] http://hyperphysics.phy-astr.gsu.edu/hbase/astro/c3#c3

[156] Trefil, ibid.

[157] http://www.thunderbolts.info/tpod/2005/arch05/050427sun.htm. Also consider James Maxlow and others' theories of "Earth Expansion Tectonics," showing that the Earth has been steadily growing larger with time.

[158] Tatterson K.G. "Boom! From Light Comes Matter. ***Photonics Spectra***, November 1997, page 31.

[159] In 1996, Anastasovski experimentally verified that under certain carefully controlled conditions, photons of real light can be shown conclusively to demonstrate properties of measurable mass. This heretical idea is explained in Anastasovski's extraordinary book. See P. Anastasovski, ***Quantum Mass Theory Compatible With Quantum Field Theory,*** Nova Science Publishers, Inc. (1995) ISBN: 1-56072-157-X.

[160] Talbott, Ref.

[161] http://www.webster-dictionary.net/definition/Inertia

[162] Trefil, Ref.

[163] Bak, P., bibliography, Ref.

[164] Russian astrophysical research, superluminal velocities in heavenly bodies, ref.

[165] Ref Russian Academy of Astrophysics – super luminal bodies

[166] Guth, A. ***The Inflationary Hypothesis***, ref.

[167] Lemonick, Nash, "Time Magazine" article, ref.

[168] Hagelin, J., "The Maharishi Model of the Universe," ref. See also **Variations on the Maharishi Model: An Integration of Consciousness and the Unified Field,** presented to the 5th Annual International Symposium of the New Energy Society, Salt Lake City, Utah [28August1999]. Journal of New Energy Proceedings et al.

[169] Muon experiments at FermiLabs and Brookhaven National Labs, ref.

[170] K. Shoulders, J. Sarfatti etal, "High Density Charge Clusters – Theoretical and Mathematical Proofs," ref.

[171] Kenneth Shoulders, Patent No. 5,018,180, "Energy Conversion Using High Charge Density" 3 May 1989;

[172] EVO's in China and CIS, ref. Journal of New Energy

[173] Jin, S-X, "High Density Charge Cluster Accelerator: Transmutation of Nuclear Waste" ref. INE publications 4 April 2001.

[174] http://www.svn.net/krscfs/Electromagnetic%20Pulse%20Source%20Using%20Fluidized%20Electrons-Appendix%20I.PDF

[175] Shoulders, K., mathematical formulations of EVO's, ref.; see also Jin, S-X, HDCC formulations at scale of one micron, ref. This apparent violation of the 2nd Law of Conservation of Matter and Energy occurs because the field effect generated at the center of the EVO appears to mitigate gravitational effects in that locale, thereby eliminating the more general effect of inertial mass.

[176] Jin, S-X, EVO plasma discharge toroidal structure image, ref.

[177] Shoulders, K., Electromagnetic Pulse Source Using Fluidized Electrons, Appendix I, found at http://www.svn.net/krscfs/

[178] http://www.sciencedaily.com/releases/2000/08/000817080822.htm

[179] http://www.phys.psu.edu/~dimeo/resint.html; see also Dimeo *et. al.*, Phys. Rev. Lett. **79** (26), 5274 (1997)

[180] http://www.geom.uiuc.edu/docs/research/ieee94/node25.html

[181] http://www22.pair.com/csdc/car/carfre10.htm

[182] http://goldennumber.net/classic/solarsys.htm

[183] Image Credit: NASA and the Hubble Heritage Team (STScI/AURA) Acknowledgment: R. Lucas(STScI/AURA)

[184] The entire galaxy is about 120,000 light-years wide, which is slightly larger than our Milky Way Galaxy. The blue ring, which is dominated by clusters of young, massive stars, contrasts sharply with the yellow nucleus of mostly older stars. What appears to be a "gap" separating the two stellar populations may actually contain some star clusters that are

almost too faint to see. Curiously, an object that bears an uncanny resemblance to Hoag's Object can be seen in the gap at the one o'clock position. The object is probably a background ring galaxy.

[185] In the 19th century, some astronomers speculated that M104 was simply an edge-on disk of luminous gas surrounding a young star, which is prototypical of the genesis of our solar system. But in 1912, astronomer V. M. Slipher discovered that the hat-like object appeared to be rushing away from us at 700 miles per second. This enormous velocity offered some of the earliest clues that the Sombrero was really another galaxy, and that the universe was expanding in all directions.

[186] **Credit:** H. Ford and L. Ferrarese, (Johns Hopkins), W. Jaffe, (Leiden), NASA

[187] Illustration of a black hole destroying a star in the galaxy RXJ1242-11 (Illustration: NASA/CXC/M. Weiss; X-ray: NASA/CXC/MPE/S. Komossa et al.; Optical: ESO/MPE/S. Komossa)

[188] Muller, Hartmut, Global Scaling Theory, found at http://217.160.88.14/ir_en_research_global_scaling/detail.php?nr=1110&kategorie=ir_en_research_global_scaling. Muller came up with Global Scaling Theory and built a torsion-wave cell phone. According to my contacts in SF, his latest stunt was to download a 10GB hard drive into the PV from Germany and instantaneously upload it in Australia without a single bit of error.

[189] Note: Consider, for example, the recently published work of distinguished scientist D. Edmundson, University of Washington, whose application of a carefully engineered microwave beam has been definitively shown to reduce inertial mass I finely particulated Aluminum. Also see, ***Detail For: Disclosure: Military and Government Witnesses Reveal the Greatest Secrets in Modern History***, {May 9, 2001) ISBN: 0967323819