

# Is Dimensionality has a beginning or in eternity?

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## **Introduction:**

It is cogitated that, 'dimensionality'<sup>[1]</sup> is one of the foundations in which the physics has been build-up to describe nature, in that we would like to discuss whether the dimensionality of nature has an origin or in eternity. As, 'time' is within the framework of dimensionality we argue that dimensionality exists without beginning, when matters of universe are not static.

In this article we adapt a modified string concept to investigate this foundation of, 'dimensionality' in that strings are considered eigen-rotational between points instead of vibrational; that describe the fundamental dynamics of matters. Thus an alternative cosmological model is espoused to enquire the foundations of nature, in that we focus much on the dimensionality that relates space, time, gravity, mass, energy, volume, etc.

*Key words:* Coherently-cyclic cluster-matter, Eigen-rotational strings, Segmental-fluctuations, Tetrahedral-brane, Eigen-rotational path-length, Eigen-rotational cycle, String-length, Compound tetrahedral-brane, Holarchy of universe.

## **Chronicle of our perceptions on Dimensionality:**

Dimensional analysis describes relation between physical quantities and establishes dimension of a physical quantity, in that 'dimensionally' describes their emergence also.

Exploration of prehistoric mathematics, Clay tablets of Babylonian mathematics and subsequent archives shows simultaneous evolution of algebra and geometry that describes quantities in lower dimensions. Works mainly by Isaac Newton (1642–1727), Albert Einstein (1879–1955), Niels Bohr (1885–1962) and others, included 'time' within the framework of dimensionality to describe the dynamics that evolved Space-time and Wave-Particle Duality.

Subsequent brane world scenario by string theory that evolved from S-Matrix on 1943 to till now, is not able to resolve Black hole singularity and thus one-dimensional eigen-rotational strings<sup>[3]</sup> between points rather than oscillating strings, is prescribed to express three-dimensional matters of tetrahedral-brane by two-dimensional rotational areas of membranes,<sup>[3]</sup> in that time is entrenched. Thus, Supermanifolds of Superspace described in the Holarchy of universe<sup>[7]</sup> in a modified brane cosmology assigns insignificant Large extra dimensions representational by Fibre bundle topology, whereas higher dimensions of Configuration space is significant.

### **Incompleteness of different cosmological models in reference with Causality:**

Hidden variable theories express incompleteness of quantum mechanics and infer with multiple bubble universes of Multiverse that describes Quantum universe, and in that also Big bang causality is not described. Emergence of multiple point sources from a single zero dimensional point is dubious with multiverse.

Thermodynamic heat death elucidated by the laws of thermodynamics in Cyclic-universe indicates the inevitability of thermodynamic free energy on the dynamics of universe for its existence. This incompatibility is resolved in the Conformal Cyclic Cosmology (CCC) model<sup>[a]</sup> by Sir Roger Penrose; in that he assumes the breakdown of mass into extremely red-shifted photon energy, and his conclusion of non-influential time at that state has constrains in describing Big bang causality for succeeding cycle. Thus we adapt an another model of, Coherently-cyclic Cluster-matter Universe,<sup>[2]</sup> to investigate the foundations of physics in that 'dimensionality' is imperative to describe noninflationary universe.

### **Modified scenario of dimensionality:**

As 'point' is primitive, a single entity of a point in isolation is deprived of referential to other dimensions and thus zero dimension does not describes any matter or empty space within itself, in that points are only to discriminate themselves in space. Thus point like structure of a particle in isolation demonstrates an impossibility to describe its interior and structural variability by mathematical notation, in that, only its relative position and velocity are expressional.

Mathematical formalism not describes three-dimensional objects from a single zero-dimensional point whereas points at one-dimensional string in coordination with temporal dimension of time emerges with three-dimensional objects, when string between points, is eigen-rotational. Temporal dimension of space-time is representational within the one-dimensional eigen-rotational string of matter<sup>[3]</sup> to form three-dimensional tetrahedral-brane<sup>[4]</sup>, in that gravity is the tensor that emerges with the mechanics of eigen-rotational string. In this modified scenario of dimensionality, Gravitational collapse to Singularity is inconclusive, whereas universe is two-dimensional when strings are not eigen-rotational, in that gravitation is basic for the emergence of all other fundamental forces. Curse of dimensionality arising on analysing higher-dimensional spaces with the extra-dimensions of oscillating particles, is inappropriate on this scenario.

### **Emergence of dimensionality from basic structure of matter:**

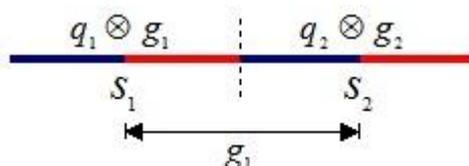
With reference to an alternative cosmological model,<sup>[2]</sup> we consider that fundamental matters are string like structures and not as point like particles. Conservation of kinetic energy of incident particles in elastic scattering and its non-conservation in inelastic scattering indicates the existence of fundamental matters as strings rather

than point like particles, in that elastic collision of atoms demonstrated by Rutherford backscattering, favours string like existence of matter.

Therefore, length-contraction in time-dilatation observational with inertial frame reference in Special relativity is representational with string-length variability<sup>[5]</sup> in an eigen-rotational cycle, referential from an inertial string-length at a reference state in that cycle.<sup>[3]</sup> This indicates the limitation of degree of freedom in this modified scenario of dimensionality, in that the Phase space states that predicts Space-time singularity is exempted and the topology of Product space is appropriate for the expression of matter in space.

### Demonstration of Parton as fluctuant string segment of quark and gluon states:

In a conventional scenario of dimensionality, Quarks and Gluons have separate entities in that Deep inelastic scattering does not conserve kinetic energy.



On ascribing Parton as string-like structure, its gluon state is observational as the tensor of that string segment, that is in continuity with a neighbouring segment of Parton in that,  $q_1, q_2$  are the proper lengths of two neighbouring Parton in their quark states. Time dilation and length contraction that originates from Parton are in covariance but not in proportionality, in that gluon state of Parton is the tensor of eigen-rotational string segment that is causal for gravity. Thus, Parton is ascribed as the fundamental string segment of matters, in that redefinition of Plank length originates.

Asymptotic freedom by Wilczek and associates is the feature of interactions between Quarks and Gluons, observational by Screening and Antiscreening;<sup>[e]</sup> indicates the existence of string like fundamental matters of quarks in chains. Appropriately, to redefine a segmental universe for evading singularity, Parton model<sup>[f]</sup> by Feynman is the ideal candidature to be investigated to modify the dimensionality framework.

### Imperativeness of dimensionality on Symmetry and Asymmetry:

In relevant to the search for Higgs boson, recent statements by CERN (July 1012) reveals the detection of an exotic scalar heavy boson with spin 0, that is a Non-Standard Model interpretation of Higgs concept. This indicates the possibility of many Higgs like bosons from Standard model,<sup>[c]</sup> compelling 'Beyond Standard Model' with Supersymmetry. Heavy scalar spin 0 property of the detected boson, in accordance with 'Pauli exclusion principle'; favours string expressions rather than discrete particle nature of the exotic boson detected, in that the tensor component of

eigen-rotational string is expressional with Electro-weak symmetry breaking that is spontaneous.

Spontaneous symmetry breaking in field equations with Gauge symmetry<sup>[9]</sup> indicates the possibility of the existing symmetry applicable in Lagrangian as Chiral symmetry; in that the analogy of handedness is expressional with the eigen-rotations of strings.<sup>[3]</sup> Consequently, Higgs mechanism needs adaptations in a different dimensionality framework, described by a modified brane cosmology in that mass is not generated as 'creatio ex nihilo', but in existence as Parton strings with non-descriptive Zero-point energy. Thus, energy of vacuum expressional by Higgs field is contradicted in that the origin of universe by featureless symmetry of undifferentiated energy<sup>[d]</sup> is non-descriptive, as symmetry and asymmetry are imperative on, 'dimensionality'.

### **Quantum mechanics and dimensionality:**

Heisenberg uncertainty that endorses quantum mechanics is the consequence of defining basic structures as discrete particles, in that the scenario of dimensionality is imperfect. Observer effect observational in certain systems indicates the existence of matters not as discrete particles and prescribes modifications in the current scenario of dimensionality.

With the development of abstract algebra, Quantum field theory got evolved to demonstrate the interactions between fundamental particles that are zero dimensional, in that the description of gravity is incomplete to conclude the unification of fundamental forces for the integration of microcosm with macrocosm.

Similarly, quantum mechanics is incomplete in quantizing the universe described in classical mechanics, in that there is disconnect between Quantum mechanics and Cosmology. Thus the complex wave-function as abstract vector space to be investigated to define a different wave mechanics in analogy with the Neutrino oscillation, in that a different scenario of dimensionality is expressional with clusters of, Connected space. Wave function collapse at the observer, expressional in abstract algebra as faithful representations, is not empirical and this inconsistency indicates inappropriate scenario of dimensionality. Thus a Quantized eigen-rotational cycle of string<sup>[6]</sup> is described in accordance with the Law of sines on tetrahedral-brane to modify Quantum mechanics in a different scenario of dimensionality on modified brane cosmology, in that gravity is in emergence with string-length variability.

This predicts the essentiality of redefining Plank constant in that the proportionality constant between energy of matter and the frequency of eigen-rotational cycle ascribes different values with fundamental units. Thus the Plank length defined by Speed of light in vacuum, Planck constant and the Gravitational constant, to be reinvestigated for a new wave propagation phenomenon in analogy with Neutrino oscillation. Exploring, Speed of light and Gravitational constant by this scenario

evolves, unification of strong interaction with gravity, in that matters are one-dimensional strings when static, and with embedded gravity as tensor when eigen-rotational.

This concludes solutions for, Gravitational time dilation defined by General relativity that generalises Special relativity and Newton's law of universal gravitation, and thus the Black hole singularity is evaded. Inconclusive Planck length in this modified scenario of dimensionality evolves an inconsistent Planck time, in that the Speed of light is nondeterministic in actual imperfect vacuum.

Granularity and Spin foam expressional by Loop quantum gravity that describes Non-singular black holes with Black hole thermodynamics, replaces Big Bang with Big Bounce and favours segmental universe,<sup>[8]</sup> in that a modified scenario of dimensionality is applied in accordance with Loop quantum cosmology, that recommends adaptations in Quantum gravity.

Casimir effect in Quantum field theory that describes the physical forces arising from a quantised field, is in analogy with the forces emerging from Quantised eigen-rotational string of tetrahedral-brane, in that virtual particles and zero-point energy are not expressional and thus a modified scenario of dimensionality is recommended.

### **Dimensionality and Holarchy of Universe:<sup>[7]</sup>**

Hierarchy problem in Standard Model by the unification of Weak force and Gravity needs renormalization and fine-tuning to obviate CP violation on CP-symmetry that reflects Baryon asymmetry and perturbations with Supersymmetry. Thus, hypothesized non observational Dark matter and Dark energy signifies the incoherency of quantum based microcosm with macrocosm in a bottom up approach and recommends eigen-rotation of cluster-matter strings in a modified scenario of dimensionality to express the hierarchy of universe in holarchy.<sup>[7]</sup>

Uncertainties in Cepheid determined distances in relation with Period-Luminosity indicate the existence of holarchical universe with a modified wave mechanics in analogy with Neutrino oscillation recommends adaptations in dimensionality framework. Thus a top-to-bottom holarchical clustering of the universe with the integration of bottom-up approach in a modified brane world scenario describes the current universe as finite in the existing infinity.

Hubble's law applicable for the astronomical observations with Standard cosmology in the observable universe is also valid for the Holarchially segmental universe, when the observables are within the segmental domains of the observer in the holarchy. Thus, co-existence of Blueshift with Redshift is indicative of a noninflationary universe with segmental fluctuations of compound tetrahedral-branes<sup>[8]</sup> of cluster-matter holons in holarchy.<sup>[7]</sup>

### **Nature of time in reference to dimensionality:**

As 'time' is coordinated with one-dimensional eigen-rotational string, time dilatation and length-contraction observational in Big bang cosmology is not applicable with modified brane cosmology that evades space-time singularity.

While 'time' is within the framework of dimensionality, discrete-time emerges basically from quantum mechanics as Quantum-time, in that the hidden variable of quantum mechanics establishes its continuity with the flow of time expressional with the dynamics of cluster-matters in holarchy. Thus the modified scenario of dimensionality is imperative to express the continuity of discrete-time with the flow of time of the universe.

This describes an uncorrelated Plank time with Cosmic time, in that inconclusive time representation in Cosmic scale factor indicates, indecisive origin of time from Big bang singularity and existence of universe backward, infinity in time. Thus an infinite Cyclic-time with finite duration of current segmental fluctuation cycle of the universe is expressional.

Eigen-rotational periods of each cluster-matter holon has referential time from its super-cluster-matter holon in the holarchy, in that universe as a cluster-matter has finite duration of Segmental-fluctuation cycle<sup>[8]</sup> in reference with the duration of its previous cycle and thus the universe has infinite Segmental-fluctuation cycles, in that eternity of, 'dimensionality' is expressional in infinite cycle of time and with group homomorphism manifestations.

As 'time' is expressional within the dimensionality framework, description of dynamics that begins with zero-dimensional fundamental particles culminates with singularity when the matters of universe are not static. This imply with a modified scenario of dimensionality in that time is coordinated with one-dimensional strings to emerge three-dimensional tetrahedral-brane. Inclusion of 'time' within this modified framework of dimensionality, not only defines force and energy but also the volume and mass by tetrahedral-branes.

### **Unification of Fundamental forces in dimensionality frameworks:**

Unification of gravity with other fundamental forces still remains obscure, though endeavoured by, Theories of everything that integrate Grand Unified Theories and recommends 'Beyond Standard Model' with the inclusion of Supersymmetric theories to proceed with MSSM. Constrains on unification of Quantum theory with General relativity, is discerned by String theory, Loop quantum gravity and Twistor theory; that endorses modifications in the dimensionality framework.

Testing the Equivalence principle by hypothesised Fifth force, demonstrates profound inability to unify gravity with other fundamental forces and thus a different scenario of dimensionality is recommended, in that gravity is the tensor of the eigen-

rotational strings to evolve other forces from the parameter variability of tetrahedral-branes.

Undetermined precision of the dimensionless quantity of Fine structure constant is inconclusive to unify Electromagnetic force with other fundamental forces in particle physics, and thus we need a different framework of dimensionality to express unification in string concepts, in that Gravitational coupling constant to be considered as an absolute constant to proceed with unification.

### **Energy, mass volume and pressure in reference to dimensionality:**

As charge is associated with energy, CP symmetry and CP violation are correlated with energy of a volume with or without fractal dimensions, in that appearance of energy from singularity is not descriptive with Spontaneous symmetry breaking.

While mass is gravitational and relative; brane cosmology needs adaptations to describe the causality of gravitation in that unification of Gravity with Strong interaction is described by the tensor of eigen-rotational strings. Perfect vacuum is not possible, as absolute pressure that is zero-referenced with Perfect vacuum, is imperfect. This implies a modified scenario of dimensionality in that the volume of a tetrahedral-brane has energy from its eigen-rotational string of matter.

While gravity is not included in Standard model, mass is not expressional in classical brane cosmology, in that, modified brane cosmology describes the mass of a volume as quantity of eigen-rotational strings of that volume and energy is proportional to the frequency of eigen-rotations of strings in that volume. Thus, Speed of light is not constant and requires a modified wave mechanics. This implies that, origin of mass is in analogy with the origin of 'dimensionality' that is eternal, as causality is with existence of dynamics.

### **Dark matter, Dark energy and Neutrino for generic wave mechanics:**

In a modified scenario of dimensionality, Dark matter and Dark energy are not considered as separate entities as energy of matter is the manifestation of eigen-rotational strings. As brane cosmology does not describes the unaccountability of Dark matter and Dark energy, candidature of Neutrino in Hot dark matter proposes a generic wave mechanics in analogy with Neutrino oscillation, in that the Hierarchy of universe describes non-observational matter and energy at the extra segmental domain of the observer, as Dark matter and Dark energy.

### **Dimensionality and dynamics of Universe:**

Einstein assigned Cosmological constant to modify his General relativity, with the intention to define a static universe, in that point like particles that travel in three-dimensional space is described in wave function. Surprisingly, observational redshift by Hubble declares the universe not as static and thus an another scenario of dimensionality also to be considered, in that the dynamics of matters in space is

expressional with a different wave mechanics without proceeding to singularity, that differs from that of Big bang cosmology.

Thereby, S-matrix defined from scattering theory has to describe elastic scattering with the conservation of kinetic energy and favours the existence of string like matters. Feynman diagrams and Mandelstam variables, evolves more hypothetical particles, in that the strings are only field expressions that differs from string theory predictions. This hypothesises our assumption on matter and antimatter that claims Baryon asymmetry. Succeeding superstring theories that demonstrate fermion vibrations to resolve the violation of postulated CP-symmetry arises from Baryon asymmetry, is incomplete.

Work by Nobel laureates, Perlmutter, Schmidt and Adam; who describe that the expansion of universe is accelerating by the dominance of dark energy,<sup>[b]</sup> indicates segmental universe in holarchy in that the observer is in a locality of segment.

Thus an another scenario of dimensionality is considered in that the mechanics of one-dimensional strings that are eigen-rotational, modify the emergence of higher dimensions, when time is coordinated with eigen-rotations that provides three dimensional tetrahedral-branes.

### **Thermodynamics and gravitational collapse in reference with dimensionality:**

As energy that exerts pressure counteracts gravitational collapse, thermodynamics that describes spontaneous process seems to be a good candidature to investigate the paradoxes on the foundation of physical principles, in that the characterization of the volume of matter is much imperative. In a modified brane cosmology, discrete time emerges from Quantized eigen-rotations of matters and thus a generic wave mechanics to be defined in analogy with neutrino oscillation, in that time dilation and length contraction are not expressional as the volume of tetrahedral-brane is in holarchy.

Non-conservational energy of Quantum vacuum fluctuations that arises from Heisenberg's uncertainty principle expresses imperfect assumptions on vacuum; in that encapsulated vacua described in brane world scenario, needs modifications.

As the unitary universe in entirety, predicts Gravitational collapse and Singularity; application of Laws of thermodynamics needs segmental approach for the universe to evade Gravitational collapse, in that assumptions on Quantum universe to be modified.

Since energy counter balances gravity, gravitation is considered as the tensor of eigen-rotational strings in that the frequency of rotations is proportional to the energy of tetrahedral-branes in a volume with vacua, and this defines a Variable cosmic-potential of that volume that is proportional to its entropy. As, Chemical potential and Gravitational potential in a locality does not agree with the entropy of that locality,

there is a proportionality constant exists between Cosmic-potential and entropy in that locality.

Thus, segmental universe describes thermodynamics without gravitational collapse, in a modified dimensionality scenario.

### **Biophysical determinants in a modified dimensionality scenario:**

Piezoelectric property of certain biological materials like DNA and some proteins, demonstrates the increase of energy in tetrahedral-branes by increase of eigen-rotational frequency, on application of pressure.

Moreover, variability of cosmic-potential in locality is causal for the eternal thermodynamics of universe in that the Chemical potential entity on Cosmic potential, is observational more on biological matters that indicates a coherently-cyclic cluster-matter universe to describe the abundance of biophysical determinants on earth in accordance with the holarchy of universe.

Fine-tuned universe that supports anthropic principle arising from the existence of many undefined dimensionless fundamental physical constants is supportive of variable cosmic potency in locality that describes cosmic consciousness and biophysical determinants that are causal for the biological evolution in locality, in that our assumptions needs adaptations on 'dimensionality' to support the emerging new physics Beyond Standard Model.

### **Conclusions:**

Inconsistency of Black hole thermodynamics, Quantum primordial black holes and Non-singular black holes, are indicative of segmental universe in that, mathematical singularity arises from existing scenario of dimensionality that needs adaptations for a modified brane world scenario in different mathematical notations. Inconclusive Higgs mechanism and the emergence of 'Beyond Standard Model' are indicative of our inadequate perceptions on 'dimensionality', in that the fundamental particles are described as point like structures and not as the preferred, string like matters. Determination of Higgs field by the detection of an exotic boson in consistency with Higgs boson, at CERN confirms that the speed of light is not constant and in that the scenario of dimensionality that is foundational, is to be investigated.

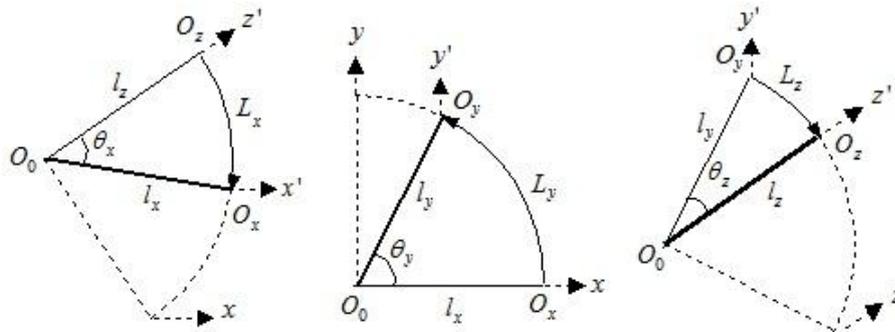
On exploring the collaborative work of Feynman and Gell-Mann in weak interaction, this modified scenario of dimensionality endorses the restructuring of atomic analogy. Thus we conclude that 'dimensionality' has no beginning and in eternity, in that our basic physical assumptions are wrong on the foundations of nature, that obscure biophysical determinants.

**Reference:**

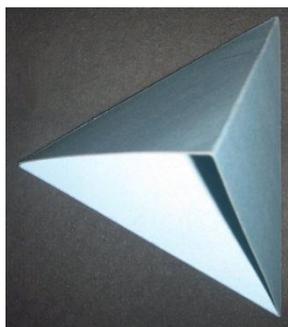
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### Technical endnotes:

1. *Dimensionality* is referred as the scenario or framework that describes relation between physical quantities in that there is emergence of quantity and dimensions in numbers, to describe matter in space.
2. *Coherently-cyclic Cluster-matter Universe* is a non-inflationary universe in entirety with group homeomorphism, in that, segmental-fluctuations of the cluster-matters of universe in cyclic-time is expressional. Thus an eternal universe is elucidated in that finite segmental-fluctuation cycle of the current universe is ascribed. For more details on this model; please visit, <http://www.clustermatteruniverse.net>
3. As per this model, all matters of the universe are, *Eigen-rotational strings of cluster-matters*, in that each eigen-rotational cycle of a string has three phases,  $[x \rightarrow y, y \rightarrow z, z \rightarrow x] \vee [x \rightarrow z, z \rightarrow y, y \rightarrow x]$ , and thus each phase is expressional as,  $[(x \rightarrow y) \vee (y \rightarrow x)]$ ,  $[(y \rightarrow z) \vee (z \rightarrow y)]$ ,  $[(z \rightarrow x) \vee (x \rightarrow z)]$ .

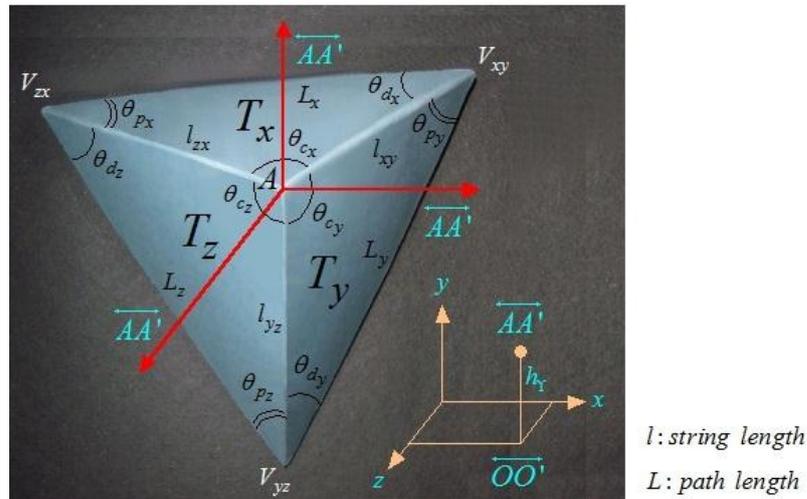


4. In an eigen-rotational cycle of a string, three two-dimensional rotational areas of triangular membranes with a non-membranous basal triangle are expressional for the three phases of the eigen-rotational cycle, representing *Three-dimensional tetrahedral-brane*.



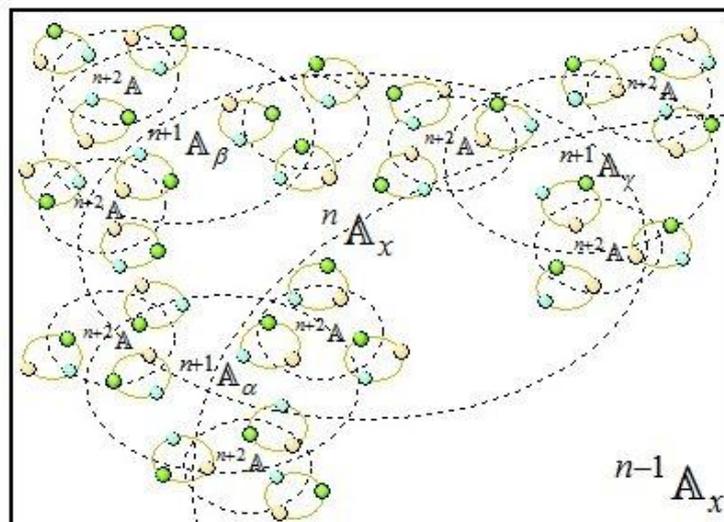
5. In a finite time of eigen-rotational cycle, *String-length variability* is observational in each eigen-rotational phase of that cycle.
6. *Quantized eigen-rotational cycle of a string* is ascribed to parameterize the string-length variability and path-length invariability in a cycle, that are normalized in a regular tetrahedral brane in that the edges of the base triangle represents path-lengths of the peripheral end of the eigen-rotational string, from the triangular transformation of rotational area of that string in three

phases of a cycle, in a finite time. Other three edges of that tetrahedral brane represents string-lengths in the three phases of that cycle.



Thus the variability of the apex of tetrahedral-brane demonstrates covariance of parameters in this Quantized eigen-rotational cycle of a string of matter.

7. As per this model, matters of universe are minimally clustered in a top-to-bottom holarchy of cluster-matters holons and thus the, *Holarchy of Universe* is expressional.



8. *Compound tetrahedral-branes* of cluster-matter holons in holarchy, demonstrates segmental-fluctuations in universe.

