Before the Primordial Geometric origin: The Mysterious connection between Physics and Mathematics

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Abstract:

Though the connection between Physics and Mathematics is much obvious from the phase of Geometric origin of the universe, the Physics of the beginning of universe is causal for the Mysterious nature of this connection. Thus we have analysed this with two models of Universe; one is with Quantum Mechanics dominated Particle scenario by Standard Model and Standard Cosmology; and the other is a Continuum Mechanics dominated String-matter scenario that is by an alternative paradigm of Universe. As the physics of the origin of universe is not geometrically descriptive in Initial singularity, we argue this as an inherent mathematical Trick in Particle scenario; whereas this Mysterious connection is a Truth, while we explore with String-matter scenario, in that the Physics of dynamics originated with time, instantaneously before the instant of plausible Mathematical notation.

As dynamics is inherent with Physics, we would like to say, 'Physics is causal for Mathematics', that is the Truth in this context, while the 'Causality of Physics', is the Mysterious connection.

> *Keywords:*
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> > Corpuscular Universe, Eigen-rotational string-segments, Inertial string-segment, Eigen-rotational energy, String-matter continuum, Particle scenario, String-matter scenario, Tetrahedral-brane (T-brane), Triangular Bi-pyramidal brane (TBP-brane), Holarchical string-bundles, Alternative wave mechanics, Spiral wave, Dual wavelength

Introduction:

When we analyse the History of Universe backward in time, the connection between Physics and Mathematics is expressional in precision by algebraic geometry up to Primordial Universe, and beyond that the connection is Mysterious.

Though it may be obvious that our Universe is Mathematical, because of Initial singularity, the only possibility to explore the initial conditions of the Universe is with Gödel's incompleteness theorems that have inherent limitations.

Thus we propose a One-dimensional continuously deformed Static string-matter state of Universe[1] before the Primordial phase. This implies to analysis this Mysterious connection, with two different scenarios of universe that provides two different results.

(1) In Corpuscular universe described with Standard cosmology and Quantum mechanics, we conclude that the Mysterious connection between Physics and Mathematics, is an inherent Trick of Mathematics.

(2) Whereas by an alternative cosmological paradigm of, 'Eigen-rotational Clusters of String-matter Universe', we conclude that the Mysterious connection between Physics and Mathematics is a Truth exists with the origin of dynamics of the universe; and thus with the Projective geometry applied on this paradigm, I would like to say that, 'Lines connects Physics with Mathematics rather than Points'.

The cause for these two dissimilar results are due to different Fundamental structure of matters ascribed in these two models of universe.

String theory – a link between Algebraic Geometry and Projective Geometry:

Implications of Algebraic Geometry on connecting the Physics[2] with Mathematics is much obvious in Particle scenario, whereas the Projective Geometry is much applicable with String-matter scenario.

Thus, some of the principles of String theory that evolved from quantum field theory in Particle physics has been adapted in String-matter continuum paradigm of Universe, while the Fermions with fields described in Particle scenario is defined as String-matter segments in Eigen-rotational String-matter paradigm of Universe.

Though the String theory predictions for Particle scenario are expressional with Algebraic Geometry, there is inconsistency in expressing the mathematical objects in singularity.

Thereby, the Projective Geometry is applied with, Eigen-rotational String-matter universe, that evolved from One-dimensional Static string-matter state of universe.

Gödel's incompleteness theorems exposes the Trick in Corpuscular universe on this Mysterious connection:

Even with ancient Geometric developments, the connectivity of Nature with Mathematics was believed to be of infinite lines and that was perceptible with Pappus's Theorems in projective geometry.

But latter the Corpuscularianism and Atomism transformed our understanding on the Universe as discrete and particulate, while the Corpuscular theory of light was mathematically expressed by Pierre Gassendi.

After the Newtonian mathematics our perceptions on the connection between Physics and Mathematics become more visible in Particle scenario, while J. J. Thomson postulated electrons that proceeded with the development of Atomic theory; whereas the Peano axioms when added with time dimension, questions the consistency of intervals and completeness of number theory that is foundational for the Mathematics that is connected with Physics. This is causal for the curved Space-time continuum that has emerged with General theory of Relativity from Einstein's field equations.

Apart from this, the Schrödinger equation provided wave-particle duality by Wave function, though continuous evolution with Schrödinger equation has resulted Wave function collapse, while the wave-particle duality with Heisenberg's uncertainty principle exhibits a variety of mathematical inequalities on the precision of position and momentum variables.

This has resulted with an expression of Corpuscular universe with full of Stochastic process expressional with probability theory, that is non-deterministic as there is a list of paradoxes in Probability mathematics. Thus the implications of Abstraction in mathematics and Applied mathematics played the tricks to resolve inconsistencies.

Anyhow, our understanding on the Connection between Physics and Mathematics has proceeded further, while all these inconsistencies and uncertainties are carried forward resulting with the prediction of Antimatter by Paul Dirac, that has turned our perception as the Universe itself is Mathematical[3], though there is a disconnect between Quantum Mechanics and Cosmology. This has ended with our assumptions of Parallel universe and Multiverse, though the paradox on the Causality of origin of universe was unresolved.

Subsequently, the Truth of Mysterious Connection between Physics and Mathematics that exists in Nature had been investigated by Eugene Wigner by his work on the Effectiveness of Mathematics in Natural Sciences[4].

This has proceeded with the development of String theory from Field theories, for relating the Gauge theories such as Yang–Mills theory with Conformal field theories by AdS/CFT correspondence, to complete the Standard Model. That has ended with Gauge/Gravity duality due to the inherent incompleteness of number theory, expressing disconnect between Quantum Mechanics and Cosmology in Particle scenario.

This implies with the constrains on expressing the evolution of three-dimensional structures from Initial singularity and the only plausible exit from this crisis is by an axiomatic system to define Initial conditions for the Universe on the Causality of origin; whereas the Gödel's incompleteness theorems reveals the limitations of number theory on establishing the axioms and thus this Mysterious connection between Physics and Mathematics is an inherent Trick of Corpuscularianism.

Thereby an eigen-rotational string-matter continuum paradigm of universe has been recommended to describe the evolution of three-dimensional structures and to conclude that the existence of this Mysterious connection is a Truth, while the axiomatic geometry on this is a One-dimensional string-segment between two points with an absolute value of positive integer.

Brief description of an Alternative cosmological paradigm proposed to explore this Mysterious connection:

As per this paradigm, continuously deformed One-dimensional static string-matter was the state of universe before the primordial phase, and from that infinite number of one-dimensional dynamic string-segments emerged with time and progressed as eigen-rotational string-matter continuum of three-dimensional structures, while Spring-constant was the only Initial condition for that Static state. In this scenario, a line segment between two points is the axiomatic geometry representing a string-segment in a reference frame.

$:\Longleftrightarrow$
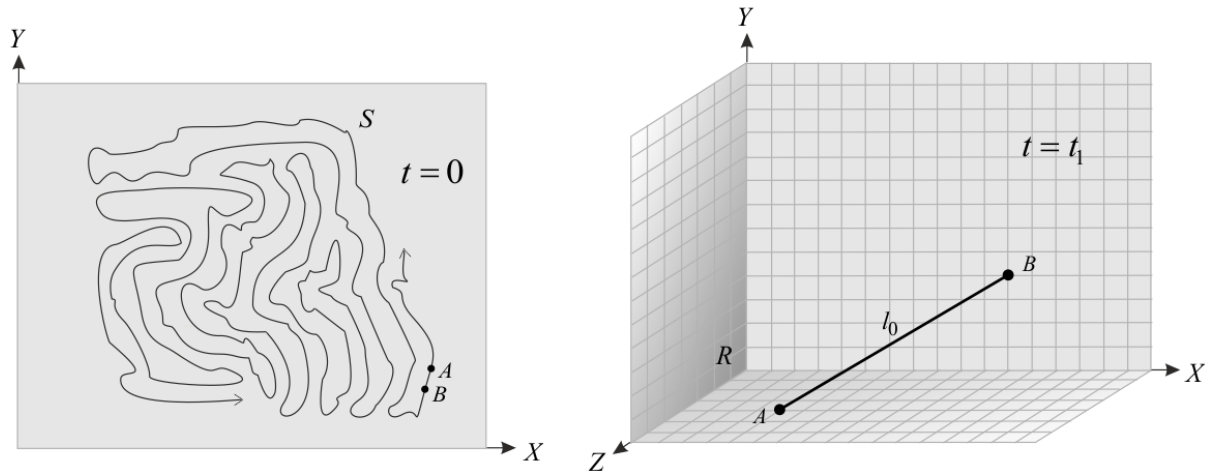
S : one-dimensional string-matter on continuous deformation, *where*, $[t = 0]$: time

$\Rightarrow$

$\overline{AB} = l_0$: a one-dimensional string-segment of, S, in time, $t = t_1$

where, $(x_A, y_A, z_A) \equiv A$, $(x_B, y_B, z_B) \equiv B$

Space-time continuum of the Corpuscular universe is analogous to the String-matter continuum of this alternative cosmological paradigm, in that the Continuum mechanics[5] is much applied rather than quantum mechanics. As the string-matter segments are eigen-rotational, two different types of brane structures are ascribed in chirality and they are, the Tetrahedral-brane (T-brane) and the Triangular Bi-pyramidal brane (TBP-brane) structures. The T-brane structures are propagative or non-propagative whereas the TBP-brane structures are always non-propagative.

1. *Non propagative TBP-brane structures:*

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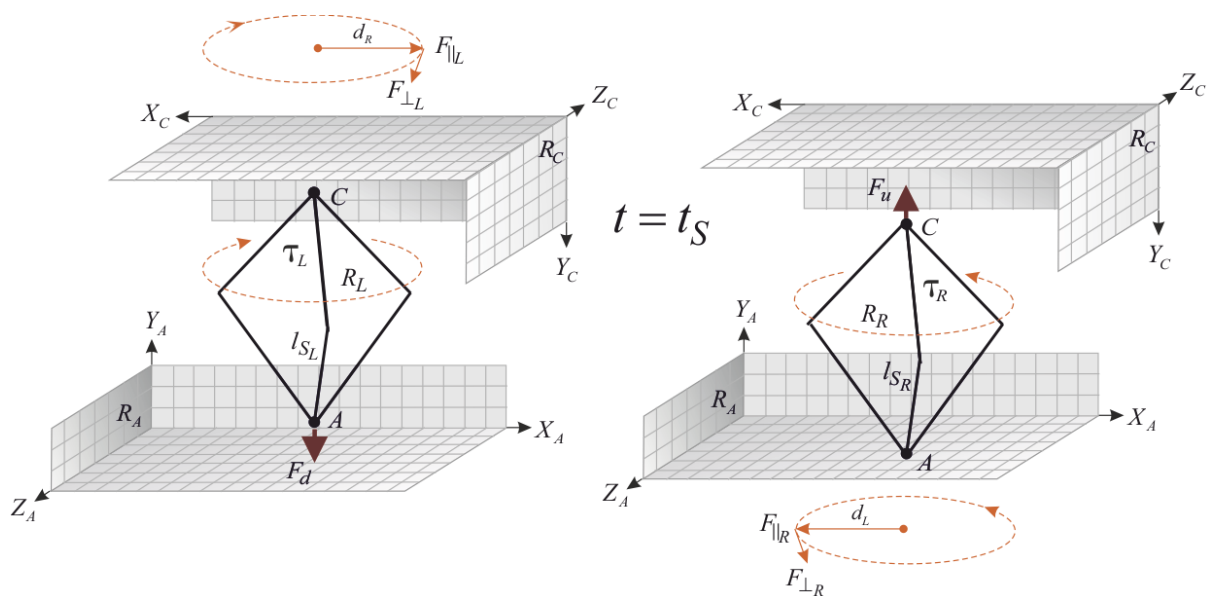
$$\{R_L, R_R\} : \begin{bmatrix} \text{left and right handed eigen-rotational states} \\ \text{of a string-matter segment, } l = l_s \end{bmatrix}, \; where, \; l_s : \{l_{sL}, l_{sR}\}$$

⇒

$$\left[\tau_L, \text{ is the torque of, } l_{sL}, \; \tau_R, \text{ is the torque of, } l_{sR} \right],$$

$where, \; \tau_L = \vec{F}_{\perp L} \vec{d}_L, \quad \tau_R = \vec{F}_{\perp R} \vec{d}_R, \quad \left[\vec{d}_L, \vec{d}_R \right]$:displacement vectors of vertices

$\left[\vec{F}_d = \vec{F}_{\perp L} \times \vec{F}_{\|L}, \; \vec{F}_u = \vec{F}_{\perp R,} \times \vec{F}_{\|R} \right]$: resultant upwardand downward forces

$where, \; \left[\vec{F}_{\|L}, \vec{F}_{\|R} \right]$: parallel forces at the vertices

The TBP-brane structures correspond to the Fermionic fields in Particle scenario as they obey Pauli exclusion principle and provides three-dimensional structures in space with mass. Eigen-rotation of the string-segment of this structure exerts force to the proceeding or receding string-segment as per their chirality of rotation; and they exhibit the following properties:

    a. An inertial string-segment that connects two TBP-branes does not exhibits any eigen-rotation and corresponds to the scalar field of spin 0 Higgs boson.

    b. Chiral TBP-branes separated by an inertial string-segment may join together in time and corresponds to the matter-antimatter existence.

2. *T-brane structures:*

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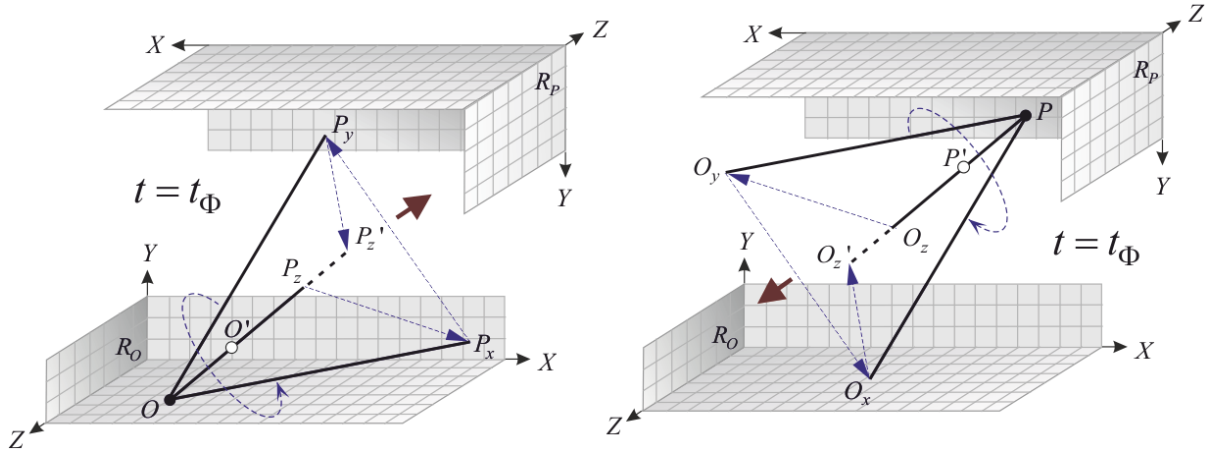
$\overline{OP} : \{\overline{OP}_x, \overline{OP}_y, \overline{OP}_z\}$, in, R_O : reference frame for, O,

$where, \; \overline{PO} : \{\overline{PO}_x, \overline{PO}_y, \overline{PO}_z\}$, in, R_P : reference frame for, P

⇒

$\left[OP_z \to OP_x \to OP_y \to OP_z' \right]$: eigen rotational cycle of, $\overline{OP}$,

$\left[PO_z \to PO_y \to PO_x \to OP_z' \right]$: eigen rotational cycle of, $\overline{PO}$

$where, \; O'P_z'$: shift of, OP, in, XYZ rotation, $\; P_z'O'$: shift of, PO, in, ZYX rotation,

⇒

$\overline{OP} \wedge \overline{PO}$, are chiral

T-branes are propagative or non-propagative string-matter segment with eigen-rotational energy and have the following properties:

    a. T-branes in solitude or in combinations are in correspondence with Bosonic field except the scalar fields by Higgs boson.

    b. Non propagative T-branes with TBP-brane structures represent the charged status of an object.

    c. Propagative T-branes expresses the propagation of eigen-rotational energy in an eigen-rotational string-matter continuum.

$:\Leftrightarrow$
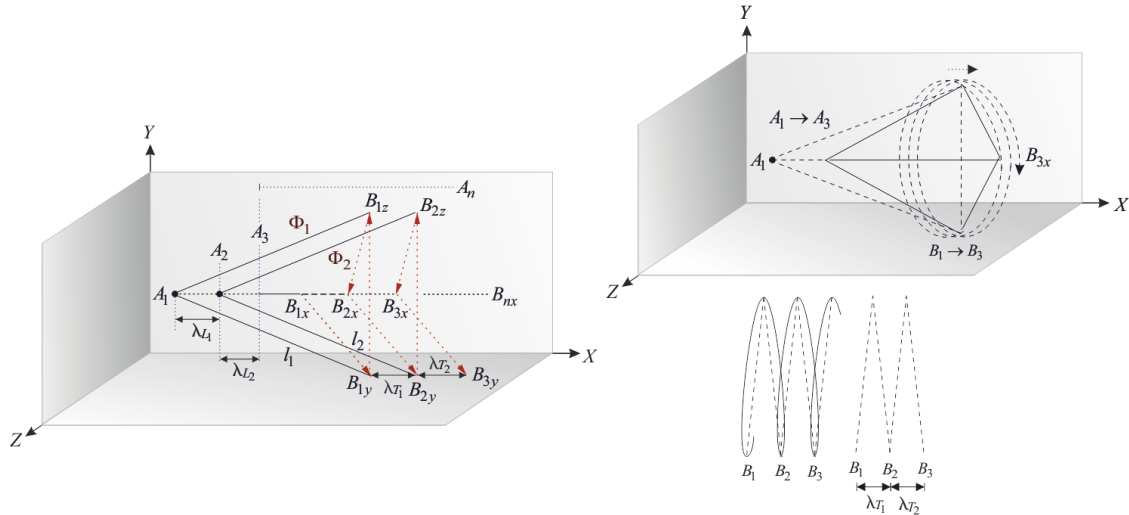
$$\left[A_1B_{1x} \equiv l_{1x,} \;\; A_1B_{1y} \equiv l_{1y,} \;\; A_1B_{1z} \equiv l_{1z}\right] \to l_1 : \left\{l_{1x}, l_{1y}, l_{1z}\right\}$$

$$where, \; \left[A_2B_{2x} \equiv l_{2x,} \;\; A_2B_{2y} \equiv l_{2y,} \;\; A_2B_{2z} \equiv l_{2z}\right] \to l_2 : \left\{l_{2x}, l_{2y}, l_{2z}\right\}$$

$\Rightarrow$

$$\left[l_{1x} \to l_{1y} \to l_{1z} \to l_{1x}\right]:\Phi_1, \;\; \left[l_{2x} \to l_{2y} \to l_{2z} \to l_{2x}\right]:\Phi_2,$$

$$where, \; A_1 \to A_2 \to A_3 \to \ldots\ldots A_n, \;\; l_1 \to l_2 \to l_3 \to \ldots\ldots l_n,$$

$$B_{1x} \to B_{1y} \to B_{1z} \to B_{2x} \to B_{2y} \to B_{2z} \to \ldots\ldots B_{nx} \to B_{ny} \to B_{nz}$$

$\Rightarrow$

$$\left[A_2 - A_1 = \lambda_{L_1,} \; A_3 - A_2 = \lambda_{L_2,\ldots,} \; A_{n+1} - A_n = \lambda_{L_n}\right] : \text{wave length of longitudinal wave,}$$

$$\left[B_2 - B_1 = \lambda_{T_1,} \; B_3 - B_2 = \lambda_{T_2,\ldots,} \; B_{n+1} - B_n = \lambda_{T_n}\right] : \text{wave length of transverse wave,}$$

$$where, \; B_1 : \left\{B_{1x}, B_{1y}, B_{1z}\right\}, \; B_2 : \left\{B_{2x}, B_{2y}, B_{2z}\right\}, \ldots\ldots, \; B_n : \left\{B_{nx}, B_{ny}, B_{nz}\right\}$$

$\Rightarrow$

$$\frac{\lambda_{L_1} + \lambda_{L_2} + \ldots + \lambda_{L_n}}{n} = \lambda_L : \text{mean longitudinal wave length,}$$

$$\frac{\lambda_{T_1} + \lambda_{T_2} + \ldots + \lambda_{T_n}}{n} = \lambda_T : \text{mean transverse wave length,}$$

$$where, \; \left|A_1 \otimes A_2 \otimes A_{3\ldots\ldots} A_{n-1} \otimes A_n\right| \neq \left|B_1 \otimes B_2 \otimes B_{3\ldots\ldots} B_{n-1} \otimes B_n\right|$$

$\Rightarrow$

$$\Delta\lambda_L \neq \Delta\lambda_T, \; where, \; \left[\lambda_L > \lambda_T\right]:\left[l_1 > l_2\right]$$

Propagation of eigen-rotational energy in T-brane is described by an alternative wave mechanics that expresses the propagation of a spiral wave in string-matter continuum, in that Wave-particle duality does not exists whereas a Dual wavelength of the propagating spiral wave, is expressional.

Some of the Analogs:

i. While History of time began, infinite number of One-dimensional string-matter segments evolved from pre-existed continuously deformed one-dimensional Static string-matter, and this is in analogue with the Quark-gluon plasma of the Primordial Universe in Particle scenario.

ii. The Fermions does not occupy the same space in time whereas the Bosons occupy the same space. This indicates that TBP-branes represents Fermions, whereas T-branes represents Bosons.

iii. The state of matter in Bose-Einstein condensate[6] is in analogues to the low energy eigen-rotational state of T-branes.

iv. Mass-energy equivalence is in analogy with the eigen-rotational energy of the string-segments.

v. Supersymmetry may be in correspondence with the Holarchical string-bundles in eigen-rotations.

Axiomatic geometry that has emerged on adapting the String theory in String-matter scenario:

As the strings are one-dimensional objects that replaces the zero-dimensional point-like particles of particle physics, String theory that provides a theoretical framework can be extended to the String-matter scenario to integrate the properties of all Fermions of Standard Model with this paradigm of Universe.

In string-theory the strings are vibrational as the connected vibrating particles, whereas in String-matter scenario they express eigen-rotations, instead of string vibrations. In this paradigm, as the strings are assumed as elastic, the curvature of space-time has been resolved in microscopic level, in that a discrete-time is implied.

String theory got developed while S-matrix theory was proposed to replace the local quantum field theory for defining the Coupling constant that determines the strength of force, exerted in an interaction. This Coupling constant is equivalent to the Spring-constant of the fundamental string-segment in String-matter scenario.

While adapting Sting theory in String-matter scenario, only the open string model principles has been adapted, and thus the gravity is considered as the derivative of the tensor product between two eigen-rotational string-segments.

On adapting the String theory in String-matter Universe paradigm, a topological isomorphism is expressional and thus the Baryon asymmetry in Corpuscular Universe is differently described in this Homeomorphically fluctuating paradigm of Universe and indicates the non-existence of Multiverse and Parallel Universe.

As the Supersymmetric models and implications are not imperative for this paradigm, the Superstring version of String theory may not be necessarily to be adapted with this paradigm.

All these required adaptability of String theory for this paradigm, indicates that the Axiomatic geometry to find the Truth of Mysterious Connection between Physics and Mathematics is, an extendable line segment between two points with an absolute value of positive integer, for describing the String-matter continuum in Projective geometry; rather than zero dimensional point like particles.

What differs on these scenarios while exploring this Mysterious connection:

In Particle scenario, the history of Universe began with the beginning of the universe; whereas in String-matter universe the matter existed as continuously deformed one-dimensional Static string-matter, before the History of Time.

This implies that the Corpuscular universe describes Big Bang as the Origin of universe, whereas the String-matter universe describes the origin of the dynamics of universe with time from a pre-existed Static string-matter universe. Thus the evolution of an eternal universe with a slow and sustained Geometric origin followed a rapidly progressed string-matter clusters of universe into its current state, is described.

Thus our perceptions on the Mysterious Connection between Physics and Mathematics differs on these two models of Universe.

Who pulled the Strings from Initial conditions:

Due to Initial cosmological singularity, the initial state problem in Particle scenario has not been solved by Friedman's solutions of General Relativity cosmological equations[7]. Thus there is disconnect between Physics and Mathematics on the Origin of Universe as there is disconnect between Quantum Mechanics and Cosmology.

In string-matter scenario, the Spring-constant is the only Initial condition for the initial state of Static one-dimensional linear elastic string of universe. Thus a trivial stress in a segment may change the linear elasticity[8] of adjacent segments and thus dynamics began with the emergence of string-segments and rapidly proceed with eigen-rotations.

But the question is on the causality of stress that effects strain to initiate the dynamics of an initial segment. How that segment got energy for that -- Is it spontaneous, an effect of charge of Isotropic elasticity of that segmental? Or, from an external source? If spontaneous, what is causal for that? If external, what is the source? Anyhow, it is by the Mysterious Connection between Physics and Mathematics at this juncture; that is beyond our imaginations..!, but it's the truth.

Conclusions:

Though the Connection between Physics and Mathematics exists from the origin of universe, it is not mysterious after the geometric origin of the universe, and before that it is Mysterious.

In Corpuscular Universe, when we explore backwards in time the Mathematical expressions on the Physics of dynamics ends up with the Initial singularity and thus the Mysterious connection that exists beyond that seems to be the result of inherent mathematical Trick of the probabilistic nature of Particle scenario proceed through the assumption on matter-antimatter existence.

Whereas in String-matter scenario, a Static one-dimensional linear elastic string of universe was pre-existed to the geometric origin of Eigen-rotational string-matter universe. Thus in this scenario, the Mysterious Connection between Physics and Mathematics began with the origin of dynamics in the pre-existed Static one-dimensional string-matter universe. This seems to be the Truth as there was no Initial singularity, while the gravity is considered as the derivative of the tensor product between eigen-rotational string-segments. In this the Physical origination of dynamics with time was instantaneously before the instant of emergence of plausible Mathematic expression.

In this context we may conclude the Truth as, 'Physics is causal for Mathematics' whereas, it is reverse with Initial singularity. But what is causal for Physics, is it that Mysterious Connection? Or, something beyond, with the Law of excluded middle…?[9]

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