Platonic Golden Network Theory for High Energy Physics and Quantum Cosmology

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Abstract- In the spirit of Pythagorean cosmic mathematical music of numbers and following the fundamental tenets of platonic transfinite set theory and the methodology of E-infinity Cantorian spacetime, we present a golden section based network with deep physical meaning confirming experimental results in high energy physics as well as cosmological measurements and observations related to the phenomenon of cosmic dark energy and dark matter.

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Platonic Golden Network Theory for High Energy Physics and Quantum Cosmology

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Abstract- In the spirit of Pythagorean cosmic mathematical music of numbers and following the fundamental tenets of platonic transfinite set theory and the methodology of E-infinity Cantorian spacetime, we present a golden section based network with deep physical meaning confirming experimental results in high energy physics as well as cosmological measurements and observations related to the phenomenon of cosmic dark energy and dark matter.

Keywords: E-infinity, cantorian spacetime, fractal spacetime, G. ord, L. nottale, golden mean number system, platonic set theory, pythagoras mathematical music, 8 exceptional lie symmetry group, dark energy density of the cosmos, noncommutative geometry, penrose fractal cosmos, 'thooft-veltman-wilson fractal spacetime.

I. Introduction

E-infinity theory is a fundamental and comprehensive theory [1-25] that purports to describe the small and the large scale structure of the universe using exact equations based on the golden mean number system [10-15]. The very idea of a system based on the golden mean is already suggestive of a combination of science and art [20],[23],[25]. The present short paper continues this E-infinity research program [1-25] by emphasizing the golden network feature or aspect of the E-infinity methodology. To do that, we could not find a better and simpler way than applying the present golden network to the major research field of cosmic dark energy [8],[12],[24] as we will demonstrate in the following sections.

II. The E-Infinity Platonic Network

a) The basic equation

The present work is structured with the intention that the reader will do the walking and fill in the gaps by consulting the literature [1-25]. Consequently we give here the equations which we will use without much explanation except the assertion that all these equations are similarly connected with literally infinite precision due to the infinitely fine structure of the transfinite golden mean number system [10-26]. In short, we require the following equation:

a. The reconstruction equation of the exact E-infinity inverse electromagnetic fine structure constant, as is well known, is given by [1],[3],[11],[14]

$$\bar{\alpha}_o = \left(1/\phi\right)\bar{\alpha}_1 + \bar{\alpha}_2 + \bar{\alpha}_3 + \bar{\alpha}_4 \qquad (1)$$

where $\phi = \left(\sqrt{5}-1\right)/2$, $\bar{\alpha}_1 = 60$, $\bar{\alpha}_2 = \left(\bar{\alpha}_1\right)/2 = 30$, $\bar{\alpha}_3 = 1+8 = 9$, $\bar{\alpha}_4 = \alpha\left(QG\right) = 1$. We remind the reader that $\bar{\alpha}_1, \bar{\alpha}_2, \bar{\alpha}_3$ are all found experimentally to be very close to these theoretical E-infinity values, the only exception being $\bar{\alpha}\left(QG\right) = 1$ which is simply the maximal coupling that can logically exist, being the coupling of a Planck mass to the Planck field and thus it is a logical imperative. The result for $\bar{\alpha}_o$ is equally close to the experimental value and may be written in the compact form [1-3]

$$\bar{\alpha}_o = \left(20\right)\left(1/\phi\right)^4$$
$$= 137 + k_o$$
$$= 137.082033989 \qquad (2)$$

where $k_o = \phi^5\left(1-\phi^5\right)$ and ϕ^5 is the experimentally found exact value of Hardy's quantum entanglement of two quantum particles [2,4]. In other words once we have the exact experimental results for dark energy as the experimental results for Hardy's quantum entanglement, then E-infinity becomes a true theory of nature without any doubt [20-26].

b. From (a) we can conclude that the core total topological dimensionality of E-infinity theory is simply given by [1],[3-4],[24]

$$\sum_{i=1}^{4}\bar{\alpha}_i = \bar{\alpha}_1 + \bar{\alpha}_2 + \bar{\alpha}_3 + \bar{\alpha}_4$$
$$= 60+30+9+1$$
$$= 100 \qquad (3)$$

This exact equation will play, besides $\bar{\alpha}_o$, a pivotal role in our analysis.

c. Einstein gravity will be presented by a quasi dimension equal to the number of Riemannian tensor components for D = 4 which is given by [10-15]

$$R^{(4)} = 20 \qquad (4)$$

d. While the dimension of E8 is equal to 496, the same E8 has an intrinsic core dimension equal to DE8(intrinsic) = 57 [16-19]. Both values must be

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harmonized in the sense of E-infinity so-called transfinite correction [1-16]. This correction is equivalent to the fundamental notions of harmony which are central to Pythagoras theory of cosmic music of numbers and platonic solids of Plato [23-25]. The final result is to find the following true values, namely [16-19]

$$\dim E8 = 496 - k^2 \qquad (5)$$

and

$$\dim E8(\text{intrinsic}) = 57 + k_o \qquad (6)$$

where $k = \phi^3(1-\phi^3)$, $\phi^3 = 1/(4+\phi^3)$, $k_o = \phi^5(1-\phi^5)$ and ϕ^5 is Hardy's quantum entanglement probability [2],[4],[12].

e. The old string theory as well as the heterotic Gross et al superstring theory has the dimensions D = 26, D = 16, D = 10 respectively [12],[24]. These values correspond in E-infinity theory to the harmonized values D = 26 + k, D = 16 + k and D = 10 where $k = \phi^3(1-\phi^3)$

f. Similar to the above, the 'tHooft-Veltman-Wilson renormalization [8] leads to a fractal spacetime given in E-infinity theory by $D = 4 - k$. It should be noted that [1-2],[21]

$$D = 26 + k, D = 16 + k, D = 10, D = 6 + k, D = 4 - k \qquad (7)$$

are obtained by golden mean scaling of $\bar{\alpha}_o = 137 + k_o$ and that $\bar{\alpha}_o$ and $\dim E8 = 496 - k^2$ are linked by the scaling

$$\dim E8 = (3 + \phi^3)(\bar{\alpha}_o) \qquad (8)$$

The reader can thus easily realize why E-infinity is truly seamless [1-26].

b) Analysis

From what we discussed so far and with regard to equations (1) to (8) we see that by invoking self-similarity and scale invariance we are lead to what we call analogical semi-duality outlined in Table 1 [16-19]. From this table, and on reflection and pondering the deep meaning of the Penrose-Connes fractal tiling model of our noncommutative universe[2],[4],[5], we see that the following is not only numerically and experimentally correct but far more than that and it makes a great deal of sense, particularly for the theory of dark energy which we feel should be renamed as the beautiful reality of cosmic pure dark energy, ergo

$$\left(\sum_{i=1}^{4} \bar{\alpha}_i\right)\Big/\bar{\alpha}_o \equiv (\bar{\alpha}_o)(\phi 3)\Big/(D^{(26)} - D^{14}) \qquad (9)$$

In other words

$$(100/13 + k_o) = (16 + k/22 + k)$$
$$= 0.7294901688 \qquad (10)$$
$$= \gamma(PD)$$

where

$$\gamma(PD) = 0.7294901688$$
$$= 72.94901688\% \qquad (11)$$

is the uncoupled pure dark energy density of the universe [12]. The exact coupled value is of course $\gamma(PD) = 73.3111\%$ which together with the dark matter energy density $\gamma(DM) = 22.18033$, comes to [2],[12],[24]

$$\gamma(D) = 95.49$$
$$\simeq 95.5\% \qquad (12)$$

The reader who is familiar with E-infinity theory will recall that $\gamma(D)$ is the energy of the empty set of the pre-quantum wave and is given exactly by the compact formula [2],[24]

$$\gamma(D) = (5\phi^2)/2$$
$$= 95.49150289\% \qquad (13)$$

III. CONCLUSION

There are no new results in the present paper that were not reported in earlier ones. However the point of view is novel in stressing the intimate relationship between science and musical harmony of the infinitely large and the infinitely small, i.e. the infinite in all directions as exemplified by the idea of the ancient theories of Socrates, Pythagoras and Plato that flourished in Alexandria, Egypt which the present author calls home with a great deal of affection.

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Table 1: Semi Duality of E-Infinity Cantorian Fractal Spacetime Theory (See Refs. [16]-[19])

Electromagnetism $$\bar{\alpha}_o = 137 + k_o$$ $$= 137.082033989$$	Compactified dimension of Bosonic strings $$22 + k = 22.1803398$$
Einstein-Riemannian tensors Component in four dimensions $$R^{(4)} = 20$$	Einstein spacetime dimensions $$D = 4$$
$$\bar{\alpha}_o + R^{(4)}$$ $$= 137 + k_o + 20$$ $$= 157 + k_o$$ $$= 157.08203389$$	The spacetime dimension of old string Theory $$26 + k$$ $$= 22 + k + 4$$
The dimension of the core of E-infinity theory + the intrinsic dimension of E8 spacetime $$= 100 + \left(57 + k_o\right)$$ $$= 157 + k_o$$	Euler constant = curvature = inverse coupling of quantum gravity $$= 26 + k$$