

The Speed of the Passing of Time as Yet Another Facet of Cosmic Dark Energy

—Dedicated to Prof. J.M.T. Thompson, FRS in Reminiscence of the Good Old Times

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Abstract

The topological speed of light which may be used to compute the density of ordinary energy and dark energy of the cosmos is replaced by dimensionless quantity taken from Special Relativity. The said quantity may be interpreted as akin to time dilation ergo a notion topologically equivalent to the speed of the passing of time or the difference of elapsed time between two events in Einstein's Relativity Theory. This results via Newton's kinetic energy into the well-known observationally confirmed and accurately measured 4.5 and 95.5 percent of ordinary and dark Cosmic Energy density respectively.

Keywords

Topological Speed of Light, Speed of Passing of Time, Dark Energy, Einstein Special Relativity, E-Infinity Theory, Cantorian Spacetime

1. Introduction

“Time passes. Listen time passes ...” These were some of the most haunting words the Author encountered as a young man when he was (and still is) fascinated by both Dylan Thomas' Under Milk Wood [1] and the acting and voice of Richard Burton in the identically entitled film [2]. At the time I was privileged to be a Ph.D. student of Prof. J. M. T. Thompson, FRS at University College, London [3]. Although working in a Civil Engineering Department [3] [4] both of us were mainly interested in fundamental science, specially Relativity. Apart of that we had deep affinity with Literature and Modern music particularly Dylan Thomas [1] [2] and Bob Dylan [5]. Nevertheless the Author must admit that neither he nor Michael Thompson ever suspected any scientific association between the psychological phenomenon of the passing of time [6] and the

mathematical relation of the same subject in Einstein's Special Relativity let alone any connection whatsoever to the Cosmic ordinary and dark energy density of the Universe. This field of scientific inquiry was yet to be discovered many decades later and was investigated and analyzed using the present Author's E-Infinity Cantorian Spacetime theory which generalized Special and General Relativity and unified them with Quantum Mechanics [7]-[427].

In the present paper, we will attempt to describe the genesis of the concept behind the topological speed of light, which was used to compute the cosmological energy density [27] [165], to become this mathematical concept of the speed of the passing of time which is used here for the same purpose [7] [29]. Remarkably but not unexpectedly both concepts give identical results [7] [29] [165]. It is not our intent to plea for one concept or the other as more natural or easier to grasp but we hope that the present work increases the confidence into the reality of the Dark Energy of the Quantum Wave [197] and the solid correctness of our quantitative analytically obtained results which is in superb agreement with all cosmic measurements and observations [89] [140]. Needless to say that, such agreement on its own account alone makes our theory almost refutation proof.

2. The Essence of the Topological Speed of Light in E-Infinity Theory

Motivated by the irreducible discreteness of quantum mechanics [8]-[28] and the mathematical-logic inconsistency in the definition of a classical point, a "pointless" Cantorian spacetime was advanced [15] [74] [420]. In this meantime well-known approach, which is based on previous work by Von Neumann and A. Connes [420], a classical point was practically replaced by an entire random Cantor set [8] [10] [420]. Such set is naturally of a Zero measure and Zero topological dimension [22] [33] [100]. Thus the only non Zero quantity attached to this set is a Hausdorff dimension equal to the golden mean ϕ as per the Von Neumann-Connes dimensional function [10] [420]. The result of such consistent but truly drastic geometrical simplification was that a subtle and delicate equality took place by which both the Hausdorff dimension ϕ became also the only representative of the "spirit" of the speed of light whereby one may set c to become $c = \phi$ [33]. The highly mathematical but simple argument leading to this unexpected result was explained elsewhere and is based on the Transfinite Set theory and Ultimate L [33] [48] [74] as applied to the unit interval of a Clopen random cantor set being the building block of E-Infinity Cantorian Spacetime. This fractal-like transfinite spacetime effectively extended the Minkowsky-Einstein spacetime program [8] [13] [41] [66] to encompass all scales *i.e.* from the large scale of the cosmos to the quantum scale of elementary particles [8] [10] [33] [74]. Taking now the kinetic energy density of Newton to the Cantorian Penrose-Connes universe one finds that [74] [79] [100]

$$E(\text{kinetic}) = \frac{1}{2}mv^2 \quad (1)$$

where m is the mass of a particle and V is its speed transfer via $v \rightarrow c = \phi$ to [74] [100]

$$E = \frac{1}{2} m\phi^2$$

where C is the speed of Light and

$$\phi = (\sqrt{5} - 1)/2 \quad (2)$$

Noting further that m is $m = \phi^3$ for ordinary energy while $m = 5$ for dark energy [81] [112], one finds the well known final results [138] [140]

$$E(O) = \phi^5/2 \quad (3)$$

for dimensionless ordinary energy and [138] [139] [140]

$$E(D) = (5\phi^2/2) \quad (4)$$

for dimensionless dark energy [74]. Subsequently a simple multiplication of the above with Einstein's density $E = mc^2$ gives us the final results namely [84] [85]

$$\begin{aligned} E(O) &= (\phi^5/2)mc^2 \\ &= mc^2/22 + k \\ &\simeq mc^2/22 \\ &\simeq 4.5\% \end{aligned} \quad (5)$$

and [85]

$$\begin{aligned} E(D) &= (5\phi^2/2)mc^2 \\ &\simeq mc^2 (21/22) \\ &\simeq 95.5\% \end{aligned} \quad (6)$$

The above result is in full agreement with a dozen or so previous derivations as well as being in more than excellent agreement with all modern recent measurements and observations [25] [27].

It is instructive to note that ϕ^5 may be interpreted as multiplicative topological volume of a five-dimensional Zero set quantum particle while $5\phi^2$ is the additive topological volume of a given dimensional empty set quantum wave [33] [81].

3. From the Speed of Passing of Time to Dark Energy

Although time does not pass for Albert Einstein as documented in his letters to the widow of his best friend M. Besso [427] there are some beautiful formulas and controversial interpretations of many consequences of Special Relativity which have bearing on this issue and the present work [33] [34] [236]. Taking things at their face value, it is possible to deduce following Ref. [7] that

$$t^1/t = \frac{1 - (v/c)}{\sqrt{1 - (v^2/c^2)}} \quad (7)$$

It is important to note that this formula is similar but not identical to the well-known

time dilation of Einstein's Special Relativity Theory. In particular our present results are correct only for $c/v = \sqrt{5}$ as noted in [7].

Furthermore following many previous results mainly due to Sigalotti as well as the members of the E-Infinity Group [27] [28] [29] [30] which clearly motivated the recent paper by the Serbian Mathematician C. Jozsef [7], it is possible to prove that $t^1/t = \phi$ as shown in Ref. [7]. In terms of E-Infinity theory and our preceding discussion we could say that the speed of the passing of time is identical to the topological speed of light and consequently $c = \phi$ [7] [33] [34] [35]. Adding $m(O) = \phi^3$ and $m(D) = 5$ to the above, the results of the preceding dissection of $E = mc^2$ into $E(O) = mc^2/22$ and $E(D) = mc^2(21/22)$ follows [66] [85] [236].

4. Conclusion

On a realistic mundane level one could say time does not pass. Only we humans pass. However Pure mathematics has normally little patience with the preceding poetic utterance. Nevertheless the mathematical utterance $t^1/t = \phi$ given in Ref. [7] and in a different form earlier on by the remarkable Italian Physicist L. Sigalotti [35] has consequence not only for us humans but for the entire universe and its formation and energy density. It is amazing how pure mathematics and mathematical logic can unite the un-unitable such as feeling and facts and all that via the magic of a Golden section based computation [236].

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