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# Commentary on a Transfinite Cantorian Gauge Theory as Applied to Determining the Temperature of the Microwave Background Radiation in the Topology and Geometry of (Fractal) Spacetime

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*Abstract* – The primary objective of the paper at hand is to introduce the far reaching consequences of applying pointless geometry of the von Neumann type in conjunction with a non commutative topology along the lines of the pioneering ideas outlined by A. Connes and his school as far as the powerful classical idea of gauge theory is concerned. In doing all of that, we simply found out that this procedure will revolutionize the entire classical gauge theory concepts as applied to modern high energy physics and quantum cosmology which we learned from the magnificent writings of G. ‘tHooft, his teacher, his students and his followers. To achieve this admittedly ambitious objective, we thought nothing could be easier than rewriting, expanding and commenting on a twenty year old paper which we published and is entitled: “Determining the temperature of the microwave background radiation from the topology and geometry of spacetime”. In the course of doing so and as the reader will surely notice, we did open new vistas in all directions connecting what superficially used to seem unrelated, disconnected and irrelevant to our subject and convert it to one coherent unit. With that we mean in particular subjects such as Eddington’s fundamental theory and its relation to the Pythagorean-Plato golden number system of “cosmic music”. The incredible truth uncovered here is that contrary to the wrong supposition that the more we move away from the cherished fundamental equation and endorse full heartedly the fundamental golden number system of ancient Alexandria, the faster we can revolutionize our outdated habitual classical view of objective science and become in a position to fuse together physics, mathematics, art and consciousness. In a sense this dream is becoming true. It is fair to point out that the present work depends fundamentally on the deep insight of the great Indian number theoretical genius S. Ramanujan in addition to the work that of E. Witten, D. Deutsch, R. Penrose, G. ‘tHooft. In addition, the work could also be viewed as an unexpected and fair resolution of the controversy known as the Hans Bethe spoof.

*Keywords* – Ramanujan’s Formula, Witten’s Fractal M-Theory, Deutsch Constructor Theory, Penrose Fractal Universe, L. Prandtl Boundary Layer Theory, Eddington’s Fundamental Theory, G. ‘tHooft Gauge Theory, A. Connes’ Non-Commutative Geometry, Von Neumann’s Pointless Geometry, The Temperature of a Picasso Drawing, Microwave Background Radiation, Hans Bethe Spoof, D. Gross Fractal Heterotic String Theory.

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## I. INTRODUCTION

The present paper comprises a substantial and comprehensive number of fundamental references [1-23] to facilitate a bird's eye view of a research program spanning almost four decades or more of intense exploration culminating into a fusion of physics, mathematics, Art and the scientific philosophy of consciousness [1-20]. Nonetheless, in keeping with the declared organization of the work at hand, let us quote first the abstract of the 20 years old paper which we seek to expand upon [1]. There we can read the following:

*“The absolute zero temperature, the mass of the electron and the COBE temperature of microwave background radiation are determined theoretically within the framework of a general theory using purely the to-*

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-pological and geometrical properties of  $\varepsilon^{(\infty)}$  spacetime [1-20]".

The above is still very much within the objectives of the present paper. However, we are going to stretch these objectives far beyond what we have done so far and we will take full advantage of the recent work on the incredible formula of S. Ramanujan [11] connecting the golden mean  $\phi$  with  $\pi$  and  $e$  via a continued fraction expansion with all what it entails about the possibility of mimicking quantum mechanics via deterministic chaos and the golden section random fractals [5-11].

Equally important for the present commentary is the very strong motivation and elucidation provided by the Deutsch-Marletto Constructor theory [6] as well as the thesis regarding the ultimate unified physico mathematical theory of nature [3], the super unification of physics and mathematics via wild topology [3-7] all apart from the fluid mechanics [21-22] models of L. Prandtl and others of quantum physics [9-10] and including the mini black holes quasi elementary quantum particles [12].

Last but by no means not least, we must stress the deep Insight in physics, pure mathematics and scientific philosophy which we gained from the many recent books of Professor Scott Olsen [2] as well as the relatively divulging into deep religious questions as presented by several contributors in Arabic as well as in English by the renowned Syrian thinker Nader Okko [15].

Next and surely in order to mention few points regarding the two competing cosmological theories namely the steady state theory as distinct from the Big Bang theory. In this context it is vital to ask if we did change our view about this important aspect of how the universe came to being. The answer is obviously we did change our opinion in two different directions. First, there was always three and not only two theories as far as we are concerned. The third theory is evidently our old proposal of a cold Big Bang as opposed to the classical 'hot' big bang. This cold big bang is obviously connected to the Banach-Tarski theorem and Cantorian micro spacetime paper which was published by the Author in 1995, almost 27 years ago [16]. On the other hand, the present work reinforced the 20 years old view that we can deduce all the information we found regarding COBE directly from Topology and geometry of spacetime without resorting to any of the three theories. Thus, in this respect, we are essentially maintaining our previous status quo.

## II. DEFINITION OF E-INFINITY

E-Infinity Cantorian spacetime meantime is well known as an infinite dimensional hierarchical Cantor set constructed from infinite number of union and intersection of elementary Mauldin-Williams golden mean Cantor set. The net total Hausdorff dimension of this space is  $4 + \phi^3$  where  $\phi = (\sqrt{5} - 1)2 = 0.618033921$  while the corresponding topological dimension is exactly 4. In the last 20 years since the guiding paper of the present work was published nothing conceptually dramatically new was discovered [1-23].

However, there has been many technical and deep mathematical connections gained from the relationships to various versions of higher dimensional Cantorian manifolds. For instance, very useful analytical tools were uncovered with respect to the important physics of the Dark Energy and matter on one side and pure dark energy and dark matter on the other side. All these advances were linked to the ingenious heterotic string theory of Nobel Laureate David Gross and his Princeton Quartet as well as the extension of E. Witten's Eleven dimensional M Theory marvel to a fractal cantorian and even heterotic transfinite M-Theory [17].

### III. THE TEMPERATURE OF AGEOMETRY

This section was the most difficult part to communicate and make it acceptable to conservative mainstream science because of the usual resistance of conventional and classical wisdom although the analysis which is provided by Professor Mendes France [1] and applied to a charming pencil drawn by Picasso is essentially thermodynamic in the sense of Boltzmann and also Nobel Laureate Ilya Prigogine. This point is however vital to understand in order to follow what is to come namely that moving from equation based physics to physics based in the Pythagorean-Plato golden mean number system will forever eliminate the deep rooted suspicion from the word numerology and rectifying the understanding of the pivotal role of numbers and number system so that at the end the Bethe spoof becomes an elementary spoofy misunderstanding between cautious yet congenial and courageous scientists [18].

### IV. THE ABSOLUTE ZERO TEMPERATURE

The initial hasty misunderstanding of this section is due mainly to two deceptively simple problems or even the habit of not being sufficiently philosophical when it comes to accepting the mainstream ideas which led to great technical control and invention but is really not as rich when true deep understanding is needed. The second reason is the artificial division between mathematics and physics and far more general between science, philosophy, art and consciousness. This and related issues are addressed in full width and breadth in the work of many highly critical Authors [19] and in the recent books of Scott Olsen [2-13].

Now and in the spirit of the above, we will skip discussing section 5, 6 and 7 as they are adequately covered by the preceding comments here and we proceed directly to No. 8 i.e., the discussion and conclusions of the 20 years old paper and try to update it in the hope we can.

### V. DISCUSSION AND CONCLUSION UPDATED

Since this is an updating of the discussion and conclusion of section 8 of a 20 year old paper we better start by quoting verbatim what we have written almost two decades ago:

*“If we accept that space time is simply a  $\epsilon^{(\infty)}$  quasi-transfinite manifold which can mimic a smooth continuum at low energy, then the Planckian character of black body radiation, the value of  $T_0$  as well as  $T_c$ , are all inevitable natural consequences of topology and geometry of our present spacetime. In essence Prigogine has always maintained that thermodynamics is just as fundamental as quantum mechanics and that both should be related in a fundamental way to spacetime geometry [4-5]. In fact  $\epsilon^{(\infty)}$  can be used in a direct way to find  $T_0$  as [1].*

$$T_0 = (2\alpha - 1)K \tag{1}$$

*It is a great irony that the above formula was first discovered by Bethe et al [1] and published as a covert parody on the work of Eddington. It also seems that a great physicist like Bethe could simply not write something entirely wrong even when he tries very hard to do so. In fact, it seems that one should never use the deadly weapon of ridicule in scientific debates even when one is sure that he is justified in doing so. Eddington was simply too much ahead of his time and his mathematics was far behind his intuition. Bethe and his associates on the other hand could not ever have dreamed of a theoretical physics formulated in 26, 16, 19, 6*

and 4 dimensions simultaneously as routinely done nowadays in the theory of Heterotic super strings and he did not know that there are geometries with no integer dimensions and theorems like that of Nash and Banach-Tarski [1], [16].

*In conclusion we can only repeat what we have mentioned at the very beginning. On its own, the COBE data could not give a final confirmation to the bang theory because we can obtain the same result using pure topological and geometrical arguments without resorting to any of the two major cosmological theories in any direct way".*

We still agree completely with the above and stress further the following points which were highlighted as far as we are concerned by a better understanding of the work of Deutsch as well as the Ramanujan formula and many other publications [11].

Mathematics is not only a tool. Mathematics is logic i.e. it is understanding per se. When the question is to understand we must stop this division between physics, mathematics and Art. Reaching such level, will convert the equation No. (1) to pure logic and simple scaling of the golden mean which encapsulates the entire truth i.e. the lingua franca of Nature itself [2, 5].

*Organization of the Present Paper:*

*The Present Work is Organized as Follows:*

We follow strictly the division and numbering of the guiding twenty year old paper quoting first mostly verbatim each section and then subsequently following it by the new extensions, commentary and suggestions using the same numbering.

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### AUTHOR'S PROFILE



**Professor M.S. El Naschie**, was born in Cairo, Egypt on 10th October 1943. He received his elementary education in Egypt. He then moved to Germany where he received his college education and then his undergraduate education at the Technical University of Hannover where he earned his (Dipl-Ing) diploma, equivalent to a Master's degree in Engineering plus being a professional chartered engineer. After that he moved to the UK where he enlisted as a post graduate student in the stability research group of the late Lord Henry Chilver and obtained his Ph.D. degree in structural mechanics under the supervision of Professor J.M.T. Thompson, FRS. After his promotions up to the rank of full professor, he held various positions in the UK, Saudi Arabia and USA and was a visiting professor, senior scholar or adjunct professor in Surrey University, UK, Cornell, USA, Cambridge University, UK and Cairo University, Egypt. In 2012 he ran for the Presidency of Egypt but withdrew at the final stage and returned to academia and his beloved scientific research. He is presently a Distinguished Professor at the Dept. of Physics, Faculty of Science of the University of Alexandria, Egypt. Professor El Naschie is well known for his research in structural stability in engineering as well as for his work on high energy physics and more recently for his work in cosmology and elucidation of the secret of dark energy and dark matter as well as for proposing a dark energy Casimir nano reactor and a fuelless interstellar spaceship. He is the creator of E-infinity theory, which is a physical theory based on random Cantor sets and can be applied to micro, macro and mesoscopic systems. Professor El Naschie is the single or joint author of about one thousand publications in engineering, physics, mathematics, cosmology and political science. His current h-index is 86 and his i-10 index is 810 and total citations are 40208 according to Google Scholar Citation.