Simulating the Quantum Universe Via the Golden mean Number Expert-Like System

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Abstract – The paper proposes the golden mean number system as the most efficient method for numerically simulating the quantum universe. We argue using numerous examples that the proposed system far outsmarts all computer based simulation methods including quantum computer and cellular automata and may be likened to a fuzzy expert system. We conclude that accepting the golden mean number system which is basically a universal simulation is tantamount to an indirect proof that the universe is a golden mean Turing-type super computer.


I. INTRODUCTION

The present work is concerned mainly with interpreting the golden mean number system as a universal numerical simulation of Nature [19-53] and its relation to E-Infinity Cantorian spacetime theory [1-49]. We may recall that E-Infinity theory was developed initially to demonstrate the fractal Nature of spacetime geometry [1-4] [6-10] [12, 14, 16] and conceptually speaking this was done more or less in the direction of the pioneering work of G. Ord and L. Nottale [24, 25]. However unlike the work of the abovementioned pioneers, E-Infinity made an almost exclusive, extensive use of the golden mean [8, 12, 14] not only as a number [6, 9, 31] but far more than that as a number system [31, 32]. We may also recall the important role of transfinite correction in E-Infinity theory and its similarity to the experience gained with Fuzzy Expert System and Artificial Intelligence [31-53].

In the present work we would like to go as far as we can using numerous examples to show that the golden mean number system is a universal transfinite Turing golden mean simulation machine of our universe [31-34] [40]. This amounts effectively to the claim that our universe is essentially a Turing-type golden mean computer [33, 34].

II. ARGUMENTS FOR THE GOLDEN MEAN COMPUTER NATURE OF THE COSMOS

Historically the golden mean entered E-Infinity theory of high energy physics and quantum cosmology via the fractal Hausdorff dimension of spacetime \(4 + \phi^3\) where \(\phi = (\sqrt{5} - 1)/2\) [1-10] and subsequently by demonstrating how the entire mass spectrum of elementary particle physics as well as the fundamental coupling constants can be computed using exclusively the golden mean and its power [1-4], [10]. Within the present work however we will discard the historical order of the subject and will list the various "simulations" based on what we perceive as the most important discoveries in this field [1-49].

2.1. Hardy's Quantum Entanglement Probability [31-45] is as far as we are concerned the most important theoretically exact result, which has been confirmed experimentally. In our opinion it is probably the most persuasive result attesting for the thesis of the present work namely that the Universe is a quasi-golden mean based computer [33]. Hardy's quantum entanglement amounts to \(\phi^5\) which is remarkably twice as large as the ordinary energy density of the universe [46, 47].
2.2. Painstaking measurement of the ordinary energy density of the universe has shown that it is very close to half the exact value of Hardy's probability of quantum entanglement [6, 47] a result which was confirmed theoretically via some 24 different methods [16, 47] and is almost impossible to see any weak points in these closed forms and accurate calculations [46, 47]. It follows then that the dark energy density of the universe is equal to half of $5\phi^2$ [16, 47].

2.3. KAM Theorem [8] is a central and crucial chapter in nonlinear dynamics [12, 14, 24]. The Golden Mean is a key ingredient of this theorem. In short KAM implies that the lack of physical friction in Hamiltonian chaos is compensated for by the maximal irrationality of $\phi$ being the "most irrational" number [24, 25], [9, 20, 50, 51].

2.4. The Golden mean gives us the exact theoretical value of the most fundamental and important inverse coupling constant namely that of electromagnetism [1-4]

$$\alpha_0 = 20(1/\phi)^4 = 137.082039325$$

which is very close to the experimental value $\alpha_0 = 137.06$ [1-4], [9], [50, 53]

2.5. The Golden mean was found theoretically and experimentally in the Ising model [5, 4] via the Exceptional Lie Symmetry groups E8 [44].

2.6. E-Infinity theory has shown how $D = 4 + 3\phi^3$ is related in exact scaling of $\alpha_0 = 137 + k_0$ where

$$k_0 = \phi^5(1-\phi^5)$$

as well as the exact dimension of fractal E8 namely [1-6], [44]

$$\text{Dim E8 (Fractal)} = 496 - k^2 = (3 + \phi)(\alpha_0)$$

Here $K = 2\phi^5$ is 't Hooft's dimensional renormalon [21, 24, [53].

The Author could go on listing dozens of more examples from the macro [1-4], [9, 20, 50, 51], micro [1-8] and large scale structure of the universe [44-47], [9, 50, 51] attesting for the unbelievable abundance of the golden mean in the fundamental equations of Physics, Biology as well as Chemistry, Visual Art and Music [1] but rather than to go on with that we can do better and more economically by directing the reader to the large body of results already existing in literature [1-53].

III. CONCLUSION

We advanced the conjecture that the universality of the golden mean number system as attested by its appearance almost anywhere in quantum physics and cosmology is due to its ability to play the role of a universal numerical simulation of Nature. This is tantamount to an indirect proof that the universe itself is essentially a golden mean Turing-type computer or a transfinite 'tHooft cellular automata. It may be also likened to a Fuzzy Expert System related to the theory of Artificial Intelligence. Numerous specific examples have been cited in support of this claim which could be said to be less than certain but more than probable.

REFERENCES


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 Naschle 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 is cosmology and elucidation of the secret of dark energy and dark matter as well as for proposing a dark energy Casimir nanoreactor. 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 Naschle is the single or joint author of about one thousand publications in engineering, physics, mathematics, cosmology and political science. His current h-index is 78 and his i-10 index is 767 and total citations are 33208 according to Google Scholar Citation.