

# T(Hawking) go to Unruh topological temperature as K(Bolzman) tends to a K(Topological) that is equal to the Immirzi Parameter $(\phi)^6$ divided by $D = 10$ of the superstrings spacetime where $\phi$ is the golden mean 0.6180339989

M. S. ElNaschie  
 Distinguished Professor  
 Department of Physics, Faculty of Science  
 Alexandria University, Alexandria, Egypt

**Abstract**

The present quite short paper proposes that S. Hawking's temperature  $T$  of a Schwarzschild black hole tends toward the topological Unruh temperature as  $K(\text{Boltzmann})$  constant tends towards a corresponding Boltzmann-like constant  $K(\text{Topological})$  equal to  $(\phi)^6$  where  $\phi$  is the minor form of the golden section  $\phi = (\sqrt{5} - 1) / 2 = 0.618033989$ ,  $D = 10$  is the topological dimension of super strings spacetime and  $(\phi)^6$  is effectively the exact transfinite value of the Barbero-Immirzi parameter connecting superstring theory with loop quantum gravity.

The work is not intended to be mathematically stringent but relies to some extent on common sense arguments plus physical intuition as well as educated guessing work supported by well-known numerical experiments coupled with thought and actual experiments as well as painstaking measurements of cosmological observations. The overall sweeping fundamental conclusion is that our classical understanding of mathematical physics as physics developed using stringent mathematical machinery may be replaced by a new and deeper understanding, namely the unification of mathematics and physics via a very general brand of topology commonly known as wild topology which came to be some time ago an indispensable part of modern nonlinear dynamics, complexity theory and deterministic chaos.

**Keywords:** Hawking radiation, Unruh temperature, Immirzi parameter, Superstrings, Wild topology unification, Golden mean number system.

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## I. A brief analysis

The following very condensed analysis relies on the following points:

1.1. Starting from Hawking's famous radiation temperature of a Schwarzschild black hole [1-4]

$$T = \frac{hC^3}{8\pi k_B GM} \tag{1}$$

we transfinitely correct it in the by now familiar E-Infinity methodology which leads to the topological quantum being equated to [5-18]

$$h \square \phi^5$$

of Hardy's probability of two quantum particles [8]. Furthermore, we have [4-10]:

$$c \square \text{the average fractal speed of light,}$$

$$GM = 1 \text{ for Planck units,}$$

$$8 \square (16 + k) / 2 = 8 + \phi^5 \text{ where } k = \phi^3(1 - \phi^3), k / 2 = \phi^5 \text{ and}$$

$\pi \square 3 + \phi^3$  is the corresponding E-Infinity value [4-22].

from which we conclude that  $(8 + \phi^5)(3 + \phi^3) = 26 + k$

In other words, we have:

$$\begin{aligned} \frac{hc^3}{8\pi K_B GM} &\rightarrow \frac{(\phi)^8}{(26 + k)K(\text{Topological})} & (2) \\ &= \frac{(\phi)^8}{(1/\phi)^2(10)(K(\text{Topological}))} \\ &= ((\phi)^{10} / 10) \left( \frac{1}{K(\text{Topological})} \right) \end{aligned}$$

Therefore, we see from the above that if T(Hawking) tends to the Unruh topological temperature which within E-Infinity theory is given exactly by  $\phi^4$  then it follows that we must have [4-11]

$$\begin{aligned} K(\text{Topological}) &\square \frac{((\phi)^{10} / 10)}{\phi^4} & (3) \\ &\square (\phi^6) / 10 \end{aligned}$$

Note that this Barbero-Immirzi parameter  $\phi^6$  [11] can be interpreted as the intersection of 6 zero sets quantum particles of the Connes-El Naschie dimension  $\phi$  or three empty sets quantum waves of the dimension  $(\phi)^2$  [6-10], [18].

1.2. The next most important point is related to the holographic principle [10,12] which simply stated holds that all the information of a quantum object is encoded on its surface. Now since the quantum wave is the Cobordism of the quantum particle, then by this famous holographic principle, the quantum wave holds all the information of the quantum object and in particular the quantum particle on its surface [10-12].

1.3. It is important to recall all the E-Infinity results of the ordinary cosmic energy density ( $\gamma(0) \square 4\%$ ), the dark matter cosmic energy density ( $\gamma(DM) \square 22\%$ ) and the pure dark energy cosmic density ( $\gamma(PD) \square 74\%$ ) [10,13]

## II. Discussion and Conclusion

From the above and putting the three previous fundamental points together, we arrive at the inescapable conclusion that the notion of mathematical physics [8,9] should be advantageously replaced by the deeper notion of wild topology [9] which conveys the idea that it is topology of the most general type which unifies mathematics and physics [8,9].

### Very personal and private concluding remarks and acknowledgement

Looking at the present work in the light of S. Hawking's contributions, the Author looks back not in anger but in amazement at how much he has fundamentally changed. He admits that he did not appreciate many years ago in Cambridge, how deep and important S. Hawking's research on black holes is [1-3],[17] because while Penrose's research [14] connected to the Arabic golden mean decoration of "Al Hambra" and its connections to the Golden Mean and M. Escher's fantastic drawings [15] captured the mind and soul of the present Author, he says it loud and clear that he underestimated the tremendous importance of the great research of S. Hawking [1-4]. It is always a big mistake to underestimate anyone was the constant advice given to the Author by his boss and dear friend Prof. S. Al Athel, the former Minister of Scientific Research of Saudi Arabia who was a brilliant Ph.D. student in Stanford.

With age we grow more tolerant maybe because in the course of our lives we have tolerated many things about ourselves and others as Boris Pasternak put it in Dr. Zhivago. However, it may be more

illuminating to point out how the hero of the Author's young years, Dylan Thomas stated it in his unforgettable radio play "Under Milk Wood" as follows:

"We are not wholly bad nor wholly good nor live our life Under Milk Wood".

With that the Author would like to rest his case and thank all those who tolerated him for so many years, almost 80 in total.

### Literature

- [1]. Stephen Hawking. The universe in a nutshell. Bantam Press [2001]. Imprint of a division of Penguin Random House. London, UK. (see in particular The Black Hole Temperature Box, page 118).
- [2]. Hawking radiation. Wikipedia. <https://en.Wikipedia.org/wiki/Hawking-radiation>.
- [3]. Michael C. Lopresto. Some Simple Black Hole Thermodynamics. The Physics Teacher, vol. 41. May 2003. pp. 299-301.
- [4]. M. S. Elnaschie. Experimentally based theoretical argument that Unruh's temperature, Hawking's vacuum fluctuation and Rindler's wedge are physically real. American Journal of Modern Physics, vol. 2, issue 6. November 2013, pp. 357-361.
- [5]. L. Marek-Crnjac. A short history of fractal-Cantorian space-time. Chaos, Soliton and Fractals. vol. 41, issue (5) [2009], pp. 2697-2705.
- [6]. M. S. Elnaschie. The Theory of Cantorian Spacetime and High Energy Particle Physics (an informal review). C, S & F. vol. 41, issue (5). [2009] pp. 2635-2646.
- [7]. M. S. Elnaschie. On a fractal version of Witten's M-Theory. International Journal of Astronomy and Astrophysics. vol. 6 No. 2. June 2016. pp. 135-144.
- [8]. M. S. Elnaschie. Fuzzy Wilson Loops, Witten's topological field theory and golden mean number system theory as the deep roots of Hardy's quantum entanglement. International Journal of Innovation in Science and Mathematics. Vol. 9, issue 4. ISSN (online) 2347-9051 [2021] pp. 70-77.
- [9]. M. S. Elnaschie, M. A. Helal, Ji-Huan He, L. Marek-Crnjac. Super unification of physics and mathematics. Journal of Progressive Research in Mathematics. vol. 18, No. 4. pp. 22-27.
- [10]. M. S. Elnaschie. Element of a new set theory based on quantum mechanics with application in high energy quantum physics and cosmology. International Journal of High Energy Physics [2017]. vol. 4. No. 6. pp. 65-74.
- [11]. M. S. Elnaschie. The quantum gravity Immirzi parameter. A general physical and topological interpretation. Gravity and Cosmology. Vol. 19. No 3 [2013] pp. 151-153.
- [12]. Leonard Susskind and James Lindsay. Introduction to Black holes, Information and the String Theory Revelation - The Holographic Universe. World Scientific, Singapore [2005].
- [13]. L. Marek-Crnjac and Ji-Huan He. An introduction to Elnaschie's theory of Cantorian spacetime and dark energy. International Journal of Astronomy and Astrophysics. vol. 3 No 4 [2013] pp. 464-471.
- [14]. M. S. Elnaschie. Penrose's universe and Cantorian spacetime as a model for the non-commutative quantum geometry. C, S & F, vol. 9, issue 6, June 1998, p. 931-933.
- [15]. Mike Wade. Roger Penrose on his friend M. C. Escher: The genius that galleries ignored. The Times. Wednesday, June 24 [2015].
- [16]. Stephen M. Hawking. A Brief History of Time (from the Big Bang to Black Holes), Bantam Press. London [1988].
- [17]. M. S. Elnaschie. Cantorian micro-type black holes as the fundamental building blocks of spacetime. International Journal of Innovation in Science and Mathematics. Vol. 8, issue 6 [2020]. pp. 259-261.
- [18]. M. S. Elnaschie. The De Broglie-Bohm Pilot wave theory via E-Infinity Cantorian spacetime interpretation. International Journal of Innovation in Science and Mathematics. Vol. 8, issue 3 [2021], pp. 19-22.

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