EJTP V14, No 37

He Lived Here
In memory of Stephen Hawking

Oxford, 8 January 1942 – Cambridge, 14 March 2018

What a strange awakening today. Stephen Hawking – escaped from an infaust diagnosis 21 years ago and from many fatal surgeries- is gone.

My generation has grown up with catchphrases such as "where were you when John Lennon died?" I think that Stephen Hawking death will bring back similar questions in the future. As it has been said for Einstein: "He lived here". I'm not speaking only of the powerful and empathetic relation he and his work had with the media and audience. All of us admired Eddie Redmayne in *The Theory of Everything* and, earlier, Benedict Cumberbutch playing the role of Hawking, all of us know something about black holes and their radiation; and *A Brief History of Time* is surely one of the the most successful book of all time.
Actually, there another reason why the Stephen Hawking death will be stuck in our minds. Just for once, the image in the media was *really* the man behind and beyond the news. You could always perceive he was a man of stature and an intense person, there was something unique between the brightening of his eyes and the lines of his most technical papers. Einstein used to say that a theoretical physicist can appear to be an opportunist with no scruples to epistemologists. The reason lies in the fact that a scientist uses precise tools, mathematics for theoretical physicists, and not the power of interpretations; in no way a scientist worries about giving a frame to a result so mimicking a philosopher. That's where Hawking was, maybe, the most secular among the scientists. He never married a theory, but he wooed them all, just like he never failed to smile at a pretty woman. He always questioned how far a theory could we lead, and we could *actually* say about the Universe. Among all the things that gave him everlasting fame there are

Fig. 1 Stephen Hawking with W.J. Kaufmann (1977)

two problems which really stay at the extreme borders of knowledge. One deals with the final stage of massive stars, the famous Black Holes, which, according to Einstein, during the last stage of their lives should enter on infinite collapse, a *singularity.* Laplace had already saw it, as well as Oppenheimer and Landau later, up to Wheeler and his master Sciama. Nobody had ever investigated it before as Hawking did. Singularity had wandered like a monster in specialized reviews and journals for some years, later – thanks to Hawking and Penrose – it became clear that it was just a structural limitation of Einstein gravitation theory and it was time to give room to a new theory, the *quantum gravity*, which is still a frontline topic in theoretical physics. Stephen Hawking was the one who reached some milestones in this new field, the black hole radiation and the information analysis of a physical system with Hawking-Bekenstein formula. Black holes were just an exercise, because now Stephen was ready to look at the more mysterious singularity, the *Big Bang.* It was about in the '80s, he and Jim Hartle proposed the *no-boundary Universe*, a charming expression that we can coarsley translate by saying that space and time emerge from a *quantum nebulosity*; something similar to the Nicola Cusano Universe, where there is no before and no after, where each point is the center. Or, just to be a bit more technical, where time is *curved and imaginary* before collapsing into what we see and what the Standard Model describes.

Similarly to all the other physicists, I happen to quote Stephen thousand times, and every time it was an occasion to read his works again. I admired his ability to build an apparently impenetrable castle of mathematics all around a strong idea. He could have been an excellent chess player. I say "apparently" because Hawking knew very well that mathematics was a sublime form of rethoric which could always be attacked or taken apart. Or started from scratch. What really makes the difference for a physical theory are generalities and the steadiness of its starting points. Sometimes, a weak point could be found in Stephen's approach (*shrewd, very subtle!*), but , at the same time, you couldn't help but notice how the question had been posed with absolute clearness and how it would be really difficult to do it better. Leonardo Chiatti and I started from Hartle-Hawking theory to develop the idea of the Archaic Universe [1,2,3]and, recently, Fabrizio Tamburini, Maria Felicia de Laurentis and I have discovered a particular mode of Hawking radiation, the so-called *soft hairs.* There's only a case when Hawking admitted to be defeated, in front of a young Don Page, about the end of the Universe, namely about the possibility that the whole wave-function rewinds to go back to origins. Like it happened some years before with Kip Thorne about the possibility to discover a black hole in Cygnus X-1, also in that occasion a stake was paid: a magazine subscription (in the case of Kip, it was a yearly subscription to *Playboy*). In my opinion, the Hawking idea is well-grounded, so the last word has not been spoken.

Maybe, the most don't know that there is a beautiful theatrical play titled *God and Stephen Hawking* on Stephen Hawking life and his struggles with his disease and the biggest mysteries of the Universe. The author, Robin Hawdon, was really within "the zone" when wrote it, you can find in the play the same humor which has became the irreducible trait of Stephen.

In the end there are some cues echoing the closing lines of *A Brief History of Time,* where Stephen reaffirms his faith in a Final Reason, it equates him with giants like Einstein. Let's listen to it once again:
STEPHEN: I do know it is there, inherent to the infinite experiment of the Universe. A solution that – differently from any metaphysical theory and belief – will look to be so clear....so patent...and we will realize it has been with us all the time.
Bye Stephen!

Ignazio Licata

[1] Ignazio Licata: Universe Without Singularities. A Group Approach to de Sitter Cosmology, EJTP, vol. 3 nr. 10 **(2006)**, pp. 211-224
[2] Ignazio Licata, Leonardo Chiatti: The Archaic Universe: Big Bang, Cosmological Term and the Quantum Origin of Time in Projective Cosmology, International Journal of Theoretical Physics, vol. 48, nr. 4 **(2009)**, pp. 1003-1018
[3] Ignazio Licata, Leonardo Chiatti: Archaic Universe and Cosmological Model: "Big-Bang" as Nucleation by Vacuum, International Journal of Theoretical Physics, vol. 49, nr. 10, **(2010)** pp. 2379-2402
[4] Fabrizio Tamburini, Mariafelicia De Laurentis, Ignazio Licata and Bo Thidé Twisted Soft Photon Hair Implants on Black Holes, *Entropy* **(2017)**, *19*(9), 458
Ignazio Licata

Preface

In the first quarter of 2018, we present a collection of fourteen manuscripts covering important topics of theoretical and mathematical physics ranging from quantum walk, gravitational waves, string theory, gauge field theories and canonical formalism, gravitational thermodynamics and quantum gravity, neutrino masses and effective Majorana, relativistic Klein-Gordan equation, thermodynamics of hot Quantum scalar field, Spin and Zitterbewegung, solutions to the gravitational field equations in curved phase-spaces, hadron mass quantization, Neimark-Sacker bifurcation and chaotic attractors for discrete dynamical systems, and Dirac space in the Quantum relativistic theory.

Lanéry on his paper presents a self-contained introduction of the projective limits of state spaces: quantum field theory without a vacuum and its relations to other QFT approaches. Mansour et al. addresses in his paper the Faddeev-Jackiw quantization methodology in the noncommutative structure of massive Bosonic strings. Margolin defined the gravitational thermodynamics for minimal length and minimal inverse temperature. Kaminaga in paper propose the Poisson bracket for a new canonical theory. Damanik in his work derives a neutrino mass matrix from cobimaximal neutrino mixing matrix in parallel with effective Majorana mass. Debnath address relativistic Klein-Gordan equation for q-deformed modified Eckart plus Hylleraas potential. Jafarizadeh et al. on their work on graph isomorphism problem investigate Fermionic quantum walk for detecting Nonisomorph Cospectral Graphs. Rojas et al. use the brick wall model to calculate of free energy of quantum scalar field in a curved spacetime (D +1) dimensions. Recami et al. in his paper "Spin and Zitterbewegung" address the classical theory of the electron in parallel with quantum analogue to extend a new non-linear Dirac-like equation. Castro in his paper gives mathematical solutions to the gravitational field equations in curved phase-spaces. Fathi presents dialectic transformation media within gravitational waves. Hothi et al. show the validation of the Hadron mass quantization from experimental Hadronic Regge trajectories. Yahiaoui et al. in their cryptographic work discuss the dynamics and bifurcations of a family of two-dimensional noninvertible maps. Temnenko in his 4th paper of the series of physics of currents and potentials addresses Dirac space and vectors.

I want to express my sincere gratitude to the my friend *Ignazio Licata* for the valuable discussions, reviewing and excellent editorial work, and thanks to my friend *Hanna Sabat* from the center of theoretical physics and astrophysics for his help in editing the manuscripts, many thanks to our referees for their valuable comments and notes. We thank all authors who contributed their articles for this issue.

Ammar Sakaji