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Origin of consciousness and contemporary physics

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ABSTRACT

All great religions used the light as a symbol of transcendence and characteristic of divinity, talking about “divine spark that is inside us”. Light indicates the life; the symbol of light pervades the Bible from the first to the last page, it is the principle of creation. God has been called in various ways, but the light is the metaphor used to talk about His nature. From the point of view of physics, the light is an electromagnetic wave; the electromagnetic force is one of the four fundamental forces known today. Recent insights consider our physical universe as appeared by a phase-like transition from a universe with 10 space-time dimensions. Relatively to a new appeared model, called B-DS model, consciousness would be created by the electromagnetic field in relation to the $SU(6) \times U(1)$ symmetry group. The human brain is conceived as an interface organ receiving informations, an element of interference from incoming data and already existing data (the subject’s memory).

Keywords: Consciousness, Light, Electromagnetic Force, Universe, Contemporary Physics, Cosmology, B-DS model

1. INTRODUCTION: THE SYMBOL OF LIGHT IN GREAT RELIGIONS

Symbolism and religious experience have always been inscribed in the complex of evolutionary processes that led to the human species. One of the common characteristics of the great religions is the *symbol of light*; the profusion of gold in statues, temples and sanctuaries tries to reproduce the light, symbol of the invisible mystery of divine presence. The path of man in search of light is witnessed by cultural anthropology.

The experience of the sacredness of light is found in ancient Egypt, Anatolia, Greece, Byzantium. In *ancient Egypt* the deceased was illuminated as a symbol of the miraculous presence of a sacred, divine element. At the heart of pharaonic religion there was the certainty that the human being is made for the light of heaven. The Egyptian man of pharaonic time believed in immortality, felt as a radical transformation into a powerful light (*akhu*) [1].

In *ancient India* the theme of light, in opposition to darkness, is present in Vedic cosmogony and cosmology. The light is the central point of numerous Brahmanical rites, such as the perfective rites (*isamskara*). In the Upanishads, the light is the symbol of liberating knowledge, a guarantee of immortality. At the final goal of the journey, the human being will become light himself, and will no longer distinguish between the subject who sees, the object of vision and the act of seeing [2].

In the *Biblical tradition* the people of Israel prostrate themselves before the Creator of every light, which guides the human being and leads him to the joy of a bright day. In the *Apocalypse*, John speaks about the realization of the victory of light: "There will be no more night and they will no longer need the light of a lamp, nor the light of the sun, because the Lord God will illuminate them and reign for ever and ever" (Ap 22, 5).

The symbolism of light leads us to the heart of the central mystery of the *Manichean faith* and of *Gnostic soteriology*; the realm of light frees the soul captive of darkness through the illumination that leads to know the divine mysteries [3,4]. The *noûs-light* enters the man, illuminates her/his divine part and awakens the psyche immersed in oblivion; in this way the human being feels the call of his divine origins.

The symbolism of light dominates also the language of *Muslim mystics*. The Arab philosopher, mystic and poet Ibn 'Arabi in his major work "Al-Futuhât al-Makkiyya" (The illuminations of Mecca) indicates how the theme of light expresses the relations between the One and the multiple [5].

The theme of transfiguration (metamorphosis) in *medieval art in the West* (IX-XVI century) represents the theme of light as multiply highlighted in Christian art, and thus the experience of light in the human condition with the "life-truth-light" perspective of the Christian message, emphasized in architecture and in various forms of sacred art [6].

In the Bible, God has been called in various ways: Elohim, El Shaddai, El Elyon, JHWH, but the light is the metaphor used to talk about His nature [7]. The symbol of light pervades entirely the Bible. The light is the principle of creation: "God saw that light was good" (Gen 1-2). It becomes the reality of all creation: the sky, the earth, the sea, the stars, the fish, the birds, the animals, the man, all come "into the light". The light is inseparably associated with the life: people come "to the light", walk "in the light", become "children of light".

The light is an attribute of God: He is "clothed with light" (Ps 104,2), "His presence is light" (Ex 13,21; Is 60,19), is the source of life and light. The light of God is "salvation" (Ps 27,1), the righteous enjoy the "light of life" (Ps 97,11). In the New Testament the symbolism of light takes up various images of the Old Testament and personifies them in Jesus Christ. The

disciples who follow him by living his word are also “carriers of light” (Mt 5,14). In the Gospel of John, the symbol of light is indispensable for understanding the text: “The true light that enlightens every man comes into the world” (Jn 1,9); the light “shines in darkness, and darkness has not overcome it” (Jn 1,1-5; Jn 8,12; 9,5; 12,36; 12,46) [8,9].

2. THE IMPORTANCE OF LIGHT FOR LIFE

Our planet is near a star that radiates it completely with its light. Every human cell and every form of life on Earth synchronizes its activity with the sun. The sun is also a source of food for all life, energy that binds together the important components of biomass, such as hydrocarbons. Hormones, neuro-transmitters, inflammatory and growth factors, self-synchronizing genes and many other undiscovered mechanisms regulate vital functions. All these elements are dependent on the availability of sun exposure.

In the morning, the components of the central nervous system launch hundreds of reactions within the human body and the number of monoamines, the most important neurotransmitter of the nervous system, increases. At the same time, hormonal regulation in different areas of the body is synchronized through chemical communications, following our activity level and other hormones in our body. Successful synchronization of these activities is a prerequisite for our well-being.

The decrease of light in favor of the dark activates the *night hormones* (melatonin), whose level increases very much at night and touches the peak in the early morning hours. The lack of light in winter or during evening can negatively affect our well-being, interfering in the essential rhythm of the metabolism of events.

The existence of light in our lives is evident. As a result, we often forget its central role for our well-being and for all life on the planet and in the universe. Scientific and technological progress is showing the enormous potential of light. About the therapeutic properties of sunlight we remember:

- 1) it has pain-relieving properties;
- 2) it burns fat;
- 3) variable sunlight according to solar cycles can regulate human life span. Exposure to sunlight can directly affect our life span and can also accelerate genetic changes providing survival benefits;
- 4) sun exposure improves mental performance;
- 5) it can be converted into metabolic energy [10-12].

3. LIGHT AND MODERN/CONTEMPORARY PHYSICS

From the point of view of physics, the light is an electromagnetic wave; the electromagnetic field is responsible for the electromagnetic interaction. It consists of the combination of the electric field with the magnetic one, and is generated locally by a time-varying distribution of electric charge that propagates in space in the form of electromagnetic waves.

According to quantum physics, every field is quantized, that is made up of discrete quantities, has its *basic brick* (the *quantum*) not further divisible (for dimensions of the order of the proton/neutron; for smaller dimensions and in *extreme* physical situations, the picture becomes more articulate). The *photon* is the quantum of the electromagnetic field. It has been historically also called the *quantum of light*, and was introduced at the beginning of the 20th century, when it was understood that the energy of an electromagnetic wave is divided into *packets*, in discrete portions. With the emergence of quantum mechanics, the photon has acquired the role of *particle*.

The term “photon” comes from the Greek “φῶς, φωτός” (phòs, photòs), which means *light*; it was coined in Paris in July 1926 by the optical physicist Frithiof Wolfers and immediately used on scientific level [13-15].

The *Standard Model* (SM) is a unified physical theory that describes three of the four fundamental forces known today, namely the strong and weak nuclear forces and the electromagnetic force. The predictions of this theory have been extensively tested experimentally with great accuracy. It is based on the mathematical theory of groups, in particular on the $SU(3) \times SU(2) \times U(1)$ group [16] (Figure 1).

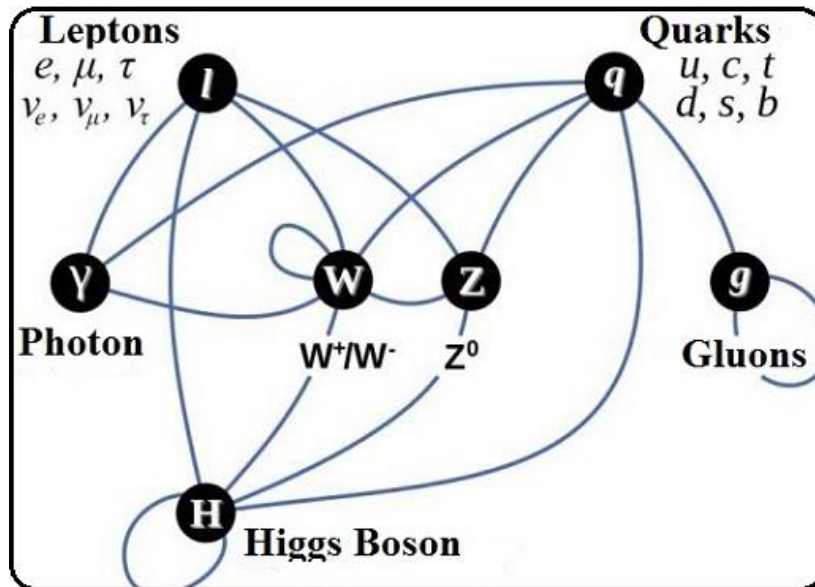


Figure 1. Elementary particles of the Standard Model [16].

The standard model is extended by larger unified theories, which also consider the fourth fundamental force (the force of gravity), in which the $SU(3) \times SU(2) \times U(1)$ group is unified in higher groups, called $SU(5)$, $SO(10)$, $SU(11)$, E_6 , E_8 , and others larger ones [17].

4. TECHNICAL DETAILS OF A NEW MODEL

There is still no consensus on how the universe initially came to be; a followed assumption is that an energetic fluctuation caused the universe to tunnel into existence from

quantum foam. The spontaneous symmetry breaking of the unified field occurred, then separating gravity, matter fields and GUT's (Grand Unified Theories) force field, as well as initiating the expansion of the universe.

With the General Theory of Relativity, Einstein expected the universe to be *closed* and *filled* with matter; moreover, always according to Einstein's General Relativity (GR), the matter-space-time cannot be separated by any cost. Going outside the gravitating sphere, theoretically there is nothing; thus, outside the closed Einstein's universe, where real time and space cannot be defined, we assume within our new model an imaginary space and time, with matter belonging to another phase. Again from Einstein's GR, the universe was born by a zero volume; an alternative idea is that the volume of our physical universe changes to another phase like the phase-transition systems. Einstein's explanation of GR works for our physical universe, but it does not explain beyond our space-time, i.e. outside the gravitational sphere; Einstein's space-time is actually measurable within the gravitational field [18,19].

Until the end of nineties, almost all the discussions about classical and quantum cosmology of singularities were devoted to the Big-Bang and Big-Crunch singularities, which are characterized by the vanishing value of the cosmological radius. The construction of different cosmological models has attracted the attention to the fact that other types of cosmological singularities could exist, as the soft or sudden singularities called *Big-Brake* cosmological singularity. They occur at a finite value of the scale factor and of its time derivative. Another class of singularities should mention the *Big-Rip* singularity.

Type	Spacetime Dimensions	Details
Bosonic	26	Deals with just bosons and open and closed strings. Major flaw: has a particle with imaginary mass called a tachyon
I	10	Supersymmetry between forces and matter. Open and closed strings.
IIA	10	Supersymmetry. Closed strings only. Fermions spin both ways.
IIB	10	Supersymmetry. Closed strings only. Fermions spin only one way.
HO	10	Supersymmetry. Closed strings only. Right moving and left moving strings differ. SO(32) group symmetry.
HE	10	Supersymmetry. Closed strings only. Right moving and left moving strings differ. $E_8 \times E_8$ group symmetry.

Figure 2. A list of studied string theories with their main characteristics.

In our model the space-time of the universe would be actually a complex space-time. According to mathematics, we consider a *narrower folded universe* with real space-time and

assume that it exists a *wider unfolded universe* with complex space-time, thus we get the space-time of the *global universe* as a complex space-time. We found a relation between folded and unfolded space-time of the global universe by using the Wheeler De-Witt (WDW) equation. In quantum cosmology the universe, as a whole, is treated quantum mechanically and described by a single wavefunction. To get a unique viable solution from WDW equation, we must respect the boundary conditions of quantum cosmology, of primary importance in obtaining the relevant solution.

The universe in our model has $(4+D)$ -dimensions with a complex scale factor $R + iR_I$, where R is the scale factor corresponding to the usual 4-dimensional universe and iR_I is that of the D -dimensional space-time (i is the imaginary unit of complex numbers). It is found that for $D = 6$ (i.e. in 10 dimensions), the WDW equation is symmetric under the exchange $R_I \leftrightarrow R$, explaining then the most popular M-theory / superstring theory [20-22] (Figure 2).

Our universe would emerge from the SU(11) group. Now, by group theory we know that:

$$SU(n) \supset SU(p) \times SU(n-p) \times U(1).$$

Putting $p=5, n=11$ (where $p > 1$ and $n - p > 1$), we obtain:

$$SU(11) \supset SU(5) \times SU(6) \times U(1).$$

We assumed SU(5) as *energy group of matter* and SU(6) as a new type of energy source, called *latent energy group*. The breaking of the supergroup in SU(5) \times SU(6) groups leads to a *phase transition*, with SU(5) leading to SU(3) \times SU(2) \times U(1) subgroups.

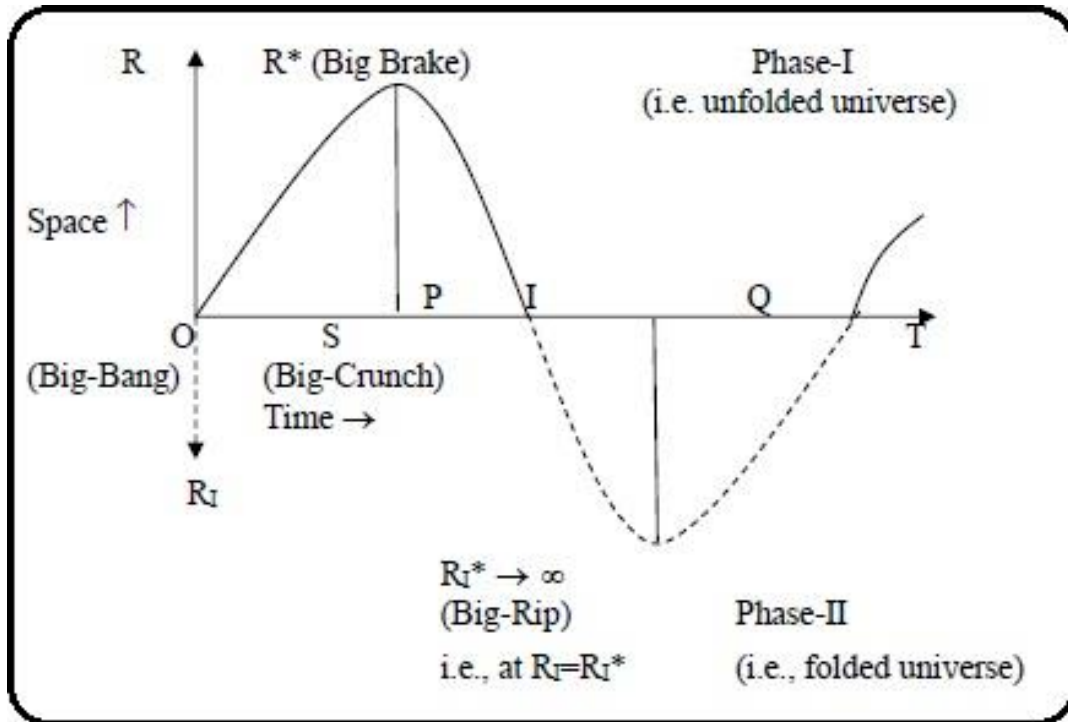


Figure 3. Graphical representation of the space-time with the new model.

The idea that our 4-dimensional universe (3 spatial and 1 temporal dimensions) emerges by a space-time with higher dimensions has received and is receiving serious attention to date by the scientific community. The extra dimensions (6 dimensions in this case) would be compactified into particular spaces called *Calabi-Yau spaces*. Unified theories (superstring theories, M-theory) include both gravity and the Standard Model, with 10 space-time dimensions [23-25] (Figure 3).

5. CONSCIOUSNESS AS FUNDAMENTAL PROPERTY OF THE UNIVERSE

This global universe has $(4+D)$ -dimensions, with the 4 *canonical* dimensions related to Einstein's space-time and the D extra dimensions associated with *consciousness*.

We are studying the *quantum state of consciousness* by introducing a series of new energy sources: SU(5), SU(6), SU(12), etc. We assume that consciousness is more fundamental than matter, that means there exists mainly two types of consciousness: an *absolute consciousness* and a *matter-oriented consciousness*. The absolute consciousness fills the wider universe; it controls the creation of the physical universe and then the matter-oriented consciousness.

Our universe appears by a symmetry breaking of the generalized Gaussian energy group SU(11), that contains the groups $SU(6) \times SU(5) \times U(1)$ from a Big-Rip singularity. Our physical universe unfolded with the symmetry breaking of SU(11) and gave three fundamental energy sources:

- SU(6), called *latent energy group*, that has created the matter-oriented consciousness;
- SU(5), the *unified Gaussian energy group*, that can be explained with Einstein theory of Relativity and the Standard Model of physics;
- U(1), related to electrodynamics.

The formation of the matter universe involves the group SU(5), whose subsets are SU(3) (responsible for the nuclear strong force), SU(2) (responsible for the nuclear weak force) and U(1) (responsible for the electrodynamics), as explained by Grand Unified Theories (GUTs) [16].



Figure 4. New ideas derived by theoretical efforts of contemporary physics and related to philosophy of mind.

The group $SU(6)$ is responsible for *human consciousness*, with the creation of *qualia*, the qualitative aspects of every conscious experience, extremely specific and characterizing the individual conscious experiences [26]. Thus consciousness is not only in our brains, but it also exists outside. Our own consciousness is a part of the universal consciousness [27] (Figure 4).

6. PHOTON AND ELECTRIC CHARGE MEDIATE THE CONSCIOUSNESS

As anticipated, the $SU(6)$ group can be interpreted as a new type of energy source, different from that derived from $SU(5)$; $SU(6)$ would therefore directly control the entire universe including ourselves, also creating the consciousness. The electromagnetic interaction through the $SU(6) \times U(1)$ structure, called *pseudo-electromagnetic interaction*, can be responsible for *sensory consciousness* with the *material electromagnetic interaction* obtained by the $SU(2) \times U(1)$ structure.

In relation to the electromagnetic theories of consciousness, the “Conscious Electromagnetic Information Field Theory” (CEMI) states that the electromagnetic field in the brain refines the probabilities of neuronal triggering. Affected neurons can be a part of larger connected groups, leading to *memory* and *learning*. In simulated networks, non-synaptic neuronal interactions through the electromagnetic field and gap junctions improve learning [28-31] (Figure 5).

Whenever the wavefunction of the electron collapses, experiences like the OBE (Out of Body Experience) and NDE (Near Death Experience) end, the person returns to her/his physical body and her/his perception of reality is similar to the collapse of the wavefunction in the double-slit experiment in quantum physics [32-34]. During OBE and NDE, consciousness can enter in an independent fluctuating existence outside the human body, where it can travel independently by the space-time, in a similar way to an entangled electron [35,36]. The entanglement plays in our model a very important role.

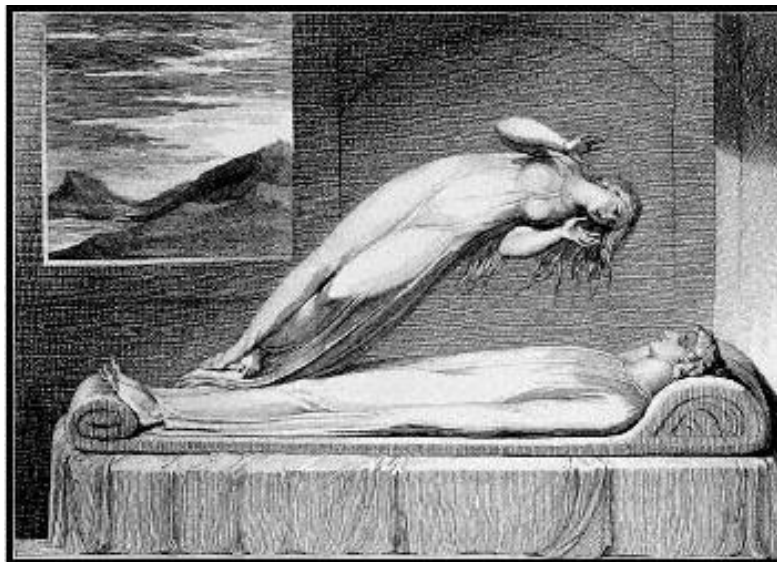


Figure 5. Illustration of Robert Blair’s poem “The Grave”, depicting the soul leaving the body.

7. CONCLUSIONS

The experience of light, substance *close to the incorporeal* and closely linked to the intelligible, refers to other from itself. The light reveals itself as an extreme attempt to materialize the intelligible. We can participate the two aspects of this double articulation, sign and sense, perceived by the eye and the mind.

Quantum physics indicates that consciousness is correlated to the *awareness* that an electron *seems* to show in the wave-particle duality; but the electron behaves differently when *it is observed by a human*. This indicates that it will change its behavior/reality depending on whether it is observed or not, as if it *would be aware* of the fact of being observed. This awareness is very similar (if not the same) to human awareness and can be connected to the same consciousness. Consciousness works for the formation of our universe, with a behaviour similar to quantum entanglement.

Recent scientific developments indicate in consciousness a non-material entity capable of independent existence, and not a simple property. It can remain localized in the human brain and interact with it, and therefore, control the activities of the human body.

The space-time of the global universe is a complex space-time and there is neither any starting point nor any ending point of the wider universe, measurable in quantum cosmology. There exists the initial and ending conditions for narrower universe, measurable in classical way, that has emerged from the wider universe by the process of phase changing. The wider universe is other than Einstein's universe, which derives from the first one.

Electrons in the brain behave as particles, so they prevent the consciousness from realizing that it is part of a larger whole. When the electrons behave as a wave, the consciousness becomes aware of its existence outside the human brain, and this makes OBE and NDE possible. We can conclude that consciousness is a quantum mechanical entity that can have an independent existence, but related with matter substances.

How do the "ego" or the "self" or the "perceived wholeness" of own world emerge from a system made up of so many parts, billions of neurons? What creates the "individuality" and the "self"? A possible solution to these questions is to consider the human being as an entity given by the combination of two different characters of electromagnetic wavefunctions, produced in two different phases by the symmetry breaking of SU(11) and SU(5) groups.

Biography of the authors

Paolo Di Sia is currently adjunct professor by the University of Padova and the Free University of Bozen-Bolzano (Italy). His scientific interests span transdisciplinary physics, classical and quantum-relativistic nanophysics, nano-neuroscience, theories of everything, foundations of physics, history and philosophy of science. He is author of 286 works to date, is reviewer of some academic books, editor of international academic books, reviewer of many international journals. He obtained many international awards, is member of many scientific societies and of many International Advisory/Editorial Boards, recently awarded with the title of Doctor of Mathematics (D.Math) as legitimate honor by the International American Council for Research and Development, California Public University, USA.

Narayan Kumar Bhadra is a 16-years teacher and 19-years headmaster/principal of a government sponsored higher secondary school in West Bengal (India). His scientific activity spans the complex quantum-state of consciousness and the cosmology of the very early universe (specially quantum cosmology). He published many preprints and papers on international journals.

References

- [1] J. D. Ray, The emergence of writing in Egypt. *World Archaeology* 17(3) (2010) 307-316
- [2] B. M. Sullivan, The Religious Authority of the Mahābhārata: Vyāsa and Brahmā in the Hindu Scriptural Tradition. *Journal of the American Academy of Religion* 62(2) (1994) 377-401
- [3] S. Mazumdar, S. Mazumdar, Religion and place attachment: A study of sacred places. *Journal of Environmental Psychology* 24(3) (2004) 385-397.
- [4] J. H. Evans and M. S. Evans, Religion and Science: Beyond the Epistemological Conflict Narrative. *Annual Review of Sociology* 34 (2008) 87-105
- [5] F. R. Halligan, The Creative Imagination of the Sufi Mystic, Ibn ‘Arabi. *Journal of Religion and Health* 40 (2001) 275-287
- [6] I. Harris, The God Who May Be. A Hermeneutics of Religion. *Symposium* 6(2) (2002) 239-241
- [7] J. V. Taylor, The theological basis of interfaith dialogue. *International review of mission* 68(272) (1979) 373-384
- [8] J. S. Bielo, On the failure of ‘meaning’: Bible reading in the anthropology of Christianity. *Culture and Religion. An Interdisciplinary Journal* 9(1) (2008) 1-21
- [9] L. Schachter, Alternative to Bible stories for young children. *Religious Education. The official journal of the Religious Education Association* 80(2) (1985) 308-313
- [10] J. M. Walch, B. S. Rabin, R. Day, J. N. Williams, K. Choi, J. D. Kang, The effect of sunlight on postoperative analgesic medication use: a prospective study of patients undergoing spinal surgery. *Psychosomatic Medicine* 67(1) (2005) 156-163
- [11] M. Münch, F. Linhart, A. Borisuit, S. M. Jaeggi, J. L. Scartezzini, Effects of prior light exposure on early evening performance, subjective sleepiness, and hormonal secretion. *Behavioral Neuroscience* 126(1) (2012) 196-203
- [12] W. E. Lowell, G. E. Davis, The effect of solar cycles on human lifespan in the 50 United states: variation in light affects the human genome. *Medical Hypotheses* 75(1) (2010) 17-25
- [13] B. Bertotti, Uniform Electromagnetic Field in the Theory of General Relativity, *Physical Review* 116 (1959) 1331
- [14] H. S. Snyder, The Electromagnetic Field in Quantized Space-Time. *Physical Review* 72 (1947) 68
- [15] S. N. Gupta, Gravitation and Electromagnetism. *Physical Review* 96 (1954) 1683.
- [16] P. Di Sia, $D = 4, N = 1$ supergravity in superspace: general overview and technical analysis. *World Scientific News* 94(1) (2018) 1-71
- [17] R. Feger, T. W. Kephart, LieART - A Mathematica Application for Lie Algebras and Representation Theory. *Computer Physics Communications* 192 (2015) 166-195

- [18] P. Di Sia, About the peculiar Aspects of Relativity and beyond: a pedagogical Perspective. *American Journal of Educational Research* 2(6) (2014) 357-360 - doi: 10.12691/education-2-6-4
- [19] N. Kumar Bhadra, The Complex Quantum and Classical Pseudo-Tachyonic Universe. *IOSR Journal of Mathematics* 8(3) (2013) 15-32
- [20] N. Kumar Bhadra, The Complex Model of the Universe (H0244145). *IOSR Journal of Mathematics* 2(4) (2012) 41-45
- [21] N. Kumar Bhadra, The Complex Model of the Quantum Universe (D0412033). *IOSR Journal of Mathematics* 4(1) (2012) 20-33
- [22] P. Di Sia, Exciting Peculiarities of the Extreme Physics. *Journal of Physics: Conference Series* 442(1) (2013) 012068.
- [23] P. Di Sia, On philosophy of mind, quantum physics and metaphysics of the uni-multiverse. *Philosophical News* (2020) in press.
- [24] P. Candelas, X. C.de la Ossa, Moduli space of Calabi-Yau manifolds. *Nuclear Physics B* 355(2) (1991) 455-481.
- [25] E. Alvarez, Quantum gravity: an introduction to some recent results. *Reviews of Modern Physics* 61 (1989) 561
- [26] P. Di Sia, Mindfulness, Consciousness and Quantum Physics. *World Scientific News* 96 (2018) 25-34
- [27] P. Di Sia, Quantum Physics, Metaphysics, Theism: Interpretations, Ontologies, Theological Remarks. *World Scientific News* 74 (2017) 106-120
- [28] N. Kumar Bhadra, P. Di Sia, Mind and consciousness as created by electromagnetic force. *International Journal of Applied and Advanced Scientific Research (IJAASR)* 4(1) (2019) 1-6 - doi: <http://doi.org/10.5281/zenodo.2573101>
- [29] L. Dong, Y. Zheng, Z. Y. Li, G. Li, L. Lin, Modulating effects of on-line low frequency electromagnetic fields on hippocampal long-term potentiation in young male Sprague-Dawley rat. *Journal of Neuroscience Research* 96(11) (2018) 1775-1785
- [30] S. Pockett, The electromagnetic field theory of consciousness: a testable hypothesis about the characteristics of conscious as opposed to non-conscious fields. *Journal of Consciousness Studies* 19(11-12) (2012) 191-223
- [31] N. Kumar Bhadra, The Complex Quantum-State of Consciousness. *IOSR Journal of Applied Physics* Ver. II 9(1) (2017) 57-93
- [32] J. McFadden, The Conscious Electromagnetic Information (Cemi) Field Theory: The Hard Problem Made Easy? *Journal of Consciousness Studies* 9(8) (2002) 45-60
- [33] A. M. Smith, C. Messier, Voluntary out-of-body experience: an fMRI study. *Frontiers in Human Neuroscience* 8 (2014) 70
- [34] B. Greyson, Western Scientific Approaches to Near-Death Experiences. *Humanities* 4(4) (2015) 775-796

- [35] P. Di Sia, About the existence of the universe among speculative physics, metaphysics and theism: an interesting overview. *International Letters of Social and Humanistic Sciences* 9(1) (2015) 36-43
- [36] N. Kumar Bhadra, The Origin of Consciousness in the Universe. *IOSR Journal of Mathematics* Ver. III 10(5) (2014) 53-68