



# Advanced Relativity for the Renaissance of Cosmology and Evolution of Life

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## ABSTRACT

In Advanced Relativity model conscious observer builds the cosmological model on the basis of elementary perception and experimental data. Each element of the model is related to the exactly defined one element of the universe with the bijective function of set theory. The physical universe represents a set  $X$ ; the cosmological model represents a set  $Y$ . Both sets are related with the bijective function of set theory  $f : X \rightarrow Y$ . The resulting theoretical model of the universe is an adequate picture of the universe as a non-created system in dynamic equilibrium in which life is the consistent part of cosmic dynamics.

**Key Words:** Conscious Observer, Bijective Function, Epistemology, Cosmology, Evolution of Life

**DOI Number:** 10.14704/nq.2017.15.4.1106

**NeuroQuantology 2017; 15, 4:37-44**

## Introduction

Conscious observer is building cosmology model exclusively on his elementary perception and experimental data. Imagine you are a conscious observer. You have the perfect ability to observe and be conscious how your mind is building scientific models of reality. With your eyes you can observe in the universe matter, energy and space. Matter and energy are continuously changing, so you observe material changes of the universe. These material changes are characterized by an exact sequential order: change is happening after change and change is happening after change. When change enters existence change does not exist anymore. When change enters existence, change does not exist anymore. Material changes in the universe have their numerical order which you observe with the sight and measure with the clocks. This numerical order of material changes is time. These are the 5 fundamental elements of the universe which you perceive with eyes and experience without interference (interpretation,

analysis, synthesis) of your mind: matter, energy, space, change and time. And you, as the conscious observer, are the sixth fundamental element of the universe. These six elements constitute the set  $X$  of the universe:

$$X : \{M_X, E_X, S_X, C_X, T_X, CO_X\} \quad (1)$$

where  $M_X$  is matter,  $E_X$  is energy,  $S_X$  is space,  $C_X$  is change,  $T_X$  is time,  $CO_X$  is conscious observer.

You may apply bijective function of the set theory:

$$f : X \rightarrow Y \quad (2)$$

and define the set  $Y$  of the model of the universe with the following elements:

$$Y : \{M_Y, E_Y, S_Y, C_Y, T_Y, CO_Y\} \quad (3)$$

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**Relevant conflicts of interest/financial disclosures:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

**Received:** 02 August 2017; **Accepted:** 14 November 2017



where  $M_Y$  is matter,  $E_Y$  is energy,  $S_Y$  is space,  $C_Y$  is change,  $T_Y$  is time,  $CO_Y$  is conscious observer.

Set X and set Y are related with bijective function which realizes the Einsteinian idea of “completeness theorem” according to which each element of the model should correspond exactly to one element of the real world (Fiscaletti and Sorli, 2015a).

Conscious observer has experimental data that black holes have tendency to become smaller and smaller and that finally disappear. He calculates that in black holes energy density of space becomes lower and this makes atoms unstable. On the basis of these calculations he predicts that in black holes matter transforms into the photons which then turn back into the energy of space (Sorli *et al.*, 2016a). This means that matter, energy (electromagnetic energy) and space are different forms of energy of the set X and forms the subset energy X (EX), which can be formulated as following:

$$\begin{aligned} X : \{CO_X, C_X, T_X, \{XE\}\} \\ EX : \{M_X, E_X, S_X\}. \end{aligned} \quad (4)$$

We have now four fundamental elements of the set universe X: conscious observer, change, time and energy; the same is in the set model Y:

$$\begin{aligned} Y : \{CO_Y, C_Y, T_Y, \{YE\}\} \\ YE : \{M_Y, E_Y, S_Y\}. \end{aligned} \quad (5)$$

Conscious observer has experimental data that space is continuously radiating cosmic rays which form elementary particles (Friedlander, 2002). In the universe matter is continuously transforming back into energy of space in black holes; in outer space energy of space is continuously transforming into cosmic rays and further into elementary particles. This means that energy of the universe is continuously circulating. The question of the “begging” of the universe does not exist for the conscious observer. He understands that universe is not running in some linear time which exists only as a mind frame in which common observer is experiencing run of universal changes. Universe runs in space where is always NOW. Conscious observer is exceeding the 20<sup>th</sup> century view on the universe as a system

which has its beginning in some temporal remote event called Big Bang.

In physics of 20<sup>th</sup> century the principle of causality was one of the most valid. No one ever had doubt that this principle could be wrong in a sense that it does not reflect the real nature of physical reality. The core of the causality principle is that events are running in time and that event 1 is a cause of event 2, event 2 is a cause of event 3 and so on. Advanced Relativity has confirmed that events run only in space and that time is their numerical order. When event 2 enters into existence, event 1 does not exist anymore, when event 3 enters into existence, event 2 does not exist anymore. Events run in space where there is always NOW. The principle of causality which implies the existence of physical time as the arena of the events does not work in physical reality; it is only our rational mind interpretation.

In Advanced Relativity principle of causality is replaced with the principle of dynamics: Universe is in a continuous dynamics which does not have particular cause. Dynamics itself is the fundamental universal principle. Dynamics always happens between two or more elements. For example motion of an elementary particle in space is dynamics between particle and space. In Advanced Relativity there are two different types of dynamics in the universe:

1. Temporal dynamics
2. Immediate dynamics.

Temporal dynamics is for example, motion of planets and stellar objects. Motion has its own numerical order and is temporal. It does not run in time, it runs in space only, time is their numerical order which we measure with clocks. Immediate dynamics has no numerical order. Such dynamics are gravity and entanglement. Universal phenomena based on dynamics do not need energy. Motion of the Moon around Sun does not require any energy use, because it is the result of dynamics between variable energy density of space and two material objects. In physics of 20<sup>th</sup> century the prevalent idea was that for anything to happen energy is used. This is valid only for manmade machines and is not valid for the universe which is ruled by the law of dynamics. Dynamics is the intrinsic physical property of the universe and nature which does not use energy in order to run. For common view of physics this seems “strange”, however our perception of the universe is confirming the principle of dynamics. Planets are rotating around the Sun without using energy; the same is with the rotation of our solar



system around the centre of Milky Way galaxy. Cosmologists today still approach the universe similarly to the machines made by the humans. This “temporal cosmological view” is based on causality principle where cause and consequence are happening in some linear physical time. In Advanced Relativity, time is merely the numerical parameter of motion in space where is always NOW which means that cause and consequence happen in the same NOW and are part of universal dynamics which can be immediate or temporal. In Advanced Relativity universal space has origin in quantum vacuum. We developed formula for gravitational constant  $G$  in order to show that  $G$  is related to permittivity and permeability of quantum vacuum.

$$G = \frac{l_p^3}{m_p \cdot t_p^2} \quad (6)$$

$$G = \frac{l_p^3}{m_p \cdot \frac{l_p^2}{c^2}} \quad (7)$$

$$G = \frac{c^2 \cdot l_p}{m_p} \quad (8)$$

Velocity of light  $c$  is:

$$c = \frac{1}{\sqrt{\omega_0 \cdot \epsilon_0}} \quad (9)$$

$$c^2 = \frac{1}{\omega_0 \cdot \epsilon_0} \quad (10)$$

Combining equations (8) and (10) we get:

$$G = \frac{l_p}{m_p \cdot \omega_0 \cdot \epsilon_0} \quad (11)$$

Equation (11) shows gravitational constant  $G$  depends on Planck metrics of quantum vacuum, its permittivity and its permeability.

Max Planck units are representing mathematical values for quantum vacuum physical properties. In empty space energy density of quantum vacuum has a value of Planck energy density  $\rho_{PE}$ . We know in physics that every physical system has a tendency to reach the

average distribution of energy. Where a given particle exists, quantum vacuum energy density is smaller exactly for the amount of the energy contained in a given particle:

$$\rho_{PE} = \rho_{qvE} + \frac{mc^2}{V} \quad (12)$$

Where  $\rho_{PE}$  is Planck energy density,  $\rho_{qvE}$  is energy density of quantum vacuum in the centre of a given particle (or massive body),  $m$  is mass of the particle (or massive body),  $V$  is volume of the particle (or massive body).

Equation (12) we can rearrange and we will get:

$$E = mc^2 = (\rho_{PE} - \rho_{qvE}) \cdot V \quad (13)$$

Where left side of the equation represent famous Einstein equation and right side represents the missing part which explain origin of energy and mass of a given particle or massive body (Sorli, 2017). Equation (13) is the "super symmetry formula" which shows that the energy  $E$  and the mass  $m$  of a given particle are made out of the same “stuff” called quantum vacuum and that energy and mass are symmetric to the diminishing of the energy density of quantum vacuum  $\rho_{qvE}$  in the centre of a given particle.

Formula (13) is also valid for massive objects and stellar objects; it works from micro to the macro level of the universe.

Formula (13) can also be multiplied by Lorentz factor and is then valid for relativistic particles, which because of their speed absorb energy in the quantum vacuum, which becomes their kinetic energy:

$$\gamma E = \gamma mc^2 = \gamma (\rho_{PE} - \rho_{qvE}) \cdot V \quad (14)$$

Equations (13) and (14) are presenting the origin of mass of elementary particles without the introduction of Higgs mechanism. According to the mass-energy equivalence, no field can exist which would give mass (mass here means energy) to the particles. The only plausible idea would be that the interaction of particles with some field generates their inertial mass. “Mass” means the amount of energy incorporated in a given particle and “inertial mass” means the particle property to stay at the certain position or to move in the



certain direction. In Advanced Relativity, the inertial masses of elementary particles and massive bodies have the origin in diminished energy density of quantum vacuum. The dynamics between diminished energy density of quantum vacuum and a given massive object (particle, massive object or stellar object) generates inertial mass and gravitational mass (Sorli, 2017).

High-speed motion of particles and massive bodies creates friction with the quantum vacuum. This friction causes the concentration of quantum vacuum energy in the relativistic object which actually is its kinetic energy. In CERN Collider are colliding about hundred millions of pairs of relativistic protons each second. Only one in ten billion of collisions create so called "Higgs boson" which is nothing more than the released relativistic energy of two relativistic protons. The conclusion that the Higgs boson is the proof of the existence of Higgs field (Higgs boson is the "ripple" of the Higgs field) which should give particles mass is epistemologically unstable. Might happen, the next generation of physicists will re-evaluate the discovery of "God particle", and give it appropriate meaning and importance.

### Weak points of Big Bang cosmology

According to the Big Bang cosmology, universe is happening in space-time as the fundamental arena of the universe. Space-time has 3 spatial dimensions and 1 temporal dimension. According to Bijective epistemology presented in the section 1 above, the element of space-time cannot have existence in the set model universe  $Y$  where time is merely numerical order of changes in space. Element of space  $S_Y$  belongs to the energy subset  $YE$  and element of time  $T_Y$  is not an element of the energy subset  $YE$ . In this view space and time cannot be united in space-time. Space-time is a model which has no solid epistemological ground and thinking that it has some correspondence in real world, seems incorrect.

Big Bang should happen in some remote physical past. The prove for that should be cosmic microwave background radiation CMBR which has origin in Big Bang and is radiating since the Big Bang via time as the 4<sup>th</sup> physical dimension of space. Bijective epistemology does not allow a given signal to move in time because time has only a mathematical existence. Every signal moves only in space and time (fundamental time) is the numerical order of its motion. When fundamental time is measured by the observer emergent time

which is the duration enters into existence (Fiscaletti and Sorli, 2015b). In Advanced Relativity CMBR has origin in a fundamental universal background space which can be also called 3D quantum vacuum and is defined by reduction-state (RS) processes of creation/annihilation of particles/antiparticles (with opposite orientations of spins), corresponding to elementary fluctuations of the quantum vacuum energy density.

Big Bang cosmology model uses finite spherical Riemann geometry. NASA results have confirmed universal space is flat and corresponds to the Euclidean geometry (NASA, 2016). This means that use of Riemann geometry in cosmology is not allowed. Universe is infinite in its dimensions and has also infinite amount of the energy:

$$E_U = \infty \quad (15)$$

Calculations which are taking in account energy and mass of the universe should be finite seems not appropriate. Universe cannot be approached as a finite system, universe is infinite. We can study the dynamics of the universe in the region of universal space which is reachable with the telescopes and hope that universe which is beyond our observation functions according to the same laws as the observable universe.

Big Bang cosmology predicts universe is finite and is expanding. We have seen above universal space is infinite and infinite space cannot expand; we could only speculate that the observable area of the universe is expanding. The main proof for expanding universe should be red shift where light of the galaxies is moving to the red spectrum because of their motion away from the Earth since universe is expanding. Expansion of observable universe is questionable because "red shift" can also be interpreted as a consequence of light pulling from the strong gravity (Pound, 2000). This so called "gravitational red shift" is a basis for "tired light" hypothesis of Swiss astronomer Fritz Zwicky. He proposed that the reddening effect was not due to motions of the galaxy, but to an unknown phenomenon that caused photons to lose energy as they travelled through space. He considered the most likely candidate process to be a drag effect in which photons transfer momentum to surrounding masses through gravitational interactions; and proposed that an attempt be





made to put this effect on a sound theoretical footing with general relativity. He also considered and rejected explanations involving interactions with free electrons, or the expansion of space (Zwicky, 1929).

### **Evolution of life is a component of universal cosmic dynamics**

Life, as we know it, beyond a common range of compatibility linked to the thermo dynamical conditions and to the chemistry of a set of elements (carbon, hydrogen, azotes, oxygen, phosphorus, sulphur), exhibits an extraordinary variety which cannot be reduced to a simple chemistry-physics. Despite life being a physical phenomenon, subjected to the general laws which rule the behaviours of matter and energy, this compatibility is not enough to reproduce the variety of the living systems: biological systems satisfy a sort of indifference principle in the sense that are historic systems and can exhibit unforeseeable behaviours, which cannot be classified (Licata, 2010). According to the Maturana and Varela autopoiesis theory in living systems it is the global functional dynamics to fix each time the boundary conditions and the back-reaction cycles which support their autonomy (Maturana and Varela, 2001). Living processes seem to be characterized by the so-called intrinsic emergency, associated with the appearance of properties which are compatible with the models describing the basic relations between system and environment, but absolutely unforeseeable because, in similar situations, several variations are possible. The appearance of these new emergent properties can modify in an irreversible way the nature of the system and its relations with the environment (Licata, 2015).

All the evidence indicates that organism and environment are intimately interconnected, from the socio-cultural domain right down to the genes. Stable inheritance depends on this very interconnection, rather than on a mythical unchangeable genome. The process of heredity has a dynamic stability that resides in the feedback interrelationships that can propagate from the external environment through the physiological system to the genes. Organism and environment engage in ceaseless rounds of mutual definition and transformation, which is the essence of evolution. Cycles of feedback between the biosphere and the physicochemical environment are the basis of stability for the global ecosystem.

Organisms may be interconnected with one another and with their physicochemical environment by information flow, as well as by material and energy flow. Most molecular biologists assume that the answer to biological organization will come when all the molecules in organisms are isolated and analysed. But biological organization is a dynamic, macroscopic order extending over astronomical numbers of molecules, spanning distances at least millions of times the size of individual molecules (Mae-Wan Ho, 2016). This organization enables organisms to transform energy with the rapidity and efficiency rarely achieved elsewhere and to be extremely sensitive to specific signals in the environment.

In 1960, Nobel laureate biochemist Albert Szent-Györgyi pointed out that we can begin to understand the characteristics of living systems only if we take into account the collective properties of molecules akin to superconductivity and superfluidity. This idea was developed at about the same time by German-born British solid-state physicist Herbert Fröhlich, who suggested that living systems have collective modes of activity somewhat similar to superconductors operating at physiological temperatures (Szent-Györgyi, 1960). The Fröhlich model implies that, when the energy supply goes above a certain level, the polar structure enters into a state of nonlinear vibration and a coherent behaviour of excited electrons observed in living systems emerges which is similar to coherent behaviours found in superconductors. The only difference is that in superconductors, this behaviour is observed with the help of Bose-Einstein condensation at temperatures near the absolute zero point (Fröhlich, 1968), while coherence in biological systems occurs at room temperature (Reimers *et al.*, 2009). The Fröhlich model suggests that metabolic energy, instead of being lost as heat, is stored in the form of collective or coherent electromechanical and electromagnetic excitations. These “coherent excitations” could be responsible for generating and maintaining long-range order. They also make possible highly efficient energy transfer and transformation of energy and the detection of very weak electromagnetic signals.

Evidence for the existence of coherent excitations in living systems comes from the work of German biophysicist Fritz-Albert Popp and his co-workers (1988), who showed that practically all organisms and cells emit light (biophotons) at very weak intensities. Organisms and cells also re-



emit light at higher intensities as delayed luminescence after exposure to a brief pulse of light. As the result of some 15 years of experimental work, Popp became convinced that bio-photons come from a coherent electro-dynamical field within the living system. This field has a wide range of frequencies that are coupled together to give effectively a single degree of freedom, and that may be the basis of biological organization. Living systems are thus both emitters and receivers of electromagnetic signals originating from the physicochemical environment as well as from other organisms.

In order to explore the biological organization which characterizes living systems, in the recent paper "The unified spacememory network: from cosmogenesis to consciousness", authors consider the possibility that nonlocal information dynamics, intrinsic to the properties and behavior of material systems and uniquely harnessed by the natural nanotechnology of supramolecular systems of the brain (similar to the Hameroff-Penrose model of orchestrated objective reduction) are involved in producing the sentience, awareness, and memory of cognitive processes (Haramain *et al.*, 2016). Moreover, they propose that nonlocal influences across spatial and temporal domains, communicated through the micro-wormhole network of the Planck-scale geometric structure of spacetime, may play an instrumental role in the evolution and development of physical systems, thus engendering an ordering dynamic as well as directionality towards higher levels of complexity and organizational synergy. In this approach, one has the same unifying ordering dynamics regarding the evolution and development both of physical systems and of biological systems and therefore awareness properties follow the same rules describing the evolution of matter and of the universe. One has a unifying picture of evolution and development processes, from non-organic matter to biological matter, which are shaped by the integrative and ordering influences of a holographic Planckian wormhole network, from cosmogenesis to the universe being aware of it, i.e. consciousness. In Haramain's, Brown's and Val Baker's model living systems are seen as complex systems composed by biomolecules intercommunicating in an intricate network of information and energy exchange. These highly complex biomolecules are constituted in turn by elements that evolve under the influence of a larger, more fundamental intercommunication

system, where, at each scale, there are dynamics creating order and directionality of interaction towards higher levels of synergetic organization, and as a result, greater levels of consciousness.

On the other hand, cosmic energy may be connected and thus forms a matrix within the entire cosmos and by means of structured matter can elicit life (Penrose *et al.*, 2011). Evolution began much after the existence of energy and matter and its unanimity and therefore the answer to the origin of life lies much before the emergence of viruses, bacteria, algae and eukaryotes, which required the presence of water and organic compounds. For life to emerge there had to be a right blend of energy and matter, where the properties of energy and matter played an important role. Many significant studies seem to suggest that, as regards the problem of the origin of life, the properties of matter and energy are not emergent, but must be considered as the designers for creation (Maysinger *et al.*, 2015). Moreover, recently, theories associated with redox homeostasis have been considered as an important aspect linked to the origin of life (Allen, 2010). On the other hand, quantum computation has unknowingly opened up a new array of hope towards understanding the origin of life from the perspective of organic and inorganic chemistries and the use of non-living matter to perform activities like living matter. Several theories are now available that support the emergence of consciousness from quantum based mechanisms (Hameroff and Penrose, 2014) and the involvement of the cosmic energy uptake in the form of electromagnetic radiation (Pereira, 2015a; McFadden, 2007 and 2013). A recent pathway known as the cell-soul pathway has been proposed to be a hypothetical mechanism where a single cell uses the quantum phenomenon to convert external cosmic energy to internal energy, to store and use this energy as part of its conservation process (Pereira, 2015b) indicating that life and consciousness is quantum processed and may have driven the origination of living forms proceeding with evolution. In the recent paper "Origin of life: a consequence of cosmic energy, redox homeostasis and quantum phenomenon", Reddy and Pereira suggest that origin of life emerges as an eternal process associated with the interaction between energy from the cosmos and inorganic matter, which supports matter with retention of this riveted energy, as energy to be circulated within the primitive channelized structures to conserve



energy by the materialization of the proton homeostasis mechanisms developed from the obtainable inorganic matter (Reddy and Pereira, 2016). According to Reddy's and Pereira's approach, origin of life is therefore a result of the organization and reorganization of matter to support constants such as the cosmic energy, matter and quantum processes that prevailed in the cosmos and mellowed with evolution.

In the light of the results of Maturana, Varela, Szent-Györgyi, Fröhlich, and the most recent ones of Popp, Hamein, Brown and Val Baker, Reddy and Pereira, the authors of this paper suggest the possibility that evolution of life is a consistent part of cosmic dynamics, is a continuation of the evolution of the universe. In Advanced Relativity (AR) model evolution of life is the integral part of universal dynamics. Life is developing in entire universe and is tending to create intelligent and conscious organisms as we humans are. In Advanced Relativity (AR) the fundamental primordial space of the universe is consciousness which is described by the  $n$ -dimensional Hilbert space. Entire universe exists in consciousness and the manifestation of consciousness is of varying degrees and such manifestations happen due to the intervention of pure cosmic energy/Prana (Jayakrishnan *et al.*, 2017). In Advanced Relativity model pure cosmic energy/Prana corresponds to the 4-dimensional Hilbert space which consists from 4-dimensional pilot bio-photons (Sorli *et al.*, 2017). That is why matter has tendency to develop in life and life further in conscious organisms. Life is the subsystem of the universe and cannot be examined separately from the system in which it develops, which is the universe. This view of Advanced Relativity is supported by a classical Vedic text, viz., Sri Saundarya Lahari written by Adi Sankaracharya, the first verse reveals the nature and existence of the universe, i.e., the universe is a manifestation of pure consciousness and pure cosmic energy cannot be separated from pure consciousness (Jayakrishnan *et al.*, 2017).

Advanced Relativity is unifying cosmology and biology. Evolution of life seen from the view of conscious observer is the process which runs in the universe. Universe is a system in a permanent dynamic equilibrium and as totality has no entropy. Increasing of entropy of the matter that we observe in the universe is only a part of universal dynamics. All over the universe matter has tendency to decrease entropy because matter is existing in space which is syntropic energy

(Sorli *et al.*, 2016b). This decreasing entropy tendency can be observed as the presence of all organic molecules essential for development of life in entire universal space. This so-called "chemical evolution" then develops in living organisms on the planets with similar physical circumstances as on the planet Earth. Consciousness is shaping life on 3D physical reality via pilot photons of higher dimensional Hilbert spaces (Sorli *et al.*, 2017).

In Advanced Relativity the notion of energy can be extended into multidimensional Hilbert spaces. Energy can be defined in a  $nD$  Hilbert space where  $n$  is the cardinal number of natural numbers;  $nD$  Hilbert space is the fundamental background of consciousness, which acts in the human being as the observer. This means that life on the molecular level of 3D dimensionality has origin in  $nD$  consciousness. Evolution of life is encoded in 4D and more dimensional Hilbert spaces of higher information density and is communicated to the 3D ordinary life dimensionality via bio-photons.

## Conclusion

Planet Earth is the subsystem of the solar system which is the subsystem of Milky way which is the subsystem of the universe. Approaching evolution of life as a process which has developed on the planet Earth surface is a narrow viewpoint having its root in the geocentric model according to which Earth is the center of the universe. The conscious observer is dropping geocentric model and building his scientific picture of the universe and life on the elementary perception and bijective epistemology. The result of the conscious observer research methodology is the model of the stationary universe which is a non-created system in a permanent dynamic equilibrium. Evolution of life on planet Earth is an integral part of cosmic dynamics which is developing in the entire universe. Evolution of the universe and evolution of life should not be approached separately because they are one phenomenon. Attained knowledge of today's science has reached to the point where cosmology and evolution of life can be unified in the new discipline called "Cosmo-biology".

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