



**THEORY OF ORDER IN COSMOS**

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**בראשית**

*At the beginning of Elokim's creation of heaven and earth  
The earth being Tohu and Bohu, darkness over the depths,  
a wind of Elokim hovering above the surface of the waters,  
Elokim said, "It will be light!" and it was light.  
Elokim observed this light and saw it as good,  
so Elokim distinguished between the light and the dark<sup>1</sup>*

**ABSTRACT**

There is no intellectual exploit more poignant than attempts to understand why we exist and if there is sense in our existence beyond the life of a smart animal. The awareness of being one with Cosmos is the gift of self-consciousness that only Man has. Most probably Man is unique and only in visible Cosmos. Man has been desperately searching for his roots in the origin of Cosmos. We find musings on the cause of our existence in conjunction with Cosmos in the records of the earliest literate civilizations. It is possible that those who did not invent script also that have occupied human mind as passionately as contemplated on the meaning of life, but they left no record of this and the meaning of their existence, if any will never be learned.

However, some individuals among some human subspecies had the evolutionary inexplicable conscious desire to leave imprint on the future beyond their lifespan. These individuals had left written testimonies for the descendants telling of their achievements and thoughts, but also of spiritual revelations descended upon them. Some of these testimonies have spurred the intellectual and material human creativity for thousands years to come. It is silly to deny, although there have been and will be hordes of instinctive, fanatical deniers of the obvious that the Hebrew Genesis, the 10 Commandments and other spiritual teachings of Hebrew Torah in conjunction with the natural philosophy of ancient Greeks passed over to the Indian and Persian mathematicians, astronomers and sages defined the course of all Judeo-Christian civilization till our time. Well documented sources testify of communications between the Hebrew sages and Greek philosophers in the kingdom of Alexander the Great and much earlier. The contacts between Hebrew and Indian sages were mentioned clearly by Josephus Flavius. The Hebrew Torah had depicted the origin of Arab race and thousands years later was the foundation upon which Koran and the civilization of Islam was based. Professionals in the field indicate correlations between the ancient teachings of pre-Confucius and Confucius period and Hebrew Genesis.

In the last two centuries scientists have been trying to replace Genesis with the ever shifting rational picture of creation transpiring from the natural laws. No one can seriously define who deemed such yet undiscovered laws natural. In our view no explanation better than anthropic principle has been found by the cosmologists and physicists. The anthropic principle is a sort of anticlimax. It says loosely that the natural laws are such since if they were different the scientists would have not existed to invent the anthropic principle. It is sad when the depth of crisis in scientific understanding of



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Creation is so profound that the discussion on the origin of Cosmos and Man is reduced to arguments between a few leading contemporary cosmologists advancing totally unverifiable conjectures while a few other as eminent scientists escape into the anthropic principle.

Surely there are many young scientists who are mum and many among laymen not satisfied with the popular hypothesis explaining the existence of the self-conscious life as an accident in our particular Universe-Cosmos that is just one among the uncountable infinity of other Universes that are the subjects to uncountable infinity of different, unnatural laws such that we do not exist. It is also a comfortable escapism that makes unnecessary understanding what life on Earth is. Since the contemporary scientific understanding of life has not much advanced from the Neolithic age life can be declared by a piece in the science columns of the New York Times as yet another fundamental natural law in our Cosmos.

Many still believe that science, in contrast to beliefs, must have proof of validity by complying with the known experimental data, not contradicting a single one firmly established experimentally and be predictive. Science void of predictive power is shallow and has no value. Indeed based on the principles of experimental testability and falsifiability the predictive power science has extraordinary advanced our understanding of Cosmos and changed the mundane existence on Earth.

The contemporary experimental science and especially astronomy, the eternal Queen of science, are bringing new cosmological revelations of the Cosmos past relevant for the future with unabated vigor and speed. It seems that the problem is not with the science and scientific method. The theoretical cosmologists and physicists are slow explaining what astronomers and astrophysicists impeccably observe and analyze. In fact the explosion of astronomical discoveries since 1998 has not been understood at all. Instead some leading cosmologists bombard the trustful laymen via the popular mass media with their personal beliefs disguised as proven science.

There is a serious problem in contemporary science that was understood by some eminent scientists. The problem is that not a single cosmological parameter pertinent to the origin of Cosmos, even the most classical Hubble constant defining the rate of Cosmos expansion can be calculated by the existing theories. Not a single elemental particle in Cosmos is imposed by the Hamiltonian equations of physics. Nothing in these equations imposes the existence of photons, quarks, gluons, composite protons and elemental electrons, the fundamental units which all visible matter in Cosmos consists of. Neither the existence of atoms made of protons, neutrons and electrons and molecules made of atoms is imposed by the fundamental equations of quantum mechanics. The only coherent entity that must exist is the black hole imposed by the general relativity Einstein gravitation equations, the EGE. In this aspect the EGE is different from all other Hamiltonian equations of physics.

If the existence of elementary building units of matter is assumed than the nucleosynthesis theories furnish spectacular results explaining how light hydrogen and helium and heavy carbon elements came about. However none of the Hamiltonian equations of physics impose the existence of the elementary building units of matter, more correctly of what is believed to be the indivisible elementary building units of matter. To be sure the Hamiltonian equations of physics allow all the coherent entities to exist and often correctly predict their properties. But these equations do not impose the existence of coherent entities. Neither these entities are the solutions of the Hamiltonian equations of physics.



One of the greatest physicists of the second half of 20th century Richard Phillip Feynman, the creator of fundamental quantum electrodynamics, the preeminent among all other field theories, in his famous lectures on physics for laymen made the following comment:

*"We have just seen that the complexities of things can so easily and dramatically escape the simplicity of the equations which describe them. The next great era of awakening of human intellect may well produce a method of understanding the qualitative content of equations. Today we cannot see that the water flow equations contain such things as the barber pole structure of turbulence that one sees between rotating cylinders. Today we cannot see whether Schrödinger equation contains frogs, musical composers, or morality".*

If Feynman was still with us he would be pleased to know that the barber pole structures and the uncountable diversity of other coherent entities/structures are in fact the exact solutions of the water flow equations flows known as the Navier-Stokes equations, the NSE. This uncountable complexity of coherence is the gist of turbulence phenomenon. However there are indeed no frogs, composers and scientists in the Schrödinger equation or any other fundamental Hamiltonian equation of physics. The NSE as the EGE are different. Therefore a natural question is why the Hamiltonian equations are fundamental if they are obviously missing the most important aspects of visible Cosmos; the aspects that define visible Cosmos.

Cosmos is full of well observed complex order and coherent organization. From the wall of superclusters of galaxies at the very edge of observable Cosmos all the way down the scale to galaxies, from galaxies to stars, from our solar system to planetary atmospheres, from the great red spot on Jupiter to general circulation of Earth's atmosphere and Gulfstream, to tropical hurricanes, tornadoes, clouds in the sky and the unique order of animate matter of biological life. The beehives, the ant hills, the packs of wolves and flocks of birds, the swarms of insects and schools of fish are all the amazingly complex coherent entities. And at last Man made coherent entities, human tribes, states and empires, the human civilizations run by the pieces of paper called money, everywhere on Earth and in far Cosmos we see complex order and organization arising, evolving, reaching the peak of potency and suddenly decomposing only for other organized entities even more coherent and potent to emerge on the ruins of the fallen. As ordered is the microworld of composite protons and unstable neutrons, elemental electrons, atoms and molecules from the Mendeleev periodic table all of the above are coherent entities arising from more elemental building units and growing in complexity with more components united into one coherent entity.

By far the most complex organized entity in visible Cosmos is human brains consisting of nearly 90 billion neurons and near to 1 trillion synapses working all as one coherent unit. By comparison the complexity and coherence of galaxies of stars is a joke.

Whatever is the complexity of coherent entities it is impossible not to see the oneness of complex organized entities consisting of inanimate atoms and molecules, atoms and molecules consisting of protons and electrons, manmade states consisting of human units instead of atoms and the animate matter, our bodies consisting of the live cells clinging to each other for unfathomable reason<sup>1</sup>.

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<sup>1</sup>Indeed, what holds the cells of our and animals, and insects and flora together? We invite readers to ask medical doctors or biologists that they are acquainted with if they know. We asked many and were met with the total incredulity. The biologists have no clue and we suspect attribute this phenomenon to "natural laws". To be more precise many of the biologists would refer to the osmotic forces between the cells. Indeed, osmosis and



The oneness is obvious in three aspects. The first aspect is the cycle of life. The organized entities having each its own lifespan. The second aspect of oneness is in coherence of elementary units of which the entities are made of. As long as quarks are in coherent interaction with each other protons stay stable unless broken in colliders. Even when broken rather than being free the quarks immediately unite again. Quarks are ultimately coherent and are never free. If there is tight coherence between molecules in inanimate matter it remains stable. Such are crystals where the molecular coherence is very high due to symmetry. The more humans in the manmade entities, states, tribes, societies and Empires are united by a common purpose the longer these entities survive. The tighter is the biological coherence within a racial group the more stable and enduring it is, unless destroyed by a biologically more coherent entity. As long as the cells of fauna and flora or human bodies cling tightly to each other the body lives, although the molecules in the cells are in the flux and correlate with each other weakly. As soon as the coherence of purpose between the units starts weakening the entities are waning and irreversibly on the road of no return to decomposition of chaos.

The third and absolutely general aspect of oneness is evolution and devolution. The organized entities are never static or steady state. They receive order from the external sources of order. The external order source furnishes coherence between the composite units of the entity. In their turn the coherent entities dispose chaos that any nonequilibrium, transient entity, or system inevitably accumulates. But all coherent entities evolve and devolve and subsequently have finite lifespan. There are many inanimate coherent entities that are so stable that they are often thought of as static and eternal. They are not. It is just that their interaction with the outside environment is weak, the intrinsic metabolism is slow and their aging is subsequently delayed. Nonetheless they all have the finite lifespan, although for instance the lifespan of protons and electrons compares the lifespan of visible Cosmos. However we will see that visible Cosmos itself has the well-defined lifespan as well.

All coherent entities in Cosmos are aging by accumulating chaos. Their lifespan depends on the ability to absorb order from the external sources willing to donate their own order, digest order by converting it into chaos and dispose chaos outside. As long as the external source donates order and the mechanisms of order absorption, digestion and chaos disposal are functioning properly the entity lives, inanimate or animate alike. The time dependent kinetics of the processes rules the existence and evolution of all coherent entities in visible Cosmos and of visible Cosmos itself.

We reiterate the basic prerequisites of the cycle of life of any and all coherent entities in visible Cosmos as consisting of the following constituent elements and mechanisms:

1. The external source of order donating its own order to a receiving entity consisting of elementary units.
2. The mechanism endowed to the entity enabling the receipt and absorbing the donated order.
3. The mechanism of digestion enabling the entity regurgitating the received order into chaos and disposing this chaos *while order remains in the system*. Failure to absorb fresh order from the donor, regurgitate this order and dispose chaos results in accumulation of chaos. The accumulation of chaos is aging.

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anomalous osmosis are the most probably the mechanism of the cells clinging to each other and other phenomena in live matter (e.g., Babchin A., et.al. 2012). However, forces are fictitious and osmosis among them. The cause of body coherence will be explained in what follows.



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The external sources of order are different and the specific mechanisms of order absorption, digestion and chaos disposal are different. However, they work to the same end extending the lifespan and success of the entities and their descendants that are the fittest to survive. And who are the fittest?

It may seem that the fittest are those having the most durable coherent bond between the constituent units. This is necessary, but not sufficient. In fact the fittest must be evolving on the top of being statically coherent. These are the kinetic entities accumulating order and becoming more coherent with time. As soon as an entity enters into the static or the steady state *status quo* coherence it is on the way out. As soon as the entity stops disposing chaos and subsequently not capable of absorbing fresh order from the source it is doomed. We call this kinetic phenomenon the quasi-steady nonequilibrium state of matter. Since matter and 4D space/time are one the same applies to the latter.

We would like to make a strong statement. As soon as the coherent entity stops absorbing order from the outside source with acceleration in time it is in crisis that indicates the start of decomposition. There may be fluctuations and periods of hope but these are just the temporal reprieves. The path to oblivion when started is irreversible, like aging of live entities. Any and all coherent entities in visible Cosmos, inanimate or animate are endowed with their respective maximum lifespan between the order of birth and chaos of decomposition and death.

There are only two exceptions in the whole of visible Cosmos. It is visible Cosmos itself and the self-conscious Man. Although they also have the finite lifespan their death is different from other coherent entities. Visible Cosmos was born in the Big Bang of light as the state of ultimate order. It accumulated chaos discharged by the coherent visible matter but as a whole visible Cosmos is gaining order on the way to the final state of ultimate order equal to the Big Bang order. The same is with the race of Man. Our bodies are decomposing and die in chaos. The information created and accumulated by Man never dies. Information just cannot die. Information can and does disappear from visible Cosmos, for instance in the black holes. The search of its final destination is one of the main subjects of this work.

The problem is that none of the coherent entities in Cosmos are imposed by the Hamiltonian equations of physics. This is a major problem requiring drastic modification of our approach to the origin and structure of visible Cosmos and life on Earth. The Hamiltonian equations of physics by definition are time reversible and subsequently do not respect the *second law of thermodynamics* and its alter ego the *reverse second law*, the *RSL* appropriate for the nonequilibrium, kinetic state of organized systems. In conjunction the *second law* and the **RSL** are responsible and impose the existence, formation and evolution of all coherent entities in visible Cosmos. The Hamiltonian physics equations, all of them are intrinsically void of all coherent nature of visible Cosmos.

The *second law* and in particular its grim implications for the fate of Cosmos known as Heat Death have been known since the late 19<sup>th</sup> century. The *second law* is taught in technical schools to all engineers and scientists. It is amazing that the incomparable in scope implications of the *second law* and especially its kinetic alter ego are still not understood. This has stymied the progress of theoretical physics and cosmology to such an extent that the anthropic principle has become a seriously discussed "scientific" explanation of the origin of Cosmos, "natural" laws and self-conscious Man.



To avoid confusion it should be reminded that the second law in equilibrium thermodynamics states that in a rigorously closed system not influenced at all by anything outside order cannot grow and on the contrary chaos cannot be decreasing. Therefore what connection the second law can have with the growth of order? No connection at all. Any system if established the growing order and diminishing chaos is unambiguously the open system absorbing order from an outside donor source. It is the kinetic, nonequilibrium system and instead of the *second law* the alter ego *RSL* rules in this system. However, the total System is now the system and the donor source together and the System is a closed. It is just that the system is a subdomain of the System. Chaos in the System does not diminish and order in the System does grow since the System is the closed one and the straight *second law* should be complied with. The two subdomains, the system and the source must arrive at the thermodynamical equilibrium between each other. Subsequently the excessive order of the source flows into the system lacking order and the system disposes chaos into the source. Eventually the amount of order and chaos will equalize between the system and the source. If the System is finite the real thermodynamic equilibrium

The situation becomes interesting when the source is infinite in capacity and ultimately coherent reservoir of order and also has the infinite capacity to absorb chaos. In this case the equilibrium between the subdomains will be achieved only when the state of ultimate order is achieved in the total closed System. In other words the state of equilibrium is when the system subdomain is subsumed within the total closed System.

Why are the NSE and EGE do impose the existence of coherent entities? The NSE are not the Hamiltonian equations. The NSE are phenomenological and contain the friction force and subsequent viscous dissipation of energy. Therefore the NSE automatically are in compliance with the second law, although until very recently it was not in any way utilized by the fluid mechanical community. As a result the phenomenon of turbulence in fluid flows has remained the last mystery of classical physics, as it is often called by eminent physicists and mathematicians. This is not a mystery any more. As soon as the second law is recognized the turbulence in fluid flows becomes the magnificent phenomenon of visible Cosmos and not the intractable mathematical problem that in all truth is not possible to solve mathematically ever. Even the posing of this problem as a mathematical does not have sense.

The reason that the EGE impose the existence of black holes coherent structures has more complicated explanation. The black holes are the EGE solutions that are singular at least at one space/time location in the 4D space/time. In fact the EGE must inevitably have a singularity somewhere in the global 4D space/time as was proved in (Penrose R., 1964). What it means is that there is a location in the 4D space/time where the EGE are not valid with the mass/energy density and curvature infinite. It is widely believed that the intrinsic malicious black hole, BH singularity in the EGE can be handled quantum mechanically but no quantitative attempts to do this have been published.

What quantum mechanics can do is smothering the singularity over the Planck space/time scales. Such smothered singularity would mean very large but finite mass/energy and corresponding large but finite curvature of the smothered singularity. We will see in what follows that when the BH singularity is smothered the consequence is the effective quantum mechanical viscosity of the 4D



space/time. This viscosity is very tiny but all significant since it furnishes the attribute of time irreversibility to the EGE dynamics and the subsequent compliance with the *second law and RSL*.

The motivation for this work came from the recently observed puzzling astronomical facts and numbers that frankly we have first learned from popular media. This and inability of contemporary cosmology and physics to quantitatively justify most of the recently observed facts, or even qualitatively understand their nature except taking refuge in tiresome platitude of "natural laws" and continuous heralding of dubious breakthroughs, with few understanding and many hesitant admitting incredulity about, prompted us to look for the general reasons that would impose coherent organization on matter beyond particular mechanisms. We were greatly inspired by the books of extraordinary intellectual depth written by Sir Roger Penrose (e.g., Penrose R., 2011 as well as by the nearly forgotten pioneering book "What is Life" by Erwin Schrodinger (1944 and 1953).

The astronomical facts that we allude to are as follows:

1. The space/time of Cosmos is expanding with acceleration. The Hubble Cosmos expansion from a single point had been anticipated first by Alexander Friedman from his iconic model of homogeneous and isotropic Universe in the frame of the fundamental equations that he derived from the Einstein gravitation equations. His work was published in 1922. It took Friedman quite an effort to convince Einstein resisting the publication of his work to reluctantly admitting in the letter to the publishers of his mathematical mistake. Later in 1927 and apparently independently Albert Lemaitre published similar conclusions. In 1929 the expansion of space/time was actually proved for a fact in the extraordinary observations by Edwin Hubble.
2. In 1998 the two independent groups in USA and Australia published the results of the many years observations indicating that the Hubble expansion is accelerating. Since 1998 this monumental discovery has been reaffirmed irrefutably. The astronomers were rewarded, deservedly indeed, with the Nobel prize in 2011.
3. The cause of acceleration of the Hubble expansion is ascribed to the invisible matter named *dark energy* uniformly distributed and permeating all and every locality of the 4D space/time of observable Cosmos. The latest precise analysis of CMB, the Cosmos microwave background radiation and other data carried out by the European Planck mission telescope in 2009-2013 shows with high accuracy that 68.3% of the total matter content in observable Cosmos is invisible dark energy. The only observable impact of dark energy is accelerating the space Hubble expansion. However, the consequences of this acceleration are enormous. Indeed, the global geometry of the 4D space/time of visible Cosmos is almost flat and getting even flatter as time goes by. The continuous flattening of the space/time geometry unambiguously proves that the global order of visible Cosmos grows with time. Could it be that visible Cosmos is on the way to perfect, ultimate order? This is what we believe is the case.
4. Many years long astronomical observations confirm that about 90% of gravitating matter in galaxies, clusters of galaxies and larger structures in Cosmos is invisible **dark matter** the nature of which is widely considered an enigma of modern science. Dark matter however contributes much more, to the total matter content of observable Cosmos. The Planck mission has established that the contribution of dark matter is 26.8 % of the total matter in visible Cosmos. We note that when we talk about the total matter content that includes the invisible matter it is proper to use the terminology of causally observable Cosmos within the event horizon rather than visible Cosmos.
5. In contrast with *dark energy* having constant mass/energy density distribution in almost all of the 4D space/time from now till the end of lifespan of visible Cosmos *dark matter* was found



- by the Planck mission distributed nearly randomly but intermittently in space/time with obvious density concentration associated with the lumps of visible matter.
6. The above findings mean that the normal matter, i.e., visible matter contribution is merely 4.9% of the total matter content in observable Cosmos. Barring the nonproductive fantasy that something might be lurking in a part of visible Cosmos behind the event horizon which is not observable this is a shocking finding. Most of the matter content in observable Cosmos is invisible except its gravitational impact on visible matter and on the geometry of 4D space/time.
  7. The global 4D space/time geometry is dominated by dark energy and almost *flat*. The *global 4D space/time* is expanding with exponentially fast acceleration. The *local 4D space/time curvature* is caused by the intermittent, randomly distributed in the quasi-fractal manner lumps of *visible matter* and associated intermittent dark matter spots. Dark matter acts as if it was an attractive gravitational force and increases the gravitational pull of visible matter. Dark energy acts as if it was the repulsive force. It should be reminded that the forces are *fictitious*. The attractive fictitious force contracts the local visible matter lumps and hence increases the local curvature of the 4D space/time around these lumps. The homogeneous fictitious repulsive force of dark energy decreases the global curvature of the 4D space/time by causing the accelerating Hubble expansion of visible Cosmos.
  8. We note that the dark energy acceleration causes acceleration of visible matter in the lumps tearing them apart. If it was not for dark matter associated with these lumps the latter would be torn apart by acceleration and no galaxies and other grandiose concentrations of visible matter would have existed. We will see later that at the largest scales where the acceleration of expansion is the largest the lumpiness disappears as it should to.

It follows that less than 5% of all matter in Cosmos is coherent visible matter with photons making it visible and neutrinos is believed by modern science to be reasonably well understood. The rest, over 95% of the material content of Cosmos is considered mystery explained neither by the meek rather than far reaching hypothesizing by a few leading cosmologists nor by the fantasies of amateurs.

The incredible observational capabilities of astronomers and their findings made clear by the subsequent astrophysical analysis furnish specific observed numerical values of physical parameters totally disattached from the quantitative ability of contemporary theoretical physics. The latter with the exception of inflation theory have not made a single prediction in anticipation of the experimental findings. As we have pointed out the cosmologists have not theoretically calculated a single value of the specific quantities furnished by the astronomical findings since 1998. The nature of dark energy and dark matter are declared mysteries and subjects of unsubstantiated speculations not producing numbers.

This is in stark contrast with the manner that far reaching predictions were made from the analysis of Einstein gravitation equations, the EGE and subsequent Friedman equations and Lemaitre analysis anticipating the Big Bang, the actual Big Bang prediction by Ralph Asher Alpher and Georges Gamow, the nucleosynthesis and CMB parameters in the aftermath of the Big Bang predicted and calculated by Alpher and Herman and finalized by Fred Hoyle for the nucleosynthesis of heavy elements in stars, or the inevitable anomalies of MCB, such anomalies being among the main tools for gathering data on the past of observable Cosmos (Sunyaev, R. A. and Khatri R. , 2013).

We reiterate that the great, fatal fault of modern theoretical physics and cosmology is the non-compliance with the *second law of thermodynamics* for the closed systems and its alter ego *thereverse second law, the RSL* the fundamental cause of order in the nonequilibrium open systems fed by the outside sources of order. There is little doubt that the *second law* and the *RSL* are the most general laws in Cosmos. There is no doubt at all that all order in visible Cosmos is the kinetic, transient order



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in nonequilibrium open systems, from the most elemental microworld to clusters of galaxies, from Gulfstream to animate life on Earth. We will argue that the self-conscious brain of Man and the growing order of visible Cosmos have the common origin behind them. This origin is the timeless dark energy continuum, the DEC into which visible Cosmos is embedded as a subdomain. We observe it since dark energy manifests astronomically via the accelerating expansion of the 4D space/time of visible Cosmos. We will further argue that both visible matter and dark matter in Cosmos are two other manifestations of the DEC. We will argue that visible Cosmos has a finite lifespan as all other transient nonequilibrium phenomena in it and when this lifespan expires visible Cosmos acquires equilibrium of ultimate order becoming one with the DEC.

Scientifically the DEC is the inexhaustible source of negative entropy for visible Cosmos via the flux of coherent momentum/energy, while being the sink where visible Cosmos disposes the chaotic momentum/energy. This is in same manner as Sun is the almost inexhaustible source of negative entropy flux for Earth and subsequently the cause of all order on Earth and evolution of species and as food the animal life consumes is the source of negative entropy flux maintaining the coherent organization of animate matter of life. The above assertions become clear when we understand that the non-compliance with the *second law and the RSL is fatal*.

The noncompliance with the *second law and RSL* in contemporary physics and cosmology is undeniable since the fundamental equations of physics are Hamiltonian and time reversible. The reality of Cosmos and our mundane experience is unambiguous and obvious in that time is irreversible. Paying no respect to the *second law and RSL* is not less than negating the irreversibility of time that is one with the *second law and RSL*. This is not an innocuous offense and the price paid is unimaginable. It is not possible to account for the *second law and RSL* post factum or approximately. These laws enter non-analytically into the dynamical equations of physics via the parameter of media viscosity. Viscosity is causing friction. As small as the viscosity parameter may be, say tending to zero, its contribution to the formation of coherent structures is decisive, although remarkably the final results do not depend on viscosity. The compliance with the *second law and RSL* necessarily implies that the correct dynamical equations have the nonlinear coupling terms and the dimensionless coupling parameter. The final results may depend on this dimensionless parameter into which viscosity enters, but not on viscosity itself.

It is asserted with confidence and we see this assertion as fairly obvious that no coherent structures of visible matter and associated chaos expelled by the coherent structures of matter, e.g., dark matter exhaled by coherent visible matter, or chaotic gluons disposed by the coherent component of hadrons, no heavy bosons of weak interaction, no elemental electrons and composite protons of microworld, no atoms and molecules, no atmosphere and oceans, no Gulfstream, no tropical hurricanes, no beehives and ant hills and no manmade states and Empires and chaos of wars for survival of the fittest, the most coherent entities, no struggle for survival of the fittest among species and Man would exist in visible Cosmos subdomain that until the discovery of dark energy and dark matter was falsely perceived as all inclusive Cosmos if not for the second law and RSL. The visible Cosmos itself would not exist if not for the *second law and RSL*.

It is inexplicable that although the *second law* of thermodynamics has been taught to all students of science and engineering for the last 150 years the modern leading scientists with few vocal exceptions, have their eyes wide shut and minds closed to the awe inspiring implications of the *second law*. Among the vocal exceptions are the famous creator of quantum wave mechanics Erwin



Schrodinger in his book "What is Life" (1944 and 1953) and Sir. Roger Penrose in his lectures and books of extraordinary intellectual depth.

As soon as recognized that the accelerating expansion of observable visible Cosmos proves that visible Cosmos is not a closed all inclusive system but merely a subdomain embedded into the timeless ultimate order of DEC it is not against the *second law* that order of visible Cosmos subdomain can grow. The visible Cosmos is a nonequilibrium subdomain receiving coherent momentum/energy flux from the DEC and disposing back the equal but chaotic momentum/energy flux, All order of visible Cosmos is extracted and absorbed from the coherent momentum/energy flux from the DEC.

The DEC is the source of negative flux of entropy or the positive flux of order for the visible subdomain. This order creates all coherent visible matter, stars, galaxies and all other visible inanimate and animate matter. Dark matter is just chaos disposed by order furnished to visible matter by the DEC and digested by visible matter. The digestion mechanism converts coherent energy into the chaotic one. Subsequently the chaotic energy is disposed by visible matter is dark matter while visible matter remains coherent.

The digestion mechanism in visible Cosmos plays the same role as the food digestion by live organisms. The latter, say animals or humans alike consume highly coherent food and dispose much less coherent substances. The difference in order between the two is what gives order to the live bodies. If chaos of digested order is not disposed the coherent entities cannot absorb fresh order. Chaos is subsequently accumulating and this is the process of aging. The source of negative entropy flux, the conversion of order and disposal of chaos are the general prerequisites for existence and evolution of coherent entities, in microworld and macro world, in inanimate matter and life. Order and chaos are inseparable in coherent entities. Unless the inevitably accumulating chaos is not disposed the coherent entities cannot absorb fresh order, sicken and die.

The above are very remarkable phenomena. There is nothing mysterious about them from the scientific viewpoint warranting outlandish conjectures. They are just complex order nonequilibrium, kinetic phenomena. For instance exactly in the same manner as order in visible Cosmos is created by the DEC the solar energy order extracted by Earth creates all coherent formations and entities on Earth, from tornadoes to Gulfstream, from flora and viruses to insects and fauna. In the same manner the beehives and wolves packs are formed and cockroaches form communities and wasp spiders spawn larvae.

The mechanisms for holding coherent animate matter and our bodies and Gulfstream on Earth and galaxies in the sky and viruses are the fictitious forces converting coherent momentum/energy into the chaotic one. They are different for different systems. But their role is absolutely the same. As one unified fictitious force we can call it the *unified digestion force*. The main five fictitious forces of physics, the gravitational, strong, electro-weak and the Euler force are all the components of the order digestion force. As long as the digestion works well order will be extracted from the source and accumulate and chaos disposed while the momentum/energy density remains optimal. The goal is creating as much order as possible and hold it for as long as possible in as much as it serves the higher goal pursued by the DEC.



The global primeval source of all order above including all local sources of order is the timeless DEC. The local sources of order are created hierarchically, by various mechanisms. Remarkably all these multiple scale organizations are correlated. They are not independent but phase coherence. From largest scales of organization to the smallest ones they are in instantaneous interaction with each other. The phase coherence interaction speed is not limited by the speed of light. The phase coherence if disturbed is restored instantaneously. The fictitious forces convert monochromatic momentum/energy flux into the multicomponent one having many ore degrees of freedom and subsequent high entropy.

The phase coherence is imposed by the easily perceived fact that the fictitious forces cannot implement the conversion if all the intermediate organization from the top down is not phase coherent. Preserving the phase coherence is in the nonlinear structure of fictitious forces. The unified digestion force preserves the phase coherence from the DEC primeval source all the way down the scales to the Planck size domain at which the reverse quasi-chaotic momentum/energy flows back into the DEC. In numerical terms the order digestion unified interaction preserves the phase coherence from the DEC injection scale  $L_c = 10^{41} \cdot l_p = 10^8 \text{ cm}$  all the way down to the Planck scale  $l_p = 10^{-33} \text{ cm}$  at which the momentum/energy flows back into the DEC.

The unified fictitious force creates the cascade of momentum/energy in the space of scales down the scale preserving the phase coherence at each intermediate scale being the integer of the Planck scale  $l_p = 10^{-33} \text{ cm}$  . But what happens with the order that is injected at the scale  $L_c = 10^{41} \cdot l_p = 10^8 \text{ cm}$ ? This order is passed to the scales larger than the injection scale  $L_c = 10^{41} \cdot l_p = 10^8 \text{ cm}$  . As long as the DEC furnishes coherent momentum/energy and negative entropy flux the size of visible Cosmos will be growing exponentially fast. The exponentially fast growth of the phase coherence scale is indifferent to the specific nature of fictitious forces. In the end all visible Cosmos will become the quantum ground state merged with the DEC. There is only one such quantum equilibrium state known in physics. It is the Bose-Einstein condensate of photons. The photonic Bose condensate is the intrinsic attribute of dark energy. We note however that this is not the Bose condensation at the zero momentum/energy state as it is usually defined. For the relevant situations of the Big Bang and the final breath of visible Cosmos the quantum ground state is defined by the Planck momentum/energy value.

Summarizing the momentum/energy flux consists of hierarchy of phase coherent structures correlated at all scales. The smallest are the Planck size domain structures. The largest scale is growing exponentially fast. The latter phenomenon is observed as the exponentially fast visible Cosmos expansion. The Planck size components dissipate the high entropy momentum/energy back into the DEC. There is no momentum/energy flux up the scales. The exponentially fast expansion of visible Cosmos is the growth of the phase coherence scale transforming visible Cosmos into one phase coherent entity

In the same manner all complex coherent entities are formed absorbing order from the local donors of order, like Earth from our Sun, converting order into chaos and disposing of this chaos, while order on Earth is continuously growing. We will show rigorously below that as long as Sun exists in its current stage of evolution the global order on Earth will be growing.

However, the DEC is the primeval source of order manifesting and present in every one of them at every space/time location of the 4D space/time of visible Cosmos.

Does the timeless DEC pursue goals? Indeed, it does and they are fairly obvious. Visible Cosmos is created and furnished with information via the coherence of momentum/energy flux from the DEC. But the crown creation of the DEC in visible Cosmos is Man, or this is what we want to believe in. Man creates information beyond that he is furnished with. All other inanimate and animate matter of life is very complex organization but it does not create.

The mathematical information into which all creations of Man are eventually converted does not disappear. The laws of science do not allow disappearance of information in closed systems. However visible Cosmos is not a closed system. Therefore information is allowed to disappear from visible Cosmos. The final destination of information created by Man is the DEC. Hence the DEC benefits from information created by the race of Man as long as the race exists. We will argue that the self-consciousness of Man exists as long as the lifespan of visible Cosmos.

It is timely to demonstrate the quantitative results achieved by following the kinetic approach to order and chaos in visible Cosmos. In the Table below we compare our theoretical results with the latest available experimental data and astronomical observations of the Planck mission 2009-2013, the most precise observations ever done. We also indicate the rare instances where the existing Hamiltonian equations results can be compared with our results.



Theory	Astronomical observations best fit of NASA's WMAP satellite and Planck Mission 2009-2014	Previous Theoretical Calculations
<b>Basic Cosmological Parameters</b>		
Contemporary Hubble constant: $H \approx 2.35 \cdot 10^{-18} \text{ sec}^{-1}$	Contemporary Hubble constant: $H_{\text{mission 2013}}^{\text{Planck}} \approx 2.35 \cdot 10^{-18} \text{ sec}^{-1}$	Do not exist:
Contemporary contribution of visible, "normal" matter to the total matter density including 1% neutrinos: $\approx 4.91\%$	Contemporary contribution of visible, "normal" matter to the total matter density: $\approx 4.90\%$	Do not exist
Absolute value: $0.0464 \cdot 10^{-29} \text{ g} \cdot \text{cm}^{-3}$	Absolute value based on assumption of flat Cosmos.	
Dark matter contemporary contribution to the total matter: =26.8%	Dark matter contemporary contribution to the total matter: 26.8%	
Total matter including dark matter and dark energy: $0.9964 \cdot 10^{-29} \text{ g} \cdot \text{cm}^{-3}$	Total matter ???	
Critical matter density based on theoretical Hubble constant above and Friedman equations: $0.9967 \cdot 10^{-29} \text{ g} \cdot \text{cm}^{-3}$  <i>Compare with total matter above</i>	Critical matter density based on theoretical Hubble constant above and Friedman equations: $\approx 0.86 \cdot 10^{-29} \text{ g} \cdot \text{cm}^{-3}$	
High accuracy flatness of the contemporary visible Cosmos is proved. Visible Cosmos is nearly in the middle of its lifespan at: $T_{\text{contemporary}}^{\text{visible}} \leq t_p \cdot R_C^{3/2}$ , $T_{\text{lifespan}}^{\text{visible}} \cong t_p \cdot R_C^2$ where $t_p \approx 3 \cdot 10^{-33} \text{ sec}$ is the Plank time unit.	Approximately observed	Qualitatively explained in inflation Theories in conjunction with the EGE



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<p>Hubble age:  <math>\approx 13.508 \cdot 10^9 \text{ years}</math></p> <p><i>Note that the Hubble age is not the age of Cosmos. The Hubble constant is not constant in this theory. Neither is the Einstein cosmological "constant" .</i></p> <p><i>Only universal constant is:</i></p> <p style="text-align: center;"><b><math>R_c \equiv 10^{41}</math></b></p> <p><i>It is obvious that for several hundred millions years of deceleration of expansion after the inflation stage it was smaller. Thus the discrepancy between the two numbers.</i></p>	<p>Cosmos age:  <math>\approx 13.840 \cdot 10^9 \text{ years}</math></p> <p><i>Note that the Hubble age is not the Cosmos age. Hubble constant is not constant in the theories based on Friedman equations.</i></p>	<p>Do not exist</p>
<p>Total visible matter within the event horizon  <math>46 \cdot 10^9 \text{ years};</math>  <math>1.38 \cdot 10^{56} \text{ g}</math></p>	<p>Total visible matter within the event horizon based on flat Cosmos assumption and empirical data  <math>\approx 2.46 \cdot 10^{56} \text{ g}</math></p>	
<p>Inflation stage: lasts <math>10^{-23} \text{ sec}</math>  <input type="checkbox"/>  after the Big Bang.</p> <p><i>Inflation does not require the hypothetical inflaton.</i></p> <p><i>The cause of inflation is the compliance with the second law and RSL.</i></p> <p><i>The tremendous momentum/energy flux of ultimately coherent light of Big Bang must be separated from the DEC into the exactly flat space/time.</i></p>	<p><i>Promising astronomical observations of the inflation imprint on observable CMB are in progress.</i></p> <p><i>The observations are focused on gravitational waves caused by tremendous impact of inflation on the initial hypothetically highly inhomogeneous space/time that would smother the inhomogeneity's making the space/time flat as is contemporary observed.</i></p>	<p>Inflation stage:  <math>\approx 10^{-35} \div 10^{-33} \text{ sec}</math></p> <p>No photonic Big Bang</p> <p><i>Einstein cosmological "constant" is not really constant in inflation theories.</i></p> <p><i>Instead "inflaton", a new hypothetical form of matter causing inflation is postulated.</i></p> <p><i>The inflation decay is the source of all visible matter in Cosmos.</i></p>



<p><i>The space/time should be exactly flat since the curvature of space/time is the chaotic gravitational degrees of freedom.</i></p>	<p><i>The initial spectrum of quantum density fluctuations of the hypothetical Inflation matter is believed may explain the density distribution of contemporary visible matter.</i></p>	
<p><i>Chaos does not exist prior to the birth of time. Time does not exist prior to the birth of protons.</i></p> <p><i>The two are born together in inseparable compliance with the ESR concept of the time measurement.</i></p> <p><i>Measuring time requires at least two clocks made of a nonzero rest mass matter and light synchronizing the clocks.</i></p> <p><i>Hence inflation is inevitable subsequent to the ultimate coherence of Big Bang light</i></p>	<p><i>We suspect, but are not qualified to argue that the imprint of inflation via the tiny trace of primordial gravitational waves caused by inflation and left on observable CMB may be not able distinguishing different causes of inflation.</i></p>	



Conjunctive Basic Parameters of Protons, Electrons and Physical Interactions		
Proton rest mass due to quarks $m_{proton}^{quarks} \equiv 10^{-26} g$	Not possible to measure directly	QCD computations based on the experimental input of the total rest mass of proton results: $m_{protons}^{quarks} < 1.67 \cdot 10^{-26} g$
Proton total rest mass due to gluons and quarks: $m_{proton} \approx 1.69 \cdot 10^{-24} g$ Lifespan: $3 \cdot 10^{38} sec = 10^{31} years$	Proton total rest mass due to gluons and quarks: $m_{proton} \approx 1.67 \cdot 10^{-24} g$ Stability: $> 10^{30} years$  <i>There is other data furnishing much longer stability time, but it depends on particular mechanisms and hence irrelevant.</i>	<i>Proton is extraordinary complex composite particle consisting of three quarks with the total charge of opposite sign and equal to that of electron.</i>  <i>This is the final gist of the famous theory started as Ne'eman, Gel-Mann eight fold theory that later led Gel-Mann and Zweig to postulate quarks.</i>  <i>Proton mass is assumed given.</i>
Electron rest mass: $\approx 10^{-27} g$  Lifespan: $3 \cdot 10^{38} sec = 10^{31} years$	Electron rest mass: $\approx 9.1 \cdot 10^{-28} g$  <i>Elementary particle</i>	<i>Considered a given fundamental Constant.</i>  <i>Considered indivisible having no internal structure.</i>



*Electron is the genuinely elemental particle inseparable from photons.*

*The transformation between the coherent light of Big Bang and the virtual electron/positrons pairs is the "Before Adam" phenomenon.*

*Stable electrons/positrons are born quite later after the birth of protons.*

*Electrons/positrons are whole made of the trapped virtual Planck particles.*

*The cloud of virtual photons is chaos emanated by electrons/positrons coherent core to maintain its coherence for the lifespan of visible Cosmos.*

*The exchange by virtual photons is the cause of electromagnetic interaction.*

*The latter is the first order effect in powers of the fine structure constant.*

*Electromagnetic force plays no less role in the structure of protons than the strong force does. But actually it is the unified electroweak force is defining the internal structure of protons furnishing them with two internal scales deep inside the proton curled "string".*

*Electron mass: is assumed given.*

*Electron is assumed elemental and forever stable.*

*The electroweak theory unifying the electromagnetic and weak forces explains everything except the large mass of W and Z bosons.*

*These are fundamentally important for digging inside of protons and neutrons transforming hem one into another.*

*The cause for it is obvious. Atoms nuclei would have not existed if not for the nuclear attraction between protons and neutrons.*

*This attraction neutralizes the Coulomb repulsion of protons.*

*Thus atoms are forced to form by the same RSL as all other coherent entities in visible Cosmos.*

*The RSL is the cause. But the mechanism of the atom formation requires neutrons, Weak interaction procures neutrons from protons.*

*Otherwise neutrons would have not been needed. But the coherent Planck particles flow from the DEC must build coherent inanimate matter to form stars and other useful entities.*



<p><i>The vibration at the bigger of the two scales generates the "sound" cloud of virtual gluons, while the higher frequency sound of the smaller scale vibrations probably generates much heavier W and Z bosons.</i></p> <p><i>This assertion is preliminary!</i></p>	<p><i>W and Z bosons have been detected long ago as all other predictions of electroweak theory.</i></p>	<p><i>One of them is Sun and Earth is circling around it in a good position.</i></p> <p><i>This is where the animate life will be created and evolved out of order extracted from the solar radiation.</i></p> <p><i>For the heavy nuclei the balance of forces cannot hold and the nuclei start decomposing radioactively</i></p>
<p>Visible matter, MHB's and Visible Cosmos lifespan: <math>10^{31}</math> years</p> <p>Higgs boson?</p> <p><math>M_B \approx 2.23 \cdot 10^{-22} g = 132 m_{\text{proton}} = 129 GeV</math></p> <p><i>We are not at all sure that the above is the boson recently observed and believed the Higgs boson.</i></p> <p><i>We mentioned above the possibility that the proton string vibrates with two distinct frequencies.</i></p> <p><i>The energy of the one corresponds to the generation of gluons with good accuracy when the energy of vibrations is compared to the rest mass of protons.</i></p> <p><i>The other frequency may correspond to much more massive "sound" bosons.</i></p> <p><i>It is a very preliminary assertion</i></p>	<p><i>Too early to judge</i></p> <p>Higgs boson</p> <p><math>\approx 125 \div 127 GeV</math></p> <p><i>Preliminary data. Experiments in progress</i></p>	<p>Visible matter, MHB's and Visible Cosmos lifespan: Roger Penrose , 2010</p> <p><math>T = T_{\text{lifespan}}^{MBN} \cdot R_c^2 = 10^{113}</math> years</p> <p>Higgs boson</p> <p><math>M_{\text{boson}}^{\text{Higgs}} \cdot c^2 \sim 126 GeV</math></p> <p><i>In the framework of Grand Unification it is believed that the Higgs bosons is defining the attribute of mass and carrier of gravitational force.</i></p> <p><i>This concept is similar to the electroweak and QCD theories. In these theories virtual photons and virtual heavy W and Z bosons are the carriers of respectively electromagnetic and weak interactions, while virtual boson gluon is carriers of strong interactions.</i></p> <p><i>We disagree with the Concept of Higgs particles as defining the attribute of mass, although the new Higgs boson and field may exist in association with strong and other interactions.</i></p> <p><i>In fact photons, W&amp;Z and gluons are all the Higgs particles in the sense that they are the carriers of respective interactions.</i></p>



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<p><i>At this scale the fictitious force transforming the coherent momentum /energy flux from the DEC is exactly equal to the quantum viscosity dissipation term and protons decay into the Planck particles, or more correctly melt within the DEC.</i></p>		<p><i>This is the reason why neither the strong force value nor the mass of proton can be calculated. This is the reason why proton is not the exact solution of any equation.</i></p> <p><i>The QCD as all other Hamiltonian physical theories do not and cannot impose the existence of coherent entities.</i></p>
<p>The ratio between the combined density of coherent visible and chaotic dark matter and the dark matter density alone is constant.</p> <p>This ratio is: <math>\approx 1.83</math></p>	<p><i>Cosmologists will be testing this prediction till the end of times</i></p>	<p>Do not exist</p>
<p><i>The asymmetry between matter and antimatter content in visible Cosmos is trivially explained.</i></p> <p><i>The coherent momentum/energy and the corresponding negative entropy flux into visible Cosmos.</i></p> <p><i>The positive entropy flux, the flux of chaos would correspond to the excessive antimatter content in visible Cosmos</i></p>	<p>Well established fact.</p>	<p>Do not exist.</p> <p><i>Considered a mystery. But there are no mysteries in visible Cosmos, rather the perceptions of strange facts create mysteries.</i></p> <p><i>As soon as one accepts the primeval source of Cosmic order and the goals of this source there are no mysteries left.</i></p> <p><i>Instead we are learning various mechanisms of ever increasing beauty implementing the will of the second law and RSL.</i></p>



Self-Conscious Human Brain Parameters		
<p><i>Human brain self-consciousness is related to the concept of time and the primordial DEC source of coherent momentum/energy flux of dark energy through the brain cortex.</i></p>	<p><i>The attribute unique to Man is well known.</i></p> <p><i>It is proclaimed in Genesis in the eternal verse that Man is made in the image of Creator.</i></p> <p><i>In mundane manner Man creates order, is endowed.</i></p> <p><i>With comprehension of time. Not only of material time, but also of the abstract time "Before Adam".</i></p>	<p>Concept does not exist.</p> <p><i>The closest was promoted by Roger Penrose in his profound quantum mechanical concept on the nature of self-consciousness and nonalgorithmic thinking of Man</i></p>
<p><i>The dark energy flux passing through the cortex of human brain with the volume of <math>\sim 10^3 \text{ cm}^3</math> is maintaining the extraordinary dark energy density of times over the average density of</i></p> $R_c^{1/2} \approx 3 \cdot 10^{20}$ <p><i>times over the average density of dark energy in visible Cosmos.</i></p> <p><i>The flux is non-interrupting and causing, potentially, the ultimate phase coherence with the DEC throughout the Man's lifespan</i></p>	<p><i>The ability of nonalgorithmic thinking is also obvious.</i></p> <p><i>Nevertheless, the persistence with which many scientists are anxious to delegating Man to smart computers, or the other way around are truly monumental and unceasing.</i></p> <p><i>The popular concept among some in the scientific community says that the self-conscious Man evolved from apes in Africa</i></p>	
<p><i>The birth of self-consciousness is in conjunction with the birth of proton and the time concept at</i></p> $t_{\text{event}} = 3 \cdot 10^{-3} \text{ sec}$ <p><i>This takes away the conflict on the nature of time prior to</i></p>	<p><i>This seems to be so out of touch with reality and absurd that it's hard to contest rationally.</i></p>	



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<p><i>the birth of Man capable of conscious understanding of time perceiving past and forecasting future not based on experience.</i></p> <p><i>The above argument has nothing to do and not in conflict with the evolution of inanimate matter in visible Cosmos and animate matter on Earth.</i></p> <p><i>The above have proceeded at their own pace in accordance with the laws of physics and mechanism of absorbing order from the solar radiation and the subsequent Darwinism; the survival of the fittest unshakeable principle.</i></p>		
<p><i>At an appropriate time the self-consciousness is ported into the most suitably evolved animal body and brain.</i></p> <p><b><i>This is the birth of the whole Man.</i></b></p> <p><i>Since then the evolution goes on and the amount of order on Earth will be ever growing which may be not perceived by any particular generations.</i></p> <p><i>As will go on the weeding out of species, races, individuals not fit for survival as well as manmade coherent entities; societies, ideologies, states and Empires.</i></p>		



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<p><i>As soon as the units of these entities lose the coherence of purpose and coherent creativity the entities are not fit for survival.</i></p> <p><i>This is especially painful for Empires incapable of comprehending the remorseless second law and RSL.</i></p> <p><i>There is no fairness and unfairness in the manner these laws prosecute their task of reaching the ultimate order of the DEC.</i></p> <p><i>Man is given the task to bring new information created by him to the DEC. The DEC is timeless and void by itself of material processes.</i></p>		
<p><i>It is the infinite capacity reservoir of Information and light. The DEC shares it with visible Cosmos and Man by the gift of life processes.</i></p> <p><i>In the end Man must not only return back the debt of life but also pay interest by giving the DEC information that had not existed, and was created by Man himself.</i></p> <p><i>For the enhanced creativity Man is given the free will of choice between good and evil, right and wrong.</i></p> <p><i>This is the theological concept having the eternal significance for Man and his creations.</i></p>		



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*The typical weight of the human brain is calculated in the manner we calculated the coherent mass of quarks in protons.*

*Rather than calculating the lifespan of the human brain we assume that the upper limit is the Biblical 120 years.*

*Then we receive for the rest mass, or weight of the brain cortex:*

$$M_{\text{cortex}}^{\text{brain}} \approx 10^8 m_p = 1000 \text{ g}$$

*This calculation no doubt may appear peculiar to say the least.*

*But if to think about it with no preconceived animosity the result ties up many loose ends that are quite rational.*



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<p><i>Most importantly it reinforces the above assertion that the extraordinary complexity of human brain is caused by the highly dense coherent momentum/energy flux passing through the human brain.</i></p> <p><i>This is a fairly rigorous result, not less than the calculation of the coherent component of the proton rest mass due to quarks.</i></p> <p><i>The remarkable fact is the appearance of the ubiquitous factor</i></p> $R_c^{1/2} \approx 3 \cdot 10^{20}$ <p><i>in the calculation .</i></p> <p><i>It connects the coherent human brain component with the fundamental dimensionless constant of visible Cosmos, the constant defining the Cosmos evolution and lifespan</i></p>		
<p><i>What is special about the Biblical lifespan? It is easy to estimate that the combined space span of dark energy passing by the above <math>10^8</math> locations in the human brain is near to the distance passed by light since the Big Bang.</i></p> <p><i>We interpret it as the indication of the phase coherence connecting the human self-consciousness since its birth in conjunction with birth of time till the present, but also the future.</i></p> <p><i>The phase coherence does not</i></p>		



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<p><i>distinguish between past and future. It is the fundamental quantum coherence serving the preservation of information.</i></p>		
<p><i>The DEC as incompressible media is the conductor of phase coherence in the total 4D space/time of visible Cosmos.</i></p> <p><i>The human self-consciousness scans the history of visible Cosmos from start to end.</i></p> <p><i>This is the conclusion of this review that the self-consciousness entity is timeless.</i></p>		

**Keywords:** Visible Cosmos, Kosmos, Universe, Second low and reverse second low, Dark energy, Dark matter, Light, Order and coherence, Entropy and mathematical entropy, Acceleration of Hubble expansion, Dark energy and brain cortex



**VERIFIABLE FORECASTS OF ENERGODYNAMICS**

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**ABSTRACT**

Not trivial consequences of the new fundamental discipline establishing unity of laws of transfer or transformation of any forms of energy are produce. The essence of the contradiction of these consequences to conclusions of some fundamental disciplines is short described and ways of their elimination are offered. References to the theoretical and experimental papers confirming conclusions of the theory or specifying ways of their check are given.

**TO THE PROBLEM OF FORMULATION OF BASIC PRINCIPLES  
IN THE THEORY OF THE MOLECULAR STRUCTURE AND DYNAMICS**

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**ABSTRACT**

In this contribution some basic problems of practical applications of quantum mechanics to the functioning of micro-systems have been discussed. In particular, it has been shown that starting from fundamental principles one cannot calculate 3D-configurations of atoms in molecules. In order to get meaningful results in these calculations, the empirical information about the configuration of molecule is necessary. It has been shown also that the separation of electronic and nuclear parts in nuclear-electronic problem of quantum chemistry can be performed in the adiabatic approximation only. The Schrödinger equation with the stationary operator  $\hat{H}_{en}$ , common for all isomers of any molecule, can not be written as well.

**ALKOXIDES OF CHEMICAL ELEMENTS - PROMISING CLASS OF CHEMICAL  
COMPOUNDS WHICH ARE RAW MATERIALS FOR HI-TECH INDUSTRIES**

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**ABSTRACT**

Alkoxides of chemical elements form a class of compounds, the practical value of which are large and are growing. In the present work generalizes the experience of creation of small-tonnage chemical production of alkoxides different chemical elements and their use in technological processes of production of various chemical compounds and composite materials.



**PECULIARITIES THE RHEOLOGY OF HUMAN BLOOD – SUPERFLUIDITY OF THE BLOOD**

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**ABSTRACT**

The article is written based on the results of the reasoning of experiments, the set up of which had nothing to do with the problems of biology, in particular, with the blood circulatory system. The experiments were initiated by the task of oil workers. To reduce the water inflow to wells they use backfilling of water-bearing beds by polysaccharide solutions. We had to study the scientific aspects of this process and optimize its technology.

**INFLUENCE OF EFFICIENT, MULTICOMPONENT, POLYFUNCTIONAL, PHYSIOLOGICALLY ACTIVE (NANO) CHIPS WITH HERBICIDE ACTIVITY ON RICE CROP GROWTH, DEVELOPMENT, YIELD AND ON WEED GROWTH INHIBITION**

*Dedicated to the blessed memory of  
Prof. Ruban Igor Nikolaevich*

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**ABSTRACT**

Using physiologically active, complex, polyfunctional, multicomponent (nano) systems – (nano) chips in the pre-sowing rice treatment (nano) technology allows precise seeding; enhancing field seed germination; reducing plant morbidity rate considerably or even deleting disease incidents; increasing plant adaptability to unfavorable environmental conditions; expanding crop yield; improving products quality by not using toxic chemical means of plant protection; intensifying competitive ability of agricultural products as well as assuring environmental safety in crop cultivation regions. Nutrition micro- and mesoelements, as also intense activity plant growth regulators and other physiologically active substances, depending on the crop variety, cultivation conditions and possible risks, can be added to such pre-sowing treatment (nano) technologies.



**PLANT RESIDUES OF VARIOUS AGRICULTURAL CROPS AS RENEWABLE RAW  
MATERIAL FOR OBTAINING ACTIVATED CARBON**

*Dedicated to the blessed memory of  
Prof. Ruban Igor Nikolaevich*

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**ABSTRACT**

**Powder carbon absorbents from raw plant material residues – the straw of various agricultural crops, have been obtained, the complex of physical - chemical and structural properties, has been studied, their sorptive capacity has been estimated, we have also detected their efficiency for pre-sowing seed treatment of oil and cabbage crops.**

**CERTAIN PROPERTIES OF ENTROPY IN CRITICAL REGIMES OF TWO  
PHASE FLOWS**

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**ABSTRACT**

**Entropy is a key notion in the analysis of properties of mass systems. This notion was first formulated in thermodynamics and then expanded to gas systems. In the previous paper [1], the author has formulated the notion of entropy for two-phase flows.**

**The analysis of properties of this kind of entropy has allowed us to formulate conditions of invariance of the behavior of narrow-size-class particles in the conditions of a two-phase flow. This analysis has revealed a universal dimensionless parameter of separation curves affinization, which makes it possible to control the process of bulk materials separation into fractions by particles sizes and densities.**



## **STATISTICAL PARAMETERS OF CRITICAL REGIMES OF TWO PHASE FLOWS**

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### **ABSTRACT**

The regime of two-phase ascending flow in which the solid phase can move in both directions is called critical. The analysis of such flows from the standpoint of statistical approach has allowed establishing main parameters characterizing this mass process. Chaotizing factor and solid phase mobility are among its energy characteristics. It is shown that two-phase systems that can exchange energy and particles, evolve towards an equilibrium state with maximal entropy. In this case, the ratio of mobility factors in all parts of the system to the chaotizing factor acquires the same value. The analysis of this ratio leads to a universal criterion of separation curves affinization. In this respect, the identity of this criterion for different size classes ensures their equal extractability. A correlation between principal parameters characterizing a two-phase flow as a statistical process is determined.

## **OBTAINING OF CYCLOCARBONATES OF EPOXIDIZED VEGETABLE OILS (REVIEW)**

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### **ABSTRACT**

The analysis of literary data on the obtaining of cyclic carbonates on the basis of epoxidized vegetable oils (EVO) has been carried out. The influence of the following factors on EVO carbonation reaction has thus been considered: the type of vegetable oil, the type and catalyst concentration, state of carbon dioxide, pressure and temperature



**PRODUCTION TECHNOLOGIES OF METAL MATRIX COMPOSITES  
(REVIEW)**

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**ABSTRACT**

**Liquid phase production technologies of metal matrix micro- and nanostructural composites are considered. Complex using magnetohydrodynamic stirring, ultrasonic treatment of melt during liquid and liquid-solid states and thixocasting advantages are proposed.**