

THEORY OF ORDER
PART 1

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"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 Schrodinger equation contains frogs, musical composers, or morality".

R.P. Feynman

The Feynman Lectures on Physics.

Preamble

From the times of antiquity philosophers and scientists have been straining minds on the primeval nature of order and chaos. Modern cosmologists and philosophers still do the same. What had been at the beginning? Had it been primordial chaos, or primordial order, or there had been no beginning at all?

From the Stanford Encyclopedia of Philosophy we learn that Plato (born between 429 and 423 BC) was " deeply impressed with the order and beauty he observes in the universe and his project in the dialogue is to explain that order and beauty. The universe, he proposes, is the product of rational, purposive, and beneficent agency. It is the handiwork of a divine Craftsman ("Demiurge," who, imitating an unchanging and eternal model, imposes **mathematical order on a preexistent chaos to generate the ordered universe (kosmos)**. The governing explanatory principle of the account is teleological: the universe as a whole as well as its various parts are so arranged as to produce a vast array of good effects. It strikes Plato strongly that this arrangement is not fortuitous, but the outcome of the deliberate intent of Intellect (*nous*), anthropomorphically represented by the figure of the Craftsman who plans and constructs a world that is as excellent as its nature permits it to be" (Timaeus, Plato).

In the much more ancient Genesis of Old Testament the **preexistent condition is not chaos**. I would like to cite a piece from a respectable translation of the original Genesis of Hebrew Old Testament:

"In the beginning God created the heaven and the earth. And the earth was without form, and void; and darkness [was] upon the face of the deep. And the Spirit of God moved upon the face of the waters. And God said, Let there be light: and there was light".

In my own, perhaps amateurish interpretation what is said here is that in the beginning there had been formless, empty, bounded quasi-nothingness, **timeless dark void with nothing material**. The spirit of God had been hovering over the boundary of this dark void, "upon the face of the waters". The situation remained static, nothing live had been happening till God decreed "let there be light".

There had been no **time concept** prior to some material processes in Universe decreed by God, or Craftsman. In Plato **time** appears associated with **motion** of celestial bodies. His student Aristotle saw **time** in a more general manner as defining **change**, the very existence of **change**. In Genesis the concept of **time** is so controversial that the arguments are still ongoing between the mainstream scientists and theological scientists without consensus. This is because since the year 1905 when Einstein literally overturned the scientific and philosophical thought of millennia with his special relativity theory and we know that there is no such thing as absolute time in Cosmos. We don't know what time and relative to what had been meant in Genesis. The relative nature of time is not a scientific proof of Genesis correctness, but it shows that the aggressive repudiation of the time duration of Genesis as incompatible with the life time span of scientifically observed Universe is naive.

Millennia have passed, but modern cosmologists, physicists and astronomers go on trying to answer the same old question. What had been the primeval state of Cosmos which we inhabit? Craftsman and God are most often excluded from scientific deliberations so that the only way to choose one rational hypothesis over another in scientific terms is to find way to observe and measure some material affirmation. The experience of the last decades show decisively that excellent opportunity to establish some material ground breaking evidence of our Cosmic past is within the reach of astronomical observations. Although it is doubtful that the final, unambiguous conclusions, satisfactory for everyone, will ever be achieved. However the marvelous discoveries have been made and are being made¹. The note of caution is based on the fact that the nature of order and its interrelation with chaos is not really understood in fairly mundane phenomena, such as at least in principle are falsifiable and verifiable by earthly observations and measurements, This is in contrast with cosmology where certain conjectures are seemingly, or truly not falsifiable and hence remain speculative, Such although meritorious are more akin to theology and philosophical beliefs than to regular science.

In general context the question asked is where at all order in natural phenomena comes from. Is it created by itself? Ex nihilo, or from primeval chaos? Like homunculus in a jar as was believed not so long ago and is still believed by some proponents of self-organization? Or mathematical order had been imposed by Craftsman?

Prior to venturing into the origin of Cosmos it is desirable to try to understand the nature of order and chaos for simpler phenomena that are widely spread in observable Cosmos and hence clearly fundamental, but at the same time falsifiable and accessible to experiment.

Cosmos is full of well observed, documented order and coherent organization. From the regularity of galaxies distribution within the so-called superclusters in visible Universe all the way down the scales to the shapes of galaxies, to distribution of stars in galaxies, from the solar system, to planetary atmospheres general circulation, ocean currents, e.g., Gulfstream, from tropical hurricanes to tornadoes and the usual clouds in the sky, from the world economy and social order, to biological Life and at last the culmination of order in Homo Sapiens endowed with self-consciousness, the unique awareness of being, everywhere we see coherent organization and mind boggling complexity rather than senseless chaos. It is noted that apparently while coming down the scale, the physical size in the above orderly phenomena we do not see downgrading of complexity and orderliness with the diminishing scale. In fact it seems the opposite. For instance biological Life and moreover the self-conscious Life are the pinnacle of order. Man modifies environment in a coherent manner, perhaps not always likeable to many. The self-consciousness, the awareness of being, the comprehension of mathematics and creation of "useless art" is the core of order. These seem to be supreme order and organization, perhaps the ultimate order.

Therefore, as before, we are confronted by the most profound question. Where does all this order in complex, but still mundane and visible and seemingly falsifiable phenomena come from?

From the time of great Plato many thinkers believe that order is the mathematical order. It is somewhere in the equations that describe one, or another particular orderly phenomenon. Or the roots of order are hidden in one mathematical principle, what is called the theory of everything that rules all subsequent order. However, as is pointed out in the **Epigraph** to this work we do not see order in the equations that we are sure do describe the reality around us. Even in the seemingly most familiar equations for water motion we cannot find orderly structures that are observed by everyone, say structures like clouds over our heads.

This order is always, invariably found in the midst of less orderly, chaotic environment. This seems true for any phenomena manifesting coexistence of order and chaos. Would it be a family life, social interactions, political and tribal structure of states and tribes and of course natural phenomena we observe daily in material world. In weather and meteorology, in astronomy and in the stock market we witness coexisting order and chaos, order disappearing into chaos and order appearing within chaos and again coexisting with it.

It would seem totally unnatural to believe all this similarity is coincidental, although some do. On the contrary it seems quite natural to conjecture that the interrelation between order and chaos is subject to some universal principle that hovers over, supersedes in generality of application and supplemental to the particular mechanisms that are at play in particular events, phenomena and happenings, the universal principle that can be associated with change and ticking of time.

Such universal all enveloping principle does exist. It is known as the **second law of thermodynamics** and its generality of application sometimes is even embarrassing. Nevertheless most scientists for over 150 years believe in the **second law of thermodynamics** despite the puzzling conclusions that its rigorous application leads to.

General Description: Order and Chaos

At the first glance it seems obvious what is order and what is chaos and how to distinguish one from another. Semantically the two words are so familiar in every aspect of daily life and events. When we make mess at our home we decrease order and create chaos at home. When garbage collectors are on strike there is chaos, piles of garbage in the streets. When a mob rules the streets there is general chaos in a city. When a rebellion against existing political order occurs most often chaos reigns. When wife and man quarrel every day order in the family dissipates and chaos is felt painfully by children.

In the physical, material realm molecules in gases move chaotically as is clear from observed Brownian motion, but in a solid matter, crystal, rock, wood molecules are organized, united by physical interaction into whole. Molecules lost independence, freedom and become subject to collective laws. Atoms unite into more orderly molecules. Elementary particles, protons and neutrons integrate into atomic nucleus. Atomic nucleus captures electrons and become atoms.

Helium is a gas for normal temperatures. But when the temperature is low enough it becomes a fluid and when the temperature is very low it becomes the superfluid helium. Individual molecules lost their independence and freedom to become parts of one conglomerate even though within this conglomerate they still retain some freedom and move chaotically, but less chaotically then when they were gas. When we pump a usual fluid through a small diameter straw there is friction at the walls, we all know this from drinking sodas. But superfluid helium flows without friction through the thinnest capillary, or a tiniest crack without friction at all. What happened is that molecules of helium in superfluid state are totally coherent and as a result helium lost viscosity. Viscosity that causes friction is the result of the individual, random molecular motion, but when molecules are totally correlated they form a coherent state and behave as a totally submissive collective. No freedom remains for the molecules and as a result viscosity as the parameter quantifying resistance is obviously zero. This is a dream of some armies and all dictatorial societies to transform individuals into molecules united in one mission.

It is more complicated with gravitationally attractive matter. Interstellar gas that fills interstellar and intergalactic space may seem to be just a gas. However when it is uniformly distributed in space and the total gravitational pull of its uniformly distributed molecules is taken into account the gravitation breaks the uniformity. The uniformity is unstable in presence of self-attracting gravitation. When certain critical value of density is reached in an infinitely, or at least very large cloud of

interstellar gas the homogeneity breaks down and gas starts to form clumps of matter of a certain size. One would think that this process leads to more order like when the gas molecules freeze below solidification temperatures, but this is not so. Specifically the matter itself becomes more organized, although not as in crystals. The crystals are a special case since they can form only if the individual atoms organize into geometrical patterns of certain symmetries¹.

Remarkably gravitational field itself is a kind of matter as is explained by Einstein general relativity theory. The matter itself forms and determines the geometry of space time and vice versa. Gravitational field does not have the proper energy and momentum² like real matter, but still it can be more orderly, or less orderly. In fact the astronomical observations of MBH (massive black holes) in the centers of galaxies together with the brilliant theories of Jacob Bekenstein and Stephen Hawking make it very clear that globally gravitation and especially the MBH's hold by far the greatest amount of chaos in all Cosmos. This extremely important circumstance is perhaps central for understanding the primeval source of order in Cosmos.

To make it short the loss of order by gravitational field when interstellar gas forms clumps of matter is more than the gain of order by the matter. The result is that the total order of the matter and gravitational field together becomes less and the total chaos more.

The opposite is also true. If the gravitationally interacting gas becomes more chaotic the gravitational pull becomes on the contrary less chaotic so that to compensate for the loss of order by the gas. This is the reason why stars don't lose their wholeness when there are violent explosions inside them and subsequent rise of temperature and kinetic energy of the atoms. The gravitational potential pull gains twice more coherent energy increasing order and the solar gas temperature drops again to one below to what it was before the explosion³. The star returns to stability.

The above elementary considerations have one prime aim. This aim is to show that those semantically clear concepts of order and chaos, coherence and incoherence, organization and disorganization extend and permeate as much the daily experience of individuals and societies as they do the realm of natural phenomena. If this is the case then it is not enough to rely on semantically familiar and deceptively obvious meanings of the words order and chaos. The semantic understanding furnishes only the qualitative understanding of the nature of these words. What is also needed is the quantitative meaning and definition of order and chaos, a mathematical measure of relative order and chaos. It is safe to follow great Plato and to accept that order is the mathematical order and by implication chaos is the mathematical chaos. The measures of order and chaos are the mathematical quantities. It is these mathematical quantities that should define the amount of order versus the amount of chaos in any system, whatever this system may be, the inanimate material world as well as the biological world and furthermore the self-conscious animated world.

Recapitulating the above line of reasoning order and chaos are not just semantic concepts, but are determined by mathematically defined quantities. Since it is obvious that in a system the amount of order and the amount of chaos are related, more order means less chaos and vice versa the two mathematical measures of order and chaos must be connected by a mathematical equation. Moreover although the particular mechanisms behind one or another phenomenon, or event, or happening may be totally different the measures of order and chaos and the equation connecting the two should be the same. This equation should supersede in generality the causes leading to say of order at the expense of chaos and the other way around. If this concept is accepted as an axiom then the consequence is that a correct theory of anything and everything, if the latter exists, must not contradict the mathematical connection between order and chaos.

¹ One exception well known for years, although admitted by conservative scientific community only recently, but rewarded by the Nobel Prize for its discovery, is quasi-crystals having an unexpected type of symmetry.

² More correctly is to say that the gravitational field does not have the proper momentum-energy tensor.

³ This is the result of so-called Virial theorem, a consequence of the Newton's law of gravitation when applied to stars. The gravitational energy in Newton theory is negative, potential energy. It is twice the positive kinetic thermal energy by absolute value. This is why the stars are so stable and live so long. The gravitational force holds together the gaseous plasma of which stars consist of during their prime life time span. The thermonuclear reactions, fusion reactions in plasma are the source of stellar heat. Despite tremendous violence of fusion gravitation holds plasma together and controls and regulates the intensity of fusion. No other constraining force has allowed creating the controlled fusion on Earthly, planetary scale.

It is also clear from the said above that the equation relating order and chaos is a certain balance equation, so that the loss of one should be the gain of the other.

Addendum.

This is Part1 of the work Theory of Order.

Part 2 will be devoted to more specific scientific aspects of order and chaos, such as order and chaos on Earth. I will discuss the origin and interrelation of and between order and chaos in meteorology and geophysics, tropical hurricanes and ocean currents photosynthesis and biological life, micro and macro phenomena, past and future fate of Cosmos.

Part 3 will be devoted to comprehensive theory of turbulence in fluids. Turbulence is one of the most typical phenomena in observed Cosmos. But its fundamental nature remains unexplained. It is usually perceived, wrongly, as chaos. In reality it is not.

It will be shown how the new approach to order and chaos allows totally novel understanding of the monumental phenomenon of turbulence. The new theory of turbulence is explicitly falsifiable and while compatible with all available experimental data explains order in turbulence. Order in turbulence is well known to experimentalists and a layman alike, look at the clouds in the sky, but has been inexplicable hitherto and is even contrary to the semantic understanding of the term turbulence. This is an example of how the historically engrained semantics may contradict the real nature of phenomena in the material world of Cosmos and beyond. **Part 3 will be heavily mathematical. As much as possible I will try and expose the necessary mathematical concepts in Endnotes.**

Part 4 will be devoted to Cosmology. In difference to falsifiable predictions as regards turbulence, some of which may be difficult to falsify to be sure, but at least in principle possible, the cosmological concepts are often hardly falsifiable at all. Nevertheless they are fascinating and huge in scope. **The complicated mathematical concepts will be briefly outlined in Endnotes.**

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1. The Universe expansion discovered by Hubble and formulated by him as the law in 1929. Every two points in Universe whether in empty space, there is no really empty space in Universe, or inside matter run away from each other with the velocity proportional to the distance between these two points. Mathematically the Hubble law is expressed like this: $v[\Delta r(t)] = H_0 \Delta r(t)$, where $\Delta r(t)$ is the distance between two points and $H_0 \approx 10^{-18} \text{ sec}^{-1} = 10^{-18} \text{ hz}$ is the Hubble constant evidently having the dimension of frequency $\text{sec}^{-1} = \text{Herz}$. The possibility of global expansion as well as contraction and flat Universe follow from the remarkable dynamical space/time metrics equations first derived by Alexander Friedman from the Einstein general relativity equations some years prior to the Hubble grandiose astronomical discovery. Independently, but somewhat later these possibilities was also perceived by de Sitter. All these works made on the dawn of modern physics and cosmology remain superbly fundamental and relevant nowadays.
2. Observation of massive black holes, MBH at the core of galaxies and likely quasars. Black holes are massive clumps of matter, so massive that if a body, or a particle, or light are pulled by black hole gravitation to a certain distance from its surface they are irresistibly trapped by the force of gravitational pull and cannot escape falling onto the black hole. The force of gravitational attraction at this distance becomes stronger than any other existing force in Universe. The incredibly huge MBH in the center of our Milky Way galaxy and other galaxies consists of millions of stars. In fact this is a cosmic scale graveyard of stars. Such MBH's are indeed graveyards because they store the mind boggling amounts of chaos spewed out by ordered, organized mater in Cosmos in order to sustain itself for as long as possible. It is truly amazing that matter that is organized by its own gravitation into coherent, ordered objects in Cosmos at the same t dispose chaos into its own gravitation so that to maintain themselves as coherent ordered objects for as long as possible. As long as possible is when all this matter collapse into super dense BMH that will swallow all the matter in its own irresistible gravitational attraction.

This is the true death of order valiantly struggling to prolong life. What mysticism can be more profound than the one of mathematical laws of order and chaos?

3. Discovery of relic radiation, the remnant of Big Bang, literally is "let there be light" of Genesis, It is widely believed, although there are other highly popular viewpoints that the birth of Universe, if such had existed, started from Big Bang the **point like extremely dense and hot state**, probably with temperature $T \approx 10^{32}$ degrees of Kelvin. At such temperature the most conceivable form of matter is radiation of most extremely energetic photons that are tied up coherently together with gravitational and all other existing forces through the particles carriers of these forces. As Universe expands the matter is frozen into the space/time coordinates and thus expands together with the Universe expansion. In particular the extremely short wavelengths of radiation corresponding to the very high temperature Big Bang stretch together with the increasing distance of the space points as if they were glued to them. In fact radiation moves with the speed of light relative to the space points and time does not exist for photons reference frame if it were that such existed. Nevertheless the effect of stretching the wavelengths due to expansion becomes significant for large distances of light travelling and corresponding large time intervals. Since the Big Bang occurred very long time ago believed to be about 13 billion years the wavelengths of the primordial radiation that we observe now are very long and correspond to a black body radiation of about 3 degrees of Kelvin. This is how the temperature of Universe has fallen down from the inception as a result of Hubble expansion.

4. The recent amazing discovery that the Hubble expansion is accelerating. All these discoveries prove that ancient science astronomy is still at the edge of knowledge. The monumental observations showing that Universe expansion is accelerating most interpret as due to the existence of mysterious, invisible dark energy. Dark energy is a form of energy apparently permeating Universe literally uniformly and present at each space-time point of Universe, whether occupied by visible matter, or not. The only way dark energy manifests is via gravitation on cosmic scale. Instead of mutual attraction as all forms of matter show the dark energy gravitation is repulsive so that to comply with astronomical data. It is the only observed form of anti-gravitation in Universe. The observed acceleration is compatible with high accuracy with a certain values of average density of dark energy in usual units of erg per cubic centimeter, in this case per cubic centimeter of volume of observable Universe space, $E_{\text{darkenergy}} \approx 3 \times 10^{-8} \text{ erg / cm}^3$. From the famous formula of Einstein special relativity theory that equivalents' all forms of energy with appropriate rest mass and vice versa, explicitly $E = \rho c^2$, the energy density $E_{\text{darkenergy}}$ corresponds to the mass density $\rho_{\text{darkenergy}} \approx 10^{-29} \text{ g/cm}^3$, where $c = 300.000 \text{ km / sec}$ is the speed of light in vacuum, one of the universal constants in Universe. On the other hand the average density of all other detectable and visible matter in Universe is much smaller with high accuracy. It means that in our current observable time dark energy and dark mass are dominant ones. The value $\rho_{\text{darkenergy}} \approx 10^{-29} \text{ g/cm}^3$ is remarkable because from the Friedman equations for the dynamics of Universe subsequent to Einstein general relativity this particular value of the total average Universe matter density $\rho_{\text{average}} \approx \rho_{\text{darkenergy}} = 10^{-29} \text{ g/cm}^3 = \rho_{\text{critical}}$ This critical total matter average density in our current time of observation means unambiguously that Universe is expanding in a certain sense that will be defined later in Part2, but globally is flat Euclidean geometry Universe. For any other total density, matter together with dark energy equivalent matter, value Universe would be either hyperbolic geometry contracting, or spherical geometry expanding, but expanding very differently from what is observed. It is believed by most that dark energy is in fact the so-called Einstein cosmological constant Λ that stood in the original Einstein equations of general relativity. If the small, positive Einstein's cosmological constant $\Lambda = 10^{-29} \text{ g/cm}^3 = \rho_{\text{critical}}$ is indeed the mysterious dark energy then hitherto astronomical observations and Einstein general relativity theory all add up perfectly.

5. Cosmological positive constant $\Lambda > 0$ is equivalent to a certain time independent repulsive, antigravity energy/mass density. If now the value of Λ is as above it means that it has always been since the birth of Universe, if such had existed and remains till the death of Universe, if such exists, the same. The rate of Universe expansion and Ω_{critical} may be different for young Universe because the visible matter density decreases with the Universe expansion Λ is the same and therefore gains the rank of one of the universal constants of Universe.
6. Very small values of Λ and $E_{\Lambda} = \Lambda c^2$ do not have noticeable repulsive gravitational effect locally in space time, Hence the usual matter gravitation continues to attract, forming stars, galaxies, planets, clusters, curving the path of light near large clumps of matter, gravitational lenses, etc. All these phenomena predicted by Einstein general relativity have been discovered and rediscovered again. On the top of it general relativity is even more tremendous seemingly explaining the totally unexpected global structure of Universe.
7. Rejecting scientific prejudices it is tempting to associate the dark "void" of Genesis with the invisible dark energy and universal Einstein cosmological constant Λ .
8. The laws of physics are firmly believed to be endowed with three universal constants. These are speed of light $c = 3 \times 10^{10} \text{ cm/sec}$, the maximal speed, in accordance with Einstein special relativity theory, that can be achieved in Universe and then only by massless particles like photon. The second universal constant is the Newton gravitational constant $G \approx 10^{-8} \text{ cm}^3 \text{ g}^{-1} \text{ sec}^{-2}$ and the Planck constant of quantum theories $h \approx 10^{-27} \text{ cm}^2 \text{ g sec}^{-1}$. All three universal constants are dimensional ones and well tested in hundreds experiments carried out for dozens of years.
9. If Λ is indeed a universal constant then the four universal constants c, h, G, Λ unite into one dimensionless universal constant $R_{\text{Cosmos}} \approx 10^{41}$. This is a curious one because Einstein general relativity, the theory of gravitation does not have a universal dimensionless constant per se. Neither does the classical electromagnetic theory which is a linear theory in vacuum. However quantum electrodynamics that cannot treat photons and electrons separately and is therefore a nonlinear theory does have a small dimensionless parameter called Rydberg constant that is actually the constant of interaction in nonlinear quantum electrodynamics equations. Numerically it is $Ry = e^2 / hc \approx 1/137$, where the electrical charge of electron is e . This is a relatively small number that allows using the perturbation expansion in powers of this parameter proving the correctness of quantum electrodynamics with amazing experimental accuracy. To be sure after performing regularization of non-physical infinities intrinsic to this theory.
10. The above $R_{\text{Cosmos}} \approx 10^{41}$ is a large allegedly universal number. If it is a coupling constant of some quantum gravitational theory if such was known, it is not convenient for perturbation theory analysis. In Part 3 of this work I will show how an arbitrary large coupling parameter, or coupling constant can be dealt with in specific calculations for a specific nonlinear phenomenon of turbulence in fluids. Fairly remarkable is that the novel attitude to the origin of order versus chaos promoted in this work allows a mathematical treatment of the ultimately nonlinear phenomenon of turbulence despite the arbitrary large value of the coupling parameter typical for this phenomenon.
11. Some of the observations made above at this stage remain no more than exactly that, observations. At this stage they do not pretend to carry deep wisdom. Still they are curious and will be pursued in Part 3 and Part 4 of this work in a more quantitative manner.

12. The origin and interrelation of order and chaos in Cosmos have been intensively thought about for centuries and longer. In particular fields of knowledge the corresponding mathematical equations for measure of order are well known and extensively applied.
13. What I have tried to do in this work is to expose the generality of concepts of order and chaos from the birth of Cosmos till its death and likely resurrection and death again in the ad infinitum cycles of birth and death, the cycles of time as they were named in the puzzling book of Roger Penrose that came to light in 2011. But also I applied these concepts to intrinsically falsifiable, mundane, but historically acknowledged as hugely complex phenomenon of developed turbulence in fluids. The new approach results in a new theory largely compatible with vast amount of experimental data and making explicitly verifiable predictions. Some of these predictions have been actually confirmed although have not yet sunk into the community raised on conviction that the theory of turbulence is not possible to develop. Indeed more than a century has passed with no fundamental understanding of this phenomenon, one of the most universal in observed Universe. This is despite the century of successful practice of semi-empirical theories of turbulence that are the mainstay of aeronautics and meteorology.
14. One may ask legitimately if a fundamental understanding of phenomena, in particular of turbulence, is at all needed if the semi-empirical practice is successful. The answer is that success of semi-empirical practice is always limited. For instance one should not be a rocket engineer to know that such mundane problem as weather prediction and cataclysmic climate changes forecasts rely on models of turbulence in particular. No doubt that many of them are not reliable, or outright wrong. It is also quite obvious to conclude when observing the incredible elegance of the sea and air dwellers propelling through their turbulent medium that they have in their genes much more knowledge of turbulence than we do. And at last the controlled thermonuclear fusion has been and definitely will be forbidden terra incognita with no fundamental understanding of turbulence. Although I personally believe that it will remain impossible on planetary scale any way.
15. It is gratifying to know that the general approach to order and chaos suggested in this work allows progress in understanding complex phenomena that at the same time, at least in principle can be put to experimental test on Earth, in laboratory and in atmosphere. It reinforces my feeling that there is some merit in this approach.
16. Furthermore I hope that with profound understanding of the origin of order it may be possible to try to look beyond the myriad of mechanisms responsible for order creation in Cosmos to try and glimpse the eternal mysteries of Why and for What it had been and is being created, the mysteries that have been the exclusive domain of theology.