

**< Intelligibility of nature >**  
**Exploring deeper levels of reality in science and virtual art.**

**“Disentanglement of Quantum Information-waves and Surface Oscillons construction in Dissipative Chemical Reactions interpreted through the rationale of the Science of Quality”**

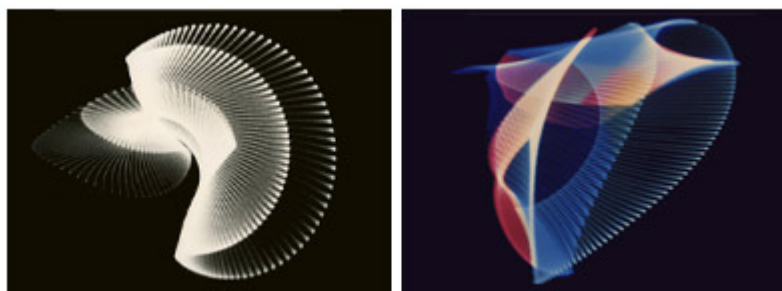
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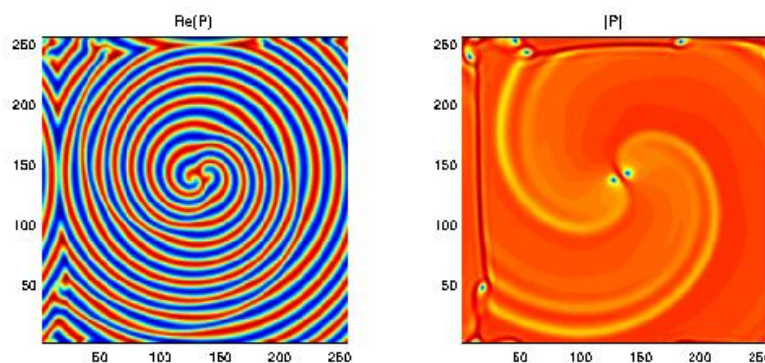
**Premise:**

**- Following the optical studies of visual illusions Richard Gregory wrote : “Brain perception is neither restricted nor guided by the physics of the Universe . Artists have known this all along.”**



Oscillons & the art of Oscillography. <http://dataisnature.com/?p=375>

**Out of equilibrium spiral waves patterns in oscillating clock reactions ( left Figure) and two generative “oscillons” simulation (right figure) .**



<http://www.esam.northwestern.edu/~matkowsky/premixed2.html>

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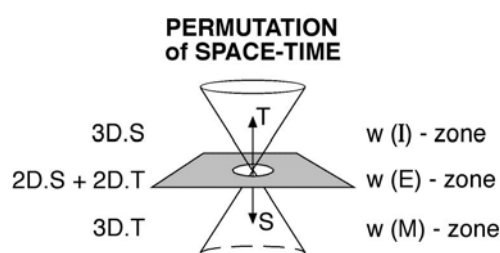
→Now I would like to start some bio-physical considerations about a better intelligibility of deeper levels of reality through seeing the simulation of oscillatory bifurcation in a self-catalytic chemical reaction at the surface, that are driven by the emergence of **synchronously oscillating peaks named “Oscillons”**. (1),(2) . The first observation of parametric surface waves ( “Oscillons”), in a macro structure was seen when some thin knobs of granular material arise spontaneously as produced through a vertical oscillation. For instance periodic pulses are observed to grow up little vertical cones in oscillating layers of sand. In other cases “Oscillons” as granular flow structures, can be seen as micro aggregation of vertical waves, working as “*strange attractors*” to resemble at the surface molecules of various shapes, during a dissipative clock reaction, in order to facilitate the molecular on going transformation at the chemical surface, where bonds are easily break and rebuild . (3)

*The rationale that we can formulate to explain the oscillating self organized reactivity is the following:*

At the initial state, “*Surface- Oscillons*” e.g super-structures of collective oscillating states in the chemical medium, can be generated in the quantum-world, within the “Entanglement” of wave particles. The successive “*disentanglement*” generates four independent polarized waves of “*information energy*” (4) related to the spitting of the four Space-Time vector’s matrix.

Those independent “*Information Waves*”, are travelling forward the reaction surface in order to be incorporated in the reaction layers, searching to maximizing “*information energy*” in a  $\langle 2D.S + 2D.T \rangle$  spatiotemporal regime, that it is living in a surface bonding environment.

In this way the incorporation of “*Information Waves*”, implements the “*surface-stress*” inducing an resonant oscillating excitation, hence optimizing the self catalytic chemical transformation in the context of superficial molecules, that at the chemical surfaces have a different bonding configuration as compared to bulk molecular field. In fact the bidimensional structure of space-time of the “*disentangled information waves*” produces some additional peculiar properties at the surface, inducing different chemical affinity to those of bulk, in order to self catalysing the reaction dynamics.



**Legend :** “*Matrix of Space Time-permutations*” : the metric structure of permutations of space in the picture has three major combinations matrix coordinates related to space and time:

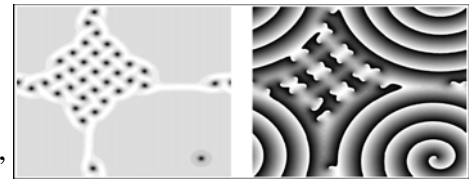
1)  $3D.S + 1D.T$ : it is the structure in which the location of a point in space is determined by three coordinates orthogonal  $3D.S$ , while transferring a point from one location to an another local-place takes in a mono dimensional time interval (T).

2)  $2D.S + 2D.T$ : it is a two-dimensional structure in space (S), living over double time lines (Tic-Tacs) ( $T1, T2$ ), which describes the simultaneous events in a plan available in various contexts such as surfaces, thin films, membrane, liquid crystals, plasmas, etc..

3)  $3D.T + 1D.S$ : it is the structure which allows to identify the moment of an event that occurs in systems such as Black Holes, micro-tubes, nano-wires and also in the description of the quantum tunneling effect etc., where the lines temporal Past, Present and Future, converge to define precisely the time to scroll into monodimensional space (S).

Now remembering that on the basis of the “*Entanglement Theory*” the space-temporal regimes build up different frames of reference (*W-Zones*) (5), it is possible to think that the four polarized waves of pure Information Energy, can be estimated to operate very similar to “*Solitons*”, e.g, “*solitary waves*” or “*particle like phenomena*”, forecasted by the Dirac quantum equation. (6) Therefore as a consequence of the particular informational activity at the surface, we would rename this particular kind of “*Information Energy Solitons*” (“*Insolitons*”). The “*Insolitons*” aggregation in “*Surface-Oscillons*”, in an oscillating chemical reaction, is similar to the *Bose –Condensates*, working in two-dimensional space-time vector field. The “*S- Oscillons*” coupling, splits in two different structural configuration, on the basis of the micro-aggregation of two different circular polarization components of the four “*Insolitons*”. Besides the spontaneous distribution on the chemical surface of the two types (“*Up*” and “*Down*”- *vector’s direction*) of circularly polarized “*S- Oscillons*”; the alternative net of “*Up and Down S-Oscillons*” defines the domain’s borders, within are arising the rhythmic activity of co-rotating and counter-rotating spirals, in an oscillating networked structure that is directly “*eyes-visible*” during the clock reaction, through an swelling and de-swelling propagation. This rhythmic oscillating dynamics it is stabilized through bidirectional signals of the parallel simultaneity property of “*information energy*” communication, in order to get a guide to the transformation of the initial chaos in a self –organized in a not-equilibrium transformation process.

Therefore “S-Oscillons” in the clock- reaction, can be seen as a “*multi- Insoliton’s solution* “ acting as a self – organization surface phenomena. In this way of understanding based on the rationale known as the “**Science of Quality**”, the “*disentanglement*” in single polarized waves of information energy, can become as the quantum “building sheets”, showing an emergent “*no local*” property at the chemical surface, that it is able to exhibit attraction or a repulsion, among the disentangled virtual waves (“*Insolitons*”), in order to combine a network of “*super-particles*”, like are the two kinds of “*S-Oscillons*”, characterised by a meta- stable collective oscillating states, all maintaining the fundamental characteristic property of “**no local**” information energy communication. In fact can be possible to observe that “*S-Oscillons*”, as a packed network of “*Insolitons*”, experimentally shows some emergent properties such as at distant attraction and /or repulsion, that are very similar to the behaviour of electric charges. Therefore “*S-Oscillons*” demonstrate the action of a double activity of “*strange attractors*” because around them are moving the out of equilibrium spiral waves in chemical clock- reactions.



In Fig: “**Surface Oscillons** “ working as “Strange Attractors”

“*S-Oscillons*” get a critical impact on the reactivity , primarily based on a simultaneity of information energy exchange. This no-local communicative effect permits to start up and to advance dynamic of self-co-organization of the clock reaction, generating the fascinating spiral geometry in the bi-dimensional space-time regime, that permits to induce the new self catalytic order from the chaos in a way so evident also at the direct visual perception.

### **Intelligibility of nature as an original production of the Virtual -Art**

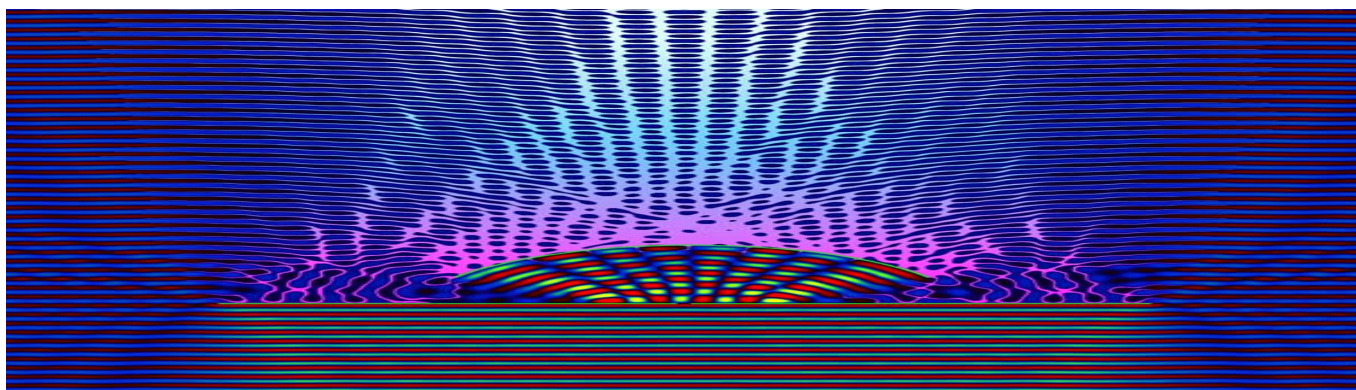
In relation to this advances of science experiments of chaos transformation in new ordered dynamic forms , contemporary artists, would be fascinating by such oscillating reactivity, so that they approach this argument through “*Virtual Computer Art*” . In fact contemporary art independently develops a number of creative simulations in “*Digital Art*” (9),(10) through various mathematical algorithms (11) , giving origin to new forms of “*Generative Art*” (12) .

Nowadays is emerging the crucial call of the growth of the Knowledge Society in order to become more conscious of the need to encouraging a strategy for strengthening scientific advancements, with an co-operative development of “*Science and Art*”, within the common aim to influence the public perception to anticipate new identification conceptual trends of the future knowledge economy . For that reason **EGOCREANET** and other partners start to aggregate at international level a research Group , the ***Open Network for New Science and Art (ONNS&A)*** , aims to develop a kind of conscious “*Entangling Science and Art*” for enhancing ideas ,symbols planning, cooperative research-management , and public engagement activities, based on describing a new kind of “*bio-physical reality*” driven,( as in the “**SCIENCE OF QUALITY**” dissemination strategy) ,through a new rationale, originally produced by means of an integrated perception embodying the subjective internal clock and the physical time arrow, both embodied in the brain in order to organize the nervous tension in neuro-chemical activities by means of a *Bio-feedback* mediated by the four fundamental rhythmic pulsation of brain waves. (*Alpha, Beta, Theta, Delta*)

As a more complete result the “**Science of Quality**” development would lead a new consciousness based on a system of “*bio-causality*”, that will be a consequence of a multidimensional representation of time perception. In fact a complete integration of the subject and object vision in “*Science and Art entanglement* “, turn out to be possible to conceive additional time dimensions, as a strategy opposed to the addition of iper-spaces in “n”-dimensions normally utilised in the traditional Quantum Mechanics. As matter of facts, applying the new rationale of the “**Science of Quality**”, would become possible to avoid the basic contradictions of the quantum and relativity science understanding, that in the past century drastically splits the epistemology of Science from the creative advancement of Art. (13).

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Digital Fine Art& Science Gallery : Quantum Resonator II; <http://www.ericjhellergallery.com/>

## INTELLIGIBILITY of NATURE II°

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### FUTURE EVOLUTION OF NOT HIDDEN NOR OBSCURED Q.BIO-PHYSICS MODELS



**HIDDEN MEANING** : Paris fashion shows 2006 , [www.nytimes.com](http://www.nytimes.com)  
FROM : GOOGLE IMAGES SEARCH. <http://images.google.com/>

Following the dualistic experimental observation of nature of quantum “wave/particles”, light energy (E) as well matter (M) behave to a double quantum interpretation of energy/matter interaction. This two modes of understanding has shaped the course of the Quantum Mechanics (Q.M.) in the last century. The fundamental implication of the duality of Q.M suggests that it is no possible to know reality through a cause effect logic as in the Classical Physics . So that Q.M. subsequently at the Uncertainty Principle (1927) , suggests that in a deeper level, existing under the macro world , the successful description of reality scientifically available, is based only on a probabilistic approach of knowing.

Albert Einstein remains isolated from the current interpretation of the Q.M., this because he would never accept the dead of linear causality and quoted : "*God does not play dice with the universe*". Hence Einstein spent thirty years attempting to unify all physical laws in the General Relativity, without any success so that an unified possibility of a physics intelligibility of reality remains incomplete to us today. As a matter of facts the interpretation of physical phenomena persists to be based upon some rather broad assumptions , as the arbitrary splitting form subject and object of the physical observation. This arbitrary separation of the observer from the concept of physics , close the intelligibility of nature in a reductive mode, continuously forced in the tradition of a mechanical science understanding. In any case physical science, during the last century, produces very important theoretical assumptions, based on various equations, mathematically demonstrable at a good quantitative reply; but forever this mathematical approach remains closed into an evident paradigmatic incorrectness, and, as a consequence of the limited assumption the creative reasoning, science falls in the proper method of predictability, essentially because never considers belonging to the observed Nature the observer her/herself.

To go beyond the current realm of science the EGOCREANET / Open network for new Science and Art , take a decision (2004) to start again to centre the re-examination of “Science and Art” focusing the “Man”, as in the tradition of Florence Renaissance period , born at the times of Leonardo da Vinci.

## “ONNS&A” -Generative Research Protocol



[www.generativeart.com](http://www.generativeart.com)

Following the C.S. Peirce's classification of semeiotics for an effective generative knowledge creation and communication, the EGOCREANET /ONNS&A research protocol of the “Science of Quality”, will be the following :

(a)- “firstness- difference”: activate an innovative research to change the traditional modality of searching only for mathematical demonstrations, in order to build up an intensive trans-disciplinary conceptual “*bio-physics*”. In fact, despite the differences of living systems and mechanical ones , a fundamental set of complementary logic will find their coexistence aiming to select the fundamental forms of diverse codification of energy. Three basic forms of Energy codification (Free Energy (E) , Energy codified like Matter (M) and Information Energy ( I ) , can be chosen, rather than spend effort in searching for long and tedious derivations of numerical formulas on the basis of the interaction between energy and matter. Henceforth this characteristic triadic approach would have a preference to enhance a critical revision of the mechanical paradigm, expressing this critique, within a clear language and using a set of visual stimuli produced in terms of art's images and graphic-questions. In fact the effective Nature embodying the “Man” , not only utilize the language of the numbers, but often prefers a creative fluent modes of meaning definitions by means of different symbol's production as teach us the Artistic methodology of communication.

(b)- “secondness -actions”: A opening action will be to introduce into the Conservation of the Total Energy the “*Information Energy*” <I>, as a new form of energy codification. Following this aperture in science it is possible to develop subsequent original activities, particularly focused to give a better interpretation of the biological communication. In fact inside of “Man” , the brain do not work directly manipulate external lighting rays or sound's notes, or other known forms of physical energy, this because inside of the brain, biological materials, (neurons, nerves, neurotransmitters, ormons etc.. ) are not row materials <M> , and also bio-electric energy <E>, interact in order to transform in “*mental information*”, the input of quantum wave/particles, received through the sensory receptors. Therefore starting from the brain it is becoming admissible a new kind of “*Information Energy*” ( I ), and we suppose that (I) can be codified in a new space-time dimension, that never it is taken in account in the old mechanic paradigm of science. In fact today (I) as energy it is becoming of straightforward importance to initiate to understand more profoundly also the biology of thinking process in science and art by crossing internal and external reality.

(c)- “thirdness -relations”: To support the opening of a original debate to provide conceptual sharing-test about the emergent properties of the new paradigm <E/M/I>, that include the goal a better quality of the “*Intelligibility of Nature*” , by means of a more complete causal field entangling Science and Art in relation to the triadic interconnections among the three fundamental codification of Energy in terms of Matter (M) , vibration- Energy (E) and Information Energy (I).

### *The Lost Ring in Science*



<http://steelgohst.deviantart.com/>

*The ring of the conjunction of cause and domain* can be originally considered found starting from 1935, when Erwin Schrödinger(1887-1961) develops an original definition of the concept of ENTANGLEMENT, obtained through a condensed structure of two different quantum-particles. The entangling effect happen when to independent “quanta” will be forced to be confined in the same space-time location, generating as a consequence, an new possibility of “no- local ” communication. The Entangling effect permits to Schroedinger to believe that an generalised entangling process among various wave/particles, would be useful for bridging mechanical science to living science (2), (3) .In spite of this conjecture of Schroedinger, till more recent times , the Entanglement effect would be considered only as an exceptional instable behaviour, so that the important Entanglement quantum interactivity, received no more attention in Quantum Science. This common scientific mentality in fact correspond to insufficient studies made in order to reinterpreting the wave/particle dualism .In addition the media-power of Albert Einstein get an high responsibility to stop the quantum theory innovation , because he affirmed that the “no local communicatiation” certainly need to be seen as a not credible “*Sporky action at Distance*”.



NOT ONCE BUT TWICE SOLUTION : BLUE SILENCE IN COMMUNICATION -by :PABLO PICASSO.

As a consequence also the evidence of an experiment performed by Alain Aspect (1982) about the distant communication of entangled Quantum-particles, do not operate any substantial scientific change of the academic conventions about the absolute space -time structure in order to understand the possibility of simultaneity in teleportation of pure “*Information Energy*”. ( 4).

Therefore the EGOCREANET/ONNS&A, research group suggests : till that giving up the will to maintain the universal concept of locality the quantum experiment that evidence the no local are not sufficient to be consistent with a changing mentality of the scientific disciplinary realm , unless certain intuitive features of realism are abandoned. To surpass the *BURIDAN DONKEY* difficulty to chose between local and non-local reality , the ONNS&A research group proposes to consider a complete permutation of the Space-time matrix, in order to codify in different structures of the four-vector in a way to justify both , the local transfer of communication of information and the no-local simultaneous teleportation. The above cognitive goal is founded on the to understand the

complementary process of coding and decoding of the four-vector matrix , generating three non-unitary space time structures. This research purpose evidently poses a high challenging difficulty but any way will be the focus of the future ONNS&A generative research in trans-disciplinary Semiotics in Bio-Quantum Physics. (5)

### **Multiple Causal Matrix in a complex intelligibility of nature.**

It is well known that semiotics is the study of sign signification and signals communication it is a fundamental sector of semiotics in living systems . Therefore it will be of decisive importance for advancing in the EGOCREANET-ONNS&A research, to analyse the semiotic 's relationships among the permutation of space-time structure in correspondence with a generation of a multiple causal-matrix. As a matter of facts each “typology” of causality obey to the “topology” of Space – Time , so that we can understand that changing the relative structure of the four vectors matrix. also a matrix of causation criteria need to be modulated in terms of a series of various correlation between space-time-structures and multiple with alternative of the cause-effect domain .

In particular the transition from one regime of timing dimensions to another change the causation rules driven by three modes of complementary causation providing a deeper understanding in expanding horizons of science reasoning and aesthetic epistemology in art :

- 1)- ***Deterministic- Causality*** correspond to one dimension of irreversible time arrow. .
- 2)- ***Super –causality*** is a consequence of simultaneity of two dimension of biology time- arrows
- 3)- ***Iper –causality*** , need to be applied in correlation with three time arrows.

Therefore embedding in the cosmological horizon more than one time’s dimension we discover the possibility to think to an “*relational reality*” in correlation with a “*dynamical determinism*” . So that if in relation of three equivalent topology of 4D space-time matrix, we add the Information Energy (I) to the other fundamental of codification e.g. free-Energy (E) and Matter –Energy (M), in order to maintain the conservation of total energy, we obtain that the whole Universe in its integrity as “ONE”, can be split in three “*equivalent blocks*” (IEM + EMI +MIE ) representative of a set of triadic equations, governing three kinds of complementary evolution. In fact those blocks are, as in a coloured kaleidoscope, not separated by physical boundaries, this because the three equations are nor representative of opposite rules, but they can interpret transient modes of topological affinity among “*no forbidden*” differential construction of the space-time matrix.

#### ***- Rationale about the relationships among Space-time permutation and Causation Matrix.***

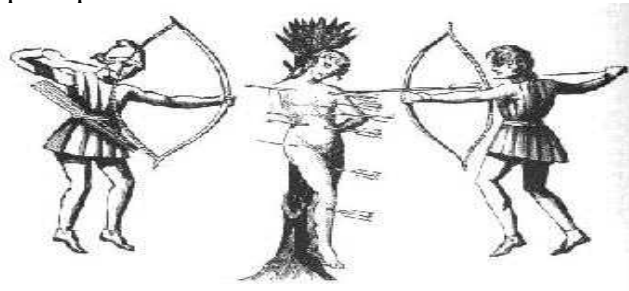
Knowledge process in science art during the contemporary development of knowledge society , tend to use different multiple chances of causality in a various modality of thought that not always enrich a very consciously involvement of people. (6)

1) - The “**Deterministic Causality**” . It is well known that can be a useful model in the classic formalisation of causation that has its central focus on believing to an successive action/reaction like in pendulum dynamics. Certainly the deterministic causality rules attempts to fail in a false predictability of effective expectations, if the dynamics of change becomes out of side of linear equilibrium dynamics as in the living systems. Therefore for avoiding the complete lost of science predictability of deterministic causal connections, Quantum Mechanics prefers to split the macro-from the micro-cosmos, subdividing the classical certainty based on forecasting the mechanical motion in macro-systems, into an imperfect probability to know, formulated through the “*Uncertainty Principle* ”, as the only possibility to understand the dynamics of interactions



between quantum particles. Therefore the acquisition of two kind of forecasting expectations in macro and micro system, open various problems in science, between chaos and ordered transformations . All those problems gives also the opportunity to develop particular resolutions using “*n-dimensional iper-spaces within an unique time dimension*”, so that so often, this mathematical methodology , give rise to extreme paradoxes in relation to the never ended need to connect by a causation the inter-dependences between macro and micro cosmos.

2) The “**Super Causality**” corresponds to a more elevated level of understanding the existence of a double time arrows , finding a complemented solution between clock time of external reality and circadian time of internal perception.

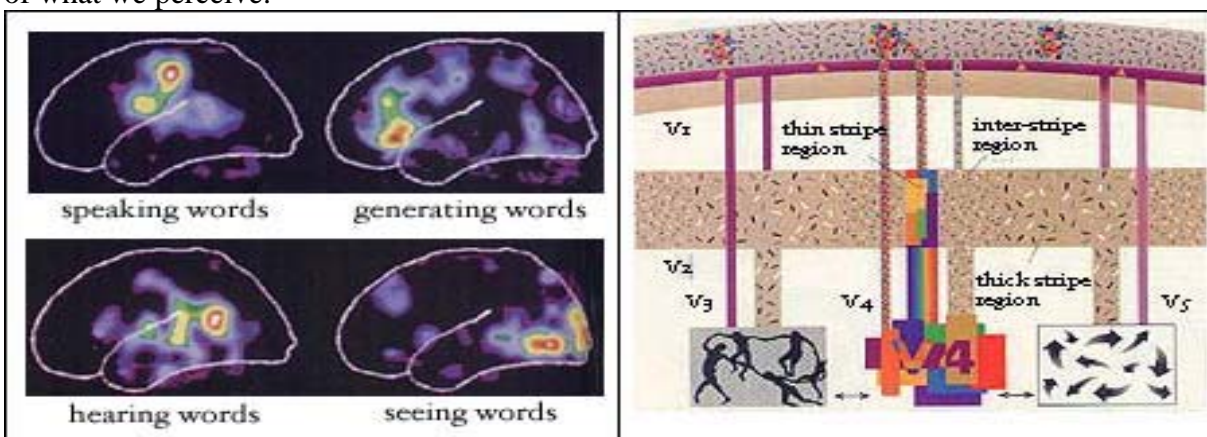


**Two arrow of time :**

Templar idea of supernatural dead of both “body and spirit”.

<http://images.google.com/>

The brain in fact do not see directly external objects, but only through information energy signals and transform those information input, in signs and significations of object visual representation . Hence the nature of information get not an immediate sense, but permit a simultaneity of correspondence between external reality changes and the internal brain’s processes of dynamic interpretation . Therefore we need to admit the complementary existence of the analytic process of recognition of the different areas of the brain , that will be too much slow if there are not a complementary possibility to realise an contemporary simultaneity of information to be conscious of what we perceive.



*Distinct parallel states of Brain’s regions all belonging to an simultaneous conscious scenario*

As a matter of facts simultaneous events may appear to coincide in time and space because the two dimensional structure in bits of Space (S) and Time (T) of Information Energy. Therefore the Space- Time permutation from ( 3D.S + 1D.T) dimensions to (2D.S + 2D.T) get more coherence of both “*clock and circadian*” double dynamics. Therefore in the context of a “*super-causality*” permitted by a new space-time paradigm , can become possible to discover obscure meanings that before are hidden to a better intelligibility of nature . At present phase of ONNS&A



### **FICTION of THE FUTURE OF UNIVERSE**

opened a research among the relationships between “*Space-Time and relative Causation Matrices*”, in a way to understand the effective logical possibility of existence of the simultaneity of “no local information”, that is forbidden when the structure of space and time is defined through the traditional space time framework.

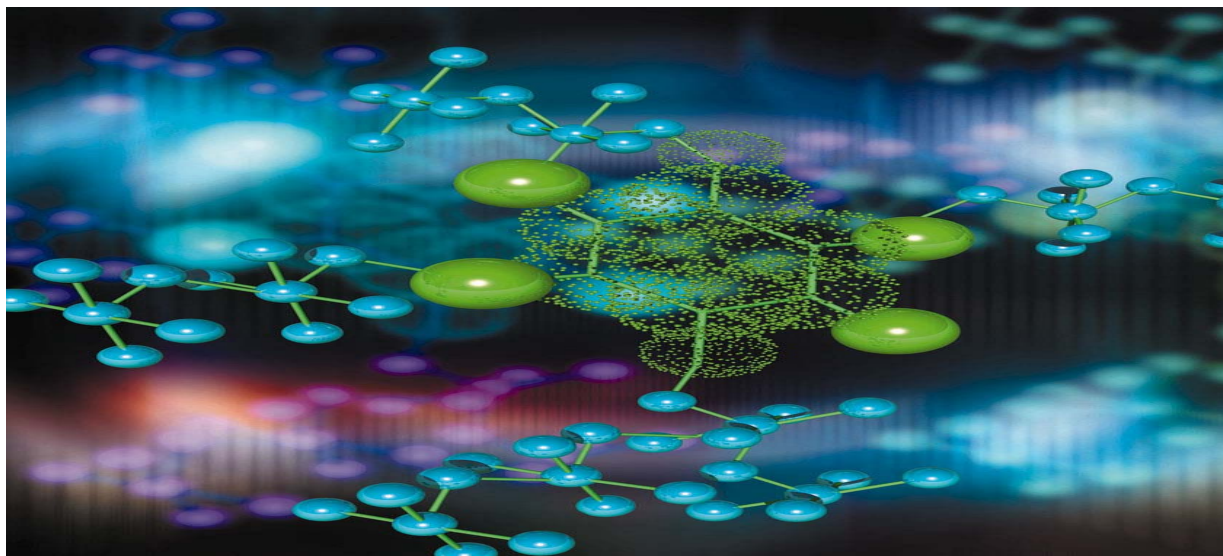
Finally a valid approach to understand the other emerging types of causality above cited as “**iper-causality**”, will be related to the need to find a multiple relationship of the space time frames permutation, in the evolution of Universe. This research goal is oriented to find a coherent correspondence among the three lines of time (*past ,present and future*) and only one dimension of space. For the scope of our current paper the “*Iper- causality in correlation with (1D.S + 3D.T) space –time topology*”, would not be undertaken now in a deep consideration, because this kind of correlations, turning forward a complete reversion of the Cartesian dominion of space-time , is evidently a problem of the great complexity that need of a general revision of the mechanical science, driven by the idea to introduce an *to innovative rationale about the gravity as a kind of information energy*.

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## *INTELLIGIBILITY of NATURE III* °

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<http://www.petrakisassociates.com/glossary.htm>

### “AFFINITY and ENTANGLEMENT” a way for rethinking about the intelligibility of bio-chemical processes

The antique idea of Affinity born in the ancient Alchemy in China is based on Yin/Yang “*Masculine/Female*” reciprocal attraction.



From the ancient alchemy the concept of affine transformation (from the Latin, “*affinis*”, “connected with”), was utilised to interpret, in terms of “*sympathies and antipathies*”, the effective possibility that some substances can or cannot mix together. Besides Alchemists work for understanding the relationships between *Hydrophilia and Lipophilia* (respectively affinity for water or fat), that has a paramount importance in the living system transformations. After during the Mediaeval era, alchemists try to understand the bond motivation between different atoms looking to interpret the natural desire by which bonds affinity established the conditions to produce new substances. (1)



**Table of Affinity**

[www.getty.edu/.../artObjectDetails?artobj=5071](http://www.getty.edu/.../artObjectDetails?artobj=5071)

When Alchemy was substituted by Chemistry, at the beginning of Industrial Era, science is becoming to change the fundamental asking question from “*why*”, to “*how*” it is reproducible the bond mechanism, in order to produce new useful substances that before do not exists in nature. Therefore the research of bond mechanism differs from the study in alchemy of bond motivation.

In fact Alchemy trays to explain why atoms would like to bond, while Chemistry refers to the mechanical forces that keeps the atom together after they have bonded to form molecules. (2)

In fact in some cases when the difference of electron affinity of various atoms is very high, then the “*ionic bonds*” are obtained through an forced extraction of one or more electrons. (3).

In the majority of other cases “*covalent bonds*” are formed as a result of the sharing of one or more pairs of valence electrons.



During the XXI Century the advent of Quantum Mechanics change again the problem to interpret the biochemical bonds giving rise to the molecules, this because the electrons need to be considered as having a double behaviour of “*Wave/Particles*”. Therefore following the Quantum Mechanical (Q.M) interpretation was revised the theory of chemical bond in Quantum Chemistry.(4)



Molecular Orbital : <http://www.bcpl.net/~kdrews/bonding/bonding.html>

It is important to consider that chemists need to take into account that bonds among atoms produces molecules that possess particular structural forms. So that to resolve the problem of representation of the molecular structure, the application of Q.M. to Chemistry, proposes to visualize in particular shapes the representation of “*Orbitals*”. “*Orbitals*” are graphicalised “*virtual volumes*” of space, without a physical equivalent, where valence bonding electrons would be found with high probability. In fact the probable “*electron density*” approximation, will be calculated considering electrons as “*pure wavefunctions*” and the values of their squares correspond to the probability to find the bonding electrons in the “*Atomic Orbitals*”. The result of wavefunction calculation gives two solutions (*subtractive and additive*) formally described as “*Bonding and Anti-bonding atomic orbitals*”.

Normally for simple molecules the “*antibonding Orbital*” is discarded as a solution deprived by electrons, this because “*anti-bonding*” solution has an too elevated associated energy. In addition in a “*bonding-orbital*” it is admitted the rule that may not accommodate more than one or two electrons, and if in one shell there are two they must have opposite spins. Therefore the result of such wavefunction’s calculations, gives two principal kind of 3D structures of different symmetry named “*s*” (*total symmetric*) and “*p*” (*symmetric along the bonding axe*), as in the upper figure where nodes (in “red”), have an “*electron density*” near to zero.

In “*Molecular Orbital*” approximation the overlapping of the previously calculated “*atomic orbitals*”, can be considered the best “*semi-quantitative*” mode to interpret the electron exchange that produces the “*covalent bonds*” among atoms in order to assembling molecules.

This complex formalism gives the “*atomic building blocks*” to mix “*hybridized molecular valence bonding pictures*”, obtained as a “*linear combination of atomic valence’s orbitals*”.

Hence in Quantum Chemistry, “*Covalent Bonds*” are made by the overlapping (*electronsharing*) of atomic (*s, p*) orbitals obtained by hybridized (*sp, sp<sup>2</sup>, sp<sup>3</sup>, sp<sup>x</sup>*) orbitals.

Besides the formation of “*Molecular Orbital*” (*MO*), on the types ( $\sigma$  or  $\pi$ ) can be accompanied by the formation of the corresponding antibonding Molecular Orbital ( $\sigma^*$  or  $\pi^*$ ). (5) The mixing of *bonding and antibonding MO*, can be less or more complicated; in fact in the case of bonding between *Lowest Energy*, the *antibonding MO* are considered “*Un Occupied*” (*LUMO approximation*), while in the case of *Highest Energy* also the “*antibonding*” orbitals, need to be

considered in the mixing of the total MO, for taking into account also the delocalized probable interactivity, in order to define the more complete structure of the molecule. (*HOMO approximation*). As a matter of fact the chemical reactions between molecules are largely governed by “*HOMO-LUMO*” interactions, this because for sharing the best condition of energetic stability of the effective structure of the molecule, the highest-energy electrons (*HOMO*) of one molecule is “*looking for*” the lowest-energy unfilled space (*LUMO*) of the other reactant molecule.

Besides the situation of mixing MO, is still more and more complicated; this because for more complex molecules, can be also possible that they belong “*contemporarily*” to some similar structures, having an equivalent energy; so that in those cases would be necessary to utilize of more than one virtual “*Resonance structures*”, because each single configuration not describe adequately the valence electron distribution, in a way to give the effective structural form to a single molecule. In fact in those cases the electrons are shared by more than two nuclei (*resonance = conjugation in a no local, or delocalised shell*).

In syntheses accepting that it is no possible to know the exact position of moving electrons, become promising the search of “*Quantum Chemistry*” for having a “*pictorial*” virtual configuration of “*Atomic and Molecular Orbitals*” that, on the basis of the contemporary knowledge, can be considered the optimal condition to represent the probable “*electron density maps*” of the external electrons of each atom in the Periodic Table (6), in a way to mix them in order to describe the structural form of molecules through adding and mixing the atomic building blocks in relation to their “*electron affinity*” (7). This very complex *semi-qualitative* model of *Quantum Chemistry*, can only give an spatial idea of the complex molecular bonding structures, and it is especially valid for organic molecules that are held together by “*covalent bonds*”.

Therefore the need to obtain a geometric structure of covalent bonds is substantially obtained finding a compromise between a quantitative calculation of probabilistic wave-functions and an a qualitative hybridization (sp, sp<sup>2</sup>, sp<sup>3</sup>, sp<sup>x</sup> ...) obtained by the Valence Bond (VB) theory by superposition of atomic orbital, and in similar way by an linear combination in the Molecular Orbital (MO) approximation. The hard complication of *semi-qualitative* approach of “*Quantum Chemistry*” it is not well accepted by all the chemical scientific community, so that opinions of chemists are divided as to whether chemical reactions can be reducible to Quantum Physics.

As a matter of fact if, at 3D the Molecular Orbital structures, we add the time (4D) looking to get an interpretation to Molecular dynamic transformation of chemical reaction, all the before described construction of Molecular Orbitals, falls down as an great castle of game's cards.

### ***CONCEPTUAL REVISION OF AFFINITY IN BONDING AS A MODEL to SHARE PAST WITH FUTURE KNOWLEDGE IN SCIENCE AND ART.***



To start now forward a revision of the concept of “*Affinity*”, it is useful to remember that in etymology “*Affinity is the opposite of Infinity* “. In fact the two words have the same root coming from the “*Latin Finis = End*” .“*Affinity*” meaning, is near to the “*Finis*” e.g. close to the “*zero point*” of the space-time. On the contrary “*Infinity*” means an unlimited and no countable extent e.g. having no bounds in space and time. Hence “*Infinity*” signify the existence of a boundless space between two “*quantities of Energy (E) or Matter (M)*”, in a time dimension without end.

On the opposition “*affinity/dis-affinity*” means the behaviour of “*attraction/repulsion*” happening when the overlapping between two “quantities” imprisoned in a narrow shell of space time is approaching to the limit near to the proximity of “*zero point of energy*”

YIN / YANG in < E-I-M > TRIALITY



[commons.wikimedia.org](https://commons.wikimedia.org)

Nowadays a better intelligibility of “*bonding*” nature can be obtained through a deep re-examining to the degree of “*entanglement / disentanglement*” effects in determining both : “*local and no -local affinity processes in bonding/ no-bonding molecular transformations*”.

The following statement, made by [Ilya Prigogine](#), (Nobel Prize in Chemistry 1973) summarizes the concept of “*Affinity*” as a dynamic event happening during a chemical transformation : <***All chemical reactions drive the system to a state of a new [equilibrium](#) in which the affinities of the reactions vanish.***>

Therefore in Physical Chemistry, “*chemical affinity*”, that is a necessary ingredient to form molecular compounds within a more compatible composition, cannot be only defined in term of the linear sum of the electronic properties of atoms. Particularly “*chemical affinity*” need to be referred to the tendency, (*out of side of equilibrium*), of “*entangled electrons*” ,imprisoned in bonding shells ,to realise a “*self-catalysis*”, driven by sharing at distance “*information energy*” (8) The last form of energy is not simply embodied in the electronic properties of each single atoms, this because, the “*entangled electrons*” shows “*no-local*” properties. (9) In fact, when two valence electrons are confined in the bonding shells, in those stressed conditions, the double “*dense-coding states*” of entangled electrons, transforms their energy functions, from “*local*” to an new “*no local*” nature. The above means that the chronotope (*time-structure*) change in a way that permits the “*simultaneity*” in the bonding auto-correlation in bio-chemical syntheses. (10)

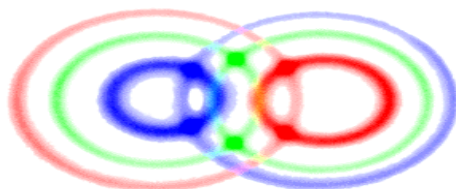
In fact, at the contrary of the higher Excitation Energy, the “*Information Energy*” will be obtained following the “*dis-entanglement effect*”, through an *temporaneous collapse* of “*entangling energy*” at a lower status, near to the “*Zero Point Energy*”. Therefore the “*Entanglement Quantum effect*”, can be interpreted through a reversible transformation of the four vectors of space time, so that, following the disentanglement , the energy of the double entangled status, can split in an upper energy bonding level (**E**) and an lower energy level of “*no local information energy*”(**I**) . The last forms of energy is shaped in a new configuration based on a bit of space-coordinates and a bit of time-coordinates. Therefore the disentangled electrons, bonded in the not equilibrium context , interacts through (**I**), likewise a sort of simultaneous “*retroactive eco*” of communication, between two dimensions of time (*t1-t2*), where during the chemical reaction dynamics, (*t1*) is conceived in relation to the reagents, and the (*t2*) is the different time line respectively connected to the contemporary transformation of the products .

Certainly ordinary linear logic does not account for the two-dimensional aspects of bio-chemical transformation related to the chemical bonds formation, between different molecular identities , this because the traditional bond-theory merely is accounting only for the spatial aspects.

In spite of this linear tradition, the double dimension of time correspond to an parallel double chronotopology , as it is necessary for creating and controlling a not contradictory destination of all the biochemical transformation . In fact during the “*out of side of equilibrium* “,

causality it is not only related to the unique and linear time dimension. As a matter of facts the simultaneity determined by the “*entanglement /disentanglement*” effects, respond to an “*new causality*” that does not remain linear in time as in the ordinary Euclidean in Space ( 3D.S +1D.T) . In fact the two time's lines become necessary to understand the “**Bi-causality**” (11).

This kind of causality, it is not be confused with the “*Retro causality*” as an “*time reverse phenomena*”, where the cause has followed effect, so that can be possible to change the past events before they occur. In fact “*Bi-causality*” means only a synchronicity of information, coming from two times lines,as it is necessary in order to get an intelligibility to how it will be possible to pass through the chaos forward a new molecular order into a contemporary event of molecular reorganization dynamics that gives, during the entanglement quantum activity, an new ordered molecular forms, becoming definitive at the end of all biochemical transformation . As a matter of facts during the action of the entanglement wave packets , the time-line (*t2*) can be considered as a “*interactive affinity mirror*” where contemporary transformation of products happen “*simultaneously*” within the changing reagents, by means of a contemporary activity of a “*self-catalytic*” system .



Quantum Entanglement of Photon that has decayed-repelled into an entangled pair.

[tonygoodson.typepad.com/.../science/index.html](http://tonygoodson.typepad.com/.../science/index.html)

As a consequence the “*covalent bond*” is formed between two atomic valence electrons, taking the available narrow space to start on the dynamics of “*entanglement*”. Consequently of the reversible change in the structure of energy, the doublet of bonding electrons, takes a valency from its acquired “*no-locality of the information energy*” (**I**) in order to controll interactively the complex actions working between attractive and repulsive forces of the bonding process.

The energy-relocation of space-time of (**I**), thus allows the activation of an ordered dynamic processes of “*Self Assembly*” (*Assembly and Dis-assembly*) in the particular field generated by (**I**), that correspond to an “**affinity**,” caused by the directional overlapping of “*no-local*” properties of quantum wavepackets. (11) . Finally when the new chemical equilibrium of products occurs, the time dependent formation of Information Energy diminuisces very quikly and its energy will be embodied in the roto-vibrational energies of stable bonds, so that the *bi-dimensional chronotope* can be resolved, restoring the traditional Space-Time structure of the Energy -Matter (**E/M**) Interaction finding the new molecular equilibrium of products.



The “*Triality*” of the forms of energy indicated as the <**E,M,I**> paradigm, that is based on the interrelation among , Free vibration-Energy (**E**) , Energy in form of condensed Matter (**M**) , and Information Energy (**I**), need to a vast and rapid expansion of conjugated ideas, because the <**E,M,I**> paradigm host a lot of new problems both practical and theoretical of the intellegibility living systems , which cannot be resolved within the present mechanic -framework of science.

Therefore a new foundation of knowledge for improving the future Knowledge Society ,will be considered as a fundamental neccessesity to explore all the possibility of the changing minds

favouring a creative-sharing atmosphere for new thinking about fundamental issues of the cognitive change, in a new conceptual synthesis more appropriated to the overcoming of the industrial society in favour of the new advancements of the future Knowledge Economy.

Approaching this endeavour of improving a new foundation of knowledge it is necessary to develop an new entanglement between “**Science and Art**”.

“**Art**” in post-Renaissance period from the end of the *17th Century*, accepts the conceptualization of the mechanical science, but then the invention of the fotografic machineries ( Photo, Film, ...etc) , after centuries of co-habitation, artists proposes new experiments of perception and emphatic communication, so that they open an increasingly divergent paths to mechanistic knowledge. So that various paintings movements during the last century, as “Futurism” , Cubism etc.”, searching for novel techniques in art , would be very innovative also in science understanding , and not only they remain closed in aesthetics creativity. In fact contemporary painters develop new ideas and solution to interpret the human perception , especially in some new approaches of scientific knowledge that are traditionally excluded by the radical separation between subject and object of the mechanical science. (11) Therefore the conceptual shif of Artist's movements in focusing new foms of emphaic communication not more streectly connected with a rational quest of scienific objectivity, permits, during the last century, to open the mind versus the realization of the inseparable relationship between the subject and object of knowledge and in this way they increased the important role of art as an agent of cultural change. Now I would like to conclude this third chapter on a reflession on the *new intelligibiliy of nature* , observing that the contemporary artists' maintain a strong motivated rejection of the formal logic normally utilised on the objective tradition of science, this because contemporary art inicieate to utilize new forms of digital communication. In conclusion since the Renaissance era of *Leonardo da Vinci*, scientific and artistic exploration have proceeded on parallel and wholly divergent paths, but nowadays the tension between two radically different ways of knowing, is becoming more and more near to a new deep entanglement , in a way to get a new combination between “*Science and Art*” for changing minds and opening new conception usefull for a more conscious future of the knowledge society. (12) Recent entangled interaction between “*Art and Science*” are in fact very impressive as it is possible to observe in the Digital-Art , in Bio-art, Neuroart, etc.. therefore starting from this recent synchronicities of the “*Art and Science in the digital age*”, the *EGOCREANET /Open Network for New Science and Art (ONNS&A)*, would like to launch, *starting from the current year 2008 , an International “PRIZE for a new RENAISSANCE”*, remenbering the idea of *Leonardo a Vinci* that both “*Science and Art*”, born in the mind of man and after different experiences need to be recomposed for enhancing a more evoluted minds. (13)

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AFFINITIES  
[www.chineseastrology.com](http://www.chineseastrology.com)



## *Intelligibility of Nature IV \**

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### **- EXPLORING NATURE OF" SELF-ASSEMBLY" IN NANO-MATERIAL SYNTHESIS -**



MIRROR –Image Replication in a Globe

<http://www.camelotdw.com/fa/pastel/images/dalicrball.jpg>

#### **Premise:**

The next generation of nano-materials are based on the self-assembly of periodic building blocks synthetic of nanostructures. The precision of replicant self-organization processes it is a very useful method for manufacturing nanoscale devices. But despite excellent advances in the nanoscale fabrication of a wide range of organic and inorganic building blocks (atoms, clusters, radicals,..) of various sizes and shapes, the control over their assembly into ordered structures, remains the main obstacle to the bottom-up manufacturing of these novel materials and devices.

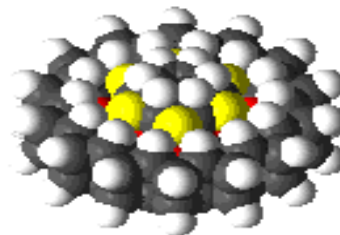
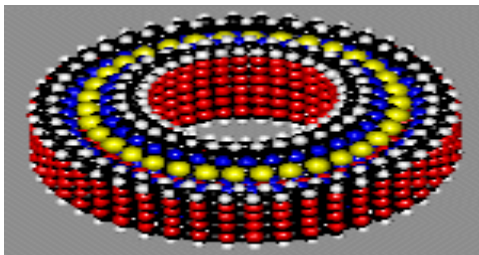
A model to study the self-assembly of nanoparticles within discrete, attractive interaction sites, is based on a computer simulations of the organization of basic building-blocks, to simulate the path of change, from a disordered state into unique geometric forms such as chains ,sheets, rings, square, pyramids etc.., In the computer simulation the supposition is that, the building blocks embody a “**mirror-like**” replication process of information; this admission is made without going in a deep theoretical approach about the origin of the self-replicating system. This simple hypothesis that admit the existence of some *mirror –information* function, that permits to carry out the molecular “*self assembly*” in order to build up replicant structure and function on the nanometer scale, suggests the need to provide a theoretic-route to understand how can be possible to control the “*self-assembly*” of building blocks into precise and predictable forms and structures.

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”*molecular manufacturing of nanoscale-bearings* ” : <http://www.zyvex.com/nanotech/images/bigBear.mpg>

“*One layer of graphite used as lubricant (yellow circle) allows the bearing to rotate*”:

<http://www.zyvex.com/nanotech/images/planGearBig.gif>

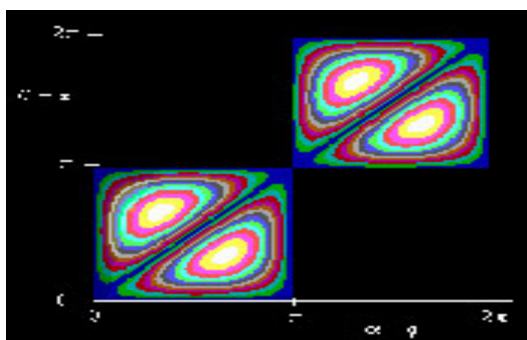
<http://www.zyvex.com/nanotech/nano4/whitesidesAbstract.html>



<http://www.zyvex.com/nanotech/bearingProof.html>

Therefore “*self-assembly*” methods in nanoscale construction, poses a number of substantial and crucial challenges, aiming to find a better *intelligibility* of the working functions, and in order to design and to control the shape of supra-molecular structures, that interplay covalent with non-covalent bonding, in a way to achieve an efficient and low cost nanofabrication, through a better understanding of the “*self-replication*” process of information .

Chemical “*affinity*”, is the fundamental reason to link atoms in order to form and transform molecular arrangements , (1) in fact chemical reactions are mostly a choosy process of breaking bonds of reactants to making new bonds of products. This double transformation in out of equilibrium chemical transformation’s dynamics , do not requires only a balance of *exothermic / endothermic* exchanges of heath, this because the process need a selective *attracting/repelling* power, named till the alchemic times “*affinity*” , that permits to control the simultaneous ”*self-catalytic*” process to go from the chaos to a new functional order of products construction.

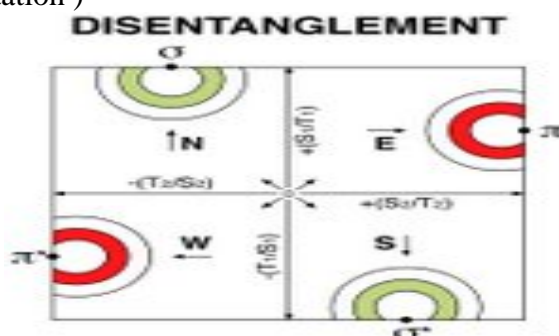


<http://www.ildiogene.it/EncyPages/Ency=entanglement.html>

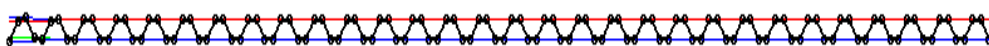
“*Entanglement / disentanglement*” of quantum states transition (2), plays a determinant role in the *simultaneity* of development of two processes, e.g. to breaking old bonds and reproducing new covalent bonds in the same shell of space time. The last in fact is working as a *quantum-cavity*, where can be possible to realise a loop of “*no local information energy* “. This *periodic loop* of simultaneity of information , it is the basis to control the selective performance named “*affinity*”. This conception, so well intuitively acquired by the ancient alchemy, to day in the mechanical science paradigm, represents a deep misunderstood reality , because a modern reinterpretation of “*affinity*”, before all need to conceive a dissolution of the linearity of time flow.(3) The nature of *non-linear time’s flow* in the *entanglement* effect can be determined through the interpenetration through molecular collision of two valence electron-clouds livelihood in the same bonding space-time domain. In this dynamic impact, the waves associated with the bonding electrons destroy though “*destructive interference* of a *not in phase superposition*” the pulses directed along the bonding-coordinate (4). Therefore the *entangled valence – shell*, assumes a “*flat dimension in space and the internal time becomes split in two vectors*. This *not- Euclidean* structure of space time ,that is composed by a bit of Space’s vectors and a bit of Time’s vectors, is typical of the “*no local*” *Information Energy* , able to show “*simultaneity*”, in a mutual communication limited to the information bonding domain, where the dynamic process of “*self-organization*” in chemical transformation takes place. Therefore likely to the change of frequencies in a “*particle in a box*” , the changes of bonding, in a chemical reaction, is a consequence of the changes of the forms of associated waves, driving the valence electrons to form new bonds. Therefore the changes of bonding is not only a consequence of the vicinity of position in space of covalent electrons, this because their negative charge the valence electrons do not prefer to remain so near, as it is previously assumed by covalent bond theorists.

Now the changes of the driving waves in defining the bond’s transformations it is much easier to understand interpreting the emergence “*self-organization*” by means identifying, qualitatively, rather than quantitatively, the process of “*disentangling entanglement*” of pure waves associated with valence bonding electrons . In fact the “*disentanglement*” is the collapse of two

entangled waves after the critical inversion point of the flux of transformation during the chemical reaction out of equilibrium dynamics. “Disentanglement” works as a dissociation activity that split the entangled waves in four polarized pulses spread in a bi-dimensional space time grid. (see following graphic representation )

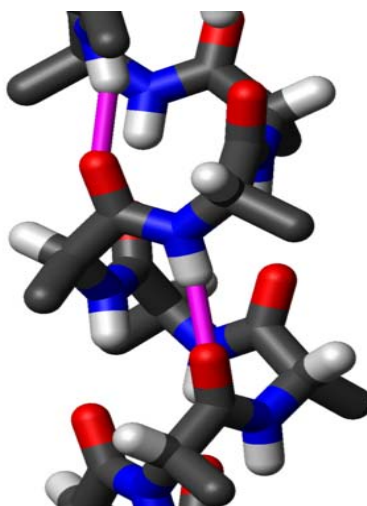


The four different polarized non-linear pulses or “Solitons” (5), are indicated in the above graphic with the capital letters of <North, South, East, West> in relation to the proper vector-directions. “Solitons” are solitary wave ( *wave single packet or pulse- fractals* ) that near to the new equilibrium rapidly generates different triadic vector’s aggregation to build up, though positive pulses interference, one of the possible 3-Dimensional Covalent Bonds, known as belonging to the vertical and horizontal topologies of bond and anti-bonding shell’s. The above triadic reassembling among three of the four “Solitons” therefore allows to let free one of the “Quantum Pulse” for each bond formation. The remaining “Soliton” corresponds to a liberated emission of a “no local information energy”, able to maintain, for a relative long time and distance , the property of “simultaneity of information communication” during the “self-periodic-construction” process of various molecular forms. Therefore “disentanglement” action is of vital importance to understand, how an “Quantum Information Replicative Processing” , during the not equilibrium transformation, can be conceived as the result of a coherent phenomena of bonding construction, happening in real time with the remaining activity to hook and join new bonds for developing successive polymeric proliferation, driven by the disentangled formation of Soliton’s patterns, generating new molecular bonds formation into a system of “self-organization” of bio-chemical transformations.



<http://www.math.h.kyoto-u.ac.jp/~takasaki/soliton-lab/gallery/solitons/sg-kink-antikink-a.gif>

“Solitons “ derived by the *Disentangling the Entangled waves* associated with valence electrons, permits a vector-system composition, that is useful for understanding the generation of “morphogen patterns” that develop the bonding-forms of molecules.



<http://www.answers.com/topic/davydov-soliton>  
Solitons weak interactivity (In Violet.)

Furthermore “*Solitons no-localised interactivity*”, acts as “*information energy*”, to define and to replicate the composition and the polymeric periodic duplication of molecular bonding and also can be utilised as weak force able to sustain helix formation in complex molecular structure .

Evidently it is argued that this suitable “*morphogen's activity* ” should attempt to satisfy other specific conditions and rules based on the search of a minimum of Matter-Energy interactions, but certainly the “*Model driven by the Soliton's triadic bonds's composition, plus one free Soliton usefull to hook and to join and to reply in an simultaneity informational activity the growing up in each polymeric system*, can be functional also to understand the construction of various forms and symmetries of molecules.

At a glance, the molecular collision causing the rupture of reagent's bonds, degrades the binding energy into heat, which disperses all over the directions of the reaction environment. At the same time “*quantum waves*” associated with the “*valence electrons*”, penetrating between themselves (*entanglement*), are producing “*information energy*” with an “*no local*” character, which collapses (*disentanglement*) in the form of “*solitons*”, splitted in four “*directional driving orientations*” . Therefore those “*solitons*”, become the basis of the process of “*self-organization at a distance*”, acting to improve the re-composition of the new bond's products of the bio-chemical reactions. Therefore during each reaction, working in conditions far from equilibrium, it is implemented a process of minimization of bond's energy , and at the same time it is developed a parallel process of transformation, carrying the previous bonding energy versus a maximum of “*information energy*” production, in order to implement a “*self-organization*” process, as it is necessary to realise the transition between chaos forward a new order of molecular products of the reaction.

Finally this “*Model of self –organization*” (6), promises to provide crucial results for complex living systems other than the inorganic molecular construction; in fact the development of these “*morphogenetic model*”, will form the bulk of the future research program about the procedures of “*self assembly on life- nanotechnology*”, owing the no local information interactive transcriptional properties of polarised “*Solitons*” , arising from the possibility to communicate “*in a non linear time*” without distortions, weak “*information energy*” over relative long timing and distances.

### **The role of Nano-Art in the Changing Scientific concepts.**



[http://mx.nthu.edu.tw/~rklee/rklee.files/pic\\_3.gif](http://mx.nthu.edu.tw/~rklee/rklee.files/pic_3.gif)

“*Self-organization*” happen through the non linear timing process of interpenetration (“*entanglement*”) of quantum waves that join each with the other generating by means of disentanglement *Soliton's patterns*, having complementary “*no-local*” properties of communication of “*information energy*” driving molecular reproductive morphogenesis.

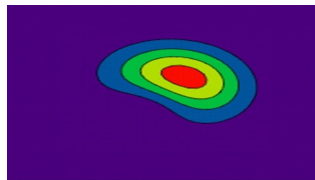
The conceptual premise of the interpretation of “*molecular morphogenesis*”, given here, is based on the understanding of a non-linear space time changes. The space-time transformation it is considered as a “*mental- operation*” so that is not only a question of science understanding , because the consequent problem of developing a new mentality in science , will explore a great range of cultural correlation related with the “*self-organization*” and a general problem of paradigmatic change of mechanical science that includes also the metamorphosis of living systems . Contemporary artists are greatly involved in giving a contribution to a mental change particularly focused on nano-technologies representation in relation to the self-organization, related to the developmental changes of molecular morphogenetic fields. (8), (9) .Besides it useful to underline that sometimes the science representation in coloured computer simulations is very beautiful, as

well as some examples shows below . Therefore this the beautifulness of science imaginary through the computerized invisible world, acts as an attractor between contemporary artists and scientists. In particular nano-technological methods of “*self assembly*”, push forward the scientific and artistic creativity to join in the development of new strategies to nanofabrication. In fact the understanding of the “*Self-Assembly*” requires to overcome the logical construction going beyond the mechanical macroscopic structures, governed by direct contact of the mechanical parts in motion.



[http://www.fi.cnr.it/r&f/n22/ist\\_fisicacosmica.htm](http://www.fi.cnr.it/r&f/n22/ist_fisicacosmica.htm)

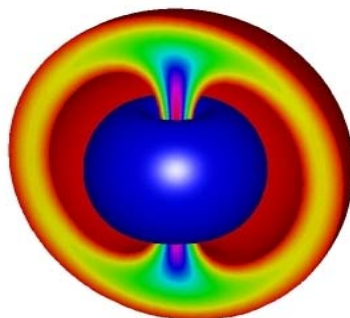
Henceforth starting from the general need to go away from the mechanical science understanding in order to explore new cognitive open strategies to be conceptually free from the influences of reductive thinking mechanistic, recently born in Florence, an ***Entangling SCIENCE & ART creative movement***, with the idea to restore, in the contemporary era, the trans-disciplinary vicinity of art and science that was the fundamental character of the antique Florentine Renaissance. (10)



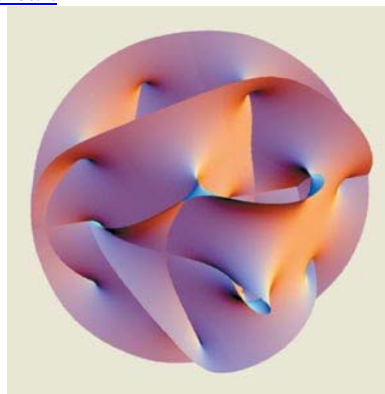
“*Interference frame*”

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- (8) – Solitons art- gallery: <http://www.math.h.kyoto-u.ac.jp/~takasaki/soliton-lab/gallery/index-e.html>
- (9)- Nano art Gallery : <http://www.wellcome.ac.uk/node5956.html> ; <http://www.nanoart21.org>.
- (10) Open Network for New Science & Art : [www.egocreatnet.it](http://www.egocreatnet.it)



“*SOLITON*” [www.acqao.org/gallery.htm](http://www.acqao.org/gallery.htm)



Multidimension- Calabi-Yau Space