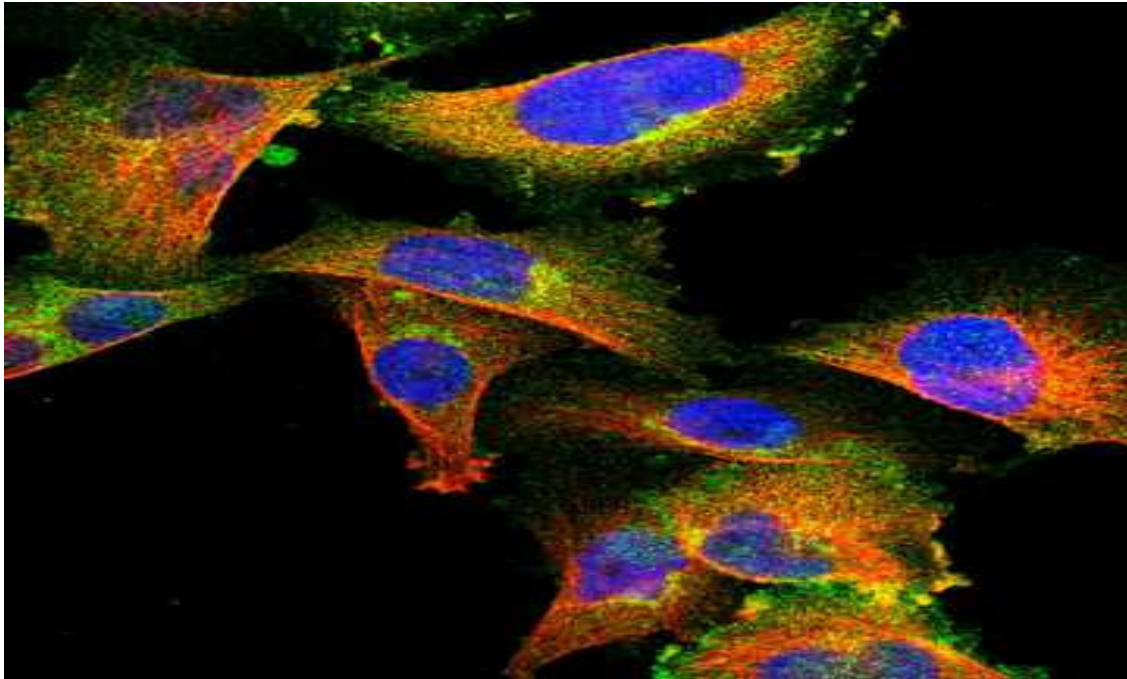


“Quantum Bio-Physics “

Conceptual Outline : Emergence of self-organization phenomena in nano-scale dimensions.

Paolo Manzelli ; pmanzelli@gmail.com; www.egocreanet.it ; www.edscuola.it/LRE.html ; www.wbabin.net



Science & Art :Protein targeted by HPA antibody is shown in green, nucleus in blue, micro-tubules in red and Endoplasmatic Reticulum (ER) in yellow. (www.proteinatlas.org)

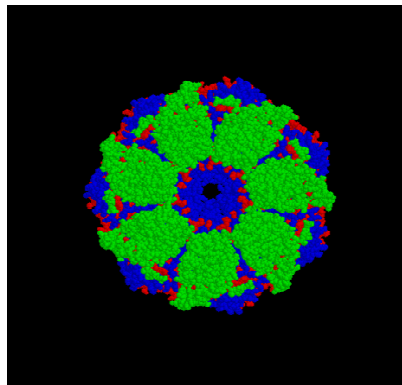
Abstract : *Self-assembly can be defined as the spontaneous organization of individual components into an ordered system-structure .“Self-Organization” dynamics is working in a number of “Quantum Bio-Physics” structural changes, acting without any interference of external agents . Therefore each kind of “Self-organization”, contradicts the mechanistic traditional world view of “bulk-science”. Despite of such conceptual problem the **Q. Bio-Physics** would demonstrate an reasonable strategy to interpret Self-organization in “nano-biology” , taking in consideration the synchronic effect of parallel processing between “**local and no-local**” co-evolutional information energy exchanges among DNA/RNA/and Protein . Therefore the focus of this paper would open a debate about the “**nano-scale**” space/time dimension, in order to enhancing a better understanding about the interdependency between complemented transformation activities in living cells. In fact through the “**Quantum Entanglement**” processes, can be possible to establish an energy conversion between quantum thermal hopping and entangled phonons, to obtain the result of a temporal simultaneity, as the basis of the synchronic co-operation in living cells, as it is necessary to anticipate the forecast of the kinetic trajectories of matter/energy transformations in metabolic systems: as an example of such complex problems of knowledge of life, we start to debate about “**protein's folding**” in tertiaty structure from its primary linear polipeptide construction.*

Folding of Proteins. The understanding of post-translational genetic information obtained though the folding process of proteins, is one of the grand scientific challenges of **Self-Assembly** processes useful for improving the future forecast and control the specific metabolic functions in living

systems. Self-organization of the process by which proteins fold to attain their active sites in a mature conformation, provides a global platform to gain knowledge of the function of biological systems and the regulatory self-organised signal communication that underpin the natural ability to adapt to changing environmental conditions. Therefore, the nano and bio-technologies, based on mimicking the principles of biological complexity of self-assembling, today develop a fundamental strategy of conceptual scientific paradigmatic change that will result in a more coherent understanding of the origin, evolution and functional properties of living cells. (1)

Protein synthesis is a sophisticated energy-consuming process, where any risk of “*mis-folding*” needs to be corrected without delay, because the functional mutation of proteins in the cell is very dangerous. It must avoid metabolic diseases in every living cell. The correct self-folding of proteins is normally assisted by cofactors named “*Chaperons*”, the last works as complemented structures of “*Ribosomes*”, to regulate through the “*Endoplasmatic Membrane*” (**ER**) the performance of the process of protein’s folding, in order to fold the polypeptide chains of amino-acids, and assemble correctly functional groups of proteins to yield active mature protein’s structures. In the case of “*mis-folding*”, other enzymes called “*chaperonins complexes*”, help to destroy immediately the mutant-proteins to avoid serious diseases. The problem that remains to understand is the organization of signal communication in a way that “**Ribosomes +ER + Chaperones**”, can work in a field of synchronic signal information, forming a highly organized pathway of bio-transformations. (2),(3),(4),(5). Certainly we can observe that such synergy of co-organization, for getting a correct *in vivo*-folding of the proteins, cannot work as a statistical search of probable conformations. This is because it would take an astronomical amount of time, and large amounts of energy will be dissipated if the properly functional conformation is choose by a trial and error method, while *in vivo*, the protein’s folding works at a rapid rate, sometime on the range of nano-second scale.

Current studies of ribosomal interactions with *Endoplasmatic Reticulum* (**ER**) (6), demonstrate the importance of the nano-organization of **ER** as “*super lattice network*” of adjacent nano- tubules, vesicles and sacs and cavities, contained in the inner membranes with a granular length of nanoscale dimensions. Today, in the *Post Genomic Era* (8), the understanding of the “*Ribosome/ER/Chaperons*” self assisted assembly, can be seen in *Quantum Bio-Physics* as a simultaneity of communication in an *Information in Energy field* , working in a nanoscale space-time region.



Science & Art : “**Chaperon**”:
Assisted- self activation // inhibition
of the folding plasticity

Nano Structures –Photon Entanglement and Information Energy Conversion.

We know that on the basis of the traditional mechanical “*Paradigm of Biological Science*” including *in vivo folding* and the study of protein *mis-folding*, until today has been closed in a conceptual paradigm where it is not easy to understand the synchronic activities that nature realises to obtain the correct functional folding based on a simultaneity of signal communication among

DNA-RNA-Proteins. In fact, biology traditional conception is limited to describe the path in which *DNA/RNA Ribosomes* produce a linear sequence as polypeptide of amino-acids and illustrates how a self-activation is assisted by a series of *Chaperons* to obtain a correct protein folding in order to be functional to organize the life timing, up to the programmed “*apoptosis*” of each living cells. (9).

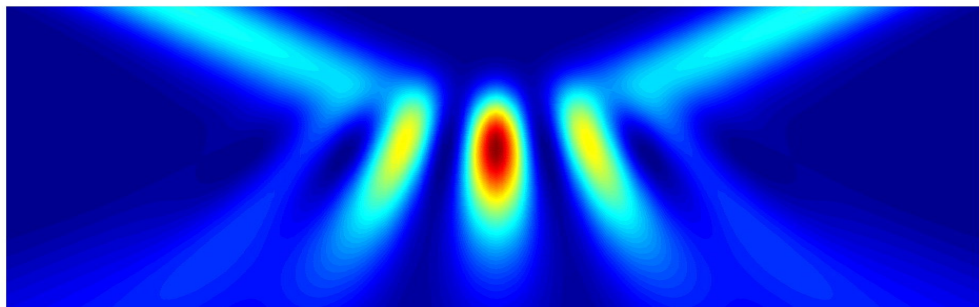
Future trends of *Bio-Quantum Physics* research need to identify how the unique properties of bio-nanostructures as the *Endoplasmatic Reticulum (ER)*, permits realization in vivo, through a confinement in the energy cavitations (i.e. nanotubes, or other nano matrices) a “*quantum entanglement*” effect, producing an energy conversion of heat signals in a field, able to generate a “simultaneity” of information to support a synchronic coherent activity among “*Ribosome/ ER/ Chaperons*”, in a way to get the best correct folding of proteins .

Recent experimentally studies demonstrate that in nano-structure the hopping of heat passing through nanotubes of about 20-100 nm, produces a conversion of heat-energy reducing the thermal conductivity. In fact adjacent nanotubes works as a superlattice material that organises the flow of phonons decreasing the mean free-path amplitude of heat diffusion in respect to typical resistance of the bulk material (10)

Furthermore “*Quantum-Entanglement*” of “*confined Q. particles*” is investigated by the “Q. Bio-Physics” theory in the context of the renormalization of the four-vector of space/time, getting a topological transition in bi-dimensional field units of “*information energy as*” that is the basis of simultaneity in “*quantum teleportation*”. (11). Therefore it is probable that the *Q. Entanglement* can allocate bi-dimensional diagrams of an *information energy field*, that become an essential instructions for sharing the correct protein’s folding based on protein-protein *coherent signalling interactions*, so essential for the living self-assembly function of a cell.

Further studies about self-organization phenomena in *Bio. Q. Physics* , will have an opportunity to discuss at the meeting in Florence (14-NOV-2008) on the issue:

“The emergence of self-organization phenomena in nano-scale dimension . (12).



SCIENCE& ART : <http://idifix.physik.uni-freiburg.de/~breuer/QInfo.htm>

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