

Time-Space Models in Science and Art .

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In the “**Classical Mechanics**” model of space- time, the role of time was traced back to Kantian notion of time as an *a priori* category for our consistent mind-perception of the outside real world .In fact in Newton’s own words (Newton, 1687): “*Absolute, true and mathematical time, of itself, and from its own nature, flows equably without relation to anything external.*” Newtonian absolute time (is declared but not explained), flows uniformly in a globally synchronous and simultaneous manner with space, till from the origin of both time and space. In fact the Newton’s admission is that : at every moment you are in "simultaneity" and in perfect synchronism at a defined place by three orthogonal coordinates. (in 3D = XYZ + one for the linear time “t”)

The supposed "simultaneity" and synchronism between time and space , was accepted in classical mechanics this because of a dominant role particles and rigid localized bodies play in classical physics; so that the notion of space, as absolute vacuum container of bodies and time (t), as a linear counter of the relationships among rotational or transitional changes between two or more local positions for any body, seemed unproblematic in the context of the classical science in relation to the so-called '**local**' physical state .



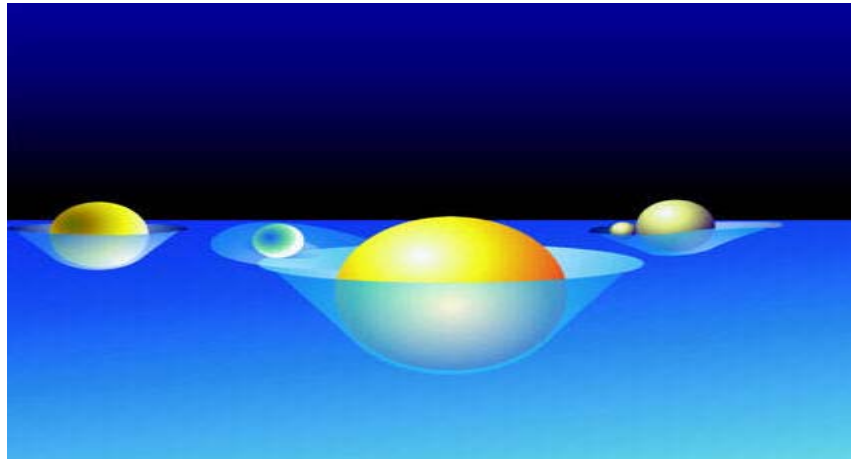
From <http://www.flickr.com/>: Rubik cube is representative of our 3D space, while the clock is providing 4th dimension

For the “**Special Relativity (SR-1905)**”, movements (in 3D space) with respect to time, becomes fourth dimensional Continuum.. As a matter of facts , according to **SR**, the presence of mass in a specific region in space causes a local spatial distortion. In fact in the well of space-time, space can become dilated assuming a spherical dimension. (3) As a consequence, relative Time changes are caused by the difference in time measurement between two observers, where one moves with respect to the other. It is important to observe that also in **SR** it is postulated the synchronism and “*simultaneity*” of relative changes in space and time also in the case of the dilation caused by a gravity well. Besides it is important to consider that following the **SR** theory, a photon traveling near the maximum of light speed, need to become flattened into a wave front, with two dimension of space .In that case, when the photon become flat (4), there are no more evidence of the unique direction of time, therefore it become necessary to conceive a flat geometry of space-time with two dimension of time as was anticipated in the artistic vision of the flat clocks of Salvador Dali’.(5)



S.Dali-particular, Double Time Direction

Therefore in **SR** theory the time is no more a linear function; in fact to maintain constant the maximum speed of light can be observed a length contraction and therefore a time dilation. **SR** indeed predict that time should run slower near a massive body, because light loses energy when it travels away from a gravitational field. This because there is a relation between the energy of light and its frequency ($E = hf$; with “ h ” Planck's constant) : greater is the energy, then higher the frequency. So that as light travels upward in a gravitational field, it loses energy and so its frequency goes down. This means that the length of time between one wave crest and the next goes up. To an observer high up, it would appear that everything below was taking longer to happen. Therefore on the basis of the “*Theory of Equivalence between mass and Energy*” ($E = mc^2$) as well as happen a space spherical contraction ,we observe in "simultaneity" a time dilation and viceversa.



Theory of Equivalence

The logical trouble produced by no linear time is consequent to an apparent limitation of the “*information*” that assumes random solutions from an ordered state to a disordered one ; in fact any forecast of the motion, can be expressed only by means the probability calculations. This is rationally derived by maintaining the conceptual domination of an unique “**local**” form of space-time. In fact Einstein’s **SR** theory remain formulated by setting a four dimensional continuum based on three ordinary dimensions of space combined with a single dimension of time to form a four-dimensional Vectors $V=(XYZ,t)$ for representing a Space-time, where the length of a four-vector is invariant under the space coordinate transformation, while the time coordinate remains based on a single direction, e.g. time coordinate is not an operator and as a single parameter do not commute with the space coordinates. It is proved that thinking in this paradigmatic way, every relativistic explanation shown to give un-correct solution to the motion and infinity producing paradoxes, as the similar ones originally conceived by the ancient Greek mathematician Zeno of Elea. (6)

The theoretical basis of “**Quantum Mechanical theory**” (**QM**) starts from the question of Time that cannot show, at the microscopic level, an unique linear direction. In fact out of side of the observable macro systems, where if we observe the stars we do not influence the direction of their motion, differently in micro-systems the Quantization of Energy can be seen as a rationale consequence of the limitation of information, essentially because time loose a pre-defined direction of flow. In fact in **QM** is not more possible the assumption of a precise “*simultaneity*” and *synchronicity* between time and space, that is underlying any dynamical classical or relativistic process, in order to maintain the contemporarily correspondence that permits to assume that for any position of a photon we can forecast the time direction of any successive event.

As a matter of facts at the heart of the **QM** lies another “simultaneity” based on a dualistic behavior between particles and waves on the basis on their complementary nature.

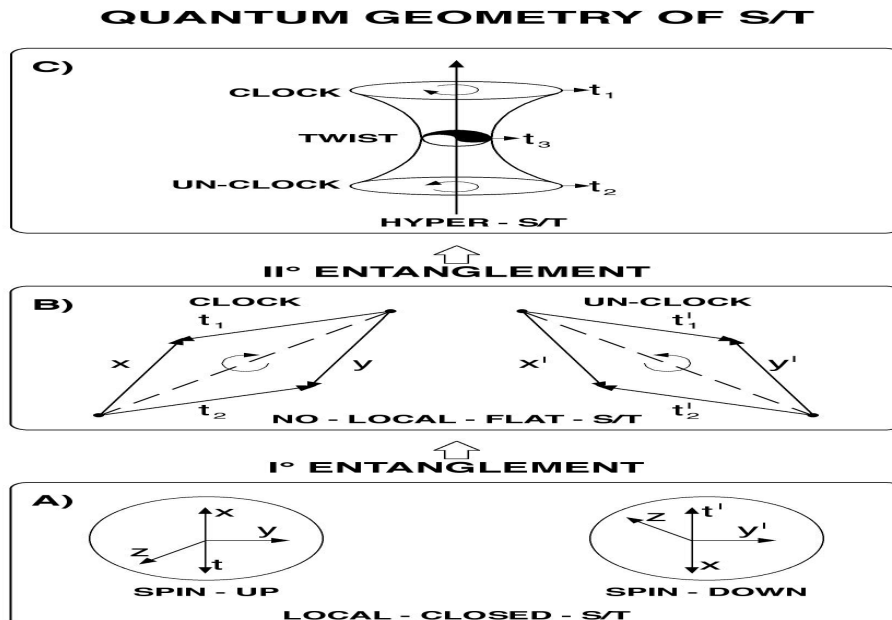
Complimentary properties of wave and particles can be exchanged ; therefore in absence of the linear direction of time “uncertainty” prevails in the forecast of the relationships Energy and Time. In fact the action of observing a wave//particle system need to accept the **Uncertainty Principle** (*Heisenberg-1927*), that put in crisis the deterministic approach of Classic and Relativistic Physics.

As a consequence, in the orthodox acceptance of **QM**, the probable wave collapse in a measurement process, is not a physical phenomenon . In fact the knowledge of the particle can be associated to the collapse of the probabilistic wave-function, and therefore knowledge of the Quantum-system exist only if we exclude in the act of measurement the "simultaneity" of the knowledge of the wave and viceversa. Besides there is no more synchronicity of observation, in fact, when in **QM** if you look for a wave you exclude knowledge of the particle and viceversa looking for the particle you exclude the knowledge of the wave.

On the basis on those ways of reasoning it is easy to focus that one of the major scientific problem of our time is to avoid to be in presence of **three incompatible Physics theories, Classic and Quantum-mechanics and Relativistic** , that cannot be unified, this because each of them get troubles to unify their conceptions, fitting into a predefined and unique "**space and time paradigm**". In fact **from the ancient view of Euclides**, science basically would ever maintain an undisputable "**simultaneity**" of relationships between "**pure**" time (based on timing-succession of instants) and "**pure**" space (in forms line-surfaces - and volumes).

A new opportunity to solve those dilemmas is given by the Theory of Entanglement (7-8) of wave/particles that permits to open new perspectives in Quantum Space-Time geometry. (9)

In fact we can associate time directions with the modes of "**information**" (embodied in Vibrational Energy (**Ev**) and In Energy condensed as matter (**Em**) in relation to different geometrical organization of the direction of the four vectors, describing three levels of Space-Time architectures. These Space-Time (**S//T**) structures can be organized reassembling the geometry of the four vectors at different levels of "**quantum-architectures**". (see follow figure) The changes in Quantum Architectures, are driven through critical singularities producing ultra fast "**space \leftrightarrow time conversions**" (10) obtained through **S//T** confinement activities of Entanglement among Quantum-particles, that modify the alternative composition among the fundamental forms of Energy , **Ev, Em, Ei** . (11)



Legenda of : Quantum Space Time image.

- a) Photons with spins Up and Down in a Closed -Local Geometry of Space -time (S//T) (XYZ,t)
- b) First "Entanglement" activity happen through an confinement action between two or more Photons-Spin , generating two kinds clockwise and counter clock wise , organization (XY,t1,t2) of the four vectors in a "no-local" flat- geometries of S//T.
- c) Second "Entanglement " activity generating an Hyper- S//T Geometry (X,t1,t2,t3) , happen trapping one or more photons **between** clock and un-clock , no-local flat geometries of new energy , derived from the first "Entanglement" activity.

The upper figure proposes a **novel structure of Quantum Geometry of S//T**, based on different quantum-organization of space time arrows. The conversion between space and time is produced when the wave-patterns associated to the quantum particles becomes flat in space, so that the component of space vector, orthogonal to the direction of the confinement action dissolves, changing in the complemented time's arrow, generating a **Quantum-geometry of S//T (XY,t1,t2)**.

Therefore the “*first Entanglement action*” on Quantum-particles produces a variation of between the geometrical relationships among S//T arrows, producing a **No-Local Quantum** -architecture. So that the space become flat and the time becomes two dimensional, as it is characteristic of the new form of Energy represented by the a pure wave field of “*Information Energy*” (**Ei**). The area of this field is proportional with the number of wave/particles enjoining the *quantum entanglement* activity. As a consequence, in relation to this field of **Ei**, the “*simultaneity*” becomes extended in the space, between (**X-Y**) and the *synchronicity* assumes a duration, between the time interval (**t1-t2**). The existence of this level of Quantum S//T structure, based on pure *Information Energy*, is extremely important as reference frame of *self-organization phenomena*, because this “*Ei-field*” get the possibility to share at distance a “*no-local*” *information*, between the X-Y, in *simultaneity* and also in *synchronicity*, between t1-t2 time's arrows. In conclusion, the *first action of entanglement*, allows a variable extension of “*simultaneity*” and a variable widening of *synchronicity* between both the binary dimensions of space and time as a consequence of the polarity of two origins of space//time vectors in the quantum-geometry level of “**Ei-Field**”.

A *second Entanglement activity*, is due to a more complex phenomena of double confinement based on a fluctuating action and resulting in an **Hyper-S//T Quantum Geometry**. This Q. Structure of S/T can be important for developing a revision of “*quantum –tunneling*”, and also, if the confinement activity generating a second Entanglement effect, acts on the strong range of nuclear forces, it produces S//T Hyper structures of the type showed in the *Black holes*.

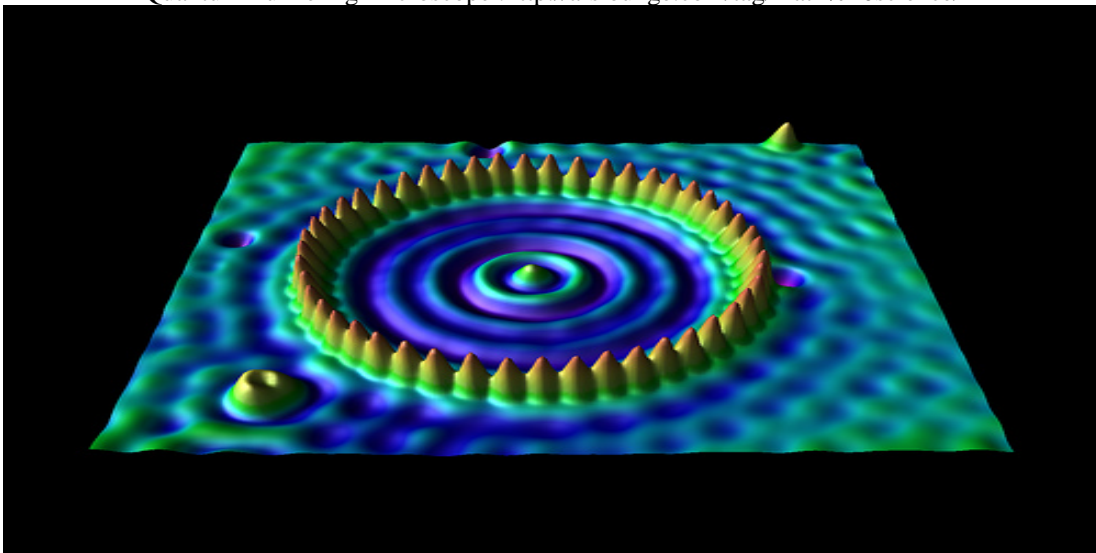
The *tunneling effect* can be explained through the wave complex behavior, that happen when some photons will be trapped between two coupled S//T polar-configurations, based on clockwise and under-clockwise oscillating vortex. In this case a new conversion of space to time is shown and appears to dissolve a new space vector, in order to generate an **Hyper- S//T Quantum Structure**. In fact, when two “*Up and Down Ei-Fields*” will be over-positioned, so that the twisting movement can trap other photons at the interface, transforming the dynamics of S//T in the *second entangled structure* described by the coordinates (**X,t1,t2,t3**). In this scenario, **X** represent the unique dimension of the Space flow, that is related to three vectors for the time (t1 = first time period), the first is relative of the Circular Right helicity of the UP-vortex, (t2 = second time period), the second is relative to the Circular Left helicity of the Down-vortex, and t3, the third is the time period of the *Twisting Time-frequency* of reciprocal complementary critical changes of opposite circular-cyclic movements, in a way that both can find a *synchronic* correspondence with a critical re-cycling pulses in *simultaneity* of the e double excitation between two kinds of vortex, acting in clock and un-clock polarizations of *Ei-fields*. Therefore a new S//T scenario get a new structured coincidences of *simultaneity* among an Unique dimension of space and three (t1,t2,t3) *synchronic* timing's dynamics.

Those new Quantum geometries of S//T can be based on a critical equivalence between similar arrows each of them composed by a “*synchronic-simultaneity*” of the bi-dimensional composition of each vector based on a mixed dimension of Space (X) and Time (t) that give as a resultant four equivalent vectors $\langle \mathbf{X}/t \rangle$. Therefore the construction of a vector's matrix can assume a bit of information values ranging between (0,1) respectively for Space and Time. So that any representative vectors $\langle \mathbf{X}/t \rangle$ is un-divisible, but can assume different informational aspects. This proposal can be developed in order to better processing, using information criteria, the new frame of reference based on the previously theorized changes of **Quantum Geometrical Models**.

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IBM- photo of confined electrons in artificial structures at nanometer length-scale
The above image shows the QTM observation of standing waves oscillations of Cu (111) of two dimensional electron-gas surface.



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