

The Adventure of Science

Francisco Martínez Flores

Physicist, Chemical Engineer and Physics-Chemistry Teacher (retired) September 2015

Abstract: Development at Physical and Biological Sciences is like an adventure that requires careful consideration of some of its points (achievements) that are controversial.

Special Relativity only allows electromagnetism and quantum phenomena to be unified, because the corresponding masses must be virtual; this will be acceptable for photons and elementary particles such as electrons and consistent with Quantum Field Theory.

Total Unification turns out inadequate as it is evidenced by the unsuccessful demonstration of gravity's quantization. True or inertial mass is born with protons and others compound particles, whose behaviour may be quantum and classical.

The known effect called dark matter in the Universe can be explained by assuming virtual mass to the radiation we are receiving. Besides, the frequency shift (Doppler effect) are due to transverse and not radial velocity of the galaxies, which is compatible to Hubble's law; therefore, the expansion of the Universe is unproven and dark energy will be unnecessary.

The Evolution that governs the processes of life can be raised with a similar approach to Physics, where it have been established an inner space in nuclei's atoms similar to mind or consciousness of living beings; this have strongly influence with the exterior or ordinary space, so Duality becomes the criterion or paradigm most suited to the behaviour of Nature.

Keywords: Development at Physical and Biological Sciences, frequency shift (Doppler effect).

1. INTRODUCTION

The invasion of gadgets and electronic devices to which we are subjected in recent years, causes at any independent and neutral mind to perform a minimum analysis. In the past century, the so-called Frankfurt School formed by thinkers like Adorno, Horkheimer and others put the emphasis on the impact of technology not only in human events but on concepts and paradigms that support to our reason, when this invasion seeks to go beyond the necessary caution.

In this regard, it is worrying the news about a group of scientists (including some Nobel Prize) and personalities linked to the latest technology, who aim to strengthen the implementation of the so-called "artificial intelligence" not only for solving problems but also in decision-making; yet we can not forget the discomfort experienced by the situation created in the film "2001 Space Odyssey" when the computer took over the decisions to be taken.

Then what we will do humans?. Nowadays, we are at the mercy of numerous data taken by electronic devices that Internet broadcast within a few seconds; the profusion of simple clinical analysis may create some mental disturbance to any sensible person.

Scientific activity is like and "adventure", which in its most general sense consists of a series of events where humans are immersed stimulated by the desire for knowledge of unusual places and peoples different from their surroundings.

It is also the task in which human groups are involved to impose the rules to govern social and economic conditions for the better development of the community.

Finally, it is the intent of establishing the laws of natural phenomena by what it is usually called Research and lately Innovation.

In all cases, paradigms are configured, ie, the assumptions that gives meaning or justification the adventure.

So, **fraternity** and **altruism** are the conditions for the former, while **equality** is the undisputed premise for the second and finally the Models based on **Unification** and **Evolution** in Physical Biological Sciences, respectively.

The problem with paradigms is the extension of its scope, so that it becomes sometimes more of an “idea” or a “wish” than a necessary condition.

The purpose of this paper is to try to establish the limits of these paradigms in Physical and Biological Sciences; to this end, we find ourselves in the situation of intellectual **freedom** that allows us to examine the issue without prior prejudice conceptual mathematical or institutional ties.

2. CHRONOLOGY OF IMPORTANT SCIENTIFIC FACTS

- “The Origin of Species”, published in 1859 by C. Darwin and Mendel’s law in 1865 on genes: Evolution.
- Formulation in 1875 by Maxwell, the Equations of Electromagnetic Fields as a result of the unification of Electric and Magnetic Fields.
- Michelson-Morley experiment in 1887, where the hypothetical “ether” for the propagation of electromagnetic waves in vacuum was discarded.
- Establishing Quantum Theory by Planck in 1900 thanks to the introduction of action quanta in electromagnetic waves.
- Special Relativity Theory by Einstein in 1905 to unify Electromagnetism and Classical Mechanics.
- General Relativity Theory in 1915 by Einstein to extend the previous theory to Gravitation and to apply it to Cosmos.
- Observation in 1915 by Slipher the redshift of light from distant galaxies that together with Hubble’s law in 1929 led to the estimation of an expanding Universe.

3. THE ADVENTURE IN PHYSICS

As we have seen, the events that led to the establishment of Modern Physics, that is, try to overcome the phenomena grouped in Classical Mechanics and Electromagnetism, thanks to Relativity and Quantum Theory, occurred in the course of a few years between the late years of nineteenth and the early of twentieth century.

The starting point was Michelson-Morley experiment, which showed that the speed of light in vacuum, c , becomes a universal constant, independent of any other velocity, v , in the way that $c-v$ or $c+v$ have no physical meaning.

In 1904 H.A. Lorentz wrote an article: “Electromagnetic phenomena in a systema moving with any velocity less than that of the light”, trying to fit the result of that experience into electromagnetic laws and obtained the expression called, Lorentz contraction, according to which an electron experiences a decrease in space travel; if that particule has a volumen undergoes a contraction in the direction of movement.

A few years earlier (1895), H.G.Wells had published a very familiar story: “The Time Machine”, where you can read: “...there is no difference between Time and any of the three dimensions of Space except that our consciousness move along it”, which undoubtedly influenced the ideas and concepts of Physics a few years later.

So, the introduction of a four-dimensional geometry in which Time constitutes another dimension, may be appearing as reasonable; but in this case predisposes to an “adventure” and the protagonist willing to do it, Einstein, who dared to enter it in his article: “On the electrodynamicis of moving bodies”.

The first result in the formulation of it is the “time dilation”, which implies the existence of two different times: the assigned to the moving system and another one to the fixed. In this sense, it was not delayed much time (1908) for a mathematician, H. Minkowski, belonging to the mathematical group of Göttingen, led by Hilbert, developed the four-dimensional space, introducing the well known diagram in which the light cone (intervalo null) separates the causal events or like-time (positive interval or event) and the non-causal or space-like (negative interval).

The daring mind that provides the spirit of adventure may be in many cases, the cause of success in the activities that human beings are involved; so, Einstein became the most popular scientist of the last century hitherto. However, the

scientific community in the beginning was cautious, as the Nobel Prize in Physics was for his contribution to the quantum theory by the so-called Photoelectric effect, which consists in the fact that quantum energy acting on matter can extract electrons with definite energy (photovoltaic) according to

$E \equiv h\nu = W_0 + 1/2mv^2$ (1), where ν is the radiation frequency, h the Planck's action constant and W_0 the minimal extraction energy.

Critical analysis of Relativity Theory:

In essence, the relativistic analysis is the establishment of the quadratic equation that combines space and time as it is usual in kinematics, but adding to classical developing the concept of intervalo or event, Δs , which by "definition" must be constant:

$$(\Delta s)^2 \equiv (c\Delta\tau)^2 = (c\Delta t)^2 - v^2\Delta t^2 = \text{const.} \quad (2) \quad \Delta\tau \text{ is the so-called "proper time"}$$

that takes the light to travel the space, $c\Delta\tau$, from the moving frame; this in turn moves with velocity v , relative to a fixed frame, which also becomes a focus of light emission, being Δt corresponds to the wave propagation time as well as the moving frame.

It is easy to convert the above equation in the $\Delta t = [1/\sqrt{(1-v^2/c^2)}]\Delta\tau$ (3) from which one can appreciate the time, $\Delta\tau$, is less than Δt ; so, the latter, ie, the measured time, Δt , from the fixed frame is dilated or stretching respected to the "proper" one.

The first consequence is the very well known the "twin paradox", so that one of the twins traveling through space at certain velocity, v , live longer than the other one at rest on Earth. It is not necessary to emphasize that the issue of different times turns out very attractive to the imagination that had been spurred by the stories like "Time Machine" and nowadays by the profusion of science-fiction's films and series.

Thinking about such a structure (interval) and taking in consideration the latest developments in Physics, we wish to point out the following objections:

- a) The experiments proposed are all "thought experiences" as it is appearing at Panofsky-Phillips' work ("Classical electricity and magnetism"); actually, it is not possible any experimental test including two observers, so the "twin paradox" can not be tested.
- b) Moving frame is arbitrarily designated as inertial system to emphasize the "fact" any material body is located in it, but that is impossible because the condition of $\Delta\tau$ being constant, only allows the measurement of Δt from the fixed frame and therefore the only system to considered from a kinematics point of view; although, it is possible to exchange the role of both frames, as the speed, v , is always relative.
- c) The construction method leading to quadratic equation (2) can be true when the only propagation o physical transmission are the electromagnetic waves and elementary particles like electrons, under their dual nature, wave-corpucle, according to Quantum Theory.
- d) In this way, the equation (3) may be converted in their equivalent frequencies instead of times, considering these are inverse to thoses; so, $\nu = [\sqrt{(1-v^2/c^2)}]\nu'$ (4) where ν corresponds to t .

The above objections might not be of enough weight if those were not supported by the inconsistency of the Energy equation:

$$E^2 = c^2p^2 + (m_0c^2)^2 \quad (5)$$

Actually, there is something very simple that seems to have gone unnoticed: for obtaining (5) the momentum is defined as $p = m_0c^2/\sqrt{(1-v^2/c^2)}$ (6) and the energy, $E = m_0c^2/\sqrt{(1-v^2/c^2)}$ (7) and then it is "prescribed" the quadratic condition must be fulfilled as any interval, Δs^2 ; but, it is very easy to check that using the momentum, p , and the energy, E , according to (6) and (7), respectively, the so-called the energy "equation" (5) turns out to be an **identity!**, ie.

$E^2 - c^2p^2 \equiv (m_0c^2)^2$, since the left side disappears.

An "identity" imply the equivalence between the two sides so that it can be used independently, but not make them an "equation". Accordingly, m_0c^2 occurs at any speed, v , and the concept of **rest mass** for m_0 is not appropriate.

However, we can use the left side of that identity; if we look carefully at the expression defining momentum, p , with the added, c , it would not be very exaggerate to say that it is a pure mathematician formula having a “strange physical meaning”. But, we can not challenge the validity of the most famous equation at Physics, $E = mc^2$ (8), which is simply the transcription of (7) when we put $m = m_0c^2/\sqrt{(1-v^2/c^2)}$ (9), similar to relationship of times, ie. equation (3).

In both expressions it is tempting to consider $v = 0$ and to reduce m and t to m_0 and τ , respectively, but the relativistic arrangement does not allow this, since it requires as a starting point a moving frame versus a fixed one, which may be interchangeable as we said earlier.

We can keep calling relativistic mass to m , to distinguish it from m_0 , although it must be stressed the latter has been introduced *ad hoc* in order to get (mathematically) the energy, which turns out to be the important physical magnitude with a radical different method from what is carried out at Classical Mechanics.

For this reason and adjusting us to the involved parameters (m_0 , c , v), the only way to accept consistently the energy formula (8) is considering to both m and m_0 as **virtual and electromagnetic mass** (not real or inertial); this implies that no actual corporeal mass according to Newtonian Mechanics can assume the previous energy, being unable to reach the speed of light, c .

In addition, the appealing to velocity, v , contained in $E = m_0c^2/\sqrt{(1-v^2/c^2)}$ after performing certain mathematical operations, is not adequate from a physical point of view, since it ignores the dimensional nature of energy as a physical magnitude.

Consequently, the concepts of energy content and mass-energy equivalence are merely “artful devices” to justify the introduction of inertial mass in the interval’s construction.

With this we may avoid having to admit that a normal body like a stone had a greater mass than the same traveling at a slower rate; in other words, the increasing of real mass with velocity for any material body is impossible.

The concept of **virtual mass** is perfectly compatible with the “reality” of **energy** made manifest in nuclear reactions and also in photons and elementary particles like electrons and others as quantum energy; these may be called quantum particles, since the only demanded treatment is supplied by Quantum Theory, whose origin is in Electromagnetism.

By this interpretation we have overcome the problem posed in this theory with the consideration of real or inertial mass, as it can easily be seen in the extensive literature on the subject, where is repeated again and again that quantum phenomena has nothing to do with real or inertial mass.

Thus, **Unification** of Electromagnetism and Classical Mechanics is **impossible** (our article: “Relativity: Theory impossible”), but we can get the **union** between Quantum and Electromagnetic phenomena, under the name of Quantum Field Theory; so we will get a better understanding of them and at the same time by opening the possibility of avoiding many problems with Standard Model, which are partly due to the conceptual status of mass, as it was well stated in a videolecture from a Nobel Prize, F. Wilzcek: “..mass is a mess”.

The breaking with orthodox interpretation of Relativity in its “unifying vocation”, it demands the obligation of clarifying some points, which we are trying to carry out in what follows.

Electron mass:

Electron is an elementary particle belonging to the group of leptons, while proton and neutron are compounds particles belonging to hadrons group. As it is well known the mass unit used in both groups is the electron-volt (eV) defined by the expression: $eV = mc^2$.

The measured experimentally value (9.1×10^{-31} g) depends essentially on **charge** an velocity (provided by electric field) without which it would not act the magnetic field; for this reason we have placed m and not m_0 , since the measurement is made from a fixed frame.

In fact, we should emphasize that to obtain this mass, a previous knowledge of charge and others electromagnetics quantities (electric and magnetic fields) is needed, whereas for obtaining charge there is not a priori requirement of its mass; therefore, charge happens to be the key parameter of electron in perfect agreement with the **virtual and electromagnetic** nature of mass.

It seems fitting to bring up the claims of two authors of Quantum Theory, P. Roman (Advanced Quantum Theory) and Messiah (Quantum Mechanics) in the treatment of Dirac's theory of the electron, according to which **charge** (not mass) should be the appropriate parameter.

Furthermore, it should be stressed the most important contribution of Dirac equation is that allowed the introduction of antiparticles; in this case is nothing more than electrons with positive charge, with the property of annihilating each other producing photons: $e^- + e^+ \rightarrow 2\gamma$, which clearly proves the main role of **charges** and that photons must have **mass** of the same nature as electrons and positrons, ie. **Virtual**.

In line with the preceding argument on the electron and its mass, we may add its behaviour in the atom: it is the relationship between the energy change that experience to jump from one layer or atom's level to another depending the absorption or emission of electromagnetic energy in the form of quanta, $h\nu$, which can be expressed: $h\nu = mc^2 = eV$ (10). As we see, the electron mass involved acts as a "money change" in the process, since the actual quantities involved are electromagnetics, in line with its **virtual** and **electromagnetic** nature.

Proton mass:

Proton is a compound particle (hadron) made from three elementary particles called quarks, u, u, d ; they have fractional charges whose sum gives the proton charge: $+2/3 + 2/3 - 1/3 = +1$. These quarks are put together by the **strong interaction**, which provides a very high forces transmitted by "gluons", so that quarks have no chance to go outside under a phenomenon called "confinement".

Proton mass is almost due entirely to "strong interactive network", since the quarks only provides their charges and its masses are virtuals, like that of electron; it happened the same in the case of the atomic masses which are due to that of its nuclei, as it is usually computed in Chemistry.

It is undoubtedly that **proton mass**, an that of all hadrons, is **real (inertial)**, and as such it must be expressed in grams (1.6×10^{-24} g).

With this, we have reached the cornerstone for building the "material world", ie provided with inertial mass. Although its experimental determination is based on its charge, in the same way that of electron, it is confirmed by others methods such as atomic mass spectrographs and Statistical Physics.

So, proton comes to represent the "turning point" that serves as a union between two worlds:

- Governed by Quantum Theory, which acts according to its charge as measured in eV (938 MeV), that may be accelerated by electromagnetic quantities associated (electric and magnetic fields), but not by mechanical forces.
- Subject to Classical Mechanics, where its mass must be expressed in grams and Avogadro's Number allows access to macroscopic level.

On the other hand, the mass of neutron is slightly higher, but it is unstable and tends to convert itself into a proton by radioactive beta decay, which it is just the emission of electrons as β particles: $n \rightarrow p + e^-(\beta) + \text{antineutrino}$; the estimated energy balance and the breakdown of Parity led Pauli to introduce a new particle: neutrino (ν).

Neutron has three quarks (u, d, d) whose charges ($+2/3, -1/3, -1/3$) add up to zero, ie show its neutrality; the transformation of u quark into d is energetically favorable, which explains why desintegration beta is spontaneous.

Following this argument, it seems logical that if enough energy is applied to protons it will be obtained a neutron and a positive charge, ie a positron:

$$p \rightarrow n + e^+ + \nu.$$

Finally, for getting both desintegrations, certain instability is needed; so, in the first case, it occurs when there was one or two neutrons in excess in the atom (isotopes), while for the second, are accounted high energies situations, which explains the great stability of protons.

Atoms' nuclei, composed of protons and neutrons, are the natural "nest" where "matter" (real or actual mass) sits. The consistency and stability of nuclei and consequently, of atoms is due to **weak interaction**, which it consists in the force produced by interactions between proton-neutron, proton-proton and neutron-neutron.

Despite the name, these forces are very large and produced by exchange of quantum particles or bosons similar to photons, but unlike them may possess electric charges: it turns out the so-called gauge particles (W^- , W^+ , Z) which respond to “gauge symmetry”, ie an invariance around a “charge” of the system (again “charge”!). Such particles are bosons which act by an incessant and indefinitely exchange, according to Klein-Gordon equation.

The enormous energy (of the order of 80-90 GeV) the particles are carrying can be explained by coupling constants (actually “weak charges”) and the corresponding potentials arising by the union of symmetry groups $SU(2)$ (isospin interaction $n \leftrightarrow p$) with $U(1)$ (electromagnetic interaction) and finally applying the phenomenological Fermi equation.

(our paper: “Charge in Quantum Theory”)

The so-called “Higgs Mechanism” is just a very elaborate method to justify the inertial mass of gauge particles; but, as we have seen, this is not necessary, since we have again charges and potentials.

Thus, **masses of gauge particles** are **virtual**, like photons, electrons and others elementary particles.

Finally, we believe it is appropriate to go forward with the following argument: the only way such enormous energies do not affect the **true (inertial) mass of the nucleus**, is to keep them in an *inner space*; this explains the enormous energy was necessary to get by LHC particle accelerator in extract the gauge particles to the *exterior or ordinary space* for being detected.

Thus, the existence of two spaces: *inner or internal* and *exterior or ordinary*, consistent with the two worlds noted above, appear as something reasonable.

From there, it is possible to develop a theory about neutrinos, where they are particles involved in beta decay, but only have existence in an *inner space* and they can not access to *ordinary space*.

Similarly, we might have a more accurate knowledge about Stars, arriving at an interpretation of the process called “nuclear fusion reaction”, in accordance with the preceding arguments. (our paper: “Stars: a new approach”).

Mass of light:

Starting on the “challenged” Energy equation: $E^2 - c^2p^2 = (m_0c^2)^2$ and considering it constant as an interval condition, is estimated being null for the special case of electromagnetic wave propagation, ie the cone light as it is indicated in the Minkowski diagram; therefore, $m_0 = 0$, ie. Photons must have zero mass and $E = cp$ (11), in consonance with electromagnetic theory.

Apparently everything is correct, but what can we say now of $E = mc^2 = m_0\sqrt{(1-v^2/c^2)}$?. Logically, m should be null as well as m_0 , but it is argued that now photons are not at rest and m should not be null.

Actually, the equation (11) comes from the fact the relationship between energy and momentum is constant, ie. $E/p = c$ and not because of $m_0 = 0$; considering that all parameters are electromagnetics, the **mass** (m y m_0) is of **electromagnetic** and **virtual** nature as we have been holding.

However, the “adventure” continued in those years (1905) when Einstein wrote the article: “Does the inertial of a body depend upon its energy-content?”, from which can be draw nothing, because they are purely theoretical assertions or definitions. (our paper: “Stars: a new approach”)

A few years later (1911) it follows another title: “On the influence of gravitation on the propagation of light” and last but not least, in 1915 his masterpiece: “The foundation of the General Theory of Relativity”.

To oversimplify, the General Theory make use of the interval o metric of the Special one, but variable, so that the space-time coordinates are no longer rectilinear but curves and are becoming so important because of the dominant role given to gravitation. This leads to establish a curve spacetime warp similar to that of a sphere but four-dimensional, with what “intuition” which always help to develop any argument, ceases to exist.

How is it possible, then, to articulate any experimental method required for any natural science?. “It does not matter, worse for Nature” or “Imagination is more importante than knowledge”, were statements set out in the last century to answer that question.

As it is usual in human events, mainly those what are named as “adventure”, it is importante that someone supported them; in this case, was Eddington from Cambridge, who welcomed this theory like if it were made by himself, as it is reflected in their works: “Space, Time and Gravitation” (1920) and “The mathematical theory of relativity” (1922).

Moreover, it is surprising the promptness (1919) with which carried out the experimental method to “prove” the inertial mass of light; this is described in the article “Weighing light” within the first mentioned work and it looks more like a story by J. Verne or H.G. Wells than the corresponding to a real one.

Actually, this requires a great difficulty, and by itself is not much reliable: it can only be done during a total solar eclipse and compare it to the one made in the same place six month later, while he made it in two differents places and also in the range from January to May; but there was available formulas (theoretical), ie the relationship between the angle deviation of light ray and parameters known as solar mass and radius, allowing through a simple calculation and arangement of the distances measured on photographic plates (low accuracy in those years) to set the necessary result.

The scientific community is fairly unanimous to accept such “evidence”, despite Max Born in his book, “Einstein’s theory of relativity” (1962) states: “.an exact agreement between theory and measurement has not yet been obtained..”.

It seems clear that such consensus is based on the conviction that the Relativity General is “deemed” the only theory to explain the evolution of Universe. But our own sense of adventure asks us to put in question in accordance with the arguments in what follows.

Inertia:

It is well known, this fundamental concept was introduced by Galileo allowing the birth of Physics, who completed Newton with the establishment of the consistent and intuitible dynamics’ laws.

To analyze properly the nature of inertia, we must start since Aristotle’s error on the motion of bodies, whereby in order to keep the velocity of those it is necessary a force; Galileo’s dicoverly was to refute this idea by stating that bodies can keep moving with a constant velocity without any force, because of its inertia.

At first glance, it may seem that such property is entirely due to the state of motion, but Newton was more accurate, since its first law clearly specifies that inertia also exists at rest state and added in its second law that mass is the physical quantity responsible for that property, hence **inertial mass**.

Later on E. Mach attributes such property to moving systems, forgetting its insertion into the mass; the explanation given about the origin of the broadening of Earth in its daily rotation can not be more strange: the gravitation pull caused by distant stars!. It surprising that such a statement is still hold, overlooking two parameters: the enormous distance an the tremendous smallness of gravitation constant, G.

Is not understandable the acceptance of the General Theory, whose formulation is based essentially on that “postulate”, although were disguised with the great mathematical arsenal, ie. Tensor algebra, manifolds and the subsequently geometrodynamics interpretation, which attempts to justify.

Given all the above, the fundamental “error” of Relativity is precisely characterize the inertia by moving frames (inertial systems), meaning all the frames, because the fixed one, will be moving respects to those. Although, it have been trying to justify this, placing a body with mass, m_0 at the moving frame, this is clearly ad hoc, because it ignores the role of mass according to Newton’s second law. But it is argued that the aim of the new theory is overcome newtonian dynamics, although it had to be admitted two types of masses! (tranverse and longitudinal).

In addition, the extracted force by mathematical analyzes is “virtual”, since what you get is merely the work magnitude (“principle of virtuals works”).

In line with the above analysis and in practical engineering problems, **Inercia** arises from the existing internal forces in compound particles, such as hadrons and macroscopic bodies.

These forces are producing the widening at Earth’s equator when it is rotating, since at these points the linear velocity is greater than at any other side and to keep doing it will need more inward force which it obliges to extend it to periphery (through flexibility) greater than in any other part. This coincides with the explanation usually given by “centripetal” (real) and “centrifugal” (ficticia) forces.

It appears, the concept of inertial forces have not been taken into account in the relativistic analysis; for this reason in the world of Elementary Particles or rather Fundamental, the real o “inertial” mass only must correspond to the composite particles (hadrons), while for the elementary one, like electrons, must be assigned a “virtual” one.

We must recall that we had this interpretation after the contradiction expressed in the formula, $E = m_0c^2$, but now it may be added that the introduced mass, m_0 not presupposed any internal structure; hence only electrons and other leptons can assume it, while hadrons may combine the status as quantum particle through its mass in eV units, like the previous one, with the usual classical particle in grams as it claims all real masses.

Finally, it should be noted that in particles accelerator, hadrons increases its energies (eV) thanks to charge and the applied potential, but this is consistent with the fact its actual mass remains constant as it demands Classical Mechanics. (Our paper: "Mass and Quantum Theory").

Doppler Effect:

This is a phenomenon that corresponds to the transmission of sound waves, where its velocity, v_s , can combine with a travelling source, v , in the form $v_s - v$ or $v_s + v$, because these waves require a material medium.

In the case of electromagnetic waves is not possible to convert the above expressions into $c - v$ or $c + v$, since the speed of light (c) is a universal constant, as it is prescribed after Michelson's experiment, which does not allow to give "physical meaning" to $c - v$, since velocity c can not be considered respect to any other velocity, v , otherwise it would not be absolute.

However, Doppler equation in which the frequency of the wave, ν , received by the observer being related to that emitted by a moving source, ν_0 , is accepted in the same way as in the sound; so, we have $\nu = \nu_0(c - v)/c = \nu_0(1 - v/c)$ (12), and velocity of the moving system, v , is estimated "radial" (moving away) and a redshifting of light will be obtained, while for the the approaching (blueshift), it will correspond the equation $\nu = \nu_0(1 + v/c)$ (13).

To give more credibility to the above approach, it has been included the relativistic correction, so that (11) becomes

$$\nu = \nu_0(1-v/c)/\sqrt{(1-v^2/c^2)} = \nu_0\sqrt{(1-v^2/c^2)}/(1+v/c) = \nu_0\sqrt{(1-v/c)}/1+v/c \quad (14),$$

A mathematical game after which one remains puzzled by the explanation it follows: the v contained in $\sqrt{(1-v^2/c^2)}$ called relativistic velocity is "transverse", while v corresponding to Doppler effect at the propagation of the wave, is being considered "radial".

We can avoid such inconsistencies, accepting from the beginning the relativistic frequency equation (4), which can be linearized as it follows

$$\nu = \nu_0\sqrt{(1-v^2/c^2)} = \nu_0(1-v^2/c^2)^{1/2} = \nu_0(1-v/c+ ...) \quad (15) \text{ where we can get a merely mathematical expression, so that its physical meaning gives account of redshifting but with a } \mathbf{transverse\ velocity} \text{ (not radial).}$$

Finally, we can exchange moving and fixed frames so that

$$\nu_0 = \nu/\sqrt{(1-v^2/c^2)} = \nu(1-v^2/c^2)^{-1/2} = \nu(1+v/c...) \quad (16) \text{ where we have obtained the blueshifting radiation, where the velocity is still transverse and there is no need of been radial.}$$

Hubble law:

This is a phenomenological law, ie obtained thanks to a numerous measurements performed: $v = HD$ (17).

At first it seems that for greater distance, D , celestial objects (galaxies) have bigger "radial" velocity, v , and the formula is consistent with the orthodox interpretation of Doppler effect. But it is noted that the value of Hubble constant, H , has been changing from 55 to over 70 at present; this is because the greatest perfection of instruments in recent years permits to visualize increasingly distant galaxies whose speed, v , turns out to be higher than those nearer.

We can not, therefore, infer the velocities of galaxies had to be "radial", but may be "transverse" in accordance with the discussion in the previous paragraph and also in tune with the workings of Nature itself: indeed, no more than at planetary and atoms structure, where higher levels or layers have bigger energy than the lower one.

Cosmic Scale factor:

It consisted at the parameter $R(t)$ that realize the distance between galaxies and being dependent on time is the main argument in favour of an "expanding Universe". It is introduced by the Robertson-Walker metric from the General Theory:

$$ds^2 \equiv c^2d\tau^2 = c^2dt^2 - R(t)^2[dr^2/(1-r^2/R^2)] \quad (18)$$

Given the spatial variable represented by r as part of the polar coordinates (r, θ, ϕ) , the object of that expression is to get the distance between two points from the constancy of the interval represented by $d\tau$; in order to do that, it is considered $dt = 0$, which implies that t being constant and the above equation reduces to

$$cd\tau = R(t)dr/\sqrt{(1-r^2/R^2)} \quad (19)$$

It is easy to see that in the previous simplification there is an “error”: to propose independently elapse times, $dt = 0$, while $d\tau = \text{const}$, when they are viewed from different frames and as that it should always be related.

Thus obtaining the Hubble constant from $R(t)$ according to

$$H(t) = [dR/dt]/R(t) \quad (20) \text{ is inappropriate.}$$

Cosmic background radiation:

As we have seen in relation to Doppler effect and the ineffectiveness of Cosmic scale factor, we may explain such radiation without having to recur to a fossil radiation from a primitive Universe.

Indeed, it is possible to receive no visible radiation in the microwave region from a very numerous and distant galaxies with high transverse velocities that correspond to a “shift beyond red”; also, by virtue of its homogeneous and uniform distribution such radiation may be of a “blackbody” type.

Dark matter and dark energy:

If we assume that all information we receive from the Cosmos is based on the analysis of electromagnetic radiation in its many versions according to the detected frequency and admit the reality of virtual and electromagnetic mass, it is easy to deduce actual or inertial mass will be a small fraction, so the **dark matter** may be attributed to the “virtual” mass.

Moreover, considering the velocities of galaxies to be transverse and that the farthest have greater values than the nearest, it is not appropriate to speak of any acceleratin forces and the so-called **dark energy** is unnecessary.

Quantum vision of Universe:

As a result of study in the previous sections, we have highlighted the “inconsistency” of a **Cosmological Model**, based on an “expanding Universe”.

It appears as reasonable that the study of the largest as Universe requires a similar treatment as the smallest like Atom; in this way, Quantum Theory would be appropriate to carry out this task, since en boths areas there is always an uncertainty or indetermination about the management of times or distances for being very “large” or very “small”.

As we noted at the begining of this paper, Unification paradigm required a limitation, so the need for a new **Standard Model** is imposed, as well as another **Cosmological Model**, in line with the interpretation of the facts outlined above.

Finally, **Duality** is presented as the criterion or new paradigma that informs Nature’s laws; according to it, Quantum phenomena act primarily in an *inner space*, producing matter represented by real or inertial mass, which can exercise its power in the *exterior or ordinary space*, thanks to Classical Mechanics and Electromagnetism, the latter being the link between both *spaces*.

4. THE ADVENTURE IN BIOLOGICAL SCIENCES

Suddenly Nature was filled with *soul*: it was animated. The sun and other stars makes use of their full power *inner space* (gauge particles) to exert their influence through electromagnetic radiation in its multiple frequencies on the *inner space* of the atomic nuclei and facilitates chemical reactions at the *ordinary space*, leading to the formation of DNA and therefore to **genes**, necessary for the existence of “life”.

The endless combinations that over time have been occurring accompanied by the so-called Natural Selection, informs the paradigm which directs Biological Sciences: **Evolution**.

There is no unanimity on the ways or manners in which Evolution occurs, but in line with the discussion over Physics, it seems appropriate to bring the D. Donnett theory, according to which, the differential criterium is in the *mind or inner space* of living beings, whose evolution reflects a Model represented by a building, where to each floor corresponds a *mind or consciousness* of greater complexity than the lower one.

The lower floor will be occupied by “darwinian creatures”, in which Natural Selection favour one of the variants.

In time the living beings having a more flexible behaviour would go occupying increasingly higher floor: they are “skinning creatures”, since according Skinner they used the process based on stimulus based on reward or punishment.

Finally, the top floor will be occupied by humans as “Popperian creatures”, named for Karl Popper who argues that our hypotheses (theories) may die earlier than us, since instead of experiencing in *exterior space* we may do it in our *imagined or inner space*, where it is possible to assess the possibilities.

How many mistakes we (humans) made throughout history by moving precipitously to *exterior space* theories originated in our *mind or inner space*!.

5. CONCLUSION

We carried out a critical study of Relativity Theory, which had led to Modern Physics with the emergence of paradoxes and concepts that intuition and therefore understanding refuses to admit, but instead Sci-Fi's has absorbed it with relish and its undoubted influence on public opinion it feedbacks to the same Sciences.

Thus, to provide with inertia (real mass) to photons, gauge particles, electrons and other elementary particles, is unsustainable, especially when the evidences adduced are very poor if not inexistent; for this reason we have given “virtual” nature to those masses compatible with the “reality” of the energy involved.

With this, the situation in which we find Quantum Theory, that has no need of actual masses, since energies involved are indebted to electromagnetism (charges, potentials), is clarified; Quantum Field Theory may then be understandable, because all particles involved must have a wave-corpuscle nature, perfectly acceptable by its virtual mass.

The meeting point with the proper “matter” (inertial mass) is represented by protons, thanks to their great stability; It turns out a compound particle, ie with a structure which is the necessary condition for the inertia can act.

Atomic nuclei have real or inertial mass, but they need a large cohesive force provided by gauge particles working at very high energies so they only have existence within the same nuclei that are configured as an *inner space*.

In the *exterior or ordinary space* acts the inertial mass, subject to the laws of Classic Mechanics and Gravitation. The attempt to unify the latter with Quantum Theory it remains as a pure “idea”, as it has been shown with the completely unsuccessful efforts to quantify gravitation.

Furthermore, Doppler effect can be explained by transverse velocities of galaxies, since the radial one contradicts the famous Michelson's experiment, whereby the speed of light in vacuum is an absolute constant.

With this and the concept of virtual mass it could be realize the mystery of dark mass and dark energy at Cosmos.

The brief approach to Biological Sciences through Evolution serves to highlight the parallelism of the two Sciences of Nature based on the configuration of an *inner space* and is great influence in the *exterior or ordinary space*, which corresponds to the establishment of a new paradigma: **Duality**.

This can perfectly replace Unification at Physics and indicates the major role of the *mind or consciousness* in Evolution.

REFERENCES

- [1] M. Kaku: “Quantum Field Theory”. Oxford University Press. 1993.
- [2] M. Berry: “Principles of cosmology and gravitacion”. Cambridge Univ.Press.1976.
- [3] F. Mandl: “Introduction to Quantum Field Theory”: Interscience. 1959.
- [4] Ta.Pei: “Gauge theory of elementary particles”. Oxford Public. 1985.
- [5] Dirac: “General Theory of Relativity”. Wiley Publication. 1975.
- [6] Einstein: The Principle of Relativity. Dover Publications.Inc. 1952
- [7] Einstein: “El significado de la Relatividad”. Espasa-Calpe. 1984.
- [8] Eddigton: “Space, Time and gravitation”. Cambridge University Press. 1968.

- [9] Eddington: "The mathematical theory of relativity". Cambridge Univ. Press. 1965.
- [10] Max Born: "Einstein's theory of relativity". Dover Publications. (1962).
- [11] C.Moller: The Theory of Relativity. Oxford University Press. 1972.
- [12] Panofsky-Phi: "Classical Electricity and Magnetism". Addison-Weley 1962.
- [13] P.Roman: "Advanced Quantum Theory". Addison-Wesley. 1965
- [14] Messiah: "Mecánica Cuántica". Editorial Tecnos. 1962.
- [15] Smith-Thomson: "Optics". John Wiley. 1973.
- [16] Lichnerowicz: "Calculo tensorial". Edic. Aguilar. 1965.
- [17] S.Cotsakis,...: "Cosmological Crossroads". Springer. 2001.
- [18] Mohapatra: "Unification and Supersymmetry". Springer. 2002.
- [19] Alons-Finn: "Campos y Ondas". Fondo Interamericano. 1970.
- [20] I.Kaplan: "Física Nuclear". Edit. Aguilar. 1970.
- [21] H.Goldsteinb: "Mecánica Clásica". Edit. Aguilar. 1963.
- [22] Landau: "Teoría Clásica de Campos". Editorial Reverté. 1966.
- [23] F.Wilzcek: "Origins of mass". MIT 2012.
- [24] NASA: "The quest for dark energy". 2007.
- [25] M.Gabella: "Non-abelian gauge theories". Higgs Mechanism. 2006.
- [26] E.Jaynes: "Scattering of light by free electrons". 1996.
- [27] Stanford E.of Phylosophy: "Quantum Gravity". 2008.
- [28] M.K.Baumann,...: "El Cosmos". Paidós. 2004.
- [29] M.S.Longair: "La evolución de nuestro Universo". Cambridge U.P. 1998.
- [30] S.Hawking: "Historia del Tiempo". Editorial Crítica. (1989).
- [31] I.Martinez-J.Arsuaga: "Amalur, del átomo a la mente". Temas hoy. 2002.
- [32] J.L.Arsuaga: "El collar del neandertal". Edic. De Bolsillo. 2000.
- [33] J.L.Pinillos: "La mente humana". Edic. Temas de hoy. 1991.
- [34] A.Nisbett: "Lorenz". Biblioteca Salvat de biografías. 1988.
- [35] P.Davies: "El espacio-tiempo en el Universo". F.CultEconomica. 1977.
- [36] F.Mora: "El reloj de la sabiduría". Alianza Editorial. (2001).