

UNIVERSE: AN EXPANSION MODEL?

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Abstract: The movement of galaxies is not radial (running away) but transverse, according to relativistic Doppler Effect and its implication in the Hubble Law, so the Universe is not expanding.

The existence of “dark matter” may be linked to the relativistic mass, which is of electromagnetic and virtual nature that can be assumed by Quantum Theory, but not by Classical Mechanics; in this sense, it may also explain the Cosmic Background Radiation, which are produced by a large number of distant galaxies that are distributed according to the homogeneity and isotropy of the Cosmos.

General Theory of Relativity fails in its claim to convert Gravitation into the relevant force, because it is mathematically inconsistent, so it could be explained that “black holes” are not inferred from the Schwarzschild metric and the “cosmic scale factor”, taken out from the Robertson-Walker metric is no more than a mathematical device: the evidence adduced is of little reliability, since they cannot be repeated, which is the necessary condition for an experimental science.

The Cosmos is arranged according to the paradigm of Duality and not that of Unification, because the very small structures (subatomic particles) and the larger ones (galaxies) are subject to Quantum Theory thanks to Relativity, while the macroscopic bodies obey to Gravitation and Classical Mechanics.

Keywords: Doppler effect, relativistic mass and matter, gravity and light, Quantum Universe.

1. INTRODUCTION

There is a real fascination with General Relativity Theory, by virtue of the great mathematical formalism involved, with which anyone may have the feeling of being immersed in the very heart of the Cosmos; in this line, it makes use of topology (differential geometry), where the tensor algebra becomes manifolds, establishing symmetries as physical laws, thanks to which the ideal of Hilbert seems to be fulfilled: “mathematize all Physics a priori”.

Moreover, if we consider that our imagination is stimulated by a “supergeometry” with curved space-time, unsuspected dimensions, other universes accessible through wormholes, etc., it seems justified the seduction exerted on any mind; then, it is not strange the appearance of a huge number of science fiction stories, conveniently exploited by the corresponding TV films.

On the other hand, it turns out surprising that the validity given to equations that produces that geometry, by means of which not only do we come to consider the Universe’s origin but to its temporal evolution, in which case we handle elapsed times of the order of 10^{-30} seconds for producing the so-called “inflation”, where the space (not time) expands exponentially; but we do not get out of our astonishment when that “fact” is overcome by the explanation given that space can travel faster than light; but the surprises does not end here, because the so-called Cosmological Model, based on an expanding Universe, allows the existence of dark matter, dark energy, black holes, etc., based on controversial arguments.

Actually, due to the very high value of c , the distances and energies involved are very much above those corresponding to macroscopic bodies; also, the constancy of c is an absolute value, so the main objection is found in admitting that the time and mass linked to moving frame as constant quantities, without realizing that in that case they would also be absolute.

In addition, the observer of the moving frame is redundant, because he can not make any measurements, which is the

origin of the epistemological confusion about Relativity, mainly when it tries to couple Electromagnetism and Classical Mechanics through the unification paradigm.

In this situation, we dare to carry out a reinterpretation of the methods and physical concepts involved in them, performing a thorough analysis of the mathematical equations.

2. RELATIVITY THEORY AND EXPANSION

2.1. Rectilinear space-time: the “fake” equation.-

The expansion of the Universe is related to the one that experiences the time, according to the well-known relativistic formula: $dt = dt' / \sqrt{1-v^2/c^2}$ (1); this equation has been providing numerous comments, being the most significant the “twins paradox”.

How is it possible the existence of two times in a theory that tries out to explain a physical phenomenon?; in other words, can we measure the two times with any experimental device?.

The admitted interpretation is something “fake” turned into truth, due to the fact that the consideration of “two times” has a great appeal to imagination; besides, to this mistake has contributed the initial approach of the question, which is based on the relationship between the coordinates (x,t) and (x',t') of two systems of reference (O) (fixed) and (O') (moving), in order to get the relationship between the physical quantities represented by the elapsed times, dt and dt' for the light to travel the distances, cdt and cdt' from both frames:

$$dt = dt' / \sqrt{1-v^2/c^2} \implies cdt = cdt' / \sqrt{1-v^2/c^2}.$$

It is easy to verify that these formulas corresponds to wrong equations: if we consider that the distance that the light travels from (O) is twice that from (O'), then, $2 = 1 / \sqrt{1-v^2/c^2} \implies 4(1-v^2/c^2) = 1 \implies v = 0.866c$, but this “data” corresponding to the velocity of the moving frame (O') can not be admitted, since it is outside the sense of “proportion” that should preside over any physical theory.

The misunderstanding comes from that to get the formula (1), it has been omitted the fact that the coordinate, x' , disappears, so the observer of the moving frame (O') turns out redundant; for this reason, the relation between dt and dt' , (dt/dt'), should be the same, whichever the speed, v , so that for a higher value of it, will also be an increase of both elapsed times, being the only certainty, $dt > dt'$.

Actually, we are dealing with a mathematical **identity**, that the condition of Interval: $ds = cdt' \equiv cdt = \text{const.}$, try to convert into an equation; but this constant corresponds to a determined value of the velocity, v , that is, we have just a simple geometrical construction, where all the distances are fixed: *there is no kinematics!*

However, this condition is accepted, because it is presented as a conservation law or “symmetry”, which can be verified by the formula: $c^2 dt^2 - v^2 dt'^2 = cdt^2 = cdt'^2 = \text{const}$ (2); this formula implies that the distance traveled by light from the moving frame (O'), cdt' , is the same to that travelled from the fixed one (O), cdt , minus the distance, vd , perpendicular (“transverse”) to cdt' , according to the euclidean geometry involved.

But, the different arrangement conceived may only be justified by “thought experiments”, that is, there is no experiment that justifies equation (2), since it is not really a true equation:

Indeed, when we consider two velocities, $v_2 > v_1 \implies dt_2 > dt_1$, so it must be fulfilled:

$c^2 dt_2^2 - v_2^2 dt_2'^2 > c^2 dt_1^2 - v_1^2 dt_1'^2 \iff c^2 (dt_2^2 - dt_1^2) > v_2^2 dt_2'^2 - v_1^2 dt_1'^2$, that is, the increase in the distance that the light travels, is greater than that corresponding to (O'), which implies that cdt' is also variable (not constant), like cdt .

It turns out a clear demonstration of the “identity”, in which case the time dilation should be interpreted so that dt replaces dt' , on account of the dilation coefficient, $1/\sqrt{1-v^2/c^2}$; besides, this is only the way to understand the formula, $dt' = dt \sqrt{1-v^2/c^2}$, corresponding to an exchange of (O) and (O'), where it is manifested that the velocity, v , is linked to dt , so both quantities would influence dt' , that is also variable.

- *The “twin paradox” is nothing more than a science fiction topic!*

Finally, the elapsed relativistic times, dt , only makes sense through the distance that the light travels from one point to another, that is, cdt , but this time can not be measured; its relation with another, dt' , linked to a speed, v , is just a shrewd construction, but it does not constitute an equation, since all the quantities are variable; with other words, the constancy of dt' , is just conventional.

For this reason, it may be considered that the point of convergence of the two lines cdt and cdt' should be the only system of reference (fixed), that may be called "laboratory" (L), from which the relationship between both times can be estimated through the main characteristic of the electromagnetic wave, such as the frequency, w , that should be the appropriate parameter, as we will see below.

2.2. Doppler Effect

The Doppler Effect is being accepted as an extension of the corresponding sound waves from a moving source, without realizing the very different nature of electromagnetic waves, in which its velocity, c , in vacuum is an absolute (constant), so that $c+v$ and $c-v$ has no physical meaning, in consonance with the Michelson-Morley's experiment, which suppressed the "ether".

To begin with, it is admitted: $w' = w(1-v/c)$, where v is considered at the radial direction, that is, the same direction as the wave propagation and after that was included the relativistic correction, introducing the dilation coefficient, $\gamma = 1/\sqrt{1-v^2/c^2}$, so we will have the equation:

$$w' = w(1-v/c)/\sqrt{1-v^2/c^2} = w'[(1-v/c)/(1+v/c)]^{1/2} \quad (3)$$

Although this equation might also be obtained by $w = w_0\sqrt{(1-v^2/c^2)/(1+v/c)}$, it makes us think that everything is just a mathematical "artifact" in which the meaning of γ with respect to frequency is lost, after noticing the explanation given: "...the velocity included in v^2 is transverse to the propagation of the wave, whereas v is radial"... (Smith-Thomson: "Optics").

However, it seems to be supported by the formula of Energy: $E^2 - c^2\mathbf{p}^2 = (m_0c^2)^2$ (4), after using the the Planck's equation $E = mc^2 = \hbar w$ (5) and making $\mathbf{p}' = 0 \implies E' = \hbar w' = \hbar w_0$:

$$E' = (E - vp)/\sqrt{1-v^2/c^2} = (E - vE/c)/\sqrt{1-v^2/c^2} = E(1-v/c)/\sqrt{1-v^2/c^2} \implies$$

$$\implies w_0 = w(1-v/c)/\sqrt{1-v^2/c^2}.$$

But, the validity of this formula is based on considering both E and p as coordinates of the frame (E, p) , as well as (t, x) , something that should not be accepted, since E as a physical quantity can only be associated with the elapsed time, dt and also it have been used the formula $p = E/c$, that is, the so-called "light-like" Interval, which corresponds to the propagation of light in vacuum, where the velocity, v , has no physical meaning.

2.2.1. True relativistic approach

Actually, the right approach imposed by relativistic theory is in the phase space of electromagnetic waves, $(wt - kx)$, so that the relationship of times allows us to reach directly to that of frequencies. For this purpose, we start with the formula (1) and identify the elapsed time, dt (not the coordinate t) with the wave period, T , that is, $dt \equiv T$, so that, $w = 2\pi/dt$ and likewise, $w' = 2\pi/dt'$; then, we may get: $w = w'\sqrt{1-v^2/c^2}$ (6), where w will decrease, which explains the observed **red-shifted** of the radiation emitted by the source, w' , that it is moving with a velocity, v , but this is transverse (non- radial).

On the other hand, both values, w and w' may be interchangeable, in which case the point (O) will move with the velocity, v , up to the point (O'), which what will get $w' = w/\sqrt{1-v^2/c^2}$, where the displacement of the spectral lines will take place towards the **blue**, without the need for the source to be approaching.

In order to obtain a simpler formula than (6), we can linearizar it via a binomial series expansion: $w = w'\sqrt{1-v^2/c^2} = w'(1-v^2/c^2)^{1/2} = w'(1-v/c + \dots)$, where the quadratic terms, etc. allow higher accuracy of the red-shifted frequency.

Following the above, we can swapping fixed and moving frames, so that we will have,

$$w' = w/\sqrt{1-v^2/c^2} = w(1-v^2/c^2)^{-1/2} = w(1+v/c - \dots), \text{ that is, } \underline{\text{blue-shifted}} \text{ frequency.}$$

As we have seen, the linear approximation in both cases are obtained directly from the relativistic equation, where speed is transverse and the Michelson's experiment on "ether" remains unchallenged.

Thus, we have made a formulation of relativistic **Doppler Effect**, where there is neither **running away** nor **approaching** from the sources, because $+v/c$ or $-v/c$ are both transverse and the exchanging of the fixed and moving frames is taken place with the same velocity, v , the movements from one system to another will be appearing as circular or elliptical, with which the transversality of the velocity will be fully justified and with it we may explain the corresponding red-shift or blue-shift.

2.2.2. Hubble law

We have to take into account that such an important result must be in accordance with the phenomenological **Hubble law**: $v = HD$ (7), where the speed of galaxies, v , are proportional to the distance, D ; but, the value of the Hubble constant, H , is not definitively established, as it is evidenced by the fact that the values that are been managed from 55 to 75 km/s/Mpc, is an indication of how limited is our information about the whole Universe.

In any case, we can see that his relationship must correspond to the relativistic formula:

$cdt = cdt'/\sqrt{(1-v^2/c^2)}$, in such a way that both the distances traveled by radiation (light), cdt and cdt' will be higher when the velocity, v , increases; but, taking into account that the such speed is "perpendicular" to the distance, cdt' , it must also be respect to D , so there is no running away neither approaching galaxies; otherwise, *has the same galaxy been detected with different speeds?*

3. MASS IN THE UNIVERSE

3.1. Relativistic mass

The only explanation found in the high energy involved in nuclear processes is based on the Energy equation, $E = mc^2$, where m is the relativistic mass, defined by $m \equiv m_0/\sqrt{(v^2/c^2)}$, similar to the time formula (1), that is, it turns out an identity and not an "equation", which we can demonstrate with what follows:

If we make use use of Energy, $E = m_0c^2/\sqrt{(1-v^2/c^2)}$ and Momentum, $\mathbf{p} = m_0\mathbf{v}/\sqrt{(1-v^2/c^2)}$, we may obtain the formula (4): $E^2 - c^2\mathbf{p}^2 = (m_0c^2)^2/\sqrt{(1-v^2/c^2)} - c^2m_0^2v^2/(1-v^2/c^2) = [(m_0c^2)^2 - (m_0\mathbf{v})^2 c^2]/(1-v^2/c^2) = (m_0c^2)^2$.

But, the physical quantities E^2 and $(c\mathbf{p})^2$, disappear as a result of algebraic calculation, obtaining $(m_0c^2)^2$, so, this quantity is mutually "exclusive" of $E^2 - c^2\mathbf{p}^2$; with other words, the Energy formula (4) turns out the identity: $E^2 - c^2\mathbf{p}^2 \equiv (m_0c^2)^2$, (8), that is, it can not be considered an equation.

How could it have gone unnoticed?

It is easy to realize that the reason is that everything must be subordinate to the establishment of the "space" of Minkowski, which requires the existence of a new dynamic magnitude called Four-momentum: $p^2 = E^2 - c^2\mathbf{p}^2 = \text{const.}$ (9), where the constant is interpreted as a law of conservation or "invariance", under Lorentz's Group, so that previous formula might be written:

$$p^2 = E_2^2 - c^2\mathbf{p}_2^2 = E_1^2 - c^2\mathbf{p}_1^2$$

But, this equality is incorrect, since $E_2^2 - c^2\mathbf{p}_2^2 > E_1^2 - c^2\mathbf{p}_1^2$, when $p_2 > p_1$ indeed, the difference between the energies, $E_2^2 - E_1^2 = (m_2c^2)^2 - (m_1c^2)^2$ is greater than that of the momentum $c^2\mathbf{p}_2^2 - c^2\mathbf{p}_1^2 = c^2(m_2v_2)^2 - c^2(m_1v_1)^2$, which implies that the quantity $(m_0c^2)^2$ also increases, that is, the mass, m_0 is variable (not constant).

This is consistent with the "identity" of (8), which allows the relativistic mass, m , to be the relevant physical quantity instead of m_0 .

On the other hand, *How a relativistic mass, m , may behave as a tangible (inertial) body, if the corresponding energie is obtained through a velocity, c , that can not assume?:* through the "mass-energy equivalence", $E = mc^2$, but, that does not make sense after establishing the issue of "identity", which is consistent with the following points:

1) The mass, m , replaces to $m_0/\sqrt{(1-v^2/c^2)}$, by virtue of the identity, so that m_0 would be like a empty mass, associated with the "vacuum" to produce m , but can not be mass "at rest", since if $v = 0$, the mass, m , also disappears and m_0

would be irrelevant; actually, there is neither relativistic physical quantity at “rest” nor constant, except c . Besides, the identity persists when m is omitted and the it is carried out the serie expansion of $E = m_0c^2/\sqrt{(1-v^2/c^2)}$: $E \cong m_0c^2 + 1/2m_0v^2$, where the sum is inappropriated, since the two terms of the right side are not homogeneous from the physical point of view, which implies that c acts as a velocity that no tangible body may assume, although the formula, $E_c = 1/2m_0v^2$, appears as a kinetic energy.

2) The radical separation between radiation and charged particle no longer exists, since the photons may have mass (relativistic), m , in any quantum process, as the “rest” mass is not possible.

3) According to the said characteristics, the mass, m_0 , should **not** be **inertial**, as required by Classical Mechanics and Gravitation and the so-called Minkowski force, F , introduced for this purpose, might only be accepted as an electromagnetic force.

There is no doubt the “mistake” has been assumed by Relativity, under the unifying paradigm between Classical Mechanics and Electromagnetism, but it has not taken into account the fact that there is no evolution in the deterministic sense of Classical Mechanics, since the relationship between the Energy, E , and momentum, p , is not the corresponding to an equation, since the mass, m_0 , is variable.

However, it is possible to integrate those physical quantities into Quantum Theory, because the wave_number, k , and momentum, p , are related by De Broglie’s law (wave-corpuscle duality), $p = \hbar k$ (10), which together with the Planck’s law, $E = \hbar\omega$, allows to establish the correspondence between statistical electromagnetic phenomena and the relativistic equations, after including the Uncertainty Principle: $\Delta E \cdot dt \geq \hbar$ and $\Delta p \cdot dx \geq \hbar$, based on the “indeterminacy” produced by the variability of relativistic mass, m , as well as the time elapsed, dt ; with other words, there is no determinism neither in space-time nor in energy-momentum.

Finally, the enormous energies involved in the gauge particles, W^+ , W^- and Z , responsables for weak interaction are due to masses, derived from “charges”, as it is the established by the unit of electron-Volt (eV), for energy, which can only be detected by the corresponding frequency; in this sense, we may formulate the double expression: $e\Delta V = \Delta mc^2 = \hbar\omega$ (11), where the relativistic mass, Δm , appears as a physical quantity that acts as a mere intermediary between electromagnetic magnitudes, that only have physical meaning in Quantum Theory.

3.2. Dark matter:

In accordance with the arguments presented above, it is reasonable to affirm that the relativistic mass must be **electromagnetic** in nature and therefore **virtual** (not inertial),

which constitutes the firm candidate for the so-called **Dark matter** of the Universe, bearing in mind that all the information that comes from it consists of electromagnetic radiation in their multiple versions according to the frequency detected.

The device to detect the so-called “ondas gravitacionales” are a mere artifice that does not distinguish these from the electromagnetic one, because it is attributed to a mass that is not inertial and therefore not gravitational.

3.3. Cosmic Blackbody Radiation:

As it is known, “Olber paradox” is based on the fact that the existence of billions of galaxies homogeneously distributed in space produce a starlit sky at night; one of the reasons for the success of an Expanding Model is for resolving this paradox, because the light from galaxies running away can not reach us.

But, there is another possibility to explain it: we can conceive an “Steady State”_Universe so large in extent, that the light from the most distant galaxies has not yet reached us.

Moreover, we may also receive non-visible radiation in the microwave region from numerous galaxies that could be the **Microwave Radiation Background**, which energetic distribution may be of the corresponding to “black-body radiation”, on account of its homogeneous and isotropic distribution.

The argument used to dismiss such an interpretation is rather curious: “... the equivalent mass of this radiation is negligible compared to those of the galaxies, which is the mass that dominates the dynamics of the Universe (as we believe), then it is better to disregard the radiation in this time and consider it to be the full amount of the “fossil” radiation of the early times of the Universe..” (M.Berry: “*Principles of cosmology and gravitation*”); this is an amazing

conclusión, because we can only detect (at present) electromagnetic energy, which corresponds to $\Delta mc^2 = \hbar \omega$, although it is intended that part of these radiation are due to gravitational waves, which in reality corresponds to variations of magnetic field, whose recent “detection” could only be admitted by the magnetic field of the matter.

4. GRAVITATION IN THE UNIVERSE

4.1. Curved space-time:

Special Relativity is extended in the so-called General, in which the corresponding Interval is defined as $ds^2 = c^2 d\tau^2 = g_{\mu\nu} dx^\mu dx^\nu$ (12), where the metric $g_{\mu\nu}$ is not constant but depends on the coordinates x^μ where $\mu = 0, 1, 2, 3$, setting a “curved” spacetime, because the curvature in its simple form is expressed by $K = 1/r$ and the gravitational force corresponds a potential energy that depends on the distance as $E_p = GMm/r$.

But, r , is just one of the spherical coordinates (r, θ, ϕ) and it is to established a mathematical curvature depending not only on the three spatial variable but also of the time, that forces to “warps” the fabric of space-time, represented by the geodesic or line of the Universe, by virtue of the null acceleration ($a = 0$), that it is produced introducing the centrifugal force (fictitious) as an inertial force (Mach’s principle), to cancell the centripeta force (real).

Actually, this is reduced to the flat closed line corresponding to the planets around the sun, due to the centripetal force (real), so that the null acceleration, $a = 0$, is a “false” premise or condition as well as occurs with $v = 0$ in the rectilinear frame.

4.1.1.- Einstein Equation:

The variability of the metric allows to perform the Covariante Differentiation of a contravariant vector, A^λ : $DA^\lambda = dA^\lambda + \Gamma_{\mu\nu}^\lambda A^\mu dx^\nu$ (13), where $\Gamma_{\mu\nu}^\lambda$ are the Christoffel symbols or affine connection, which may be obtained through the derivatives of the metric, $g_{\mu\nu}$, with respect to the unit covariant vectors, e_μ , e_ν , and the action of $g^{\mu\nu}$, defined by the unit contravariant vectors, e^μ , e^ν . Both vectors correspond to curvilinear coordinates extracted from a n-dimensional space, by means of the so-called “parallel displacement”.

In this sense, identifying the vector A^λ with the velocity, v^λ , that is, $A^\lambda = v^\lambda$ and carrying out the “derivation” of (12) with respect to the time, $d\tau$:

$Dv^\lambda/d\tau = a^\lambda = \frac{dv^\lambda}{d\tau} + \Gamma_{\mu\nu}^\lambda v^\mu \left(\frac{dx^\nu}{d\tau}\right) = 0$, where where the cancellation is justified by virtue of the “proper” time, $d\tau$, corresponding to $v = 0$ in the Special theory, which becomes in the General one in $a = 0$; but we have already seen that the moving frame is “redundant” (unnecessary), so that the geodésic, that is, the “line” of the Universe is something conventional (arbitrary).

Also, a second derivative must be made, to get the Rieman tensor, $R_{\mu\nu\sigma}^\lambda$, that represents the “curvature” of the space-time, which leads to the Einstein equation, $R_{\mu\nu} - \frac{1}{2}g_{\mu\nu}R = 0$, (14); but the Riemann tensor implies a fourth dimension, $d\tau$, which was very cleverly introduced by Minkowski, although we have seen above that it immediately becomes, dt , by virtue of the dilation coefficient, $1/\sqrt{(1-v^2/c^2)}$, that is, we must only consider it as the physical variable the elapsed time, dt , which may be associated with any vector velocity, v^μ .

The Einstein equation may only be consistent if it is obtained from the dynamic Interval,

$p^2 = g_{\mu\nu} p^\mu p^\nu$, instead of the kinematical, $ds^2 = g_{\mu\nu} dx^\mu dx^\nu$, since it contains the vector potential, that can not be accepted by the gravitational fields; this potential is related to the momentum, as the energy with the scalar potential in its quantum connection.

In short, Gravitation is outside the General Theory, where the Minima Action’s principle is congruente with its electromagnetic nature, so it is not necessary to force its insertion in Classical Mechanics as it was made in the corresponding literature.

4.1.2. Gravitacional equation:

Christoffel Symbols really appear through the derivation of the metric tensor, $g_{\mu\nu}$ with respect to three variables (ordinary space), which leads to the differentiation of the covariant vector, A_μ : $dA_\lambda = \Gamma_{\lambda\nu}^\mu A_\mu dx^\nu \implies DA_\mu =$

$dA_\mu - \Gamma_{\lambda\nu}^\mu A_\mu dx^\nu = 0$ which is the complementary or “dual” formula of (13); but unlike that, the nullity of the absolute differential is consistent with the tensorial development and then $A_\mu = v_\mu$, the derivation with respect to the time, dt , leads to the formula:

$$\frac{dv_\lambda}{dt} = \Gamma_{\lambda\nu}^\mu v_\mu v^\nu \quad (15).$$

It turns out a true equation, since it conforms to the rules of tensor calculation in relation to the product of the covariant, v_μ , and contravariant, v^ν ; now, we can introduce the real curvilinear coordinates, that is, the spherical ones, (r, θ, φ) :

$\frac{dv_r}{dt} = \Gamma_{r\varphi}^\theta v_\theta v^\varphi \implies dv_r/dt = g_r$ and $\Gamma_{r\varphi}^\theta v_\theta v^\varphi \implies \Gamma_{\theta\theta}^r v^\theta v^\theta = v^2/r$, where Christofel symbol, $\Gamma_{\theta\theta}^r = 1/r$, represents the true physical “curvature”, that is to say, the closed curve line (circumference or ellipse), which any material body, subjected to gravitational, with what we get the newtonian equation: $g_r - v^2/r = 0 \implies g_r = v^2/r = a_c$, (16), where a_c is the centripetal acceleration.

In this sense, the acceleration of gravity can only have a zero value in the case of the free falling elevator, where it is experienced the “weightlessness”, but in this case all the quantities are null: $dv'/dt + \Gamma_{00}^r v^0 v^0 = dv'/dt + 0 = 0 \implies g_r = 0$.

Once again we find that the observer in the moving (accelerated) frame can not account for the kinematics and dynamics states, that is, he is unnecessary (redundant).

For that reason, It makes no sense the name of “inertial” to the centrifugal force, for we have shown that the operational acceleration is centripeta; also **inertia** is a property of the real mass, m , with structure that corresponds to the composite particles (protones and neutrons) forming the atomic nuclei, with which the formula (16) will become a “true” physical law:

$$mg_r = mv^2/r \implies F_{gravity} = mv^2/r.$$

This equation is equivalent to the one corresponding to the energy balance:

$-GMm/r$ (potential energy) = $1/2mv^2$ (kinetic energy), where it can be seen that the scalar potential, $V = -GM/r$ is the physical magnitude associated with Gravitation, while the vectorial potential, V^μ , only corresponds to electromagnetic field, where the source is the charge (not the mass).

On the other hand, *How galaxies located thousands of light years could acts gravitationally despite the very small value of G ?*

The “deviation” of light produced by a gravitational field is considered a “fact”, since the approval given by Eddington for almost a century ago, which has served to establish the General Theory of Relativity, together with the concept of inertia on electromagnetic energy; but, we think that it is difficult to accept it if we add to the previous arguments, those that follow:

- a) The measurement of the angular deflection is taking place during a total solar eclipse and the apparent position of the star should be compared with the same position six month later when the star can be observed during the night, but Eddington made the second observation four month later and at different place. It is not surprising that almost half a century later, Max Born stated: “..an exact agreement between theory and measurement has not yet been obtained”
- b) During the eclipse the light beam has to pass through the area called corona, whose spatial extent is much greater than two or three solar diameters and consists of a very thin atmosphere of ionized gases; to think of light passing through the layer without undergoing any refractive or absorption and re-emission of light wave is hard to admit.
- c) By claiming the measurements coincide with the approximated formula calculated according to General Relativity, $\Delta\phi = 4GM/c^2 r_{\min}$, where M is Sun’s mass and r_{\min} its radius, introduced more than reasonable doubt; otherwise, *how many times have been repeated the experience when one of them requires half a year?*
- d) “The fact that the scientific establishment believes that light in free flight produces a gravitational field continues to be a major conceptual roadblock in the ongoing effort to formally (mathematically) unify the forces” (J.A.Gowan:”General Systems and the unified field theory”).
- e) Despite all the attempts made up to now to, it has not been possible to “quantized” Gravitation.

4.2. Dark Energy

It turns out weird and even funny to follow the reasoning of the paper “NASA’s quest for dark energy” (2007): it starts with the “fact” that the Universe is expanding (Hubble’s law), but necessarily it should be slowed because of gravitational attraction of hundred of billions of galaxies.

In this line, two working groups during 1990s (using methods of computational models) reported in 1998 that have found the opposite effect: the Universe’s expansion is actually speeding up!. They state: “.. accelerated galaxies require an unknown force and therefore exist dark energy in the Universe”.

A precipitated conclusion, since “Gravitation” does not have the fundamental role granted by General Theory (as we see below), so the galaxies would not have to slow down its speed at first and then increasing it. In fact, the speed is the corresponding to the Hubble’s law, $v = HD$, which is approximate because the value of constant, H, is not definitive, so the speed that some galaxies may possess could be greater than the estimated, giving explanation to **dark energy**.

4.3. Black Holes

It is used the expression of Schwarzschild metric, which arises from a first application of Einstein’s equation:

$$ds^2 \equiv c^2 d\tau^2 = (1-2GM/r)dt^2 - dr^2/(1-2GM/r) + r^2 d\theta^2 + r^2 \sin^2\theta d\phi^2 \quad (17)$$

At first sight, it may be noted that in this equation there is a “singularity”, due to the second term, produced by the so-called Schwarzschild’s radius, $r_s = 2GM/c^2$ (18); but, in this case, $d\tau (dt')$ (the time that takes the light to travel the distance r) is infinite, while dt can have any value, as $1-2GM/rc^2 = 0$, something that can not be admitted, since both times must always be related.

The usual given explanation: “it have been reached to a point where the gravitational force is so great that not even light can go out”, so the name of **black hole**.

How can it be that gravitation were imposed on electromagnetic force, when its intensity is of the order of 10^{40} respect of the last one?

“Through the Unification implied in the previous metric”, it is the usual answer; but, as it has been noted, times intervals have been running “arbitrarily”.

However, it is stated: “for a star reaching this stage must possess a mass three times that of the Sun”; in any case, it is hard to admit it, since all matter consists of atoms and they shall be converted in a shapeless gravitational mass united only by that force (gravitation).

Moreover, all this is said in the most natural way, when to the above is added: “..the star which has consumed all it fuel and not radiate more light, its mass pressure can not resist its own gravitational attraction naturally collapses to a size corresponding to Schwarzschild’s radiu, r_s ” (M. Berry)

What does this “own” gravitational attraction mean?. Where are the others (weak and electromagnetic) forces, which are of much greater intensity?. What happened with the charges?

A whole set of questions that coupled with the inability of a direct detection of **black_holes**, makes its existence more than doubtful, despite recent images, which are nothing more than electromagnetics waves as a result of any process of quantum interaction.

4.4. Cosmic Scale Factor

This is introduced through the Robertson-Walker metric:

$$ds^2 \equiv c^2 d\tau^2 = c^2 dt^2 - R(t)^2 [dr^2/(1-r^2/R^2)] \quad (19),$$

where we have suppressed the angles θ, ϕ , because the isotropy and homogeneity of the cosmological model; $R(t)$ is called **Cosmic Scale Factor**, since it constitutes the parameter that determines the distance between astronomical objects, ie, galaxies and it accounts for the “expansion” of the Universe, for it time dependence.

The previous expression had the purpose of estimating the distance between two points from the Interval_ ds ; in order to do that, it is considered $t = \text{const} \implies dt = 0$, with which the metric will be reduced to

$$ds \equiv c d\tau (cdt') = R(t) dr / \sqrt{(1-r^2/R^2)} \quad (20)$$

As we have repeated earlier, the times $d\tau$ (cdt') and dt , should always be related, but in this case, it is only be considered $d\tau$, since $dt = 0$, although t (const) was acting as a variable of the scale factor, $R(t)$, so that for each value of t , $R(t)$ will have a definite value, that is, constant, while dr change in proportion to $d\tau$.

However, it is accepted the Hubble constant from $R(t)$, making use of dt , according to the equation $H(t) = [dR(t)/dt]/R(t)$ (21), although it is in “contradiction” with the condition

$dt = 0$. Actually the Hubble’s law is phenomenological and the constant H is not a value definitely established, but it depends on the extension of the known Universe, in a way that the greater transverse velocities are linked to galaxies located at a bigger distance.

The problem lies in the confusion between “constant” and “variable” in the same way we had seen with “equation”_ and “identity”; therefore, it is not understood that $d\tau$ and dr was both considered constant, while $R(t)$ may be increased with t , that is, variable; it turns out of a whole display of a mathematical “game”, justified with notions derived from Riemann curvature tensor, accelerated frames, etc.

Actually, it is only a very skilfull method that intuition rejects, although it is accepted for the sake of a Unified Theory.

5. QUANTUM UNIVERSE

Time and space only become relevant as variables in newtonian dynamics and gravitation, which are built to the “measure of human scale”, as the classic proverb state; but, when we handle quantities extremely small (nuclei and particles) or enormously large (stars, galaxies) they are difficult to precise, so that the right treatment is through Quantum Theory, where both space and time may be blurred (indeterminate), as well as momentum and energy.

The stars of our Galaxie behave in a similar way to electrons inside an atom, whose existence is evidenced thanks to the emission or absorption of electromagnetic radiation (light); they should be characterized by its energy and angular momentum, so, its only movement relative to our solar system will be circular or elliptical, making them appear as fixed or static.

Likewise, the rest of the countless galaxies are behaving towards us like stars which allows its detection by the emission of light; they will be found distributed homogeneous and isotropically according to Quantum Theory, so that the Model suitable to Cosmos will be **Steady State**.

The enormous energy in the Cosmos is due mainly to the force produced by **strong, weak and electromagnetic** interactions; the energy due to first two interactions with the concurrence of the electromagnetic are produced in an “inner space, where the gauge particles (W^+, W^-, Z) may act as quantum particles, that are characterized by their “charges” or “coupling constants”, which together with the potential associated to the fields give rise to weak interaction, while strong interaction is produced by the interactive network provided by gluons that together with the so-called “confinement” phenomenon produce the union of quarks, which are the charges’ carrier, whose relativistic mass is **virtual and electromagnetic**, in line with what has been argued above.

The manifestation of that energy at the “exterior” space can be made:

- Under the formation of proton, neutron and atomic nucleus with real or **inertial mass**, because they have internal structure; these may act after forming the atoms (neutrals) as the sources of **gravitational interaction**, responsible for the Solar System and others planetary systems that could be repeated in all the stars; the very small value of G makes the scope of this interaction very limited within cosmic scale distances.
- Thanks to quarks, the liberated charges such as electrons and positrons (beta decay) have unit charge, that gives them their quantum behaviour and their interaction will give rise to electromagnetic radiation, which in its most energetic version are gamma rays; in other words, elementary particles (electrons and positrons) and radiation (photons) constitute the manifestation of “quantum particles” at ordinary or exterior space and their associated masses are of electromagnetic nature (derived from charge) and virtual (not inertial)

Finally, Hubble’s Law, $v = HD$, is compatible with Quantum Theory: the distance D must be understood regardless the distance travelled by galaxies, because their speed are transverse (not radial); these will be greater the farthest they were, which it corresponds to a higher energy as it happens with electrons within atoms.

6. CONCLUSION

The stubborn insistence in Theoretical Physics to provide actual mass (inertial) to light, collides head-on with a much simpler approach based on the claiming of principle contained in the “razor’s Occam; in this sense, we have carried out a reinterpretation of Relativity Special Theory, with which we have explained the Doppler effect in accordance with Hubble’s law, dark mass, dark energy and the cosmic background radiation without being necessary a rushing away of galaxies.

On the other hand, General Theory in which the trajectories of any celestial object become geodesic belonging to a “curve” spacetime, whose comprehension requires an effort similar to any scifi-tale imagination, actually results in a great display of mathematics with no physical meaning: black holes and cosmic scale factor are examples of that.

It is generally admitted that the extremely small becomes similar to the enormously large; in this sense, the time taken by the light emitted from very small entities (subatomic particles) to the macroscopic level, subjecto to Classical Mecanics, is the same as the time from the very distant objects very far way (galaxies).

For this reason, the behaviour of the very large and very small must be in consonance with Quantum Theory, where the distances and times shall be indeterminate as well as the physical magnitudes such as energy and momentum, since they depend on variable velocities, which is congruent with an immeasurable Cosmos.

Eventually, a metaphorical digression extracted from literature (Macbeth): “..life (Cosmos expanding) is a tale told by an idiot (General Theory), full of sound and fury (mathematical display) signifying nothing”, which could be complemented with the statement: “..in the beginning was the charge (quarks) as an energy’s carrier..”.

These should be the only comments, regarding the origin of Universe, that an experimental science, such as Physics, can afford.

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