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The new cosmological scenario and dark matter fixed by general experimental facts

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Abstract

Both from gravitational (G) experiments and from a new theoretical approach based on a particle model it is proved that the classical invariability of the bodies, after a change of relative rest-position with respect to other bodies, it is not true. The same holds for the traditional hypotheses based on the classical one. The new relationships are strictly linear. From them it is proved that a universe expansion must be associated with a G expansion of every particle in it, in just the same proportion. It does not change the relative distances, indefinitely. From the relative viewpoint, globally, the universe must be rather static. According to the new cosmic scenario, galaxies must be evolving, indefinitely, in rather closed cycles between luminous and black states. The new kind of linear black hole must absorb radiation until it can explode after releasing new H gas that would trigger new luminous period of star clusters and galaxies. Statistically, most of the galaxies must be in cool states. The last ones should account for all of them, the higher velocities of the galaxies in clusters, the radiation coming from intergalactic space, including the low temperature black-body background observed in the CMBR.

1 Introduction

The current hypotheses in gravitation and in cosmology are tacitly based on *the classical hypothesis on the absolute invariability of the bodies after a change of the rest position with respect to other bodies.* Such hypothesis comes from the fact that, according to the Equivalence Principle (EP), all of the bodies of his local system obey the same inertial and gravitational (G) laws[1]. Therefore, all of then must change in the same proportion, i.e., every local ratio would remain constant.

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In principle such changes can be tested by observers that have not changed of position in the field. However this has not been done because, on the contrary, *current G tests are tacitly based on such classical hypothesis, as shown below.*

1.1 A crucial test for the cosmological hypotheses

To fairly test such hypothesis the observer (A) must stay in a fixed distance from the earth center. The observed body (B) must be at another distance from it.

A well-defined experiment that meet this condition is the G time dilation (GTD) experiments done with standard clocks, [2],[3]

From the results of such experiments, corrected after special relativity, it is concluded that *the relative frequency of a non local (NL) clock B, located at rest at a well defined distance Δr from earth surface, runs with a different frequency compared with the clock A at the earth surface.* Thus *the clocks are not invariable after a change of distance with respect to the earth center.*

1.1.1 Discussion

It has been argued that: "*experiments to detect difference of frequencies between the clock B and A have given negative results. What happens (in a GTD experiment) is that an electromagnetic signal controlled by clock B generally arrives at A with a frequency different from the frequency of the same type of clock there. Photons must do some work in moving around and their frequency changes*".

This is not true because *the readings of the clocks do not depend on the frequency or energy of any photon travelling between them.*

This fact is most obvious in the Hafele-Kerting experiments[2] in which no photon was used. The readins of the clocks A and B were directly compared in the earth surface, before and after experiments. During experiments of 48 hours, the clocks B were flying at 9 km over the earth surface. Thus the differences of the readings of the clocks did not depend on the frequency of any photon travelling between such clocks[1].

Then the differences of time intervals observed in the GTD experiments made up with clocks can only be due to real differences of the relative frequencies of the standard clock B, compared with A[2] This means that , during the flight, some fundamental physical change had occurred to every part of the clock B.

Then it is expected that *the current relations between quantities measured by observers located in different G potentials are not strictly homogeneous because their reference clocks are not strictly the same with respect to each other,*

[1] The same fact holds for other experiments in which the time interval between the initial and final readings of the clock B are obtained from electromagnetic signals coming from such clock[3]. Such time intervals are differences of times in which the time of flight of the initial signals is cancelled out by the one of the last signal. Thus such measurements do not depend at all on the frequency of the photons.

[2] An observer at B cannot detect such change because, according to the equivalence principle[1], all of the natural frequencies of the local bodies have changed in the same proportion after a change of rest position with respect to the earth center.

respectively. They would be sources of errors in the current literature.

It is also said, without fair demonstration, that the GTD experiments would have verified the theory of GR. On the contrary, from them, the photons emitted by the NL clock B would "start" their trips with an initial frequency shift z with respect to the local clock A. From the fact that the final redshift of the photons is just equal to z it is concluded that: "*during the trip BA, the relative frequency of the photons, with respect to the observer A, remains constant*". (Relative frequency conservation law for photons.).

Then *the G redshift of photons is not due to real frequency changes of the free photons. It is due to differences of the natural frequencies of atoms and clocks of observers located at rest in different distances from the field source.* The same conclusion was obtained by Vera in1981 from direct application of "wave continuity"[4].

The non local form of the Equivalence Principle

From above it is concluded that: to relate quantities measured in different G potentials, they must be transformed to some well-defined reference standard in a well-defined G position of the field. Here, the fixed position of such observer (A) is stated by means of a subscript a.

From Lorenz equations and GTD experiments, it is inferred that the "relative" quantities can depend on the velocity and distances of the body and of the observer with respect to the field sources.(Vera 1981). On the other hand, from the EP, when an observer moves altogether with his clocks he finds that the local ratios between frequencies (ν) masses (m) and lengths (λ) are constants that do not change after a change of position of the measuring system with respect to the G field sources. The opposite comes true when the observer A remains in a fixed position a. He finds, from GTD experiments, that the frequency of the clock at rest at B is a function on its position (r) in the field, say $\nu_a(0, r)$. The first results can be consistent with the last ones only if: "*the relative values of the frequencies, masses and lengths of any well-defined part of the system have changed in just the same proportion after the same change of relative position with respect to the G field sources*". Only in this way all of the local ratios can remain unchanged. This may be called the NL form of the EP, or NL EP.

2 The field equations fixed by experimental facts

A short cut can be done from results of experiments and applications of the NL EP.

For example, assume that the observer A throws a clock upward with some energy $\Delta E_a(0.r)$. From results of free fall experiments, the clock would stop at some NL radius $r = a + \Delta r$ given by the three first members of (1). From results of the GTD experiments made up by the observer A, the clock at rest

at B would have a frequency $\nu_a(0,r)$ given by the third and fourth member of (1)[3]. The last member of (1) comes from the NL EP applied to any of the frequencies, masses, lengths and wavelengths, of any particle or standing wave of the same system.

$$\Delta\phi(r) = \frac{\Delta E_a(0,r)}{m_a(0,r)} = \frac{GM}{a}\frac{\Delta r}{r} = \frac{\Delta\nu_a(0,r)}{\nu_a(0,r)} = \frac{\Delta m_a(0,r)}{m_a(0,r)} = \frac{\Delta\lambda_a(0,r)}{\lambda_a(0,r)} = \frac{1}{2}\frac{\Delta c_a(r)}{c_a(r)} \tag{1}$$

The last member results from the application of this equation to any standing wave of the system. In it, $c_a(r)$ is the relative (NL) speed of light at B with respect to the observer A. This one is the product of its relative frequency $\nu_a(0,r)$, and its relative wavelength $\lambda_a(0,r)$.

In a previous article, in (1981), it is proved, step by step, that this equation is consistent with the current tests for G theories[4].

2.1 The relative mass-energy conservation

From the 2nd and 5th members of (1), the relative mass of the clock B, with respect to the observer A, depends on its relative position:

$$m_a(0,r) = m_a(0,a) + \Delta E_a(0,r) \tag{2}$$

The energy $\Delta E_a(0,r)$ given up to the clock is not given up to the G field: it remains "in the clock" as an additional mass. Vice versa, during a free fall from r, its relative initial rest mass is $m_a(0,r)$. From (2) and special relativity, its final mass passing by A is.

$$m_a(V,a) = m_a(0,a) + \Delta E_a(0,r) = m_a(0,r) \tag{3}$$

During the free fall, the relative mass of the clock, with respect to the observer A, remains constant. This is consistent with the relative frequency conservation law for photons derived above. Then it may be concluded that *there is not a true exchange of energy between bodies or photons and the G field.* This result is in clear contradiction with *energy of the G field assumed by Einstein*[4, 5].

2.2 The linear black hole

The theoretical properties of the "linear black hole" (LBH) derived from (1) *are radically different from the conventional ones[4] F*or $2GM >> r$, the gradient of the relative speed of light would produce dielectric reflections preventing the escape of photons and nucleons[4]. On the other hand it has a larger cross-section for photon capture. Thus the average NL mass-energy of its nucleons increases with the time. When it gets higher than the one in free state, the LBH can explode. Their neutrons would decay into new hydrogen.

[3]The common unit of mass and energy used here is 1 $[joule]$

The theoretical field equation from the NL form of the EP

From the NL EP, a *particle model* made up or radiation in stationary state between any two parts of a system *must obey the same inertial and gravitational laws of the particles in it.* This fact has been verified by Vera (1981,1997) with a full consistency with special relativity, quantum mechanics and equation (1) [4, 5].

When particle models emulate all of the uncharged particles of the universe it is found that, according to the Huygen principle, the particles are the result of constructive interference of wavelets crossing the space. *The properties of the empty space in some position r^i can depend only on the actual perturbation frequency of the space produced by all of the wavelets with random phases crossing it.* Each wavelet contribution must be proportional to the product of its frequency and of its amplitude. After taking into account the cosmological red shift, in which $d\nu/\nu = dr/R$, the average perturbation frequency of the space, called $w(r^i)$, must be proportional to:

$$w(r^i) \propto \sum_{j=1}^{\infty} \frac{\nu^j}{r^{ij}} \exp\left[\frac{r^{ij}}{R}\right] = \sum_{j=1}^{\infty} \frac{m^j}{r^{ij}} \exp\left[\frac{r^{ij}}{R}\right] \cong 4\pi\rho R^2 \tag{4}$$

The average density of the universe, in $joules/m^3$ is ρ. The Hubble radius is R.

The best fit of (4) with (1) occurs for particles in equilibrium with the space:

$$\lambda_a(0,r)w_a(r) = \text{ Constant} \tag{5}$$

$$\Delta\phi(r) = \frac{\Delta\lambda_a(0,r)}{\lambda_a(0,r)} = -\frac{\Delta w_a(r)}{w_a(r)} \quad \text{In which } \; G(r) = -\frac{1}{w_a(r)} \tag{6}$$

From (6), the universe density is about 30 times the average density of luminous matter. This is consistent with dark matter estimated in some *clusters.*

2.3 Matter expansion due to universe expansion

Assume, as a hypothesis to be tested, that after a time dt the distances between the galaxies i and k have increased the proportion,

$$\frac{dr^{ik}}{r^{ik}} = Hdt \tag{7}$$

From (4), after using (6) and (7), it is found that the increase of the G potential produces a gravitational expansion of any standard rod of length λ given by:

$$d\phi(r) = \frac{d\lambda}{\lambda} = -\frac{dw}{w} = \frac{dr^{ik}}{r^{ik}} = \frac{dR}{R} = Hdt \; ; \qquad \frac{\lambda}{R} = \text{ Constant} \tag{8}$$

3 The new cosmological scenario fixed by experimental facts

From equation (8) *it is concluded that: in the average, the relative distances and the average density of the universe cannot change with the time.* The universe age must be rather infinite.

The evolution of the celestial bodies must be occurring according to rather closed cycles between luminous (hot) and non-luminous (cool) states.

1) The hydrogen atoms, after stellar evolution, must be evolving, indefinitely, in closed cycles between states of gas and linear black hole (LBH), and vice versa.

2) The explosions of massive LBHs would fix the initial period of a luminous star cluster or a galaxy. The new stars would be normally formed from condensation of gas over older bodies that existed before the explosion.

3) A galaxy must also be running, almost indefinitely, in rather closed cycles between luminous and dark states, and vice versa. Something similar may hold for clusters.

Statistically, all of the evolution stages of the galaxies should be present in the proportion fixed by their evolution periods. Since the energy-recovering period of dark galaxies must by of a higher order of magnitude that the luminous period of galaxies, then *most of the universe must be in the state of black galaxy cooled down by LBHs and the rest of the universe.* They should account for most of the higher velocities of galaxies in clusters and for the radiations coming from the intergalactic space, mainly gamma, cosmic and low temperature blackbody radiation (CMB).

Galaxies should start their luminous period with new gas, free of heavy metals, with a high density of randomly oriented angular momentum generated during the LBH explosion. This should correspond with "elliptical galaxies".

During the luminous period of a galaxy, the luminous volume would decrease with the time. The last luminosity should come from a small region located in its center, in the strong fields of massive bodies. They should correspond with the true (radio noisy) *quasars* of relatively variable luminosity. Most of their red shifts would be gravitational one. They should be not confused with QSOs of large Hubble red shift.

Most of the energy released in a matter cycle, from the state of gas up to LBH, is gravitational. Most of it must be transformed into other kind of energy around neutron stars. Thus the true role of the G energy in the interpretation of the celestial phenomena is most important[6].

4 Conclusions

The classical hypothesis on the invariability of the bodies after a change of relative position with respect to other bodies is not consistent with the experimental facts. The true changes occurring to the bodies, after changes of position in the G field must be described by using a position-dependent formalism with respect to some well-defined observer that does not change of position in the G field.

In this way the fundamental errors derived from this wrong hypothesis can be eliminated.

The new field relations derived from the EP and the G tests are strictly linear ones. They rule out the presumed energy of the G field. The G field does not exchange energy either with photons or with bodies. The G energy comes from the bodies, not from the field.

The new approach based on particle models made up of photons in stationary states provides more exact relationships for long range interactions and a for unified understanding on the properties of bodies and their G fields. The new relations reveal that, in the average, the relative density of the university cannot change with the time. The average relative distances must remain constant, indefinitely, i.e.,the universe age should be rather infinite.

In the new scenario, the H gas must be evolving in rather closed cycles between the states of gas and LBH and vice versa. A LBH, after absorbing energy from the space, would explode. The new gas, condensed over other bodies, would regenerate star clusters or galaxies. Galaxies would be evolving, rather indefinitely, in rather closed cycles between hot and cool states. Most of the matter of the universe must be in the black galaxies that would be absorbing energy from the rest of the universe. They must account for the black body radiation coming from the intergalactic space, observed in the CMB. They must also account for the anomalous velocities of galaxies in clusters.

The LBH explosions should account for the clean H and high densities of angular momentum with random orientations observed in some galaxies. They would be testimonies of the "small bangs" that occurred rather recently.

4.1 *References*

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