



UNIVERSE EXPANSION EXPLANATION BY PREDOMINANCE OF REPULSION FORCE IN RELATION TO THE ATTRACTION FORCE IN THE DUAL FORM GRAVITATION OF THE QUANTUM SPACE-TIME THEORY EVTD2

²I. Șerban, B.C. Braun,² C. Drugă, M. Conte¹ and I. C. Roșca^{2,*}

¹INSA Lyon, France (retired),

²Transylvania University of Brasov, 29 Eroilor, RO-500036, Brasov, Romania

ARTICLE INFO

Article History:

Received 05th December, 2020

Received in revised form

10th January, 2021

Accepted 25th February, 2021

Published online 30th March, 2021

Key Words:

New Newton and Coulomb relations,
Quantic substratum, EVTD² entities theory.

*Corresponding author: I. C. Roșca

ABSTRACT

The present paper propose a phenomenological explanation of the accelerated universe expansion. In the first part, scientific achievements that present the deep observation of the phenomenon and the results are reviewed, including those recognized for the 2011 Nobel Prize in Physics. But until now there is no suitable proposal that would explain the guiding physical principles that would generate this acceleration of the reciprocal distances of certain distant galaxies and, this, contrary to the current understanding of gravity only attractive. Further, are briefly presented the principles of a new model in physics, based on the theory of quantum and energetic entities EVTD² structuring all space-time, wherefrom emerges that gravity of dual form: attractive and repulsive simultaneously. Gravitational repulsion can take precedence over attraction in cases of very large reciprocal distances of the masses and then the repulsive form, even specifically very weak, manages to be superior in relation. Thus, the spacing of the widely spaced galaxies would go so far as to provoke an accelerated expansion of these astral masses. In the last part is proposed a relationship of the quantum repulsion and the resulting global gravity form in EVTD².

Copyright © 2021. I. Șerban, B.C. Braun, C. Drugă, M. Conte and I. C. Roșca, 2021. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: I. Șerban, B.C. Braun, C. Drugă, M. Conte, and I. C. Roșca. "Universe expansion explanation by predominance of repulsion force in relation to the attraction force in the dual form gravitation of the quantum space-time theory EVTD2", 2021. *International Journal of Current Research*, 13, (03), 16716-16720.

INTRODUCTION

We must first of all reflect on the case of the so-called expansion of the Universe, which itself consists, on the one hand, of empty spaces of matter and, on the other hand, of a considerable number of astral masses of different sizes. A first answer consists in considering a joint enlargement of the whole universal space-time with all the masses that compose it. Secondly, we may think that the space-time of the Universe is defined and stable and that it is certain astral masses which are in the conjuncture of being able to distance themselves from each other thus giving the idea of a global expansion of the Universe. It would rather be the second option that seems the most likely because there would be, for the moment, only a recognized observation of certain reciprocal distances of clusters of galaxies clearly spaced between them. So this study will continue, in its main part, trying to propose an understanding of the accelerated distances observed from certain properly arranged astral galaxies.

The accelerated expansion of Universe is one of the most important challenge for cosmology. It was discovered in the third decade of the twenty's century and continues to interest the scientific world. The first measurements are due to the American astronomer Vesto Melvin Slipher who done long (1912-1925) systematic observations of spiral galaxies radial velocities and, thus creating a fist base for the theory of the expanding Universe. (1) Carl Wilhelm Wirtz continued the research and published its conclusions where he confirmed the redshifts of distant galaxies and the fact that they are becoming higher than closer ones. (2) He interpreted this conclusion as the increase of the radial velocity with the distance. Knut Lundmark also contributed to the study of galaxies behavior. (3) But Edwin Hubble was the one who observed the relation between distance and the velocity of galaxies, known today as the Hubble law (4), and thus establishing the certitude of expanding universe. By different methods, he estimated the distance to 24 galaxies and examined the relation between these distances and their redshifts. Using the data in comparison with those obtained by Vesto Slipher, he created

an empirical linear relationship between galaxies' distances and their radial velocities (Hubble Law):

$$v = H_o \times d , \quad (1)$$

where H_o represents the slope of the line in the Hubble diagram and is called Hubbles constant. Its initial value was of 500 km/s/Mpc, but today's better calibrated value is $H_o = 70 (\pm 2)$ km/s/Mpc.

By this law, Hubble's research suggests that Universe is dynamically evolving by expansion in all directions, contrarily to what Einstein assumed in 1917, that it is static. (3) Even there were observed large differences in measured values, the Hubble's law remained unchanged and open a large domain to be studied. Beginning with 1994, two teams – one lead by Brian Schmidt in Australia and the other one, by Saul Perlmutter in USA, independently searched for supernovae, obtaining important scientific data. These drawn to scientific papers mentioning that it seems to confirm a low matter density in Universe. (6) Two crucial papers were published in 1998 and 1999 promoting the idea that the Universe accelerates in its expansion, (7, 8) acceleration that would be induced by the negative pressure of the dark energy. All above mentioned researchers' results highly contributed to the cosmology development in order to improve the knowledge on the Universe age and its evolution so much as to lead to a well-deserved Nobel Prize for physics in 2011.

But until now there is no suitable proposal that would explain the guiding physical principles that would generate this acceleration of the reciprocal departing of certain distant galaxies and, this, contrary to the current understanding of the gravity, only attractive. This paper tries to find a possible phenomenological explanation through a new physic model of the Universe structuration – the EVTD² entities theory. In the EVTD² entities theory, the space-time is quantic structured by volumetric and energetic entities whose interior must be perfectly homogeneous (because same vibratory phase) in energy levels so that it is, in the whole volume entirely temporal (T of the acronym EVTD²). (9) Thus the gravitational attraction results from a perfect homogeneity in the interior of the neighboring entities, mainly on the axis of the masses centers, these energy volumes EVTD² can be agglomerated, then, in each other. (10) It follows an action which is generated, by the work of the EMW (Electromagnetic Mother Wave), giving a decrease of the energy space (amalgamation of gravity energies in a limited number of entities) separating two respective masses hence the consequence of the approximation conforming to the attractive gravity. Because, in fact, the masses are intimately connected to their gravitational energy levels which are therefore integrated into the volumes of the EVTD² entities and with an energetic condensation this leads to the corresponding attractive pseudo approximation of the masses to the center of these condensations on the masses axis.

With regard to repulsion in gravity it effects which occur in areas of space surrounding the concerned masses and outside the specific areas where the effects of attractive force are generated. The attractive force can be represented by the action of an attractive mini black hole or by the vacuum effect of a siphon where the water flows and which would be positioned, evolutionarily, on the area of the resulting potential

zero in the case of relative mass displacements. (11) While the gravitational repulsion of masses results from the intercalary multiplication of a more or less significant number of additional EVTD² volumes, which space correspondently gravitational energy levels, which potentially or actually simulates mass spacing. In both cases, attraction and repulsion is as if, on the one hand, for attraction, positive pressure would condense time-space in the right places and nested gravitational levels, and, on the other hand, a negative pressure that would specifically act antagonistically for mass repulsion. But the main novelty is the assimilation of gravitational fields to the quantum spatial structure of the black body equivalent emissions of the considered objects (12, 13).

METHOD

Permanent dual attraction-propulsion and repulsion in EVTD² gravity: The quantum gravitation deduced from the EVTD² entities theory, makes it possible to understand the phenomenon of gravity as resulting from the sum of the vibrational works of the EMW in the various surrounding areas of the considered masses. It then follows, that the gravity must be of dual (bipolar) form: on the one hand, attractive – propulsive in particular zones and, on the other hand, for the other zones of space-time there is manifestation of a repulsive force and of an effect of spacing (which remains the most often potential but which becomes effective at the very large distances of the masses). There is always duality between these two forces in the resultant works where each of these effects are counted on the one hand, positively and on the other hand, negatively to finally obtain the power of the specific resultant of the various gravity cases. The areas where the attractive – propulsive – forces develop, generating what we call conventional gravity, are located all around the axis passing through the centers of the two considered masses, e.g. between the masses, as is illustrated in Figure 1, in terms of the overall attractive effect areas. (10, 11) But there are also *behind each of the masses, in the extension of this axis, areas where action, also of gravity, is manifested in the form of propulsive works* (Fig. 1) which also participate in the global approach of the masses. (10, 11, 15)

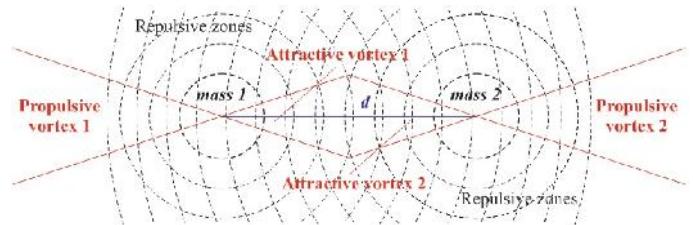


Fig. 1. The two types of attractive and propulsive (+) vortex and, elsewhere, the potential or effective zones in which the repulsion force (-) of quantum bi-polar gravity (+and -) is organized.

These two types of attractive and propulsive EMW work result from the vibrational compaction action of the unique *Substratum (the substratum of the «pseudo vacuum»: under the current names of dark matter and dark energy under pressures + and, respectively -)*. Because, indeed, the geometry of the curvatures of gravity equipotential (organizers of Substratum densities), in these areas, is consistent with the characteristics of the compaction phenomenon between neighboring EVTD² entities. (10, 11) This substratum would be made of unknown substance but what is sure is that its

composition itself does not give it the possibility of irradiating photonic radiation, hence its current name of dark matter and dark energy when subjected to pressures + and – depending on the areas it occupies in space-time. On the other hand, the repulsive effect is also of geometric origin, because there is incompatibility of compaction of the Substratum densities, too disparate along the equipotential, in the space zones of the neighboring concerned entities, which have curvatures too pronounced to be able to amalgamate together in the same EVTD² entity. Indeed in an EVTD² entity, *all geometric points must be identical to meet the criterion of temporality T of the entire EVTD² volume*. In this case only they can live, in an identity way, the different events. Since this is not the case in certain areas, around the masses, it follows the generation of additional EVTD² (similar to the insertion of corners) in order to overcome the disparities present by a creation of entities as numerous as there are disparate levels in the density of the Substratum. This results in a resulting spreading effect of the masses: figure 1, with the appearance of a negative pressure in relation to the compaction pressure which is considered positive. (10, 11) Hence the potential and effective tendency, if the conditions are conducive to the increase the volume of these areas almost between the masses which will cause an expansion that is to say a repulsive effect of everything in the environment.

Globally the work of the EMW will initiate the approach between the two masses: it will be of the attractive-propulsive type when the curvatures of the equipotential of each of the masses are integrating in the very small volumes of the entities, without causing disparities in the concentrations of diffuse energy: energy of the Substratum. In contrast, the work of the OME will initiate repulsion or negative gravity, compared to the previous one, according to Figure 1; when the effect is inverse with regard to the curvatures and the uneven densities in the corresponding entities. As a result of these considerations *it appears that the resulting gravity between two masses is an adequacy between the simultaneous intensities of the positive and negative gravities: according to the different conjectures and cases species*. Gravity, globally attractive, so understood would be analogous to the motor skills of a so-called car with two direct traction effects at the front of the masses one towards the other and also with two propulsive effects at the rear of each of the masses. Thus by continuing this image of a 4x4 car that would climb a steeper slope the vehicle would see, for a constant power, its speed decreased gradually from the starting point. This is the reduction of the attractive-propulsive force at increasing spacing between the masses because it takes into account, in an adjusted and progressive way, more and less energy density levels along the equipotential that become intervenors. Moreover, in all the other space-time zones, where attractive-propulsive work is not manifested, it is work that develops globally the repulsive effects between the two masses. Consequently it is possible to understand the weakness of the attractive gravity as being permanently diminished by the increase of the distance between masses. But even if the increases are very low repulsive levels (of opposed signs to the precedents) they end up becoming as consequent (for a given distance between the masses in question) and still beyond to be even more and more superior in the course of progressive distancing. In fact, the areas where they develop are growing with the progressive distancing: this generates an increase in the number of repulsive effects between the two masses, while for the attractive effects there is a sharp decrease (division by

distancing d²). It will be necessary to take into account the increase of the potentiality and also the reality of the repulsion force during the progressive distancing of two masses. This moderates in relation to the total value sum of their resulting intensities (+ and -). Hence the low value of gravity in relation to other fundamental forces.

Proposed relationship of the quantum repulsion and the resulting global gravity form in EVTD²: In the tentative for the development of a relation which makes it possible to calculate the relatively estimable value of the dual force of gravitational repulsion in gravity EVTD², it is necessary to use the relation of the current attractive gravity but also to propose a distance of spacing of inter masses, d_e , where there would then be equality between the forces of attraction-propulsion and simultaneous repulsion. As has been suggested above, the gap between the masses must be very considerable if this equality is to be achieved effectively in vis-à-vis the initial smallness of the repulsion force and its supposed relatively slow progression after the widening of the deviation d . Newton's relationship, for inferior mass spacing, for example in dimensions in the Solar system, may overlook the great weakness of the corresponding repellent effects and therefore, no consideration of the very low repulsion that can be so neglected. It can be assumed that the relationship of force F_{Ga} represents a suitable expression of gravity:

$$F_{Ga} = G_N \frac{m_1 \cdot m_2}{d^2}. \quad (2)$$

But as soon as d strongly increases in the vastness of the Universe, and especially on both sides of this distance d_e and far beyond, it is indispensable to consider the force of repulsion F_{Gr} and then to introduce it in the relationship of the resulting force of the global quantum gravity F_{GEVTD}^2 . Then, the following relation which would be correctly representative of the dual repulsive force F_{Gr} could be proposed:

$$F_{Gr} = C^{ste} \cdot m_1 \cdot m_2 \cdot d, \quad (3)$$

and it follows, for the quantum gravitational force EVTD², F_{GRVTD}^2 , a subtraction of this repulsive force to the attractive-propellant force:

$$F_{GEVTD2} = F_{Ga} - F_{Gr} = G_N \frac{m_1 \cdot m_2}{d^2} - C^{ste} \cdot m_1 \cdot m_2 \cdot d. \quad (4)$$

From this expression it follows that the constant G_R of the repulsive force form must be numerically evaluated to the best of the fact that there are no suitable indications for this. It is necessary to consider a distance d_e from where the force of attractive-propulsive form is equal to the force of repulsive form for a couple of masses m_1 and m_2 . In this case the resulting global force F_{GEVTD}^2 is zero because the two opposing forces are equivalent but of opposite signs. In this case only, it is possible to write with d_e :

$$\begin{aligned} F_{GEVTD2} &= F_{Ga} - F_{Gr} = 0, \\ F_{Ga} &= F_{Gr} \Leftrightarrow \frac{G_N}{d_e^2} = G_R \cdot d_e. \end{aligned} \quad (5)$$

It then comes for the expression of the G_R :

$$G_R = \frac{G_N}{d_e^3}. \quad (6)$$

If we want to attribute a certain value that seems relatively acceptable for the constant of repulsive gravity we must adopt, without particular references, a value for d_e which is sufficiently large but inferior to the very large spacing dimensions of some galactic clusters of the distant Universe. We can choose, for example, the distance that separates two galaxies relatively close like the Andromeda and the Milky Way galaxies for which we have known data. The order of magnitude of the distance between these two galaxies is about $2.54 \cdot 10^9$ light year, which would make for this choice of the distance $d_e = 24030.25540 \cdot 10^{21}$ m, with $G_N = 6.67408 \cdot 10^{-11} \text{ m}^3 \text{ Kg}^{-1} \text{ s}^{-2}$ and

$$G_R = \frac{G_N}{d_e^3} = \frac{6.67408 \cdot 10^{-11}}{(24030.2554 \cdot 10^{21})^3} = 4.80975 \cdot 10^{-77} \text{ m} \cdot \text{Kg}^{-1} \cdot \text{s}^2. \quad (7)$$

The general quantum gravity relationship in time-space theory EVTD² is therefore written, according to the mentioned uncertainties:

$$F_{GEVTD2} = F_{Ga} - F_{Gr} = m_1 \cdot m_2 \left(\frac{6.67408 \cdot 10^{-11}}{d^2} - 4.80975 \cdot 10^{-77} \cdot d \right). \quad (8)$$

RESULTS

It is to emphasize that with this new relationship of the global and dual gravitational force and for spacing between the supposed masses moderately restricted in the Universe: we can therefore, with a fairly good determination, take into account only the value calculated by the Newton's relation considering the very low value of repulsion in such cases. But beyond that, with wider distances, it is then essential to use the new relationship of quantum gravity EVTD² to take into account the respective repulsive effects that are becoming more and more widespread until becoming majority from the distance d_e of between the masses.

CONCLUSIONS

In present day physics, the study of the Universe expansion was developed the last one hundred years and involved many important researchers. It started with systematic observation of spiral galaxies radial velocities and the confirmation of distant galaxies redshift. The certitude of expanding universe was, finally established by Edwin Hubble who observed the relation between distance and the velocity of galaxies - Hubble law and proposed, the values for Hubble constant and Hubble time. More than 70 years the research continued by amplifying the observation on the dynamic universe and increasing the precision of specific parameters. This evolution was completed by the demonstrating the accelerated expansion of the universe and crowned by the Nobel Prize for physics in 2011. But until now there is no suitable proposal for a possible phenomenological explanation of the universe accelerated expansion. A new physical model of the Universe structuration – the EVTD² entities theory – presumes that the space-time is quantic structured by volumetric and energetic entities whose interior must be perfectly homogeneous (because of the same vibratory phase) in energy levels so that it is, in the whole volume entirely temporal (T of the acronym EVTD²). Thus, the gravitational attraction results from a perfect homogeneity in the interior of the neighboring entities, mainly on the axis of

the masses centers, these energy volumes EVTD² can be agglomerated, then, in each other. In fact the masses are intimately connected to their gravitational energy levels which are therefore integrated into the volumes of the EVTD² entities and with an energetic condensation this leads to the corresponding attractive pseudo approximation of the masses to the center of these condensations on the masses axis. The effects of repulsive gravity would occur in areas of space surrounding the concerned masses and outside the specific areas where the effects of attractive force are generated. Following this study on reminders about the high presumption of quantum gravity in an EVTD² space-time and the shaping of the permanent and dual repulsive force cohabitating with the attractive force it can be predicted that it is the repulsive force of gravity that would cause the accelerated expansion of the Universe. Some physicists have had doubts about the constancy of the value of Newton's G_N constant, but, according to this study, this can be understood because of the repulsive effects that avoid the attractive-propulsive effects for large inter-mass distances. This may suggest that it is the G_N constant that is not stable and would alter the calculations because then the repulsive effects that are not taken into account in the classical relationship of gravity. In the new relationship of quantum gravity EVTD² the constant G_N should remain very constant in value even for the very large distances between masses in the distant Universe.

REFERENCES

1. Nussbaumer, H. Slipher's red shifts as support for de Sitter's model and the discovery of the dynamic universe. Proceedings of "Origins of the Expanding Universe: 1912-1932", ASP Conference Series, Michael J. Way and Deidre Hunter, eds., Astronomical Society of the Pacific, 471, 25–38 (2013).
2. Kragh, H. R.W. Smith, Who discovered the expanding universe, History of Science, 41(2), 141–162 (2003).
3. A.N. Bahcall, Hubble's Law and the expanding universe. PNAS, 112(11), 3173-3175 (2015).
4. Hubble, E. 1929. A relation between distance and radial velocity among extra-galactic nebulae. Proceedings of the National Academy of Sciences, 15(3), 168-173.
5. Kirshner, P.R. 2004. Hubble's diagram and cosmic expansion, PNAS, 101(1), 8-13.
6. The accelerating universe, Scientific Background on the Nobel Prize in Physics 2011, compiled by the Class for Physics of the Royal Swedish Academy of Sciences
7. A.G. Riess, *et al.* Observational evidence from supernovae for an accelerating universe and a cosmological constant. *Astron. J.*, 116, 1009-1038 (1998).
8. S. Perlmutter *et al.* Measurement of and from 42 high-red shift supernovae, *Astrophys. J.*, 517, 565-586 (1999).
9. M. Conte and I. Rosca, Introduction in a new mechanical theory of the universal space-time based on EVTD² entities. ATN. Series: Applied Mathematics and Mechanics, II, 7-10 (2007).
10. M.J. Conte and I.C. Ro ca, News in classical and quantum EVTD² gravity through body Emittances. IJCR, 9(06), 53332-53335 (2017).
11. I.C. Ro ca and M. Conte, Calculation of the mini black holes size, present to zero resulting potential, in quantum gravity EVTD². Photonic fields radiated by the masses black body balance temperatures are the gravitational

- quantum fields.ATN. Series: Applied Mathematics and Mechanics, 60(I), 63-68 (2017).
12. M.J. Conte and I.C. Ro ca, Energetic and quanta potentials in values multiples of \hbar , distributed on lengths adapted to the 6,048 ratio between the free fall on earth and moon, confirm their accelerations and the compaction process of the EMW in gravity quantum EVTD.ATN. Series: Applied Mathematics and Mechanics, 58(II), 173-178 (2015).
13. M.J. Conte and I.C. Ro ca, Zero resulting potential energetic and quantic in \hbar initiate free fall and proximity of masses in quantic gravity EVTD². Design by substratum compacting mode (inter mass) depending on the EMW work. ATN. Series: Applied Mathematics, Mechanics and Engineering, 58(III), 315-322 (2015).
14. I.C. Ro ca, M. Conte, Gravity reconsideration in tri-quantum energetic space-time EVTD² where the potentials are expressed in \hbar quantum energetics levels. Mass temperature above 0 K and the zero resulting potential has a major role with EMW. ATN. Series: Applied Mathematics, Mechanics and Engineering, 58(III), 343-348 (2015).
15. M.J. Conte and I.C. Ro ca, Reconsideration of electrostatic interaction in quantum EVTD² theory-its new approach is strongly analogic with the new gravity, it would be no more direct interaction but EMW work in inter charges zones. ATN. Series: Applied Mathematics, Mechanics and Engineering, 58(III), 323-330 (2015).
16. M.J. Conte and I.C. Ro ca, New Coulomb's force formulation with balance black body temperature correlated to charges -m the last ones are no more employed. IJCR, 9(08), 55465-55468 (2017).
