On the Unification of Physic and the Elimination of Unbound Quantities

Shpëtim Nazarko[1]

[1]Independent Researcher, Tirana, Albania

ABSTRACT

This paper supports Descartes' idea of a constant quantity of motion, modernized by Leibniz. Unlike Leibniz, the paper emphasizes that the idea is not realized by forms of energy, but by energy itself. It remains constant regardless of the form, type, or speed of motion, even that of light. Through force, energy is only transformed. Here it is proved that force is its derivative. It exists even at rest, representing the object's minimal energy state. With speed, we achieve its multiplication up to the maximum energy state, from which a maximum force is derived from the object. From this point, corresponding to Planck's Length, we find the value of the force wherever we want. Achieving this removes the differences between various natural forces. The new idea eliminates infinite magnitudes. The process allows the laws to transition from simple to complex forms and vice versa, through differentiation-integration. For this paper, this means achieving the Unification Theory.

KEYWORDS

Energy Transformation, Principle of Least Action, Lorentz Factor, Dark Energy, Relativistic Momentum, General Theory of Relativity, Energy State, Planck's Length, Quantum Gravitation, Schwarzschild Radius, Unification of Physics

1. INTRODUCTION

Presentation of the General Idea Seeking the Unification of Physics:

The demand for knowledge of the fundamental laws of nature is linked to the attempt to reach them through initially discovered laws, which are essentially derived from them. This leads to the idea that through differentiation-integration processes, we can transition from simple to complex laws and vice versa. The validation of this idea requires controlling proven theories in practice and supported by the principle-mathematical apparatus-conservation laws rule. The general theory of relativity and quantum mechanics can be considered the best examples to control the process. It is first done for the relativistic theory.

Can we transition from the apparatus and laws of the General Theory to those of the Special Theory and mechanics, and then achieve the opposite through the integration process?

The answer is not positive, and the reason seems not related to its apparatus or laws. They are accurate, so the mystery should be sought in the meaning of the Principle of Relativity. Transitioning from Galileo's Principle to the special and then general principle of relativity is seen here as an attempt to understand the principle's meaning. The continuous search for it leads to the observation of the most important feature of the fundamental magnitude of energy. It appears to be independent of form, type, or speed, even that of light itself. Precisely this fundamental magnitude, which is not recognized by classical mechanics and initially by the special theory,

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seems to reveal the mystery of the meaning of the Principle of Relativity. Analogously to the principle, it shows why laws have the same form in coordinate reference systems.

Thus, when Einstein proves that laws have the same form in coordinate reference systems, he has not expressed the meaning of the principle of relativity itself, but the attempt that aims first to understand through the consequences produced, the feature of the fundamental magnitude of energy.

The effort to understand the essence of these consequences expresses the essence of the theory of relativity. The paper sees Einstein's ideas about the principle as accurate but only in a quantitative aspect. Therefore, it replaces the general principle of relativity with the principle of energy conservation. The energy of the object remains constant, and with the action of force on it, it is transformed. With speed, the object gradually changes not its energy, but only its energy state, a process reflected by the Lorentz Factor. The process of deriving the energy state at any moment with speed leads to the laws of impulse and force for special relativity and classical mechanics. The part of the untransformed energy does not affect the process, so it is called dark energy. Force, as a derivative of energy, emphasizes that it exists even at the moment of the object's rest, reflecting its minimal energy state. It is represented here by the classical radius for objects with small mass. For those with large mass, by the Schwarzschild radius. The minimal energy state is multiplied up to the maximum. The transformation process continues until the object reaches a minimal spatial parameter. It corresponds here to Planck's Length. The minimal and maximal energy states, expressed through Planck's and Sommerfeld's Constants, also reflect the essence of quantum mechanics. In the maximum energy state, a maximum force is derived from the object. It weakens according to the inverse square law with distance. The process can also be realized in reverse. It allows us to find the force at any moment at the distances we want. This enables us to remove the difference between different natural forces. We have thus achieved the requirement to go from a simple form of the laws of motion to the laws of a higher form. The process can also be realized in reverse. The achievement requires the mechanism of differentiation-integration. The presentation helps build a quantum theory of gravitation. It allows the unification of General Relativity with Quantum Mechanics, so it is seen here as a unification achievement. The idea that energy remains constant automatically eliminates infinite magnitudes.

Method and Its Role in Building Fundamental Theories

The paper links the achievement of the Unification Theory of physics with a fundamental condition. It requires that based on the principle-mathematical apparatus-conservation laws rule, we transition from one theory or theoretical model to another and vice versa, achieved through the differentiation-integration process. Therefore, it does not follow any of the current or proposed models to achieve the goal. Practically, the new idea should overcome the difficulty presented by transitioning from the laws of a simple form to those of a more complicated form. The difficulties highlighted, as well as the successes, accumulate experience to judge the possibility of revising past or current theoretical models. A technique the paper calls "Revision of the research procedure from scratch." By utilizing the achievements, it analyzes historical processes, i.e., the periods of theory creation. This is the premise that leads to the Method of building a fundamental unifying theory. The construction of the Method enables you to assess the value of theories as much as theoretical models.

But how does the paper present its essence? Matter or substance is represented by the fundamental relation energy-mass-space-time. In their dynamic interaction, the fundamental magnitudes create invariant relationships with numerical or non-numerical character. They can be the rest-uniform straight motion relationship of Galileo or natural constants like the speed of light, Planck's, Sommerfeld's, etc. Invariant relationships and natural constants serve as the basis for formulating principles that are placed at the top of theories. Principles are accompanied by the construction of mathematical apparatuses that faithfully reflect their meaning in quantitative terms. Fundamental theory or theoretical models are completed with conservation laws that show the limits of the theories' effectiveness in practice. The Method defines the primary role of fundamental magnitudes.

Through their number, the value of other factors or the theory itself is determined. The absence of one of the fundamental magnitudes means that we are dealing with only a theoretical model and not a fundamental theory. Invariant relationships and natural constants, despite their importance, can never replace the role of fundamental magnitudes or determine their behavior. The same thing can be said for invariants, principles, or conservation laws.

2. JUDGING THEORETICAL MODELS BASED ON THE METHOD

Galileo and Newton

Isaac Newton laid the foundations of classical mechanics based solely on three fundamental magnitudes: mass-space-time. His invariance is based on the relationship of rest-uniform straight motion. It also serves as the basis for formulating the principle of relativity named after Galileo. Referring to the Method, despite the quantitative successes, we are dealing with a serious problem.

The invariant or invariant relationship can serve as the basis for creating the principle, but it can never replace it or play its role. A similar situation is seen later in the special theory where Einstein replaces the role of the principle with the invariant of the speed of light. Disregarding the rule dictated by the Method leads to consequences. The creation of models that legitimize any theoretical construct, considering the achievement of quantitative results sufficient. Newton, who has very limited possibilities, does not give much importance to the principle of relativity, considering it a healthy rule that he uses to derive the laws of impulse and force. The invariant relationship of rest-uniform straight motion does not have a numerical character. A specificity that allows Newton's principle, apparatus, and laws to have an infinite scope of action. In Newton's theoretical construct, due to the unchanging nature of mass, dynamic interaction is missing. This makes his dynamics have a character that contains many elements of statics. Here we can include his Law of Gravitation, whose cause cannot be found, a task that normally belongs to dynamics. This emphasizes that Newton's dynamics are built on simple kinematics. Which is based on the study of motion equations through Galilean Transformations. Its form is simple. But it accurately represents Newton's and the period's understanding of the essence of the principle of relativity.

Here we can say that the first chapter of classical mechanics named after Newton is closed. What we can highlight as special in his work is that he maintains the same concept with Galileo for force. Exerted on an object, it can lead its motion to infinity.

Descartes and Leibniz

The dynamic interaction of fundamental magnitudes is initially expressed in Descartes. Embodied in the idea of "constant quantity of motion," it is valid even for the Universe seen as a single object. With his work "Geometry" in 1637 (**1**), he lays the foundations of modern kinematics. But it also helps to establish dynamics on a new foundation. However, Descartes does not have the opportunity to advance his idea through the expression of impulse, which is only valid for low speeds. The discovery of differential and integral calculus by Newton and Leibniz is needed to verify Descartes' idea through a new dynamic. The well-known Cartesian-Leibniz debate, which divided the great minds of Europe, including Kant, sides with Leibniz in a qualitative view through the concept of "Vis Viva" or "Living Force" **(2)**. However, in a quantitative view, Leibniz's idea is realized not with the formula mv^2 but with $mv^2/2$. The Cartesian-Leibniz debate gradually leads to the presentation of two forms of energy, kinetic and potential. Then to Lagrange's Function in 1790 and a bit later to Hamilton's Function in 1830.

$$L = T - V \qquad \text{(L-Lagrangian, T-Kinetic Energy, V-Potential)} \qquad (1)$$

$$H = L + V \qquad \text{(Where H is the Hamiltonian)} \qquad (2)$$

Subsequent processes seem to materialize the initial idea of "constant quantity of motion." Expressed by a formula that is a contribution of Mayer, Joule, Colding, etc.

$$mgh + mv^2/2 = const \qquad (3)$$

The formula, which takes a general form from Kirchhoff in 1870 with the "Virial Theorem **(3)**," completes in its final form the ideas initiated by the Cartesian-Leibniz debate. In this sense, it seems to inspire Helmholtz, who emphasizes that here we can say that the unification process of theoretical physics is completed, and its study should be concentrated only on the study of conservative forces acting along the centers of objects **(4)** . We have, therefore, the conclusion of the second chapter of classical mechanics. Hence, we can draw some conclusions. They are based on the ideas that in this period are developed not under the sign of Newton.

The force, which is the foundation of Newtonian dynamics, does not have the same role as given by his definition. It more than increases the magnitude of motion, only transforms it. The force that also has the function of measuring motion leaves it to kinetic energy, which, regardless of its magnitude, is expressed through the formula $E_k = mv^2/2$. The potential energy form, initially seen as an auxiliary concept, becomes increasingly important. Lagrangian and Hamiltonian can easily solve all mechanics problems. Showing as a product that modernizes kinematics and dynamics, it allows the analysis of all forms of motion. Lagrange's Function reduces the importance of using Galileo's Apparatus. From the perspective of the paper that values the control of the transition of laws from top to bottom and vice versa through the differentiation and integration process, it seems that we have a clear realization of the process.

$$mv^2/2 \leftrightarrows mv \leftrightarrows dp/dt \qquad (4)$$

From what has been presented above, classical mechanics, initially formulated by Newton and then modernizing its kinematics and dynamics, resembles a small but regular house. Meanwhile, in the post-Newtonian period, physics operates again only with three fundamental magnitudes mass-space-time, replacing energy with its forms. But it mistakenly thought that with the terms of kinetic and potential energy, it also defined the term of energy. Practically, it had reached only the formula of work. Regardless of the units, work is not the same as energy. This principal error marks the beginning of significant problems in physics.

Maxwell and Lorentz:

In a general definition, despite the advantages of Lagrangian and Hamiltonian, some weaknesses are attributed to them. For the paper, its main weaknesses are expressed this way. They cannot be used in the case of high speeds due to the limited value of the kinetic energy formula. A limitation shown by Einstein in the Special Theory. The second and most fundamental limitation comes from the fact that Lagrangian and Hamiltonian analyze energy forms, not the energy itself. The problems created in electrodynamics that lead to Maxwell's field laws and those in thermodynamics that lead to Planck's law are related to energy as an inherent characteristic of the problem, not its forms. The difficulty of using Lagrangian and the non-recognition of energy as an inherent characteristic of the object impose solving problems using natural constants. Initially considered as auxiliary elements or for respecting physical units (as we see in Newton's law where the gravitational constant is placed a century later), they now occupy a central place in theoretical constructs. The apex is reached with the Constant of the speed of light in Maxwell and Planck's Constant, which stands at the foundation of Quantum Mechanics. In Maxwell, we see this idea directly in the formula that presents the speed of light (5) .

$$c = \frac{1}{\sqrt{\epsilon_0 \, \mu_0}} \qquad (5)$$

Referring to the Method, which calls invariants a product of the dynamic interaction of fundamental magnitudes, the question here is straightforward. To whom do the invariant of the speed of light or Planck's belong? The study poses the problem, starting from its main goal. The demand to achieve through differentiation -integration processes the transition from high-form laws to lower ones or vice versa. So, can we transition from Maxwell's field laws to Newton's laws or vice versa? Referring to the rule that emphasizes the dependence of principle-mathematical apparatus-conservation laws, the signs seem positive. From Lorentz's Apparatus, we can go to Galileo's. From the latter, as Lorentz shows, we can only reach the former with modifications. This process seems to be experienced even in the conservation laws of energy. The fundamental difficulty according to the Method here lies in the fact that energy is considered massless, whereas the object is assumed not to have energy. In a general plan, unification stands in constructing physics based either on matter represented by mass or on energy. The conclusion aimed at unification in this form is clearly described by Einstein a long time after constructing the Special Theory. **(6)**

The paper assesses the situation based on the "Revision of the research procedure from scratch." For it, the control of the unifying idea can only be done after we reach the conclusion that energy has mass and the object has energy. These facts are not recognized only at the time when Clerk Maxwell formulates the field laws but also later after Einstein presents the Special Theory.

Einstein.

Uncertain about the meaning of the invariant of the speed of light, Maxwell sees it as an electromagnetic wave that propagates in a vacuum at the speed of light. Einstein sees it as the maximum speed in nature. He elevates the invariant to the rank of principle by placing it alongside Galileo's Principle. **(7)** Which is considered valid in mechanics, but now also in electromagnetic and optical phenomena. Einstein thus canonically raises a serious theory, which has at its head the Special Principle of Relativity and the Postulate of the speed of light. They are accompanied by Lorentz's Apparatus, which he formulates independently of Lorentz. Along with the conservation laws presented in the article "Electrodynamics of Moving Bodies," Einstein constructs the scheme principle-mathematical apparatus-conservation laws. The paper judges the Special Theory of Relativity referring only to the Method, without being influenced at all by the quantitative results.

Einstein briefly shows at the beginning of the article the compatibility of the Special Principle with the Postulate of the speed of light. This through a simple example. A spherical light wave emitted along a moving axis retains the same spherical shape even at its end. The invariant represented by the speed of light has a numerical value. For the paper, it merely reinforces the invariant relationship rest-uniform straight motion, which does not have a numerical value. It does not seem difficult to understand in mechanics that precisely this character of it allows the development of events to infinity. A possibility that is limited by the new invariant with a numerical character. Referring to the Method, we check the factors determined by it in constructing a theory. Despite the importance of the invariant, it, like the principle, cannot replace or play the role of fundamental magnitudes. Even more so that through it to determine the line of behavior of these magnitudes. We are dealing with a principal error, which leads to a presentation of the apparatus and laws that carry on their back the consequences of breaking this rule. Einstein's initial conclusions expressed in a popular form are: With speed, the mass of the object increases continuously and takes an infinite value if we reach the speed of light. The time measured for an object in motion, from an observer at rest, seems to move slower. It stops completely when we reach the speed of light. For the same conditions for the observer at rest, the length of the object in motion with the reaching of the speed of light becomes zero. The processes are described below through the well-known Fitzgerald-Lorentz Factor.

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$$\frac{m_0}{\sqrt{1-v^2/c^2}} \quad (6) \qquad l = l_0\left(\sqrt{1-v^2/c^2}\right) \quad (7) \qquad t = \frac{t_0}{\sqrt{1-v^2/c^2}} \quad (8)$$

Where the Fitzgerald-Lorentz Factor is equal to;

$$1/\sqrt{1-v^2/c^2}$$

The initial judgments are initially accompanied by a set of masses with strange names like longitudinal mass, transverse mass, rest mass, motion mass, electromagnetic mass, relativistic mass, etc. It is understood that from the perspective of the "Revision of the research procedure from scratch," we are dealing with an epistemological weakness, dressing the mass with a set of names, a burden that it cannot bear.

It is Einstein himself who withdraws from this idea by returning to Newton. Forty-three years after the Special Theory, in a letter he sent to Lincoln Barnett, he expresses himself exclusively as follows.

It is not good to use the concept of mass $M = m/\sqrt{1-v^2/c^2}$ for a moving object, all the more so when we cannot give a clear definition for it. It is better to use the concept of rest mass m. Instead of M, it is good to use the concept of momentum or the energy of the object in motion. (8)

The conclusion is accurate. But with the new kinematics that leads to new dynamics and naturally to new physics, Einstein can practically only reform classical mechanics. The reason is simple. By keeping, like Newton, the idea that it is based on three fundamental magnitudes, he cannot achieve qualitative results, only quantitative ones.

Today it is accepted that we should only talk about Newton's mass, i.e., the rest mass. Einstein's initial explanation is still held in a few texts, and this is for didactic reasons. Wheeler sees the difficulties of the problem differently from him in the geometric properties of space-time. (9)

Both explanations, whether that of Einstein or Wheeler, are inaccurate. We say that the problem is not didactic. They should be sought in the new formula of mass.

$$m = \frac{m_0}{\sqrt{1-v^2/c^2}} \qquad (9)$$

The formula that explains Einstein's initial interpretation expresses a principal problem. The change in the form of laws can lead to a change in the qualitative properties of fundamental magnitudes, but not their quantitative ones. The discovery of energy as an inherent characteristic of the material object expressed through the formula $E = mc^2$, does not improve the initial explanation. Presented simply, its formula is reached by multiplying both sides of the above equation by c^2.

$$E_{tot} = \frac{m_o c^2}{\sqrt{1-v^2/c^2}} = m_0 c^2 + \frac{1}{2} m_0 v^2 + \cdots \qquad (10)$$

The general energy formula consists of two factors, rest energy, and kinetic energy. If the speed reaches that of light, the total energy becomes infinite. For the judgment given here, it is not logical to see the energy formula as the product of two factors where one of them, the rest energy, is an inherent characteristic of the object, and the other, the kinetic energy, is only a form of energy. How can the quantitative results achieved by the Special Theory be explained despite the criticism? In the last formula that differs from Einstein's initial one based on mass, there is a fundamental difference. He has now introduced energy represented by the formula $E = mc^2$. Precisely energy, not mass, allows presenting the new and reformed formula of kinetic energy.

Einstein did not know the energy formula $E = mc^2$ at the time of constructing the Special Theory.

It is a fundamental absence that does not allow him to present events with Lagrange's Function. The Lagrangian is placed later in the Special Theory. As mentioned, the Lagrangian is based on the analysis of motion equations that include energy forms and not the object's energy itself. But its placement emphasizes that it is as much an indicator of the modernization of his theory as the fact why it cannot be placed earlier. The defects shown seem to be eliminated after Dirac's new formula in 1928 **(10).** He presents the general energy formula of the object with speed, combining momentum and energy.

$$E_{tot}^2 = m_0^2 c^4 + p^2 c^2 \qquad (11)$$

or

$$E^2 - p^2 c^2 = m_0^2 c^4$$

(Energy, momentum and mass are given with the numerical value of their squares.)

The formula, which stands at the base of Quantum Mechanics but also of all physics, shows the difficulty of transitioning from the laws of a lower form to those of a higher form. The elegance of the formula lies, among other things, in two elements. It first shows that whatever energy value you take in the experiment, the difference in its numerical value with the momentum gives the value of the rest energy, which remains constant. The second element is that the relativistic momentum is expressed here in a form that respects the idea presented by Einstein in 1948.

$$p = \frac{m_0 . v}{\sqrt{1 - v^2/c^2}} \qquad (12)$$

The formula gives the idea that momentum is a direct product of energy, and from Dirac's idea, we can transition with derivation processes to the one started from the general energy. Feynman does not give any importance to presenting the momentum in this form. Emphasizing that Einstein modifies both it and the magnitude of the force starting from the correction of Newton's mass with speed. Therefore, he presents the formula of relativistic momentum as follows (11**)**

$$p = \left(\frac{m_0}{\sqrt{1 - v^2/c^2}}\right) . v \qquad (13)$$

Feynman's presentation does not lead to the laws of mechanics through the derivation process from those of the Special Theory. But this goal, which is fundamental for the study, does not say anything about theoretical physics, which is satisfied only with achieving quantitative results.

From Dirac's formula, we go to Einstein's formula of the total energy of the object:

$$E_{tot} = \frac{m_o c^2}{\sqrt{1 - v^2/c^2}} \qquad (14)$$

Dirac's formula shows a significant improvement achieved by using four-vectors or Minkowski's space-time continuum. However, the idea that it leads to the laws of impulse and force of Classical Mechanics and the Special Theory through derivation is not a principal form. It is not difficult to see that Dirac's formula also contains the initial and inaccurate idea of Einstein about the change in mass with speed.

Theoretical physics ultimately legitimizes Dirac's new formula as the representative of the total energy. It also presents the unification in one formula of energy and momentum. The possibility of unification in a single formula of the law of impulse with that of energy is another point that the paper views with skepticism. Accepting this conclusion is analogous to that of force, which states that its increase leads to an increase in the object's energy. We can only accept that through impulse, we transition to the expression of force, the formula of which is based on that of kinetic energy. But in this case, we would accept that the formula of the total energy of Dirac, as well as that of Einstein, is a formula that only reforms that of kinetic energy. Despite the progress, a product of the introduction of Minkowski's space-time continuum, which Einstein, like energy of the material object expressed by the formula $E = mc^2$, did not know at the time of constructing the Special Theory, Dirac's presentation does not close the problems created by the idea that assumes the increase of mass. Referring to the Postulate of the speed of light, which states that the object never reaches its magnitude, the Special Theory allows any value close to its speed that the parameters space and time can take in the process of measuring the movement. For this theory, it is enough not to violate the Postulate of the speed of light, a conclusion that cannot be complete if we accept Planck's Length as the minimum in nature. In today's practice, efforts lead to attempts to avoid the problem, which require the construction of a theory that reconciles the Special Theory with the condition imposed by Planck's minimum Length. Such is presented by Giovanni Amelino Camelia, who names his effort "The Double Theory of Relativity." Referring to the Method, the problem is not solved by constructing a new apparatus. The mathematical apparatus faithfully represents in quantitative terms the meaning of the principle, so the issue is not resolved without first understanding the axiomatic character of the principle of relativity. The presentation of the difficulties of Classical Mechanics or the Special Theory given by Dirac's formula or Camelia's attempt is given in the two figures below, which express the change in the energy state of the object with speed (**12)**.

Newton

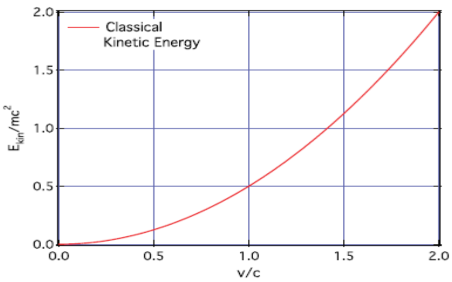


Figure 1 Kinetic energy according to Newtonian mechanics

Einstein

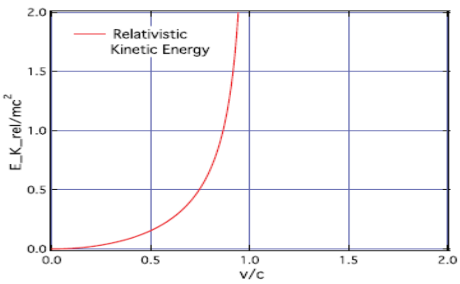


Figure 2 Kinetic energy according to Special Relativity.

The graphical presentation of the figures shows, firstly the fundamental weakness of the idea that seeks to express energy and its formula through energy forms and not from this fundamental magnitude itself, which is an inherent characteristic of the material object. This is the most important difference from the study's perspective, which constitutes the basis of the criticism for the generally accepted judgment of the situation at the time. The practical consequence of thinking differently is clearly seen in points zero and c in the Special Theory of Relativity, where kinetic energy takes the values zero and infinity. Einstein's idea of attributing a certain energy to the material object at point zero, which he calls rest energy in a theoretical plan, seems to reinforce his accepted conclusion today that the $E = mc^2$ is a consequence of the Special Theory of Relativity. The consequences of the relativistic interpretation for rest energy are transmitted to all new theories based on the conservation law of energy of the Special Theory. They are clearly seen in the works of de Broglie and Schrödinger. The rest energy given in the Special Theory of Relativity cannot be measured. It must be accepted by deduction, so in the above works, the idea is imposed that attributes to point zero the wavelength infinity and to point c, zero. The practical successes and the impossibility of determining the energy state at points zero and c cement in physics the infinite magnitudes. This problem is the same one reflected by Classical Mechanics. It seems that mathematical techniques, despite the partial successes achieved, cannot remove them. Meanwhile, theoretical physics, which continues endlessly the efforts for this task, seems never to have asked the question of their real cause. In a general statement, it seems that only Niels Bohr emphasizes that the law of conservation of energy of the Special Theory of Relativity is a suit that is too tight for theoretical physics. **(13)**

The above conclusions for the paper are reflected first by the theoretical apparatus. Lorentz's Apparatus is valid for the field laws and the Special Theory. Modified, it is also valid for classical mechanics. Based on the connection apparatus-law, we could not expect to go from the initial laws of the Special Theory, which are conservation laws of mass, to those of Maxwell. But it seems that we cannot go from Maxwell's laws to those of the Theory with the derivation process either. The logical justification of the conclusion seems evident. The energy represented by the field is considered massless, while the object with mass is assumed to have no energy. To expect the transition with the differentiation-integration process to realize the transition of laws from one theory to another, you need to have the common factor of both theories in hand. That is, to have the conclusion that the object has energy and light has mass. The first fact, Einstein discovers it only after constructing the Special Theory and presents it in the article where we see the formula $E = mc^2$, in 1905. The idea that light has mass in addition to energy, he discovers after constructing the General Theory in 1915. The idea of raising the laws of conservation of the Special Theory, based on the role that Einstein gives to the invariance of the speed of light, seems difficult to accept. Invariants are a ratio that comes from the dynamic interaction of fundamental magnitudes. And they cannot play their role or determine their line of behavior.

In the above reasoning, there was no talk of the fundamental magnitudes of space and time. It seems that in the central equation of Lorentz, they directly express the invariance of the speed of light.

$$\frac{l_1}{t_1} = \frac{l_2}{t_2} = \cdots \frac{l_n}{t_n} = c \qquad (15)$$

The parameters l and t represent space and time even in the case of light which is considered to have no real physical dimensions. Hence, concepts such as wavelength, frequency, etc., are attached to it. The changes in their values express light with different energy and mass. The invariance of the speed of light represents a ratio of the dynamic interaction of the fundamental magnitudes, but at the time of the Special Theory, the reasoning cannot be done, because light was considered massless. In the analysis that Einstein makes of the magnitudes of space and time in the Special Theory, his great difference from Newton's classical physics is emphasized. The work takes a different stance here. As emphasized above, the change in the form that the laws take and the measuring instruments has a purpose which should be considered achieved, only when this change in their form also preserves the invariance of the fundamental magnitudes. The continuous reformulation of the form taken by space and time is related to the demand for reaching the final form of the conservation law. In that case, we should see how the graphical curve of the conservation law of energy corresponds to the graphical curve of space-time. At the current point of discussion, this task and its achievement are very far away. This is also because in this case, the magnitudes of space only serve a conservation law that represents a principle based on the invariance of rest-uniform straight-line motion. The work tries to prove below that the content of the Lorentz Central Equation is fully clear in Quantum Mechanics. There we can easily see why its laws are valid even for Classical Mechanics. Or in other words, why the laws of the latter are derived from it. Concluding on the Special Theory, we can say that it cannot lead us through the processes of derivation-integration, neither to Maxwell's laws nor to those of Classical Mechanics.

Referring to the Method, the principal defects of the Special Theory can be summarized in this form. The invariance of the speed of light is only a product of the interaction of the fundamental magnitudes. It cannot condition their behavior. The invariance can be the basis for formulating the principle, but it cannot play its role. The role given and the properties assigned to it are reflected in the conservation laws, which make infinite magnitudes inevitable. The formula for the general energy as the sum of the rest energy and kinetic energy, which is a form of energy, is a fundamental inaccuracy. It expresses the addition of content with form. The second and more important problem arising from this perspective is that it leads to the incorrect conclusion that we can increase the energy of an object through force.

3. Derivation of the Laws of Classical Mechanics and the Special Theory of Relativity

The work utilizes the conclusions of Poincaré (1900), Hasenöhrl (1904), and Einstein in 1905, which present the formula $E = mc^2$. The idea that it is a consequence of the Special Theory seems difficult to accept.

This would imply that through force, we change the energy of the object, which is a principal inaccuracy for the paper. The paper maintains the idea that the action of force on an object never changes its energy but only transforms it. What changes is its energy state. The energy of the object remains constant. The action of force and the counteraction of the object against it is reflected by the Principle of Least Action. So if the process of action-counteraction force-object occurs at the speed of light, the quantitative value of the transformed energy is shown by the value taken by the Fitzgerald-Lorentz Factor. The role given to it is different from that attributed by the Special Theory. It merely reflects the process of energy transformation. The Factor accompanies all laws and also the measuring tools, which are space and time. These latter are considered accurate in their task only in one case. When the form of the graph curve that reflects them fully coincides with that of the law of conservation. If the law of conservation is in its final form, even the forms of the measuring tool have the same character. The paper fundamentally differs from the Special Theory by accepting first that the energy of the object is constant, and the Fitzgerald-Lorentz Factor only reflects the process of its transformation. Based on these objections, we present the new form of the law of conservation by proving directly how the laws of Mechanics and the Special Theory are derived from it.

The paper revitalizes the idea of the Cartesian-Leibniz debate, which states the transformation of motion from one form to another. But now it does not operate with the forms of kinetic or potential energy but with the energy itself. The magnitude of it at rest is the same in numerical value and at point c.

E_p – is considered by the paper, the total energy of the material object. It is equal to the rest energy $E = m_0c^2$ given by the Special Theory of Relativity. So;

$$E_p = m_0c^2 = const \qquad (1)$$

The total energy is considered the rest energy. It is the sum of two energies, the exposed and the unexposed, which change at the expense of each other with the Lorentz Factor.

$$E_p = E_{ex} + E_{pex} = m_0c^2 = const \qquad (2)$$

The unexposed energy at rest has the value of the total energy. With the change in speed, it continuously decreases and becomes equal to zero at the speed of light.

$$E_{pex} = mc^2 \left(\sqrt{1 - v^2/c^2}\right) \qquad (3)$$

The exposed energy is given as the difference between the total energy and the unexposed energy;

$$E_{ex} = E_p - E_{pex}$$

or

$$E_{ex} = mc^2 \left(1 - \sqrt{v^2/c^2}\right) \qquad (4)$$

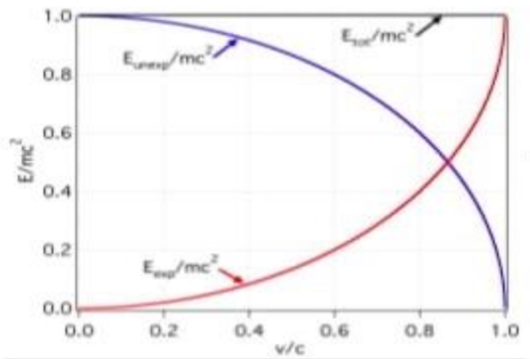
At rest, the exposed energy has a value of zero. At the end of the transformation process, we have taken the value of the initial energy of the object that was unexposed at rest. The graph curve that graphically represents the exposed energy against speed corresponds to Einstein's known asymptote, obtained through reasoning as follows. From formula 3, we see that the curve of the unexposed energy (normalized by mc^2 against speed (normalized by c) is a quarter circle with a radius of 1. After minimal algebraic manipulations, the formula is written;

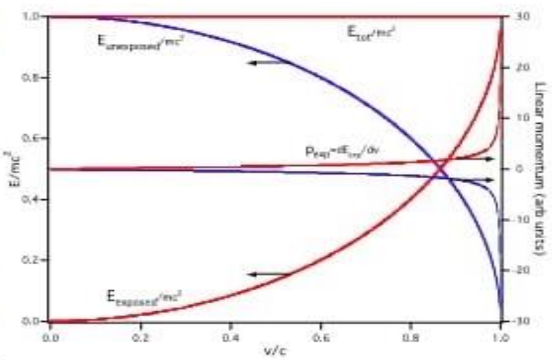
$$\left(\frac{E_{ex}}{mc^2}\right)^2 + \left(\frac{v}{c}\right)^2 = 1 \qquad (5)$$

By varying the speed v from zero to c, we obtain a quarter circle in the first quadrant of the coordinate system (Figure 3). On the other hand, if in equation 3, we divide both sides by 〖mc^2 and replace E_p from equation 1, we will have:

$$\frac{E_{exp}}{mc^2} = 1 - \frac{E_{unexp}}{mc^2} \qquad (6)$$

Therefore, we can obtain the curve of the exposed energy (normalized by mc^2) from the curve of the unexposed energy (normalized by mc^2) by making a reflection about the horizontal axis - changing the sign - and a vertical shift by one unit.





Figures 3 and 4 show the exposed and unexposed energy and their respective impulses.

Deriving the exposed energy with respect to speed gives us Einstein's expression for momentum:

$$\frac{dE_{ex}}{dv} = \frac{m.v}{\sqrt{1-v^2/c^2}} \qquad (7) \qquad\qquad p = \frac{dE_{ex}}{dv} = \frac{m.v}{\sqrt{1-v^2/c^2}} \qquad (8)$$

For low speeds in the paper, Classical Mechanics and the Special Theory, the momentum takes the well-known value m·v. By deriving the momentum with respect to time, we get the expression for force:

$$\frac{dp}{dt} = \frac{m.a}{(1-v^2/c^2\,)^3/_2} \qquad (9) \qquad\qquad F = \frac{m\,.a}{(1-v^2/c^2)^3/_2} \qquad (10)$$

The derivation process can be done using the Lagrangian. From it, we first go to the law of momentum or quantity of motion and then find the force.

$$L = \left(1 - \sqrt{1 - v^2/c^2}\right)mc^2 - V(x) \qquad (11)$$

Einstein, as mentioned, could not initially present the Lagrangian in the Special Theory. We present the general form of the object's motion equations through the new Lagrangian. The new Lagrangian in the paper does not have the minus sign as the one presented in the Special Theory.

$$\begin{aligned} &\frac{d}{dt}\left(\frac{\partial L}{\partial v}\right)-\frac{\partial L}{\partial x}=0 \\ &\frac{d}{dt}P+\frac{\partial V}{\partial x}=0 \\ &\frac{d}{dt}P=F \end{aligned} \qquad (12)$$

For (ß«1) we go from the standard Lagrangian used in Classical Mechanics.

$$\left(1-b^2\right)^{1/2} » 1-1/2\, b^2$$

$$\begin{aligned} &L \approx mc^2\left[1-\left(1-1/2\,\beta^2\right)\right]-V(x) \\ &L \approx mc^2\left(\frac{1}{2}\frac{v^2}{c^2}\right)-V(x)=KE-V(x) \end{aligned} \qquad (13)$$

From the above relation, we go to the formula of relativistic kinetic energy.

$$\int F dx=\int\left[\frac{\partial}{\partial t}\left(\frac{\partial E_{\exp}}{\partial v}\right)\right]dx=KE \qquad (14)$$

By replacing the force in the given equation above, we write:

$$\int\left(\gamma^3 ma\right)dx=\int\gamma^3 m\frac{dv}{dt}dx=\int\gamma^3 mdv\frac{dx}{dt}=\int\gamma^3 mvdv \qquad (15)$$

Through minimal algebraic manipulations and replacing u= v^2/c^2, which leads to du = $2/c^2\, dv$, and following other complementary steps, we reach the formula of Kinetic Energy.

$$\int\gamma^3 mvdv=(\gamma-1)mc^2=KE \qquad (16)$$

The idea allows us to easily derive Classical Mechanics laws of Newton and Einstein's Special Theory laws. The conclusion is verified by the paper's Lagrangian. Its analysis shows that for low speeds, the graph curve representing the law of energy conservation has an elliptical form. This shows an analogy not only with the natural motion of planets. It also takes us back to the period of analyzing Maxwell's laws when Heaviside, who reformulates them, emphasizes the elliptical form of the electrostatic field in motion. It seems that the law of energy conservation is also the universal law of nature. The fact that unexposed energy does not influence our measurements might create the idea of the absence of mass or energy. But the fact that it exists in reality in the untransformed form explains the phenomenon of dark energy. The new law of energy conservation is not final. The reason is simple. Energy is considered continuous, which is evident in points zero and c. Here, momentum and force seem to take undetermined values. Therefore, we say that through exposed and unexposed energy, we can only represent events based on the idea that the energy of the object is a continuous magnitude. For the physics structure to be functional, it is necessary to determine the force values at points zero and c. Here, the paper utilizes the idea that force is the derivative of energy. A conclusion not known to traditional concepts. But being the second derivative of energy, the force seems to exist even when the object is at rest. A fact that we see not only in Coulomb's law, which is reflected by the electrostatic force. The force is also reflected by Newton's Law of Gravitation, but in a more complicated form. At point zero, the force expresses the minimal energy state and at point c, the maximal energy state of the object. The energy state is an inherent characteristic of the object and reflects the field's intensity at any moment.

4. Defining the Boundaries of Classical Mechanics and Special Theory

The discovery of energy not only imposes its central placement in theories but also demands its association with the redefinition of their operational boundaries. This work analyzes not only the zero points and c but also the intersection points of the curves where exposed and unexposed energy intersect, where both rest energy and relativistic kinetic energy are equal. To clarify the idea, we construct a figure analogous to that of the energy curves. Exposed and unexposed energy are replaced by kinetic and potential energy, which again represent energy forms, but now expressed solely through the term mc^2

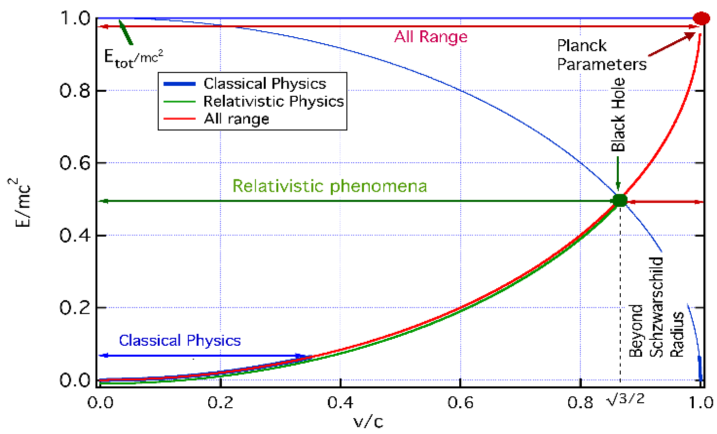


Figure 5 *The table presents the transition of lows from quantum mechanics to the special theory and then to classical mechanics.*

In the zero point for the work, the energy of the material object has the value of the total energy, but it is all unexposed. In the zero point, the kinetic energy has a value of zero for Classical Mechanics. For Special Theory, the zero-point energy is expressed by the value of the rest energy, m_0c^2. But what nature does this energy have, which Einstein emphasizes that the object has as its own and which he considers "a kind of energy"? At the intersection of the curves, it equals the rest energy at the speed $\sqrt{3/2}$ c. The Special Theory does not give any importance to this point. At this point, in analogy with Classical Mechanics, we have the equality of kinetic energy with potential energy. The difference is that here we have the equality of two energies and not their forms. The kinetic energy of classical mechanics is valid regardless of the values of the speeds. As we will see below, it has the same value even at point c. There, the value given for what is called the Schwarzschild Radius is provided. But this precise result in the quantitative plane is inaccurate in the qualitative one. It shows that its value is limited as Einstein shows in the Special Theory. The analogy with this formula serves for something else. The points around zero show the upper limit of the application of classical mechanics. For the Special Theory, it is the lower limit of its operational field. But as we showed above through the derivation of the law of conservation of energy, we can go from the limit of the Special Theory to that of Classical

Mechanics. The opposite is impossible. The analogy with the formula of kinetic energy thus serves to determine the upper limit of the application of the Special Theory and the general one. This is because both theories see energy as a continuous quantity. We can say here that the upper limit of the application of both theories is found at the intersection of the curves. Beyond this point, we can continue with modifications to obtain results in the quantitative plane, but they are difficult to comment on in the qualitative aspect. They express at the same time the impossibility of eliminating infinite quantities. Therefore, phenomena after the intersection are analyzed only by Quantum Mechanics. From the intersection to point c, the phenomena express quantum character and virtual spatial and temporal parameters. At point c, we have the limit of the application of all physical theories. Here, the energy state of the object takes its maximum value.

The final removal of singularities through the concept of the Energy State

Based on the formula $E = mc^2$ and the idea of its transformation, the work does not make any difference between matter and field. It considers matter as a large concentration of energy. In this approach, the object in space is seen as a field moving at its speed. It is an idea that Einstein sees as the core of unification but calls it very difficult to realize mathematically. The work emphasizes the conceptual aspect as such**. (14)**

For the realization of the idea, the work utilizes the central equation of Lorentz, $l/t = c = cons$, which here expresses not the invariance of the speed of light, but that of energy. The difference from the traditional perspective is expressed as follows; The energy state of the object after the exertion of force becomes at the speed of light, but the quantitative value of its change is given by the Fitzgerald-Lorentz Factor. This conclusion emphasizes why it is necessary to find the minimal energy state of the material object.

The maximum values of (l) and (t) express the energy state of the object at the zero point. Whereas the minimal values express it at point c. The maximum energy state is characterized by a value of (l) that seems to correspond to the minimal length of Planck. With the concept of the Energy State, we not only reinforce the quantum character of energy. Its main contribution here is related to the possibility it provides for the removal of infinite quantities, not only in the law of energy but also in momentum and force. Through the Energy State, the functional structure of physics is sought to be realized. Which allows, at the level of the laws of energy-momentum force, to ascend and descend through the known mathematical processes, derivation-integration.

5. Unification

The values of the Energy State of the object at points zero and c and the removal of the singularity

The absence of energy seems to be the fundamental factor that causes the laws of Newtonian Gravitation and Coulomb's laws to be considered as laws described through the concept of force. This process of presentation is complicated in Maxwell's Field Laws where the mechanism of force changes from that of Newton in terms of quantitative value, as noted by Lorentz. The work solves the issues raised by the above laws through the law presented earlier. The elliptical form that the graphic curve of this law takes is the one presented by Kepler. This can easily lead us to Newton's law of gravitation. But through the new law of energy conservation, Maxwell's laws can also be described. The source of the electromagnetic field is simply the electron that transforms its energy with speed. This shows the elliptical form that it takes expressed in Einstein's language or the electrostatic field spoken in Heaviside's language, who reformulates Maxwell's equations in canonical language. The work starts from the idea that the above laws are not expressed with the concept that sees energy as a continuous quantity. This feature is expressed in the laws of Newton, Coulomb, and Maxwell. The work utilizes the fact that force is the second derivative of energy and exists even in rest. This fact allows us to remove from the scene the Boltzmann Constant, as well as the concept of charge. The work similarly acts with Newton's gravitational constant. But it does not follow the path proposed by Einstein in the General Theory. Despite appreciating the quantitative results achieved by him, it considers it insufficient. Firstly because its values are limited in what is called the Schwarzschild Radius, which is very far from Planck's Length. Secondly, and this is the main problem, Einstein's idea of space-time curvature is artificial and a product of the lack of a final law of energy conservation. As noted above, the forms that the measuring tools of space and time take are dependent on the form of the law of energy conservation. Therefore, the graphic curve of space-time should match that of the graphic form that describes the law of energy conservation of the object regardless of the size of the mass it represents. This description seems necessary even for achieving a unified theory for theoretical physics that describes macro and micro.

The work presents the laws of gravitation and electricity formulated by Newton and Coulomb not as laws of force, but of energy. The formulas below, through the "Classical Radius" (r_{kl}) and "Schwarzschild Radius" (r_{shv}) express the minimal energy state of objects with smaller and larger mass than that of Planck. The energy state at rest, in analogy with the Special Theory, is the smallest multiple of the Exposed Energy of the material object.

$$\frac{ke^2}{r_{kl}} = mc^2 \quad (17) \qquad\qquad \frac{2Gm^2}{r_{shv}} = mc^2 \quad (18)$$

Knowing the fact that $e^2/c = ah$, we divide both sides of Coulomb's law by c. We get the equation $mcr = ah$, with the units of angular momentum. It expresses its character as a constant quantity and is valid for any material object regardless of its mass.

$$mcr = a\hbar = const \quad (19)$$

The work does not make distinctions between matter and field. The energy state of the object changes with the speed of light, but the quantitative value of this change is expressed by the Lorentz Factor. Therefore, we use the general form of Lorentz's equation, distance/time = c, or *r/t* = c. Which was constructed to express the invariance of the speed of light, but here it expresses that of energy. We find here the force that originates from the electron itself, which defines its energy state at rest as the smallest multiple of the Exposed Energy.

$$F_{min} = \frac{mc^2}{r_{max}} \quad (20) \qquad \text{ose} \qquad F_{min} = \frac{mc}{t_{max}} \quad (21)$$

Here r_{max}, expresses the "Classical Radius" for objects with small mass, such as the electron, and the "Schwarzschild Radius" for those with large mass, such as the Earth. The conclusion reiterates that the formulas for the laws of Coulomb and Newton conceived as laws of energy and not force, express through the Maximum Radius, the minimal energy state of the object at rest.

The maximum energy state or the maximum exposed energy is given in an analogous form;

$$F_{max} = \frac{mc^2}{r_{min}} \quad (22) \qquad \text{or} \qquad F_{max} = \frac{mc}{t_{min}} \quad (23)$$

In general form, the above equations are expressed by the formula Force x radius = $mc^2 = const.$ The formula that seems paradoxical and simply inaccurate based on known formulations, has its origin in the ratio $r/t = c$It is based on the concept of the Energy State, which by representing the Exposed Energy, removes from the theoretical scene the Kinetic Energy. This imposes that the description of events analyzed through the parameters of space and time should have a quantum character. The situation is analogous to Quantum Mechanics, which replaces the role of Kinetic Energy with that of operators. We preliminarily state here that if the value of the force measured from the quantitative perspective is the same regardless of the technique used, the space-time parameters can have a virtual character, as we will see below when analyzing the situations created at and beyond the limit of the applicability of the General Theory of Relativity. The minimal radius is achieved using the help of the concept of the Energy State, which is seen as the ratio of the exposed energy to the unexposed energy. Continuing to see the energy of the material object still as a continuous quantity with a temporary character description, we write the formulas for energy and momentum.

$$E_{minex} = \frac{1}{E_{maxex}} \text{ ose } E_{minex} = \frac{1}{mc^2} \text{ ose } E_{minex}.E_{maxex} = 1 \quad (24)$$

The results correspond to the part of the work where the exposed energy collected with the unexposed energy has the value 1. In an analogous way, we write the formula for momentum.

$$I_{minex} = \frac{1}{I_{maxex}} \text{ ose } I_{minex} = \frac{1}{mc} \text{ ose } I_{minex}.I_{maxex} = 1 \quad (25)$$

The concept of the Energy State as a continuous quantity is auxiliary; it only serves to determine the maximum momentum. Whereas the real momentum of the object is always mc, so like energy, it is a constant quantity. Reaching this seemingly paradoxical determination is expressed as follows. The maximum energy state is the product of multiplying the state of rest. What changes with speed in any energy state are the time and space parameters? Whereas the ratio between them, which is always equal to c, expresses the fact that what really changes with speed is the force. Therefore, momentum as a ratio of energy to speed, which is a ratio of space-time parameters and equal to c, expresses this constant quantity for any Energy State analyzed. The determination of the maximum momentum allows us to find the minimal radius, which represents the maximum exposed energy.

$$r_{minex} = \frac{I_{maxex}}{a\hbar} \quad (26)$$

The minimal radius is multiplied by 2π, which respects the ideas of the Descartes-Leibniz debate that emphasizes the closure of the motion process, as well as reflects the circular character of the energy graphic curve. The concept is not in contradiction with quantum mechanics. The reduced constant is usually used to illustrate the Heisenberg Principle, and the one with full value to characterize the minimal state of the object when talking about its spatial dimensions.

The fundamental space-time quantities have the same character in the representation of the transformation of energy. We determine here the maximum and minimum radii of the material object.

$$r_{maxex} = \frac{mc_{minex}}{a\hbar} \quad (27) \quad \text{dhe} \quad r_{minex} = \frac{mc_{maxex}}{ah} \quad (28)$$

Due to numerical values, the ratio 1/mc expresses for masses greater than zero, the minimal momentum, and for smaller than zero, the maximum exposed momentum. Whereas mc, for masses greater than zero, the maximum momentum, and for smaller, the minimal exposed momentum. The table below generalizes the conclusions reached from the formulas through examples.

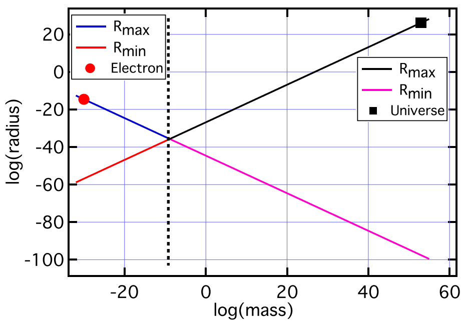
Table 1 The table gives the results for the "Schwarzschild Radius" which correspond 97.6% to the General Theory.

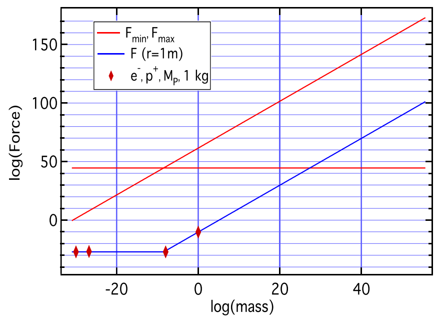
	Mass (kg)	r_{max} (m)	r_{min} (m)
Electron	9.11×10^{-31}	2.83×10^{-15}	$\mathbf{1.32 \times 10^{-57}}$
Plank's mass	1.33×10^{-9}	1.93×10^{-36}	$\mathbf{61.93 \times 10^{-36}}$
Universe	1×10^{53}	$\mathbf{1.46 \times 10^{26}}$	2.58×10^{-98}

However, we see results that do not correspond with it, which if accurate, enable us to find the limit of the applicability of the General Theory. Secondly, they help to create a new law of gravitation, the field of application of which corresponds to Planck's Length.

We construct tables that graphically express the correlation force-radius mass

It is noted that for masses below the Planck Mass, the force does not depend on the mass of the object.





The table below expresses in general form the correlation momentum-force-energy.

Table 2 The formulas for the calculation of space parameters and the forces.

$m < m_{crit}$		$m > m_{crit}$
$r_{max} = \frac{\alpha\hbar}{mc}$ 2.1	Original domain Impulsi = (mc)	$r_{min} = \frac{\alpha\hbar}{mc}$ 2.2

$r_{min} = \frac{2\pi\alpha\hbar}{1/mc} = 2\pi\alpha\hbar(mc)$ 3.1	Inverse domain Impulsi = 1/(mc)	$r_{max} = \frac{2\pi\alpha\hbar}{1/mc} = 2\pi\alpha\hbar(mc)$ 3.2
$F_{max} = mc^2/r_{min} = c/(2\pi\alpha\hbar)$ 4.1		$F_{max} = mc^2/r_{min} = m^2c^3/\alpha\hbar$ 4.2
$F_{max} l^2_{min\_real} = F(r) r^2$ 5 .2		
$F(r) = \frac{F_{max}}{r^2/l^2_{min\_real}} = \frac{c}{(2\pi\alpha\hbar)} \frac{l^2_{min\_real}}{r^2}$ 6.1		$F(r) = \frac{F_{max}}{r^2/l^2_{min\_real}} = \frac{c^3}{\alpha\hbar} m^2 \frac{l^2_{min\_real}}{r^2}$ 6.2

Determining the Limit of the Applicability of Theoretical Physics

To achieve this goal, the work is based on two pillars. Firstly, it considers energy as a constant quantity with a fully defined value, which gives it a quantum character. Secondly, through the Energy State represented by the minimal and maximal radii, it determines the energy values at every point including zero and c, which gives the overall table a fully quantum character. The realization of the main idea begins with the clear determination of the limit of the applicability of the General Theory and then that considered as final and supposed to be represented by Planck's Length.

Determining the Limit of the Applicability of the General Theory of Relativity

From observing the energy curves, the Exposed Energy equals the Unexposed Energy at the intersection, or at the speed $\sqrt{3/2}\, x$ c. Referring to the figure that presents the energy curves, the work seeks to show first that the limit of the applicability of the General Theory is located precisely at the intersection of the energy curves. The General Theory cannot analyze the transformation process after the intersection or the radius that characterizes it up to the minimal radius corresponding to Planck's Length. The calculation of the value of the Energy State at this point is done by first determining the quantitative value of the energy that is partially transformed.

$$E_{pikp} = \frac{mc^2}{2} \qquad (29)$$

At the intersection where the Exposed Energy becomes equal to the Unexposed, we have presented, if speaking in the language of the Descartes-Leibniz debate, the partial transformation of the energy of the object expressed through the Exposed Energy. The process is analogous to that of Classical Mechanics which is given by the formula $E_{kin} + E_{pot} = cons.$. The difference given by the central equation of the work from the formula $E_{ex} + E_{pex} = mc^2 = cons$, is that now we are not talking about forms of energy, but about the energy of the material object itself as a quantity that remains constant. The value of the radius of the intersection according to the reasoning, comes by dividing the Schwarzschild Radius, or the maximal radius, by 2. How is this value determined? Referring to the language of the work, the General Theory cannot answer the question. It limits its field of application to the zero point and not to the intersection. Speaking again in the language of the work, the Special Theory has very little interest in the intersection and emphasizes that here the rest energy equals the relativistic kinetic energy and the rest mass increases by 2 times, a result that is verified in accelerators.

Therefore, the limit of the applicability of the General Theory is located at the intersection of the curves, where the radius is 2 times smaller. For verification, we first calculate the radius of the intersection.

$$r_{pik} = r_{shv}/2 = r_{max}/2 \qquad (30)$$

The intersection of the curves expresses a situation analogous to where the rest energy equals the relativistic kinetic energy. A situation after which Einstein's conclusions for its evaluation from the quantitative perspective are accurate, but not in the conceptual aspect. The work proves that the situations created after the value given by the Schwarzschild Radius, emphasize the quantum character of the space and time parameters that are beyond the intersection, only virtual.

We draw the first conclusion from the radius of the intersection that replaces the Schwarzschild Radius;

$$r_{pik} = r_{shv}/2 = \frac{Gm}{c^2} \qquad (31)$$

The conclusion emphasizes that the maximum rotation speed of what the General Theory calls a Black Hole is at the intersection of the curves and has the value $\sqrt{3}/2 \,.\, c$, a value that marks the limit of the applicability of this theory, which is still far from the limit speed of light.

Unlike the General Theory, the work uses the concept of force and not that of the curvature of space-time. It remains faithful to the idea of building a functional theory based on the scale of energy-momentum-force laws. Therefore, it uses the force-radius correlation given by the formula $Force\ x\ radius = mc^2 = cons$ in solving problems. We provide through this formula the ratio of the force of the intersection and the Schwarzschild Radius or the minimal force.

$$\frac{F_{pik}}{F_{shv}} = \frac{F_{pik}}{F_{min}} = 2 \qquad (32)$$

Einstein makes a distinction between them because he does not consider energy as a constant quantity.

Referring to the concept of curvature, he expresses the deflection of light in strong gravitational fields through the angle of deviation, which for the work is simply an expression of the ratio of the force originating from the object on the light. Regardless of the concepts, the results are the same in both cases.

From the above, $r_{shv} = 2r_{pik}$and knowing that r_shv = $r_{shv} = 2Gm/c^2$, the angle of deviation expresses the values of the ratio of the Schwarzschild Radius to the Radius of the intersection.

$$\alpha_{dev} = 4Gm/rc^2 = 4_{rG}/r \qquad (33)$$

where α_{dev}- Angle of deviation r_G- gravitational radius, r - distance planet-object

r_G - in the language used by the work, corresponds to the value of the Radius of the intersection.

Physics reflects the problem with the phenomenon called the Shapiro effect. The work considers the ratio of the force of the intersection to the distance from the given object. The ratio of the Radius of the intersection to the Schwarzschild Radius is seen as the ratio of the force that represents the limit of the applicability of the General Theory to that of the limit of the applicability determined by Newton's classical mechanics. The results achieved are the same as those of Einstein's General Theory.

$$\frac{F_{pik}}{F_{shv}} = 2 \qquad (34)$$

The ratio can determine the deviation of Mercury's perihelion from Newton's law of gravitation calculated by Einstein in a similar way to that given in the formula of light bending. If the angle of deviation is expressed in Newton's law, for example, with the value x, referring to the ratio of forces, the real deviation different from that given by Newton is 2 times more,

The value found emphasizes that the correction should be made for every planet but considering first the distance where the events occur. In general terms, we can say as follows;

$$\alpha_{dev} = \frac{2\,\alpha_{dev\,Njuton}}{r} \qquad (35)$$

Specific quantitative calculations are not the subject of this work. What we can still emphasize for this problem is that both Newton's elliptical motion, or Einstein's rosette-type for Mercury, in principle, express the way of the existence of the material object. Or expressed differently, the motion described by them reflects the law of energy conservation whose graphic curve according to the work is circular. Therefore, the different forms of Mercury's motion or any planet during their existence period are forced to follow this curve. This life process developed in a spiral form, thus tends towards the natural circular motion, which is hypothetically emphasized by Copernicus. The conclusion emphasizes that the calculations on deviation from the law may need to consider also the value of the Energy State of the planet or otherwise that of the exposed energy. It determines the specific form of the energy curve which increasingly approaches the circle over time.

Whether Newton or Einstein describes the process quantitatively, they cannot emphasize why the planets move in forms that increasingly approach the circular one. This is because they lack the law of energy conservation that expresses this form of presentation.

Eliminating Newton's Gravitational Constant and Charge in Coulomb's Law

In the explanations given, there seems to be no reason for the use of the Gravitational Constant. The masses of the objects analyzed were larger than Planck's. The consideration of the problem for masses smaller than Planck's considers the use of charge unnecessary.

The reasoning above leads to the conclusion that the values of the radii given in the results table and converge with those of the Schwarzschild Radius should be divided by 2. This operation encounters a difficulty in cases of objects with a mass smaller than Planck's, for example, the electron. By determining the Schwarzschild Radius for all objects regardless of their mass with the formula $r_{shv} = 2Gm/c^2$, physics attributes to the electron a radius $r_{shvel} = 1{,}321\,.10^{-57}m$. But meanwhile, it emphasizes that the result found should not be considered physical reality, because these dimensions are in contradiction with Planck's Length. Is this really the cause, or does the problem have a principled character? The General Theory to find the Schwarzschild Radius uses only the formula $r_{shv} = 2Gm/c^2$. If it applies it to all objects regardless of their mass, it must first adhere to Schwarzschild's reasoning, which through extrapolation, assumes that the object is at rest. This conclusion does not correspond to the case of the electron. At rest, it has the Classical Radius, the value of which is $2{,}81\,.10^{-15}\,m$. This value corresponds to the Maximum Radius. The formula of the General Theory, which determines only one type of radius, that of the Schwarzschild Radius, according to the work, confuses the roles of the Schwarzschild Radius with the Classical Radius, determining the former as the Maximum Radius and the latter as the Minimal Radius.

We write below the correction of the values of the radius of the electron.

$$r_{shvel} = r_{klel} = r_{maxel} = 2.81\,x\,01^{-15}m \qquad (36)$$

Referring to the ideas of the work that emphasizes that at the intersection we have the limit of the applicability of the classical theory of electromagnetism, the Classical Radius should be divided by 2. As a result of the confusion of the Schwarzschild Radius with the Classical Radius by calculating through the Schwarzschild formula, it is the division between gravitation and electromagnetism. The idea of uniting them into one theory is not successful, as proven by Einstein and costing him half a century of effort. The difficulty presented above, where the Schwarzschild Radius is confused with the Classical Radius, is clearly reflected in the theoretical practice. Thus, the radius of the electron is determined sometimes with the value of the Classical Radius, and sometimes divided by 2. Showing that in the second case, the explanation takes into account that the value found is reflected based on the principles of Quantum Mechanics.

For the work, this result is logical and corresponds to what was analyzed above for the limit of the applicability of the General Theory. The correction of the values is done as follows;

$$r_{pikel} = r_{maxel}/2 \qquad (37)$$

Respecting, but only formally, the presented table which emphasizes the correspondence of the results with the General Theory, the work divides by 2 what is called the Schwarzschild Radius for the electron, thus formally accepting it as the Maximum Radius. Meanwhile, recognizing the situation, the correction is made in the actual calculations that help determine the final limit of physical theories, a limit that corresponds to Planck's Length. The correction is valid for removing the distinction of gravitational forces from electromagnetic ones, but also for constructing a new law of quantum gravitation. Through the curves of exposed and unexposed energy that intersect at points zero and c, we can conceptually present here an idea analogous to that of Dirac for matter and antimatter. For the case of the electron, when the curve of Exposed Energy goes to point c, we have the maximum energy state of it, where it can also be seen as a positron. The correction given through the figures emphasizes first the results achieved from the work that uses the concepts of the Minimal and Maximal Energy State, expressed through the Maximal and Minimal Radius, and the General Theory, which uses only the concept of the Schwarzschild Radius.

The conclusion of the above analysis, which seems foreign to physics, is based on the graphic curves of energy, which by defining it as a constant quantity, gives a completely quantum character to the table through the concept of the Energy State. The work emphasizes here the idea that the issue presented above is not the domain of theories that see energy as a continuous quantity. These theories cannot precisely define the lower and upper limit of the applicability of the laws, which as analyzed, is reflected only by the values of the Maximum and Minimum Radii.

Unifying Gravitation with Electromagnetism and the New Quantum Nature Law of Gravitation, the Field of Application of Which Corresponds to Planck's Length.

Theoretical physics accepts the concept of the Schwarzschild Radius, but considers it a physical reality only for objects with mass larger than Planck's. Meanwhile, it excludes other values, based on the reason that space-time parameters are in contradiction with Planck's Length. Although there is no theoretical proof that legitimizes this condition coming from Planck's table or Wheeler's hypothesis, the work analyzes the situation after it is easily noted that many of the values of the radii it provides contradict the condition. It determines the situation when the Maximum Radius with speed reaches the value of the Minimal Radius where we have the Maximum Exposed Energy.

The first step is presented by the force-radius correlation written as follows;

$$\frac{F_{max}}{F_{min}} = \frac{r_{max}}{r_{min}} \qquad (38)$$

Using the formulas of the maximum and minimum radii, for example, those of the electron, we easily find the corresponding force ratio. From the application of the numerical values of the formula, we see that the ratio $F_{\max el}/F_{minel}$ is $2{,}13.\,10^{42}$. The transition from the minimum force to the maximum exposed force, referring to the universal law that expresses the force-distance relationship, leads to the reduction of the physical or real radius of the object by the fourth root of the numerical value of the force ratio. The work determines the real radius of the object, starting from the point of rest where its real radius according to it is $r_{max}/2$until we reach the minimal radius. In this area, beyond the intersection, which the work considers outside the limit of the applicability of the General Theory, the space-time parameters that express the ratio r/*t* =*c*, are of quantum character but only virtual. Respecting the force-radius correlation and the universal law that expresses it, we substitute the forces with their respective radii and find the real radius.

$$l_{realq} = \frac{r_{max}/2}{\sqrt{\frac{r_{max}/2}{r_{min}}}} \quad (41) \qquad ose \quad l_{reale} = \frac{r_{real\,q}}{\sqrt{\frac{F_{min}}{F_{max}}}} \qquad (39)$$

With minimal arithmetic manipulation, we write the last formula as;

$$l_{reale} = \sqrt{\frac{r_{\max}.\,r_{min}}{2}} \qquad (40)$$

Placing the numerical values, we apply the last formula for the electron

$$l_{real\,el} = \frac{\sqrt{2{,}81.10^{-15}.1.321.10^{-57}}}{2} = 1{,}364\,.\,10^{-36} m.$$

The formula is valid for all material objects from the electron to the universe. It characterizes the final state of any object regardless of its mass. At the point where the Energy State has the maximum value and the force has the same value. From this point, which corresponds to Planck's Length, we can find the value of the force anywhere we want by utilizing the force-distance relation. The conclusion thus reflects a new law of quantum gravitation, which shows in a theoretical perspective the way of the existence of a material object. We emphasize here that the conclusions reached do not need the concept of charge or the gravitational constant. This expresses the unification of gravitation with electromagnetism.

Comparing the numerical values with Planck's Length, we see the analogy;

$$\frac{l_{reale}}{l_{plank}} = \sqrt{0{,}98.a} \tag{41}$$

Planck does not place a in his table, as it is discovered later by Sommerfeld. The conclusion emphasizes that in nature, we cannot find values smaller than that of the Real Radius, which corresponds to Planck's Length. It is not difficult to get exactly the result of this length in the value emphasized by Planck. The Classical Radius of the electron divided by the Sommerfeld Constant gives what we call the Characteristic Length of the electron. It corresponds to the value $3.86.10^{-13}\,m$. For the work, this value expresses the state of the electron at rest. Or expressed differently, its hit by the photon enlarges the value of its wavelength to the value we see. But as emphasized before, the electron presents a minimal energy state at rest expressed through the Classical Radius. The conclusion emphasizes that the ratio of Planck's Constant to the Sommerfeld Constant gives the ratio of the magnetic field to the electric field.

$$\frac{h}{ah} = \frac{magnetic\ force}{electric\ force}$$

Placing a expands the limit of the applicability of our laws to the point called rest. It also solves the dilemma that preoccupied Newton expressed with the "First Force" for a universe that initially could have been at rest. Placing a makes it possible to correct this problem that appears in the works of Bohr, De Broglie, or Schrödinger, which attribute an infinite wavelength to the electron at rest and zero at point c. Placing a and the concept of the Energy State allows us to state that the relation ah conceived here as the smallest quantum of rest energy, can replace that given by h. Placing a gives a quantum explanation, or a different one, to Heisenberg's Uncertainty Relation. Placing initially the two equations allows us to see the differences between them.

Heisenberg's Relation	**Work's Equation**
$dp\ x\ dx\ \geq h$	$mcr \geq ah$

In Heisenberg's relation, energy expressed by the concept of speed v is considered a continuous quantity. It also shows that we are talking about small energy values. The situation reminds us of the analogy with Classical Mechanics. Heisenberg's Uncertainty Relation, which claims that in the small, the energy expressed by the concept of speed v, can be considered a continuous quantity, legitimizes the placement of arbitrary values of momentum or the parameter x. It is enough to satisfy the condition set by the author. The work's equation shows why the values of momentum x length cannot be smaller than the Energy State determined by ah.

6. CONCLUSIONS

One of the fundamental reasons that motivates the work to follow the consequences of the Descartes-Leibniz debate comes from the Method that emphasizes the rule of constructing fundamental theories, a rule that conceptually separates them from today's theoretical models.

The work attempted to prove the idea initially presented by Descartes with the Thesis "On the constant quantity of motion" as well as Leibniz's suggestion for its realization through the process of transformation. Despite the progress it brought to physics, it could not be realized. More than the success of the Special Theory that proved that the classical kinetic energy $E_k = mv^2/2$ is valid for low speeds, the reasons for non-realization are of a different nature. The goal is not achieved neither by the invariance relations, such as the invariance of the speed of light proposed by Einstein in the Special Theory, nor by the different forms of energy as operated in Newton's Classical Mechanics. The attempt to go from the laws of force to those of energy expresses the first fundamental defect of the Relativistic Theory. Not having at hand the formula $E = mc^2$, which is discovered after the construction of the Special Theory, Einstein goes to the idea that with speed the energy of the object increases, which for the work is an incorrect conclusion. The figure below emphasizes the idea why it is not possible to go from the laws of a lower form like force or momentum to those of energy, but the opposite is possible.

Despite being imposed due to the initial process of understanding nature, this way of advancement does not achieve the goal. The figure shows, according to the work, the impossibility of this effort.

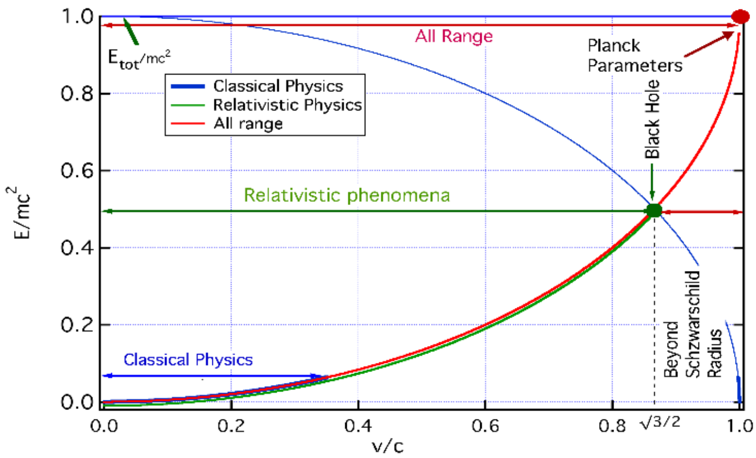


Figure 6

We can go from Einstein's laws to those of Newton, but the opposite is impossible. Likewise, we can go from the laws of Quantum Mechanics to those described by Einstein, but the opposite seems impossible. As above, we say by analogy why it is not possible to go from the laws of force and momentum to those of energy, but the opposite is feasible.

However, energy cannot be considered a continuous quantity because this consideration leads to infinite quantities. Placing another inherent characteristic of the object, the Energy State, removes them from the physics scene, enabling the realization of Descartes' Thesis. Referring to the central idea of the work, the process of deriving laws from Quantum Mechanics to the theories described takes the simplest form. The process appears in the formulation below.

Energy- momentum -force

$$mc^2 - mc - f$$

The process shows the difficulty of transitioning from simpler forms of laws to higher ones through integration. The difficulty is analogous to the attempt that seeks through the shadow, which is a product of the leaves of a tree, to find the number of leaves that created this shadow. Or expressed differently, to go from a straight line to a circle. Which figuratively seems to also represent the fundamental law of energy conservation.

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APPENDIX

1) Elimination of Newton's gravitational constant

Newton's gravitational constant is defined as the force between two objects with a mass of one kilogram at a distance of 1 m. Here it originates from the object's field itself. We first find, referring to formula (26), the minimal radius of the object from which the maximum force originates.

$$r_{min} = \frac{\alpha\hbar}{mc} = \frac{7.297\times10^{-3}\ 1.054\times10^{-34}}{1.3\times10^{8}} = 2.563\times10^{-45}m \quad (42)$$

The second step requires determining the force from this radius, which is of virtual character.

$$F_{max} = \frac{mc^2}{r_{min}} = \frac{(1\times3\times10^{8})^2}{2.562\times10^{-45}} = 3.513\times10^{61}kg\ m/sec^2 \quad (43)$$

We find the value of this force at a distance of 1 m in the third step.

$$F_1 = \frac{F_{max}}{[r_1/l_{min\_real}]^2} = \frac{3.513\times10^{61}}{[1/1.364\times10^{-36}]^2} = 6.54\times10^{-11}kg\ m/sec^2 \quad (44)$$

The result obtained is 98% of the value given for Newton's gravitational constant.

2) Elimination of the fundamental constant of Coulomb

As in the previous cases, we find the minimal radius of the electron and then the maximum force.

$$r_{min} = \frac{ah}{1/mc} = \frac{7{,}293.10^{-3}.6{,}62.10^{-34}}{1/9{,}1.10^{-31}kg.3.10^{8}m/s} = 1{,}321.10^{-57}m \quad (45)$$

The value corresponding to the Schwarzschild Radius is divided by 2 as emphasized in the work.

$$F_{maxel} = \frac{mc^2}{r_{min}/2} = \frac{9.1.10^{-31}9.10^{16}}{1.321\ .10^{-57}/2} = 1.231.10^{44}\ kg/ms^2 \quad (46)$$

Now we find the value of this force at a distance of 1 m.

$$F_1 = \frac{F_{max}}{[r_1/l_{min\_real}]^2} = \frac{1{,}231\ .10^{44}}{[1/1.364\times10^{-36}]^2} = 2{,}3\times10^{-28}kg\ m/sec^2 \quad (47)$$

The value is the same as given by Coulomb's Law:

$$F(r) = ke^2 = (9)(10^9)(1.6\times10^{-19})^2 = 2.3\times10^{-28}\ kgm/sek^2 \quad (48)$$

3) Calculation of the values of nuclear forces

The work does not make any distinction between the types of forces in nature. It is known that the forces called nuclear forces act at a distance of $10^{-14}m$. The problem solved is analogous to the previous examples. The only specificity is that the force for objects with mass smaller than Planck's Mass does not depend on mass. Therefore, in calculations, we use the mass of the electron and not the proton.

$$F_{max} = \frac{mc^2}{r_{min}/2} = \frac{9{,}1\,.10^{-31}kg\,x9.10^{16}m^{2/sec^2}}{1{,}321\,.10^{-57}/2} = 1{,}22.\,10^{44}kgm/sec^2 \qquad (49)$$

$$F_1 = \frac{F_{max}}{[r_1/l_{real}]^2} = \frac{1{,}22{,}\times10^{44}}{\left[1x10^{-14}/1.364\times10^{-36}\right]^2} = 2.94\,kg\,m/sec^2 \qquad (50)$$

4) Calculation of the acceleration on the surface of the Earth

The problem is related to the demand to find out what is the force of the Earth with mass $5{,}974.10^{24}$kg on its surface when the value of its radius is $6371.\,10^6\,m$. The first step requires determining the minimal radius of it. Then the maximum force that originates from the real length $1.364\,.10^{-36}\,m$:

$$r_{min} = \frac{\alpha\hbar}{mc} = \frac{7.297\times10^{-3}\;1.054\times10^{-34}}{5{,}974\;x\;3.10^8} = 4.291\times10^{-70}m \qquad (51)$$

$$F_{max} = \frac{5{,}974\;x10^{26}\;\left(1\times3\times10^8\right)^2}{4{,}291\times10^{-70}} = 1.252\times10^{111}kg\;m/sec^2 \qquad (52)$$

Now, we find the value of this force on the surface:

$$F_1 = \frac{F_{max}}{[r_1/l_{real}]^2} = \frac{1{,}252\times10^{111}}{\left[6{,}371x10^6/1.364\times10^{-36}\right]^2} = 5.\,74\times10^{25}kg\;m/sec^2 \qquad (53)$$

Knowing the mass of the Earth and the formula of mechanics for acceleration, we write:

$$a_E = \frac{F_{real}}{m_E} = \frac{5{,}74\;x10^{25}}{5{,}974x\;10^{24}} = 9{,}61\;m/sec^2 \qquad (54)$$

The result is 98% of the value usually given for the acceleration of free fall.

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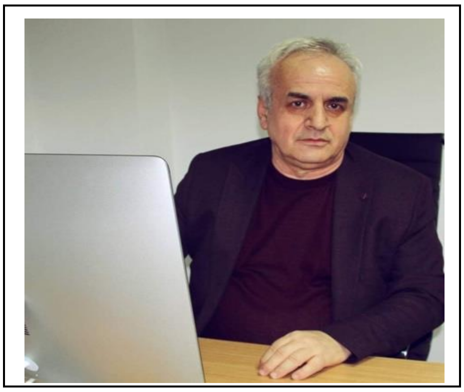
Author



-Birth Date:August 18, 1959

- Education: Technical School of Fier (1974-1978); Goethe Institute, Mannheim, Germany (1992-1993)

- Occupation: Political analyst, publisher of several periodicals such as "Dita Informacion" (1993-1998), "ABC" (2005-2009), and "Konica" (2017-2024) under Nazarko Publishing.

Professional Activities:

- Journalist

- Advisor to the President of the Republic (1991-1992)

- Advisor to the Prime Minister of Albania (1998-2001)

Conference Participation and Presentations:

- International Conference on Physics, Crete, Greece (2015)

- Rome, Italy 2022 Marcel Grossmann meeting
- La Sapienza, University of Rome (2016, 2017)
- Moscow (2018)
- Armenia, 5th Zeldovich meeting (2023)

Additional Achievements:

- FIDE Master in chess