Plastic Spacetime and Not Gravity
- Reconciling General Relativity and Quantum Mechanics

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Abstract

Main current theories and their limits: Theory of Relativity, Quantum Mechanics, Analysis of the limits of theories, "Indefinite" issues: Physical Nature of Time, Missing mass and "dark matter", Mode of energy transmission, "Empty" space.

Premises: Methodological approach, Composition, Quantity and Principle of conservation, Principle of Stability and Minimum Consumption, Definition of "infinite": space, Definition of "infinite": time, Definition of "infinitesimal".

The "Plastic spacetime" and "not-Gravity": Basic assumptions: Continuous versus discrete, Infinitesimal limit,

Basic element, Plastic spacetime: Plasticity, Transmission of energy, Space, Time,

Not-Gravity, Consequences: Premise, Universal gravitational field, Gravitational waves, Dark matter, Light speed, Physical constants.

1 - Main current theories and their limits

The most accredited theories by modern science for the description of physical phenomena are the Theory of Relativity, for macroscopic phenomena, and Quantum Mechanics, with its Standard Model, for microscopic phenomena. Both theories have well known and consolidated experimental results, but they are incompatible in the definition of the structure and functioning of Gravity.

1.1 - Theory of Relativity

The Theory of Relativity correctly describes the mechanics of physical phenomena of the "infinitely large" and for speeds close to that of light, establishing the latter as one of the constant values of the Universe and, consequently, affirming the variability of values dimensions of space and time. With regard to space, it has been experimentally proved that this is curved by the Force of Gravity generated by planets and stars and that its dimensions reduce for speeds close to that of light (contraction of distances). With regard to time, its slowdown as the Force of Gravity increases (time dilation) has also been experimentally proven for it. Furthermore, the Principle of Equivalence is defined, which establishes that the effect of a force of gravity on a body is identical to that of an acceleration equal to that caused by the force of gravity itself. Furthermore, the indiscernibility between space and time is established, combining both in a single topology called "space-time". Finally, through the famous formula E = mc2, the equivalence between mass and energy is sanctioned, in the sense that one is transformed into the other.
At the basis of the Theory of Relativity is the concept of "Continuity" of space and time and the concept of "Determinism", according to which every phenomenon is regulated by laws from which it is not possible to derogate.

Limitations of the Theory of Relativity:
- it does not analyze the ultimate origin of the Force of Gravity
- not valid for microscopic phenomena

1.3 - Quantum Mechanics

Quantum Mechanics is currently the most correct theory in the description of the physical phenomena of the infinitely small, that is, the structure of matter and mechanics at the level of subatomic quantities. Its name derives from the term "quantum", introduced for the first time by Max Planck, with which we intend to define the modality of variation of the value of certain physical quantities, that is to say by "discrete quantities" and not continuously, as believed until then. The innovativeness of this concept of "quantization" concerns not so much matter as energy which, consequently, can only assume certain values and not any values.
Quantum Mechanics is formalized in what is called the "Standard Model", in which the Universe is composed of particles divided, in general, into "particles-matter", called "fermions" and endowed with mass, and " force-particles ", called“ bosons ”, with or without mass, which act as carriers of the fundamental forces. Regarding the structure of particles, the QM establishes their nature as both "particle" and "wave", counterintuitive to Classical Mechanics, which defines light as a "wave" and the electron as a "particle". This “wave-particle” dualism is enunciated by the “complementarity principle”.
With regard to particle dynamics, the QM establishes the impossibility of simultaneously determining their position and speed (impulse). This concept is formalized by the "Heisenberg uncertainty principle". As a consequence of this there is a transition from the "deterministic" approach of Classical Mechanics to the "probabilistic" approach of Quantum Mechanics,

formalized by an "interpretation" of the Schrödinger equation, conceived as a definition of a "probability wave" , variable over time, of the value of a physical "observable" (position, speed, etc.), which wave takes on a unique value only at the time of measurement, through the so-called "collapse of the wave function".
At the basis of Quantum Mechanics is the concept of "Discrete" ("Quantum") and "Probability", according to which matter and energy are agglomerations of their discrete quantities and follow probabilistic rules of behavior.
Some aspects of "arbitrariness" and "counterintuitiveness" of Quantum Mechanics should be highlighted:

- the "uncertainty principle", in reality, establishes nothing but an "inability" to carry out certain types of measurements of the state of matter, which, however, represents a "human" limitation, not a limitation of the nature of the Universe: the fact that we are not able to simultaneously determine the values of certain physical quantities certainly cannot mean that these values, simultaneously, do not exist but are only "probable"
- consequently, it is arbitrary to introduce the concept of "probability" into the physical structure of the Universe
- the "wave-particle dualism", stated in the "principle of complementarity", can refer to the "behavior" of a physical component, not to its "constitution"
- it is not enough to note that an explanation of certain phenomena is "counterintuitive" to assume it as real, as for "quantum entanglement"
- the "observer" cannot have an "active" role in the formalization of the principles that define the structure and functioning of the Universe.

Limitations of Quantum Mechanics:

- what logic justifies the "probabilistic" definition of physical reality
- what logic justifies the "collapse of the wave function" and the importance given to the role of the "observer"
- failure to define and identify the "lower limit" of the "quantum"
- failure to define and identify the "graviton", if not as a "hypothetical particle"
- failure to define the modalities according to which the phenomena of attraction and repulsion between particles, energy transmission, force fields occur

1.4 - Analysis of the limits of theories

The limitations of current theories, starting with the Theory of Relativity and Quantum Mechanics, in their attempt to describe the structure and functioning of the Universe give rise to multiple problems that remain
The most relevant of these issues can be identified in the following:

- irreconcilability between the concepts of "continuous" and "discrete"
- irreconcilability between the concepts of "deterministic" and "probable" and their actual physical validity ultimate nature of the Gravity Force
- nature of the ability to "movement" of energy (e.g. light)
- physical identification of the concept of "empty space"

1.5 - "Indefinite" issues

There are some elements of physics that do not yet have a precise and coherent definition.

1.5.1 - Physical Nature of Time

A problematic "ignored" is related to time, that is, its meaning, its nature and its functioning. Analyzing the matter in depth, none of the so far developed physical theories has shown, and less than ever formalized, a physical nature of time that is equivalent to those of matter and energy. The current conception of "time" comes more from a universally accepted convention, almost congenital, rather than by its detection as a physical entity, that is to say that it does not have its own definition, but rather is defined as "the difference between the two values" of a concrete physical quantity, or as "distance between two events". A formalization of this kind leaves room to the question on the actual existence of "time" as a physical quantity. Other questions are, however, whether time is "continuous" or "discrete", whether a "particle of time" ("cronone") actually exists, whether or not it has a unique "direction", whether or not it is "unique".

1.5.2 - Missing mass and "dark matter"

Experimental observations have established that "visible" matter is not present in sufficient quantity to satisfy the laws of gravitation, representing only 10% of the matter present in the Universe. To justify these observations, a hypothetical component of matter called "dark matter" was introduced, which should represent the remaining 90% matter of the Universe. The existence of this "dark matter" could also answer the question of whether the Universe will evolve in a "Big Crunch" or if its current state of "expansion" is infinite. The characteristics of this hypothetical "dark matter" are such that its presence can only be detected "indirectly", that is through phenomena concerning the rotation of galaxies, the "gravitational lenses", the deviation of light in the absence of visible masses.

1.5.3 - Mode of energy transmission

There are different types of energy, whose transmission modes have in common the presence of a "medium" through which the energy itself propagates. Only electromagnetic radiation seems to escape this rule.

- Sound

Starting from the case of sound transmission, we know that sound waves propagate by moving the molecules of the medium through which they travel, so it is the source that gives energy to the surrounding molecules in the form of movement. This movement causes the surrounding molecules in turn to move those close to them, in order to create a wave that propagates in a direction that is increasingly distant from the source. The wave subsists and propagates as long as, due to the friction between the molecules themselves, they absorb the energy, supplied by the source, which causes the movement, causing the progressive attenuation of the wave, until it disappears.

- Heat

In the case of heat transmission through a medium, the transmission takes place by the emanation of heat from a source, which also provides the direction of propagation of heat in the surrounding space and propagates by excitation of the particles of the medium through which it spreads. The phenomenon underlying the propagation of heat, consisting in the excitation of the particles that constitute the medium through which the heat propagates, is given by the absorption of the energy received by a particle; the absorbed energy brings the particle into a state of unstable excitation, so that the natural tendency is to return to the closest stable state

by releasing excess energy. This occurs through the transmission of this amount of energy to the surrounding particles. The cascade repetition of the described phenomenon constitutes the propagation of heat through the medium.

- Electromagnetic radiation

The transmission of electromagnetic energy also occurs through a medium, which can be fluid or solid, and follows laws similar to those of sound. The exception is its ability to propagate, in the form of "radiation", even in what is called "empty space", or in circumstances of "absence of a transmission medium".

1.5.3 - "Empty" space

What has been reported regarding the modalities of electromagnetic radiation transmission leaves unresolved the problem regarding the concrete definition of "empty space" and how the radiation can actually propagate in it.

2 - Premises

The identification of the physical structure and functioning of the Universe must necessarily start from some basic premises, which establish essential axiomatic concepts, according to an objective logic.
At the same time, methodological criteria to be followed for the mathematical formulation of the relative laws must be established a priori.

2.1 - Methodological approach

The study of a physical entity always requires an objective methodological approach, that is to say that, in an arbitrary way, it does not exclude existing elements and does not introduce non-existent elements.
In defining the laws that describe the functioning of the Universe as a whole, we must start from the reality of what exists and then arrive at the formulation of mathematical laws, not start from a mathematical formula and translate it into reality. Finally, NOT everything that is NOT detectable does NOT exist.

2.2 - Composition

In the state we know, the fundamental components of the Universe are matter and energy. Since the Theory of Relativity has established that matter and energy are equivalent, we deduce that they are two of the different states that can be assumed by the same substance, which we can call "Fundamental substance". This is none other than the agglomeration that initiated the expansion of the Universe, following the Big Bang.

2.3 - Quantity and Principle of conservation

The quantity of the fundamental Element, which is present and constitutes the Universe, is defined, finite and fixed. In other words, the following applies:
What does exist cannot be erased, what does not exist cannot be created.

2.4 - Principle of Stability and Minimum Consumption

The evolution of any physical phenomenon tends to achieve a "stable" state, or a state to which the phenomenon tends to return spontaneously. At the same time, this "stable" state is always reached through a path that provides for the minimum possible energy consumption.

2.5 - Definition of "infinite": space

The material concept of "infinite space", or infinitely large, is assimilated, as usual, to the corresponding mathematical one. In concrete terms, logic dictates that what we define as "infinite space" cannot be understood in the common sense of "which has no end". The only permissible concept of "infinite space" is that of "circle", or "sphere", in the sense of a "path without a point beyond which it is not possible to go”.

2.6 - Definition of "infinite": time

Distinctively from other physical quantities, time is, by its nature, an abstract quantity, as it can only be defined starting from other physical quantities. Moreover, without prejudice to the need to revise the definition and, even before, the validity of the concept of "time" itself, the only concept of "infinite time", or "eternity", logically admissible is that of "pendulum", to say “which repeats itself cyclically”. Defined in these terms, the physical quantity "time" is closely linked to the physical quantity "space", as established by the Theory of Relativity.

2.7 - Definition of "infinitesimal"

Unlike the concept of "infinity", for which it is possible to identify a coherent concrete definition, the same approach cannot be applied to the opposite concept, that is "infinitesimal". According to the same logic adopted for the concept of "infinity", the concept of "infinitesimal" must necessarily be, in some way, "limited", so the problem arises of identifying the terms of this "limitation". A fundamental need for this "limitation" is to identify the "basic element" on which all the other quantities are built and from which, ultimately, the specific values of the Universal Constants we know, starting with that of the Speed of the light, derive. It is evident that this "basic element" constitutes the "lower limit" of the physical concept of "infinitesimal".

3 - The "Plastic spacetime" and "not-Gravity"

Summarizing the assumptions of the current theories to be considered axiomatic, starting from the "macroscopic" up to the "microscopic", we obtain the following.

- the speed of light is "constant" and immutable
- space and time are "variable", so as to satisfy the constancy of the speed of light
- space and time are two aspects of the same entity, "spacetime"
- "spacetime", being "variable", can be "curved" by a force, the "force of gravity"
- the "curvature" of "spacetime" generates preferential "paths", which "guide" the propagation of light
- the "force of gravity", or simply "gravity", is generated by accumulations of matter; the greater the amount of matter, the more intense the gravity, the greater the curvature of "spacetime"
- matter, or mass, and energy are "equivalent", that is, one can transform into the other, so we can define it "massenergy", similar to "spacetime"
- the "massenergy" is made up of "particles", in turn composed of smaller and smaller particles, and each with its own characteristics
- the "particles" can "combine" or "divide", turning into other massenergy particles

3.1 - Basic assumptions

The main incompatibilities between modern physical theories have the following concepts as fundamental points:

- continuous versus discrete
- infinitesimal limit
- basic element
- plastic space
- not gravity
- consequences

3.1.1 - Continuous versus discrete

The concept of "continuous", applied to any physical entity, by its nature implies the "non-discontinuity" between the values that a physical quantity can assume. This means that two contiguous values are "infinitely close", which results in the impossibility of obtaining a measurement of absolute precision, as between those two values there would always be an intermediate value. Accepting this assumption would give physical truthfulness to Zeno's “Achilles and the Turtle Paradox”, with particular reference to the description given by the Argentine writer Jorge Luis Borges, and would be incontrovertibly in contrast with logic and reality. As a consequence of this, the only context of validity of the concept of "continuous" is that of being an "approximation" linked to the "macroscopic" sphere, or in the "infinitely large". The only logical alternative that remains, for the evaluation of physical entities, is that of "discrete", that is to say that these entities, understood as physical quantities, can only assume a "finite" number of values, that is limited below, and whose differences between two of them are different for different quantities, but identical for a single quantity.
The problem that arises at this point is to physically identify the "infinitesimal limit" of each physical entity or quantity.

3.1.2 - Infinitesimal limit

The assumption of the concept of "limited infinitesimal" implies the invalidity of the concept of "continuous" and, as a consequence, gives logical and physical validity to the concept of "discrete", typical of Quantum Mechanics. Applying this concept of "discrete" to physical reality, Quantum Mechanics defines a structure of this reality based, in very simple terms, on a "Matryoshka" model, formalized in the well-known "Standard Model". Using this model, Quantum Mechanics establishes that any physical entity is composed of "quanta", or "particles", that each particle is made up, in turn, of an agglomeration of smaller particles (eg- molecule-> atom -> nucleus-> proton-> quark ...?) and that each particle can be broken down into its component particles. Of course, the decomposition of a particle into its component particles requires an amount of energy: this amount of energy grows the more the smaller the particle to be broken down. It is at this point that the "lower limit" of the concept of "infinitesimal" is defined, that is to say the one constituted by that particle for which "**the existing energy is not sufficient to break it down**". This assumption constitutes the definition of the "fundamental property" of the "basic element". The next step is the physical identification of this element.

3.2 - Basic element

Returning to the transmission of an electromagnetic field, this however is a transmission of energy, which, as long as it occurs in a fluid or solid, as described above, is part of the normal transmission of energy. On the other hand, this raises the problem of how the energy of an electromagnetic field propagates in what we call empty space, starting from the assumption that by vacuum we mean the absence of a medium. The logical conclusion is that what we call empty space is actually not empty, but consists of a particle-like medium, capable of allowing the transmission of energy. The acceptance of this assumption has the logical consequence of **extending the concept of "non-empty space" to all space**, finally reaching the statement that "**all the space of the Universe is made up of material particles**", each of which constitutes the "basic element".
These material particles can be defined as "**spacetime particles**" and constitute the smallest physically detectable particles, or the "lower limit" to the decomposition of the particles, according to the assumption of "infinitesimal limit".

3.3 - Plastic spacetime

The "particles of spacetime", considered in their totality, constitute what is defined "**Plastic spacetime**".
The characteristics of spacetime particles are obviously related to the physical quantities of Space and Time and totally correspond to the definition of spacetime given by the Theory of Relativity. Another feature concerns the "transmission of energy". But the main feature is the “**plasticity**".

3.3.1 - Plasticity

The "plasticity" of spacetime particles consists in their ability to compress or expand when subjected to an external force.

3.3.2 - Transmission of energy

This characteristic consists in the ability to absorb and release energy without it suffering losses or increases. In this way, the energy that is released by the particle is exactly equal to that which has penetrated it. In summary, the transmission of energy occurs with "**zero attenuation**".

3.3.3 - Space

By “space” characteristic we intend to identify this particle as the “minimum quantity” of detectable, invariable and, by its nature, not decomposable space. Ultimately, according to the criteria of Quantum Mechanics, it represents the "**quantum of space**".

3.3.4 - Time

In terms completely analogous to the previous one, by characteristic "time" we intend to identify this particle as the "minimum quantity" of detectable, invariable and, by its nature, not decomposable time. Ultimately, according to the criteria of Quantum Mechanics, it represents the "**quantum of time**".

3.4 - not-Gravity

The concept of "plastic space-time" represents the element that allows us to reconcile the Theory of Relativity with Quantum Mechanics, providing a logical solution to the problem represented by the Force of Gravity. This solution is simply "**not-Gravity**".
Starting from the definition of "space-time curvature" of General Relativity, it can be stated that "spacetime particles", due to their characteristics, when subjected to external forces can:

- contract, shrinking space and dilating time
- expand, expanding space and restricting time

while maintaining the same "quantity" of both.
At the same time, the external forces, exploiting the "energy transmission" characteristic of the "spacetime particles", are able to propagate through them.
The logical consequence is that it is precisely the "**fundamental forces**", those that hold the elementary particles together to form matter, which are responsible for the "**contraction" of the spacetime particles**, thus causing the "**curvature of spacetime**". The consequence of this is that **"gravity" conceived as "force" does not exist**, but actually consists in the "curvature of space-time" of General Relativity, but of a **material "plastic spacetime"**.
Hence the definition of "**not-Gravity**".

3.5 - Consequences

The previous definitions "Plastic spacetime" and "not-Gravity" obviously have significant repercussions on various aspects of physics that are still, in part or completely, not explained.

3.5.1 - Premise

With the Big Bang began the transformation of part of the fundamental substance into matter, of the diffusion of the remaining part in the form of radiant energy and, finally, the expansion of plastic spacetime and the movement of matter in it, that is the **expansion of Universe**.
The motion of matter was at the origin of aggregation phenomena, which gave rise to the formation of those clusters that, today, we define galaxies, stars and planets.

3.5.2 - Universal gravitational field

The concentration of matter in the form, mainly, of stars and planets of various sizes is at the origin of the "**curvature of plastic spacetime**", what has so far been defined as the "**universal gravitational field**", or "curvature of space-time" of General Relativity.
The greater the concentration of matter, the greater the contraction of the “spacetime particles”, or the “curvature of plastic spacetime”.

3.5.3 - Gravitational waves

According to the definition of "universal gravitational field", "gravitational waves" are nothing more than the **propagation in "plastic spacetime" of the variations of its "curvature"**, due to displacements or variations in the concentration of the matter present in it.

3.5.4 - Dark matter

Starting from the definition of "plastic spacetime" as consisting of material "particles of spacetime", it is reasonable to assume that the so-called "missing mass", or "dark matter", is nothing more than **the set of "plastic spacetime" itself**.

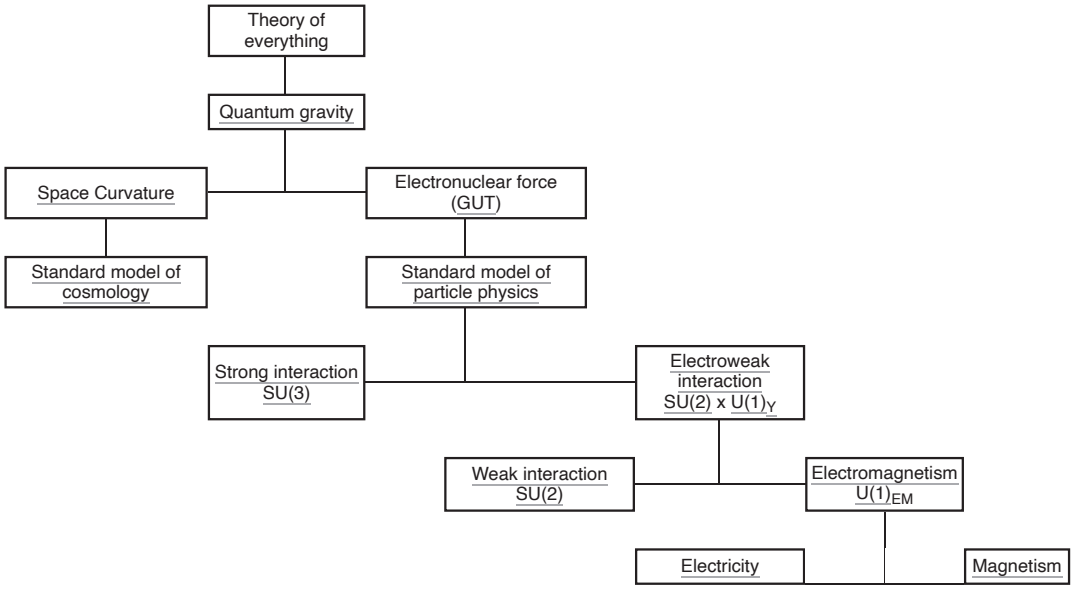
3.5.5 - Light speed

Given the characteristic of "spacetime particles" of "Energy transmission" with "zero attenuation", which allows them to absorb and release energy without losses or increases, it follows that the light speed derives from the fixed relationship between these two “events" (absorption / release) and the “time" between them. Since these characteristics are constant for each spacetime particle, independent of their level of "contraction", or "curvature of plastic spacetime", it follows that, as already known, even **the overall light speed itself is constant and independent of the "curvature"**.

3.5.6 - Physical constants

The definition of "spacetime particle" and "plastic spacetime", in addition to reconciling the Theory of Relativity with Quantum Mechanics, provides the possibility of **tracing back to the only two constant values** ("quantum of space" and "quantum of time") of a single element (the "space-time particle" itself) **the values of all the fundamental constants**, starting with the light speed.

4 - Graphics


Theory of everything
Quantum gravity
Space Curvature
Electronuclear force (GUT)
Standard model of cosmology
Standard model of particle physics
Strong interaction SU(3)
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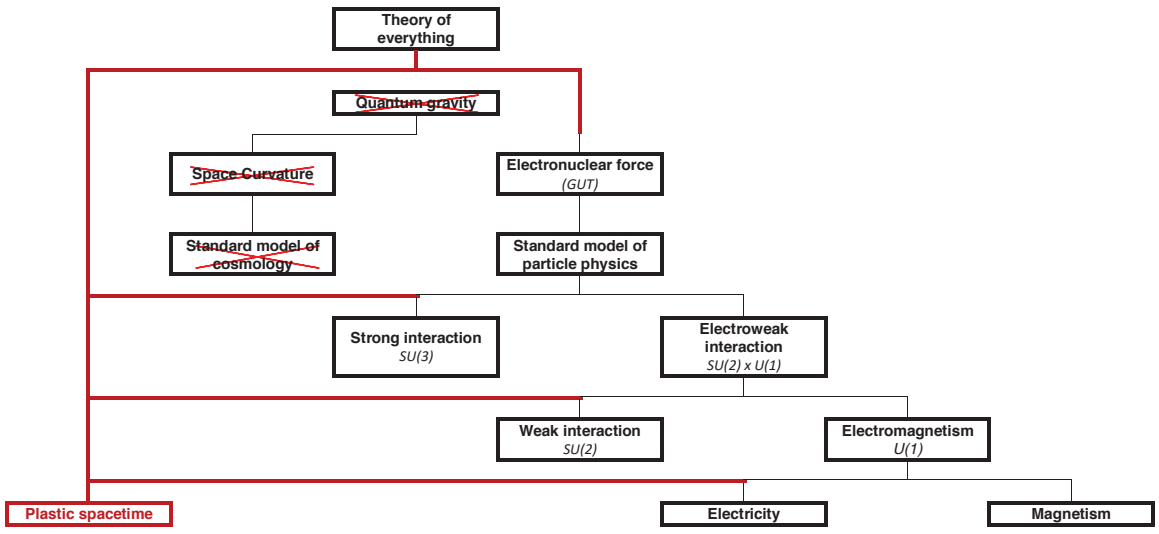
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