

Minimum Contradictions Physics as a New Paradigm

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Abstract

According to the existing experience, the various theories of physics include more or less some contradictions. The problem raised is whether the theories themselves are contradictory or if the system through which they are stated i.e. the language includes contradictions. The aim of this work is to show that the basic system of communication is contradictory and that the continuation of any research based on logic can be achieved only by means of a claim for minimum contradictions. In this way, it is possible that a minimum contradictions physics can derive from which, under certain general assumptions-simplifications, can derive the known laws of nature and new phenomena can be interpreted such as these related to the correlation of gravitation and electromagnetic field. The fact that this physics is based only on the basic communication system –the extreme consequences included– provides the frame for a new paradigm as this constitutes a request of many scientists today.

1. Introduction

On the basis of Thomas Kuhn's "The Structure of Scientific Revolutions", F. Muller has written that a new paradigm cannot constitute an evolution of an old theory [1]; there must be a new theory i.e. a new set of axioms commonly accepted. Thus, the question is raised whether there is a privileged set of axioms in physics. A purpose of this paper is to show that there is a privileged set of axioms in physics and this is the set of axioms on which our basic communication system i.e. the language is based. In fact, it is impossible to imagine a theory out of language. Therefore, any physics theory includes the language axioms on which it is based and any further axioms proposed. Thus, we can minimize contradictions when we eliminate the further axioms mentioned. Our basic communication system is based on the Aristotelean Logic, the Leibniz's sufficient reason principle included as well as the axiom that there is anterior-posterior. In fact, in our language for everything we seek the reason of its power; we put a phrase after another phrase, a word after another word e.t.c. It can be proved that this basic communication system is contradictory. When, despite this, we communicate in a way that we consider logical, this means that we try to understand things through minimum possible contradictions since contradictions are never vanished [2]. A theory is stated based on the claim for minimum contradictions when it is stated based on the principles of the basic communication system itself since in this case any arbitrariness caused by further axioms is avoided. The claim for minimum contradictions, despite being completely general, can lead by itself to the statement of a minimum contradictions physics theory; under certain simplifications both the relativity theory and the QM can derive; space time is stochastic and its geometry is described by the aid of a Ψ wave function; the electromagnetic (em) space-time is a space-time whose all magnitudes are considered imaginary and behave exactly like the gravitational (g); the (em) space coexists with the (g) one, the two of them being interconnected. Taking into account all these we can conclude that "useful energy and momentum can be produced by means of an asymmetrical approaching-distancing of an electron with a proton". In this way, the gravitoelectrical Biefeld-Brown effect can be interpreted; this has been experimentally verified. Phenomena such as arrow of time, forces' unification, electric clusters stability, self-similarity of matter systems, light water electrolysis energy production e.t.c. can have further explanation on the basis of the present point of view. Most of these aspects have already been exposed in previous works [3,4,5,6,7,8,9,10,11]. What is being tried in the present work is to show that the minimum contradiction physics can

constitute an autonomous new paradigm which is in accordance with the already revealed experience since, under conditions, the laws of nature derive.

2. The basic communication system

From Aristotle it is known that the way in which we communicate obeys the rules of logic. These rules are the rules of identification. These rules are included in the following principle [12]:

Principle I: A is A; A is not $\sim A$; It is not possible that something is A and $\sim A$ at the same time.

Apart from these rules Aristotle also stated the causality principle according to which for every thing to happen it must have a reason-cause. Leibniz expanded the causality principle and claimed more generally that for something to be valid it must be able to be logically proved by something else that is valid [13]. This means that we do not only wonder about the causes of things but we also put under consideration the laws and principles that facilitate us with the interpretation of natural phenomena and whose absolute validity nobody guarantees. So, Leibniz principle could be written in the following form:

Principle II: No statement is valid if it cannot be logically proved through some valid statements different from it.

Elucidation: Principle II is valid for any combination of statements i.e. the statement : $A \equiv A_1 \cdot A_2 \cdots A_n$ cannot prove that $A \equiv A_1 \cdot A_2 \cdots A_n$ is valid since it requires some valid statements different from it.

We feel that our communication system obeys Aristotelean principles but also the generalized Leibniz principle which implies the Aristotelean causality principle. To avoid any misunderstandings in the text, the principles of our communication system will be named logic Λ .

We feel that logic Λ is valid but we cannot prove whether it is valid or not. When we already speak logically it means that we have decided to communicate and we cannot but, most generally, think that:

$$\Lambda \vee \sim \Lambda \quad (1)$$

Which means that either logic Λ is valid or logic Λ is not valid. So, our consideration takes the widest credibility. Therefore, we can look into the following cases:

1) $\sim \Lambda$

If logic is not valid the most consistent attitude is silence. When, despite the awareness of the imperfection of logic Λ we continue to speak logically, this means that we accept as valid what includes the minimum possible contradictions given that the contradictions never vanish due to the fact that logic Λ is not valid.

The claim for minimum contradictions constitutes a basic element of this paper and it will be referred to more widely in paragraph 3.1.

2) Logic Λ is valid.

If $R_{\Lambda 1}, R_{\Lambda 2}, \dots, R_{\Lambda N}$ are the statements-reasons for Λ validation then – since any proof requires Λ – we will have that:

$$R_{\Lambda 1} \cdot R_{\Lambda 2} \cdots R_{\Lambda N} \cdot \Lambda \supset \Lambda \quad (2)$$

Since $\Lambda \supset \Lambda$, we conclude that (2) is valid due to Λ itself and does not require any further reason. This is not in contrast with principle II since Λ is regarded as valid due to a hypothesis which of course does not exclude its non validation that has already been examined.

Based on all these and using the symbolic logic [14](though not the frame of the propositional logic but the frame of logic Λ) we will prove the following Statement I:

Statement I: "If logic Λ is by hypothesis valid then any system which includes this logic Λ and a statement A which is not theorem of logic Λ leads to contradiction."

Proof.

We consider the system $\Pi \equiv \Lambda.A$

Because of Λ we have:

$$\Lambda \Rightarrow A \vee \sim A \quad (3)$$

and

$$(\Lambda \Rightarrow A) \vee (\Lambda \Rightarrow \sim A) \quad (4)$$

If Π is complete all statements deriving from Π are valid due to Π itself.

$$\text{If } (\Lambda \Rightarrow A) \quad (5)$$

according to principle II, (5) is valid only on condition that it can be proved from some statements different from it. Because of the completeness of Π the only possibility for statement (5) to be valid is A to be theorem of Λ i.e.:

$$\Lambda \supset A \quad (6)$$

since by hypothesis logic Λ is valid, A cannot prove itself (principle II) and A cannot be proved by means of statements out of Π (completeness).

It is noted that the term $\Lambda \supset A$ expresses an inference while the term $(\Lambda \Rightarrow A)$ expresses an implication. Of course, an inference is not an implication. However, because of (5,6) in the case under study we have that the implication (5) has meaning only as inference (6).

By definition, A is not a theorem of Λ ; therefore we have:

$$\sim (\Lambda \supset A) \quad (7)$$

Because of (4,5,6,7) we obtain:

$$\Lambda \Rightarrow \sim A \quad (8)$$

According to logic Λ we have:

$$A \Rightarrow A \quad (9)$$

Because of (8,9) for a complete system we obtain:

$$\Lambda \cdot A \Rightarrow (\sim A) \cdot (A) \quad (10)$$

Statement (10) is valid for any set of statements $B \equiv A.A'$ since B cannot be theorem of Λ as having a component (A) which is not theorem of Λ .

Taking into account the above mentioned, we conclude the following statement:

Statement II: "If logic Λ is by hypothesis valid then any system which includes this logic Λ and a statement A which is not theorem of logic Λ cannot be complete and consistent at the same time."

This statement can be regarded as a generalized case of Goedel's theorem [15]. This theorem in order to derive uses Aristotlean logic (Mathematica Principia) and axioms which are not theorems of this logic (Peanno's axioms); it also derives on the basis of an arbitrary hypothesis according to which there is an algorithm through which only the true statements can be proved [16,17,18]. This algorithm reminds the sufficient reason principle. However, it is more restricting since it requires for statements validation their arithmetical provability. Thus, its application is restricted only in cases that such an algorithm is valid and of course it cannot be used for logical systems in general.

We consider that Π is not complete. According to principle II, both Λ and A must be provable through some statements different from them. As was mentioned, Λ is by hypothesis valid.

If $R_{A1}, R_{A2} \dots R_{AN}$ are the statements-reasons for A validation we consider the statement:

$$AR \equiv A.R_{A1}, R_{A2} \dots R_{AN} \quad (11)$$

According to statement II, the system

$$\Lambda.AR \equiv \Lambda.A.R_{A1}, R_{A2} \dots R_{AN} \quad (12)$$

should be complete and consistent so that A can be logically provable through statements different from it. However, according to statement II, it is impossible for system $\Lambda.AR$ to be complete and consistent at the same time. Therefore, in general, the system $\Lambda.A$ leads to contradiction regardless of whether it is complete or not.

Therefore, any system which includes the logic Λ and a statement which is not theorem of logic Λ leads to contradiction.

The anterior-posterior axiom in arithmetic can be stated as following [15]:

$$1. \text{ Zero } (0) \text{ is a number} \quad (13)$$

$$2. \text{ There is the next of any number } x \quad (14)$$

For $x=0$ the next is 1. If this axiom was theorem of logic Λ , then "1" should derive from "0". However, the notion "1" is not included in the notion "0".

In fact, according to the common way in which we learn and use numbers, we can correspond 0 to non existence of something and 1 to its existence somewhere. Of course, the non existence of something cannot imply logically its existence. Thus, the anterior-posterior axiom is not a theorem of logic; therefore, statement I can apply to systems that include this axiom i.e. the following can be stated:

Statement III: "If logic Λ is by hypothesis valid then any system that includes logic Λ and the anterior-posterior axiom leads to contradiction."

3. The Claim of the Minimum Contradictions-Consequences

3.1 General [2,3,4]

Our basic communication system consists of Aristotle logic and of a hidden axiom which postulates the existence of anterior and posterior. In fact, every word or phrase is constructed in such a way that the letters or the words are put one after the other. Thus, the basic communication system obeys statement III; however, we notice that statement III cannot be stated because it is based on the basic communication system which, according to statement III itself, is contradictory.

Thus, statement III imposes the silence.

When we communicate, we use a hidden claim according to which "*what is accepted as valid is what includes the minimum possible contradictions*" since the contradictions cannot be vanished. According to this hidden claim, which we could name as "*claim of the minimum contradictions*" [2], we obtain a logical and an illogical dimension. In fact, through this axiom we try to approach logic (minimum possible contradictions) but at the same time we expect something illogical since the contradictions cannot be vanished.

It is noted that we cannot state that *this claim is true* because of statement III. According to this claim, statement III can be stated since contradictions are permitted, but it leads to *silence*. Thus, *the claim of the minimum contradictions can be regarded only as a necessary condition of communication. Therefore, this claim, and whatever derives from it, includes the arbitrariness deriving from breaking the silence while, at the same time, it constitutes a tendency to logic.*

3.2. Compatibility with Relativity theory [5,19]

3.2.1. General

The systems of axioms we use in Physics include the communication system and, therefore, their contradictions are minimized when they are reduced to the communication system itself; because of statement I further axioms - beyond the ones of logic Λ - cause contradictions.

Therefore, we have minimum contradictions in Physics when it is based only on the basic communication system i.e. on logic Λ and on the 'anterior-posterior axiom'.

In order that such physics will be valid, a unifying principle is needed since everything, i.e. matter, field, space-time should be described in anterior -posterior terms.

Thus, *at first sight*, for a least contradictory physics we can state the following statement:

Statement IV: Any matter space-time system can be described in anterior -posterior terms.

It is noted that time implies the existence of anterior and of posterior; space does, too. If I say 10 cm, I mean the existence of 1,2,...,9,10 i.e. the existence of anterior and of posterior. Therefore, the existence of anterior and posterior is the condition for space and time to exist and vice - versa. Thus, because of statement IV, for a least contradictory physics we can state the following:

Statement V: Any matter system can be described in space-time terms.

Since everywhere there is space-time and not something else, space-time can be regarded as matter itself. A matter system, in general, has differences within its various areas. This means that a matter system, in general, is characterised by different rates of anterior - posterior (time) within its various points. Since space is also locally affected by the local rate of anterior-posterior, it is expected to be deformed due to different rates of anterior -posterior. According to the above mentioned, we can state the following corollary:

Corollary I: The existence of matter implies the existence of space time and vice versa.

3.2.2. Definitions [20]

For the purposes of this paper the following definitions are useful:

i. As reference space time we define a euclidean space time to which, through transformations of deformity, any field can correspond. This reference space time is not only a geometrical notion because, according to the present hypothesis, it is also matter. Any magnitude of it will be denoted by the subscript $_0$. A point A_0 of the reference space time occupies by the action of the field a position $A \neq A_0$

ii. As Hypothetical Measuring Field (HMF) is defined a hypothetical field, which consists of the reference space time, in which at every point A_0 the real characteristics of the corresponding point A of the real field exist.

iii. In a HMF, we define as relative space time magnitude sr the ratio of a real infinitesimal space time magnitude ds to the corresponding infinitesimal magnitude ds_0 of the reference space time: i.e. $sr = ds/ds_0$. This can apply to any magnitude as follows :

a) Relative time $tr = dt/dt_0$, where dt is an infinitesimal time of comparison at a given position of the HMF. b) Relative length in a direction \vec{n} $lr_n = dl_n/dl_{n0}$ where dl_n is an infinitesimal length of comparison in a direction \vec{n} and at a given time of the HMF. c) Relative volume $vr = dv/dv_0$ where dv is an infinitesimal volume of comparison at a given time of the HMF. The relative space time magnitudes mentioned above, are denoted by SR, TR, VR, LR_n when they refer to mean values of a particle space time field. Relative space time magnitudes can apply either to a space time continuum, or to a statistical matter field. In the latter case the above magnitudes are denoted by $\overline{sr}, \overline{tr}, \overline{lr_n}, \overline{vr}$ where the superscript $(-)$ denotes the local mean value.

4.2.3. Relativistic Behavior [5,19]

On condition that any space time is considered as a continuum the relativity theory can be regarded as a possible consequence of statements IV, V. In fact any infinitesimal area of a space time continuum can be regarded as an area with constant rate of anterior-posterior and therefore it has not any space time deformity. Thus, time is independent of space in this infinitesimal area and, since its rate is different in various points of the field, it can be regarded as a 4th dimension. Thus, in Riemans's 4-dimensional space with $dx_4 = kdt$, where k a constant with units of velocity so that dx_4 will have units of length, we can write[14,15]:

$$dS^2 = dx'^2 + dy'^2 + dz'^2 + kdt'^2 = dx^2 + dy^2 + dz^2 + kdt^2 \quad (15)$$

$$\text{and } dS^2 = |d\vec{r}'|^2 + k^2 dt'^2 = |d\vec{r}|^2 + k^2 dt^2 \quad (16)$$

For $dS=0$ we obtain:

$$\frac{|d\vec{r}'|}{dt'} = \frac{|d\vec{r}|}{dt} = ik \quad (17)$$

As we notice, there is a velocity that is invariant to the coordinate systems mentioned. This obviously coincides with the Relativity Theory requirement when $k = ic$, where c is the speed of light; eqn (10) implies Lorentz transformations which are the basis of the relativity theory.

Since the physics proposed is based on the notion 'anterior-posterior' and in extension, on the notions of space and time we have not an experience of what energy is on the basis of these notions. We make the following definition for energy which, as it will be shown later, is in accordance with what the gained experience has revealed.

Definition: We name energy of an infinitesimal space-time element its ability to exist.

According to this definition, the energy of an infinitesimal space time element with energy dE exists on condition that some corresponding 'anterior-posterior' exist too. With respect to the HMF this space time element exists during a time dt which is different from the corresponding time dt_0 . Various space-time elements in the HMF have different dt for the same dt_0 . Thus, dt measures the duration i.e. the ability of a space time element to exist. So, we can write:

$$dE \sim dt \quad (18)$$

Relation(18)can be expressed by the following statement VI:

Statement VI: The energy of any changing infinitesimal space time element is equivalent to its internal time.

where internal time is a time of a phenomenon of comparison.

A consequence of Lorentz transformations is that:

$$dt / dt_0 = (1 - v^2 / c^2)^{-1/2} = \gamma \quad (19)$$

where \bar{v} an equivalent velocity of a space time element and dt the time of a phenomenon of comparison. Because of statement VI and Eqs(18,19) we obtain:

$$dE / dE_0 = dt / dt_0 = \gamma = 1 / \sqrt{1 - v^2 / c^2} = \gamma \quad (20)$$

We consider a flat matter space time whose all space time magnitudes equal the mean values of the same magnitudes of a matter field. For this flat matter space time it will be valid:

$$E / E_0 = dE_i / dE_0 = \gamma_i = \text{const.} \quad (21)$$

where i indicates a point of the HMF. Because of Eqns (19,20,21) we will have:

$$E^2 = c^2 (E / c^2)^2 v^2 + E_0^2 \quad (22)$$

Considering the following :

$$E / c^2 = m \text{ (mass)}, \quad E_0 / c^2 = m_0 \quad (23)$$

$$(E / c^2) \bar{v} = m \bar{v} = \vec{P} \text{ (momentum)} \quad (24)$$

$$\text{we obtain: } E^2 = c^2 P^2 + m_0^2 c^4 \quad (25)$$

Eq(25) together with Lorentz transformation show that the relativity theory, under the hypothesis that space time is continuum, can derive from the claim for minimum contradictions not as an arbitrary claim but as a possible consequence of the communication system, since for energy ,mass and momentum the until now experience provides the same forms as the ones of Eqs(23,24,25).

Elucidation: Eqns (19-25) are valid for any flat matter spacetime; therefore, they are valid also for a flat space time whose all spacetime magnitudes have values equal to the mean values of these magnitudes of a stochastic matter space time system.

From eqn(25), for a motion in a direction \vec{n} we obtain:

$$2EdE = 2c^2 PdP = 2c^2 (E/c^2)v dP = 2Ev dP = 2EdP(dx_n / dt) \quad (26)$$

and

$$dE / d\vec{x}_n = d\vec{P} / dt = \vec{F} \quad (27)$$

We notice that Eq(27) has the same form as the one which the gained experience has revealed. Thus, eqn(27) shows that Newton mechanics can derive as possible consequence from the claim for minimum contradiction on the hypothesis that matter itself is a space time continuum. It is noted that, on the basis of these conclusions, it is possible to be shown that Newton's gravitational formula is valid for the HMF on condition that matter is replaced by point masses and the space time energy is replaced by the energy of a field which acts at a distance [10].

3.2.4. Stochastic Behavior [20]

At second sight, taking into account the above mentioned and applying the claim of the minimum contradictions, we conclude that matter-space-time has logical and contradictory behavior at the same time; this can be valid when space-time is stochastic. Statement VI can be extended to non relativistic forms. In fact, in a stochastic space time we have from eqn(20):

$$\frac{d\bar{E}}{dE_0} = \frac{\bar{dt}}{dt_0} = \bar{tr} = \left(\frac{1}{vr}\right) \neq \frac{1}{vr} \quad (28)$$

where the superscript ($\bar{\quad}$) denotes the local mean value. Thus, we notice that $d\bar{E}/dE_0 = \bar{dt}/dt_0$, which is compatible to the relativity theory and that $\bar{tr} \neq 1/vr$, which is non compatible.

We consider a flat matter spacetime whose all spacetime magnitudes equal the mean values of the same magnitudes of the field under study. Since this matter space-time is flat, eqn(25) is valid; thus, we reach the following conclusion I:

Conclusion I: Relativity Theory is compatible with the claim for minimum contradictions through Statement VI which is valid for stochastic space-times as well and through eqn(25) which is valid for the flat space time that is composed of the mean values of a stochastic space-time matter field.

3.3. Compatibility with Quantum Mechanics [5,6]

3.3.1. De Broglie's principles [5,19]

Eqn (20) can be viewed in two ways:

- when dt_0 is a unit of time, eqn (20) describes the duration dt , with respect to an observer and, as was mentioned, it leads to the relativity theory.
- When dt is a constant period of time in the HMF, then eqn (20) can be written in the form:

$$dE / dE_0 = dt / dt_0 = (f / v) / (f / v_0) = v_0 / v \quad (29)$$

where ν is the frequency of a periodical phenomenon of comparison and f an arbitrarily constant factor through which we can change the scale of ν, ν_0 . If $\nu=1$, ν_0 must be different in various points of the HMF. If this is the case, ν_0 represents the number of hits of a clock connected with a spacetime element in the unit of time which is observed in the reference spacetime and eqn (29) can be written in the form:

$$dE / dE_{i0} = \nu_{i0} \quad (30)$$

where $dE_{j0} = dE_{i0}$ for $i \neq j$ and where i, j indicate points of the HMF. Since, according to this paper energy-matter is nothing else than a system with different and changing rate of anterior - posterior, eqn (30) shows the way through which a field exists and acts at various points. Eq(30) is valid also for stochastic space time. In fact, for a stochastic space time from eqn(28) we obtain:

$$d\bar{E} / dE_0 = d\bar{t} / dt_0 = (f / \bar{\nu}_{eq}) / (f / \nu_0) = \nu_0 / \bar{\nu}_{eq} \quad (31)$$

where $\bar{\nu}_{eq}$ is a frequency which corresponds to $d\bar{t}$. For $\bar{\nu}_{eq} = 1$ we obtain $d\bar{E} / dE_{i0} = \nu_{i0}$ and so on. Thus, for the same equation we have the following correspondences:

$$dE / dE_0 = dt / dt_0 \rightarrow \text{observation} \quad (32)$$

(Relativity Theory)

$$dE / dE_{i0} = \nu_{i0} \rightarrow \text{action} \quad (33)$$

(Quantum Mechanics)

On this basis, we can reach the conclusion that De Broglie's principle for energy is valid for $E_0 = h$ (arithmetically) i.e.: [19]

$$E = h\nu \quad (34)$$

Because of Eqn(25) we obtain:

$$E_{eq} = \pm \sqrt{E^2 - m_0^2 c^4} = \pm cP \quad (35)$$

where E_{eq} is the energy of an equivalent photon i.e. a particle with zero rest mass. Eqn(35) refers to an oscillating matter space-time field with energy $m_0 c^2$ when the oscillation stops. Therefore, we may notice that the equivalent energy E_{eq} characterizes the creation of space time waves. Thus, we can write:

$$E_{eq} = h\nu_{eq} = hc / \lambda_{eq} = \pm cP,$$

and $\lambda_{eq} = \pm h / P$ (36)

For energy the general formula of eqn (34) is valid i.e.:

$$E = h\nu, \quad \omega = 2\pi\nu,$$

$$\nu = c_w / \lambda_{eq} \neq c / \lambda_{eq} \quad (37)$$

For a particle field in general, because of eqns(36,37), we have relations which are compatible with De Broglie principles. According to the present paper the wave length has sense since it refers to something that can vibrate and this is the matter-space-time system itself.

3.3.2. Particle Field Space Time Wave

Since Matter Space Time, according to the Claim for Minimum Contradictions, is stochastic, we have that its energy, momentum and geometry are distributed according to a density probability function. In fact the existence of this function reveals the logical structure of a stochastic space-time, while it implies its contradictory nature. If we say that probability density function $P(\vec{r}, t)$ exists, we accept that something, at the same space and time, can exist and not exist.

In the HMF, for a relative spacetime magnitude \overline{sr} it can be proved that:

$$\overline{sr}(\vec{r}, t) = \langle \overline{sr} \rangle V_0 P(\vec{r}, t) \quad (38)$$

Thus, it is of great importance to define, on the basis of the principles of this paper, the function $P(\vec{r}, t)$.

By the aid of Fourier analysis for a particle field we can obtain [19]:

$$Sr \sim \Psi \quad (39)$$

i.e. Ψ wave function describes a relative space time magnitude in the HMF. This wave function is valid on condition that space-time has not any deformation. When the vibrating medium is space time itself, we may assume that this wave function describes the HMF in which, by definition, there exist only local deformations. Thus, Ψ describes the changes of relative space time magnitudes i.e. the changes of the rates of anterior-posterior at various points (r,t) of the HMF (see definitions ii,iii).

Ψ has the form:

$$\Psi = \sum_m A_m e^{-i((2\pi/\lambda_m)\vec{e}_w \vec{r} - \omega_m t)} \quad (40)$$

where \vec{e}_w is a unit vector which has the direction of wave velocity and due to Eqs(34,37) the form:

$$\Psi = \sum_m A_m e^{-i(\vec{P}_m \vec{r} - E_m t)/\hbar} \quad (41)$$

only on condition that:

1. $c_w \neq c$
2. $\lambda_m = L/m$, i.e that L is the wave length of the first harmonic
3. both $\lambda_m = L/m$ and $\omega_m = 2\pi c_{mx}/\lambda_m$ can take values with both signs \pm . Such a thing is irrational; however, it is expected, according to the present claim; negative values can be regarded as corresponding to antimatter (see section 3.3.2)

Notice:

Under these conditions the spacetime function Ψ is a complex function which can be only statistically interpreted.

Thus, the question is raised whether a particle has always rest mass so that $c_w \neq c$ and Ψ is only statistically interpreted. As was mentioned, the rest energy $m_0 c^2$ is the energy of space time when any oscillation stops. Because of statement VI, energy is equivalent to

time; thus we have zero rest energy if there is reference space time without time (anterior-posterior) which is in contrast with the present paper. It is noted that according to Parshin [21], light has rest mass and this is a basic conclusion of its experimental investigation on a de Broglie's concept. Thus, a photon has speed c when it is travelling in a "non existing space" e.g. in the frontier of Universe or during conversion of g space into em space [20]. After its creation the photon interacts with the cosmic medium as Jaakkola had observed [22,23]. Because of Eqs(41,25) we obtain:

$$\hat{E} = i\hbar \partial / \partial t \quad \text{and} \quad \hat{P} = -i\hbar \nabla \quad (42)$$

and

$$-\hbar^2 \partial^2 \Psi / \partial t^2 = -\hbar^2 c^2 \nabla^2 \Psi + m_0^2 c^4 \Psi \quad (43)$$

i.e. Schroendinger's relativistic equation.

In order that further contradictions are avoided, a matter system in general should be described through the same principles as a particle field is. This can be valid when a matter field locally behaves as a particle field; this is compatible with the Claim for Minimum Contradictions so that further assumptions can be avoided. At this point, it is important to make the following notice:

Notice:

Since stochastic space time is matter itself, there does not exist a potential which acts from a far distance, but an action of matter-space-time itself in the whole extent of a matter system.

Thus, in a matter field, eqn (43) is valid locally and m_0 is constant only in an infinitesimal neighborhood of any point (\vec{r}, t) of the HMF; according to this equation, the function $P(\vec{r}, t)$, which can be regarded as probability density is [24,25]:

$$P(\vec{r}, t) = (i\hbar / 2m_0 c^2) (\Psi^* \partial_t \Psi - \Psi \partial_t \Psi^*) \quad (44)$$

This function, according to what until now has been accepted, cannot be interpreted as probability density because it is not always positive. A negative $P(\vec{r}, t)$ would imply, because of eqn(38), negative values of geometrical magnitudes and negative values of local energy as well. This is at first sight incomprehensible. According to the claim for minimum contradictions, we try to apply logic but we have to expect contradictory behaviors; thus, negative values of geometrical magnitudes can be interpreted as contradictory-incomprehensible entities that appear because of our inadequate basic communication system. Of course, it would be constructive to investigate if these incomprehensible magnitudes appear as reactions to our communication system and constitute a reality that our basic communication system cannot approach. This point of view may be compared with Wittgenstein's point of view, i.e. with the process to approach reality through contradictory language games [26]. According to the up-to-now gained experience, these negative magnitudes can be regarded as characterizing the anti-matter.

4. Electromagnetic Space Time [6,19]

According to what was mentioned, space-time is stochastic and it can be regarded as matter - ether. However, matter can be either mass or charge. Thus, there exist both mass-gravitational (g) and charge-electromagnetic (em) spacetime. The (em) spacetime behaves as a (g) spacetime, since both are spacetime and obey the same principles but it is not. Thus, any time interval in the (em) spacetime is incomprehensible with respect to a coexisting (g) spacetime

and it can be regarded as an imaginary number which is incomprehensible too. *According to statement VI, the energy of an infinitesimal (em) spacetime can be regarded as imaginary since it is equivalent to an (em) time interval. Therefore, in general, the electromagnetic energy and in extension (em) magnitudes can be regarded as imaginary.* The electromagnetic space time can be regarded as a four dimensional space time which coexists with the gravitational one. Taking into account what was mentioned about negative geometrical magnitudes, we may assume that there exists also an anti-em space that corresponds to antimatter. Thus, space as a whole is described through sixteen dimensions, i.e. four dimensions for each of the following space times: (g), (anti-g), (em) and (anti-em). Note that eq(25) is valid for positive, negative imaginary and negative imaginary values of energy and momentum.

According to what was mentioned $P(\vec{r}, t)$ can correspond to matter for positive(g space) and to antimatter for negative values (anti-g space). Because of eq(44) we have a probability density function $P_{em}(\vec{r}_{em}, t_{em})$ which can signify the (em) and the (anti-em) space.

Therefore, we will have an HMF(g) for the gravitational space time and an HMF(em) for the (em) space time.

The coexisting (em) and (g) reference space times correspond to each other through a scale; since by definition they are flat and continuous, Lorentz transformations are valid. Thus, we obtain:

$$\partial x_{gi} / \partial x_{emi} = \gamma \quad (i=1,2,3,4) \quad (45)$$

According to previous work it is valid [9]:

$$\begin{aligned} \tau_{em} / \tau_g = \gamma, \quad l_{em} / l_g = \gamma^{-1}, \quad m_{em} / m_g = E_{em} / E_g = \gamma \\ G_{em} / G = 1/\gamma^2, \quad \vec{g}_{em} / \vec{g}_g = \gamma, \quad \hbar_{em} = \hbar_g \end{aligned} \quad (46)$$

$$G_{em} M_{em} m_{em} = G_g M_g m_g = \hbar c \quad (47)$$

$$\text{where } \gamma = i\alpha \rightarrow em, \quad \gamma = -i\alpha \rightarrow anti-em \quad (48)$$

For (em) operators we have:

$$\hat{E}_{em} = i\hbar \partial / \partial t_{em} = -\alpha \hbar \partial / \partial t, \quad \hat{P}_{em-n} = -i\hbar \partial / \partial x_{em-n} = \alpha \hbar \partial / \partial x_n \quad (49)$$

If $E_{em} = iE_{em-g}$, $\vec{P}_{em} = i\vec{P}_{em-g}$ we obtain:

$$\hat{E}_{em-g} = i\alpha \hbar \partial / \partial t, \quad \hat{P}_{em-gn} = -i\alpha \hbar \partial / \partial x_n \quad (50)$$

Because of (39) we have:

$$\Psi_{em} = kSr = k \frac{dS_{em}}{dS_{em0}} = k \frac{dS_g}{dS_{g0}} \quad (51)$$

$$\text{And } \Psi_{em}(\vec{r}_{em}, t_{em}) = \Psi_{em}(\vec{r}, t) \quad (52)$$

Taking into account the above mentioned we obtain:

$$P_{em}(\vec{r}_{em}, t_{em}) = P_{em}(\vec{r}, t) \quad (53)$$

5. Equations of the Stochastic matter Space Time [9,19]

The so far analysis has shown that we can express a particle field in space time terms. However, there is always function Ψ that depends on a mass m_0 . A more general description of space should be independent of any notion of mass. In a system with $\hbar = c = 1$ Schroendinger equation becomes:

$$\square\Psi = -m_0^2\Psi \quad (54)$$

Thus, it is valid that:

$$\frac{\square\Psi}{\Psi} = -m_0^2 = const. \quad (55)$$

$$\text{and } \partial_{xi} \frac{\square\Psi}{\Psi} = 0 \quad (i=1,2,3,4) \quad (56)$$

These equations should be valid also in the case of many particles so that, as it was mentioned in 3.3.2 according to the Claim for Minimum Contradictions, further assumptions can be avoided. In this case, Ψ function locally is described by a local particle field function Ψ_i . Something like this can occur when Ψ is derivable everywhere but its derivatives are not continuous, which means that in the vicinity of every (\vec{r}, t) eq(43) is valid but with different m_0 . Applying eqn(56) for the (g) and the (em) space time, we obtain:

$$\partial_{xi} \frac{\square\Psi_g(\vec{r}, t)}{\Psi_g(\vec{r}, t)} = 0, \quad \partial_{xi} \frac{\square\Psi_{em}(\vec{r}, t)}{\Psi_{em}(\vec{r}, t)} = 0 \quad (i=1,2,3,4) \quad (57)$$

It can be proved that the conservation principle leads to:

$$\partial \left(\frac{\partial_t \Psi_g(\vec{r}, t)}{\Psi_g(\vec{r}, t)} + \alpha \frac{\partial_t \Psi_{em}(\vec{r}, t)}{\Psi_{em}(\vec{r}, t)} \right) = 0 \quad (58)$$

where α is the fine structure constant [9]. Eqns(57,58) characterize in general the system of equations of the stochastic matter space time as a whole.

On the basis of this analysis, we can obtain the space time operators, the gravitational acceleration and the quantum space time geometry of a space time regarded as a whole. All these have been defined in previous works. It is noted that for the quantum space time as it derives from the principles of this paper, the self-similarity property is valid [3,19,27,28], a fact which has wide application in various matter systems. Because of Eqs(57), we have that in a generalized case the form of Schroendinger's relativistic equation has similarities with both potential Maxwell equation and gravitational waves equation; probably all these express the change of relative space time in all of its forms; however, the investigation of this subject is out of the limits of this work.

According to previous works and taking into account the equations of chapter 4, for gravitational acceleration we have:

$$\vec{g}(\vec{r}, t) = \frac{c^2}{P(\vec{r}, t)} \nabla P(\vec{r}, t) \quad (59)$$

$$\bar{g}_{em}(\vec{r}, t) = \frac{i\alpha c^2}{P_{em}(\vec{r}, t)} \nabla P_{em}(\vec{r}, t) \quad (60)$$

From Eq(60) we may notice that for the simplest case of Coulomb expression for opposite signed charges we have attraction ($(+i)(-i) = 1$) while for similarly signed charges repulsion ($(\pm i)(\pm i) = -1$). Because of eqs (59,60), we have that all forces are based on a unified formula. It is noted that eqn(59), under certain assumptions, is compatible with Newton's law[8].

From Eq(60) we may notice that the gravitational acceleration depends on the probability density function. This can explain the stability of electric clusters i.e. it is not paradox [29] to have a cluster with similarly charged particles since their stability does not depend on the charge's sign but on the gradient of their matter probability density.

6. Conservation Principle

In a closed system, it can be shown that the following equation is valid::

$$\bar{E}_g + \bar{E}_{em-g} = \text{constant} \quad (61)$$

where the em-g index indicates a gravitational space energy in such a way that $\bar{E}_g = i\bar{E}_{em-g}$ and the dash ($\bar{\quad}$) indicates the mean value. It is stressed that the energy of a system is a stochastic quantity, thus the mean value is meaningful . This equation has physical sense since it has been verified by the first thermodynamic axiom according to which a mechanical work that can be corresponding to the (g) space is converted into radiation which mainly constitutes electromagnetic space.

If we consider the Universe as a closed system, which has been derived from zero, then the following equation applies:

$$\bar{E}_g^U + \bar{E}_{em-g}^U = 0 \quad (62)$$

where the superscript U indicates Universe quantities. In a particle field, the following equation is valid according to the QST hypothesis:

$$\langle E \rangle \langle V \rangle = hc \quad (63)$$

i.e., the product of the energy expectation value of a particle field multiplied by the expectation value of the volume which contains that energy, is equal to hc. This means that $\langle E \rangle$ decreases as $\langle V \rangle$ increases and vice versa. In general, it can be proved that the volume \bar{V}_g increase of a closed system has as a result the energy \bar{E}_g decrease and vice versa. Thus, when \bar{E}_g^U is very high, the volume \bar{V}_g^U that contains \bar{E}_g^U will be very low. Universe's expansion means increase of \bar{V}_g^U and decrease of \bar{E}_g^U as well as increase of \bar{E}_{em-g}^U according to the equation (62). From the equation (62) it is derived that for positive value of \bar{E}_g^U the \bar{E}_{em-g}^U value will be negative. Thus, the Universe evolution is a process reverse to that of the Universe creation, and during this evolution the quantity \bar{E}_g^U decreases tending to zero, while the quantity \bar{E}_{em-g}^U increases tending also to zero.

The passage from the (g) space time to the (em) one might be considered as expressing the passing time which is irreversible due to the expansion of the Universe [29,30]. Thus, the irreversibility mentioned that has a close relation with the arrow of time is dependent on whether the Universe expands or not. According to this point of view, the Universe expansion

is a reverse process to Universe creation and therefore, all of its magnitudes tend to zero. Moreover, the Universe expansion is due to the space time compatibility since the Universe as a whole expands before the “non existing space” i.e. it must be expanded-moving in order to be compatible with the “non existing”.

We can assume that the charge energy \bar{E}_{em-g}^U is the charge energy sum of all the proton-electron couples regardless of whether they are joined or not. This means that the absolute value of the proton charge, assumed as negative energy, is greater than the electron charge – assumed as positive energy -, so that the total \bar{E}_{em-g}^U will be negative. According to existing measurements the proton charge is $4,803206815 \times 10^{-10}$ esu . According to the existing data the electron charge is $e = \sqrt{\alpha \hbar c} = 4,80319626 \cdot 10^{-10}$ esu [7]. When there is a tendency for increase and nullification of \bar{E}_{em-g}^U , this means that there is an approach and coincidence tendency between the positive and negative charges of the proton-electron couples. The electron charge, if considered as an imaginary mass, is not constant but it varies with its velocity; thus, when the electron approaches the proton, it will have a value able to neutralize it. Thus, the approach between electrons and protons has as a result the increase of \bar{E}_{em-g}^U and due to equation (62), the decrease of \bar{E}_g^U . Consequently we can reach the conclusion I:

Conclusion I: During the approach between $e^- + P$, a gravitational space energy absorption takes place .

This might be a reason for the following reaction to be valid:



which is endothermic. This might facilitate the explanation of cold fusion phenomena[7].

6. Biefeld Brown effect

On the basis of the conclusion I Biefeld Brown effect can be explained. Because of this conclusion we may assume that the energy of (g)space mentioned in the conclusion is not due to the masses of electron and proton but due to (g) space which is out of the system proton-electron. In fact, during the approaching of an electron with a proton the kinetic energy of the electron increases and therefore, an additional (g) space energy absorption is required; that is we have two reasons for (g) space absorption: the first is the electron-proton approaching and the second is the kinetic energy increasing. During an asymmetrical approaching-distancing between an electron and a proton we might have a useful energy production if the energy due to approaching is bigger than the one due to distancing. This can be shown in fig.2.

As is known, the Biefeld Brown effect schematically can be demonstrated in fig.1; that is the capacitor loses weight when charged and when the acting force is towards the positive pole. When the capacitor is charged we have a polarization in the molecules of its dielectric. This schematically can be represented in fig.3 .

According to conclusion I, during the approaching of the electron with the positively charged wall of fig.3 we have a (g) energy absorption with a momentum δP_1 ; during distancing we have a momentum δP_2 which means that the whole process implies a force towards the positive wall. When the wall is moving due to the energy absorbed this process is non reversible and useful work can be produced.

The above mentioned have been experimentally verified and as it is reported by T. Musha [31] a weight loss of the order of 3% can be observed when high voltage of the order of 20kV is imposed. T.Musha has given a theoretical explanation of the Biefeld-Brown effect assuming that a gravitational field is created during the voltage imposition. However, the question is raised why the acting force is always towards the positive plate. In this paper an explanation to this question was given. The force mentioned is increasing when the imposed

voltage is periodic. This is in agreement with the conclusions of this paper since in this case we have a continuous protons-electrons approaching-distancing due to periodical polarization of the dielectric.

Discussion

We may notice that the simple principles of Aristotle logic which at first sight seem to be obvious to any one lead in a reasonable way to a more complicated way of thinking which is characterized by contradictions and by a tendency to logic at the same time. This thinking is in agreement with what the experience of communication has revealed and it is powerful enough to have laws of physics derived. According to this way of thinking there are not privileged areas in nature; even thought is regarded as a part of physical reality as being uncertain itself. However, this way of thinking though logically linked is far from what at a first sight we regard as truth. In this paper we are not trying to make a perfect theory -which according to what was mentioned is impossible- but we are trying to state a minimum contradictions physics model. According to this point of view, space time is stochastic and matter itself. In previous works it was shown that the fact that space is matter facilitates the cold fusion phenomena explanation [7,32,33]. According to previous works the possibility for the non locality effect to be interpreted has also been shown [19]. Finally, it is stressed that the claim for minimum contradictions is general and so it has a relation with a philosophical attitude in general. In previous works [4,19] has been shown a relation of the spirit of this work with other relative points of view [4,19,34,35,36].

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