THE RELATIVITY THEORY AND THE QUANTUM MECHANICS UNDER THE CLAIM FOR MINIMUM CONTRADICTIONS

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Abstract

The purpose of this paper is to show that our basic communication system, which consists of Aristotle logic - the sufficient reason principle included - and the claim that there is anterior-posterior in our communication is contradictory [1,2,3]. Thus, any consequences of this system can derive with the aid of a claim for minimum contradictions [1,2,3,4]. On this basis a physics theory is least contradictory when it is described in anterior-posterior and in extension in space-time terms. This leads to a matter space-time aether in which things exist and from which things are made. Lorentz's transformations derive on condition that a perfect (non-contradictory) physics theory can be stated; in this case, space-time is regarded as continuum. However, a non-contradictory physics theory is impossible and this leads, on the basis of the claim for minimum contradictions, to a stochastic matter space-time[5]. Relative - with respect to a reference frame - spacetime magnitude operators can be defined; locally a matter system behaves as a particle space-time formation whose geometry distribution, in a hypothetical measuring field, can derive by means of these operators and the probability density function $P(\vec{r},t)$ of Schroendinger's relativistic equation; this equation is proved as valid; the epistemological basis for the use of this function $P(\vec{r},t)$ is shown. Thus, on the basis only of the language rules, a minimum contradictions unified theory - compatible, under certain conditions, either with the Relativity Theory or the QM - is proposed. The matter space-time as a whole has both gravitational (g) and electromagnetic (em) dimensions; the (g) and the (em) space-time coexist and interact. New phenomena explanations can be given on the basis of this theory, the gravitation the forces' unification and the property of self-similarity of matter systems included [6].

1. Introduction

Every theory is stated based on the basic language communication system which is composed of Aristotle logic and a hidden axiom which states that "there is anterior-posterior". In fact, the way in which we communicate is not a simultaneous process but a process that is characterised by anterior-posterior. One word is put after another, one phrase after another e.t.c. [1,2,3]

It is noted that Aristotle logic, beyond the tautology axioms, it also contains the Sufficient Reason Principle according to which for everything we seek the reason of its power.

The belief that a perfect theory can be found originates from the fact that we believe that the basic communication system is perfect. If this system is contradictory, it is meaningless to seek the statement of a perfect theory through a contradictory system.

A purpose of this work is to prove that the basic system of communication is contradictory. When, despite all these, 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.

Every theory includes at least the principles of the communication system and, of course, any contradictions that are created by any further axioms.

Thus, 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.

The Claim for Minimum Contradictions, though being completely general, can lead by itself to the statement of minimum contradictions physics theory.

Another purpose of this paper is to show the way to state such a theory and to investigate its compatibility with both the Relativity theory and the QM.

One of the results of this work is that the claim for minimum contradictions leads to the conclusion that any space time is stochastic.

Despite the fact that space time is stochastic, there are basic relativistic relations that continue to be valid. Under certain simplifying assumptions (continuity of space time) Lorentz transformations can derive as consequence of the claim for minimum contradictions.

At first sight, QM seems to remain unchangeable. However, what it describes, according to this paper, is not a particle wave but the stochastic space time in a Hypothetical Measuring Field that composes a basic tool of the present investigation. De Broglie

principles can be regarded as an other view of a basic relativistic relation of matter space time. On this basis, we have the frame in which a unified theory can be stated, the operators of relative length in a given direction and relative time are defined and the geometry of the stochastic space-time is described with the aid of a Ψ wave function. The stochastic space-time derives from the distribution of the properties of a flat relativistic space-time based on the probability density $P(\vec{r},t)$ of Schroendinger relativistic equation.

The negative values of $P(\vec{r},t)$ can correspond to the geometry of the anti-matter; the incomprehensible notion of the negative probability is compatible with the claim for minimum contradictions (since contradictions are always expected).

The Electromagnetic (em) space-time is a space-time whose all magnitudes are considered imaginary and behave exactly like the gravitational (g); the way of communication between (g) and (em) space-time is shown.

The stochastic space time has the property of self-similarity while, at the same time, it is chaotic (contradictory)- non deterministic. It is something compatible with fractal geometry, which is a geometry of nature. On the basis of the model of stochastic matter space time new phenomena can be interpreted like the one of the excess heat of light water electrolysis.

The force of the gravitation is interpreted as a force that is exerted on every infinitesimal element of the stochastic matter space time in order that it is distributed according to a given probability density. The formula that derives, on certain conditions, is compatible with Newton law.

2. The Aristotle Logic [2]

It is known that the principles of Aristotle Logic are the following [7]:

1. The identification rules i.e.:

1a. A is A,

1b. A is not ~A,

1c. It is impossible for something to be at the same time A and ~A

2. The Sufficient Reason Principle

The principles of the Aristotle Logic are not proved but it has been noticed that they are valid in our communication through the language.

For the purposes of this paper, we will use the Sufficient Reason Principle in its absolute form stated by Leibniz [8] as it will be shown later. This principle derives from the fact that we do not feel safe with any arbitrariness. We always want to find the reason why everything is valid.

The sufficient reason principle is not usually applied for the derivation of various theorems. For practical purposes, we accept some axioms as valid and we derive theorems that we can apply in a useful way.

However, the sufficient reason principle is not more arbitrary than the rest Aristotle logic principles; on the contrary, it claims their complete application. For the purposes of this paper, this principle will be used since its main target is the statements' validation in general and not some statements' validation for practical purposes. More specifically, this principle, on condition that it is meaningful (see elucidation), will be used in the form of the following principles:

Principle I: No statement is valid without a sufficient-logical reason out of it.

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

Principle II declares that any statement, in order to be valid, must derive as an inference through other statements and not as an implication since as implications are regarded only the Aristotle Logic principles; thus, in order to avoid any further arbitrariness we should claim the provability of a statement through other statements which are considered to be valid.

In order to avoid any misunderstanding, in the following, when we say Aristotle Logic, we mean the logic that obeys principles 1a, 1b, 1c and 2, where principle 2 is stated through principles I and II.

Elucidation:

1) The Sufficient Reason Principle cannot apply to Aristotle Logic itself since, according to this principle, Aristotle Logic requires Aristotle Logic (logical reasons); this makes any other reason non active.

2) The Sufficient Reason Principle has no meaning out of logic since it requires the existence of logical reasons.

3) We don't know if Aristotle Logic is valid. In the following, we suppose that Aristotle Logic is valid; thus, it can apply to the text of the proof that follows. If Aristotle Logic were non valid, then it itself would impose the silence, and any logical communication would have meaning only on the basis of a claim for minimum contradictions (see 4.1); this claim is one of the main targets of this paper.

3. The Contradictions of logical systems [2]

For the purposes of this paper, we use symbolic logic [9] but the inferences produced are not the same as the ones of the known proposition logic. The Aristotle Logic we use is denoted as Λ and, as it was mentioned, it includes the Sufficient Reason Principle.
On this basis, the following statement will be proved as valid:

Statement I: Any system which includes Aristotle logic Λ *and at least one statement which is not theorem of* Λ *leads to contradiction*.

Proof: We consider a statement A regarded as a set of statements so that:

$$A \equiv A_1 \cdot A_2 \cdots A_n$$

We consider also the system:

$$\Pi \equiv \Lambda \cdot A$$

According to logic Λ, in general it is valid that:

$$\Pi \text{ is complete} \vee \Pi \text{ is not complete} \quad (1)$$

The notion of *completeness* is related to Aristotle Logic Λ. In this work, we consider that the system $\Pi \equiv \Lambda \cdot A$ is complete if the statements that derive from it, including Logic Λ and the statement A, are valid due to the system itself and not due to any other further statements.
According to the sufficient reason principle, statement A must have a logical reason to be valid; this principle cannot apply to Logic Λ itself which is regarded as valid (see elucidation of section 3). According to this principle in general, we have:

$$A \Leftrightarrow (\Lambda \supset A) \vee \text{“}A \text{ is logically proved through some statements different from it”} \quad (2)$$

where “$\Leftrightarrow$” means equivalence and $\Lambda \supset A$ means that A is theorem of Λ.
If Π is complete, it means, as it was mentioned, that its validation is due to the system Π itself and not due to something out of it.
Thus, if Π is complete because of (2) we have:

$$A \Leftrightarrow (\Lambda \supset A) \quad (3)$$

Relation (3) is in agreement with what proposition logic has proved for Principia Mathematica; it has been proved, with the aid of logic, that this system is complete and consistent and therefore there is sufficient reason for its validation on condition that logic is valid; its axioms are compatible with logic[10].
If $\sim(\Lambda \supset A)$, we have that $\Lambda \cdot A$ leads to contradiction since, according to (3), $(\Lambda \supset A)$ is the only condition for A to be valid.
Thus, statement (1) on condition that $\sim(\Lambda \supset A)$ leads to:

$$\Pi \text{ is inconsistent} \vee \Pi \text{ is not complete} \quad (4)$$

Statement (4) can be extended to any system $\Pi' \equiv \Lambda \cdot A \cdot A'$ since $\sim(\Lambda \supset A)$ implies that $\sim(\Lambda \supset A \cdot A')$. Thus, we can notice that statement (4) is a Goedel like statement because it can be stated in the following form:

Statement II: Any consistent system which includes Aristotle logic Λ *and a statement which is not theorem of* Λ *is incomplete.*

It is noted that Goedel’s theorems cannot be stated in the form of statement II. H. Putnam [11] and R.Penrose[12] showed that this theorem is based on the arbitrary hypothesis that there is an algorithm from which only the true statements derive; this point of view has generally been accepted[13].
According to statement *II*, we never have a complete system on condition that it is consistent and on condition that $\sim(\Lambda \supset A)$.
This means that if we add any number of statements (even infinite), the system produced remains incomplete when the conditions mentioned are valid; thus, if the produced system is consistent, we can never state logically the deeper reasons of Π validity i.e. Π cannot be logically proved through any system of statements different from it. *This is in contrast with the sufficient reason principle (principle II); therefore, if the system under discussion includes this principle, it cannot be consistent i.e. it leads to contradictions.*
But the statement:

$$\sim(\Lambda \supset A) \quad (5)$$

is valid on condition that:

$$\sim(\Lambda \supset A_i) \qquad (6)$$

where A_i any statement of the set of statements $A \equiv A_1 \cdot A_2 \cdots A_n$.
Thus, we always have contradiction if $\sim(\Lambda \supset A_i)$. This proves statement I which, as it will be shown in the following, can apply for the case of the anterior-posterior axiom.
The anterior-posterior axiom in arithmetic can be stated as following [10]:

1. *Zero (0) is a number* (7)
2. *There is the next of any number x* (8)

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" and, therefore it is not valid that:

$$\exists(x=0) \supset \exists(x=1) \qquad (9)$$

In fact, according to the common way in which we learn and use numbers, we can correspond 0 to non existence of something at some place and 1 to its existence at the same place. 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 which include this axiom i.e. the following can be stated:

Statement III: Any system that includes Aristotle Logic Λ and the anterior-posterior axiom, leads to contradiction.

4. The Claim of the Minimum Contradictions-Consequences

4.1 General [1,2,3,4]

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 truth 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"* [4], 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.*

4.2. Compatibility with Relativity theory [5]

4.2.1. 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. *Therefore, we have minimum contradictions in Physics when it is based only on the basic communication system i.e. on Aristotle Logic 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, <u>*at first sight*</u>, 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 corrolary:

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

4.2.2. Definitions [6]

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

i. *As reference spacetime we define a euclidean spacetime to which, through transformations of deformity, any field can correspond.* This reference spacetime 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 spacetime 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 spacetime, 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 spacetime magnitude sr the ratio of a real infinitesimal spacetime magnitude ds to the corresponding infinitesimal magnitude* ds_0 *of the reference spacetime*: i.e. $sr = ds/ds_0$. This can apply to any magnitude as follows :

α) 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 spacetime magnitudes mentioned above, are denoted by SR, TR, VR, LR_n when they refer to mean values of a particle space time field. Relative spacetime magnitudes can apply either to a spacetime 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 ($\bar{}$) denotes the local mean value.

4.2.3. Relativistic Behaviour [5]

On condition that any spacetime 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 spacetime continuum can be regarded as an area with constant rate of anterior-posterior and therefore it has not any spacetime 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-dimentional space with $dx_4 = kdt$, where k a constant with units of velosity so that dx_4 will have units of length, we can write[14,15]:

$$dS^2 = dx'^2 + dy'^2 + dz'^2 + k^2 dt'^2 = \\ = dx^2 + dy^2 + dz^2 + k^2 dt^2 \qquad (10)$$

For $k = \pm ic$, where c is the speed of light, eqn (10) implies Lorentz transformations which are the basis of the relativity theory.

We can reach the same conclusion on the hypothesis that a perfect (non contradictory) physics theory can be stated; in this case, space-time is regarded as continuum. Statements IV and V are also valid since a perfect theory requires the non existence of further axioms - beyond the ones of the communication system – which might cause contradictions.

A consequence of Lorentz transformations is that:

$$dt/dt_0 = (1 - v^2/c^2)^{-1/2} = \gamma \qquad (11)$$

where v an equivalent velocity of a spacetime element and dt the time of a phenomenon of comparison. As is known, the application of Lorentz transformations on Newtonian Mechanics leads to [14,15]:

$$dE/dE_0 = \gamma \qquad (12)$$

where dE and dE_0 are energy of infinitesimal space-times which correspond to each other through Lorentz transformations; it is noted that, according to what was mentioned, these space-times are regarded as matter. Because of Eqs(11, 12) we obtain:

$$dE/dE_0 = dt/dt_0 = tr \qquad (13)$$

and $$dE \sim dt \qquad (14)$$

Relation(14)can be expressed by the following statement VI:

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

where internal time is a time of a phenomenon of comparison.
In the analysis above, Lorentz transformations derive from the claim for minimum contradictions and not from any other physical principle. However, eqs(12, 13) derive from the fact that we have accepted the Newtonian Mechanics as valid. The question raised is whether or not the Newtonian Mechanics is compatible with the minimum contradiction claim; this is valid on condition that relation (14) can derive directly from the claim for minimum contradictions without any further assumptions. In fact according to corollary I, the existence of energy dE of an infinitesimal spacetime element dÙ is the condition in order that dÙ exists. However the condition for a spacetime to exist is the existence of "anterior" and "posterior". Thus, the energy dE can be regarded as the ability of dÙ to produce the "next". If a "next" stops to exist, dÙ stops to exist too; therefore, energy can be regarded as the permanent ability of dÙ to produce the "next". However, the quantitative expression of energy dE could measure the ability of dÙ to produce "one next" e.g. the ability of an interval between two successive hits of a clock connected to dÙ to exist; therefore, we may assume that dE can measure the duration between these two successive hits. This duration can be measured with respect to the reference spacetime. If dÙ had energy 2dE the duration of these two successive hits would be twice as many and so on. Thus, we could assume that [6]:

$$dE \sim dt \qquad (15)$$

where dt is the internal time of dÙ, ie the time of a phenomenon of comparison e.g. the duration between two successive hits of a clock in dÙ measured in the reference spacetime.
Because of Lorentz transformations, for flat space-times it is valid that:

$$E / E_0 = dE_i / dE_0 = \gamma_i = const. \qquad (16)$$

where i indicates a point in the HMF. Since a flat space-time according to this paper is regarded as matter, it has mass, energy and momentum as well. Therefore, the SRT equation for energy and momentum is valid, i.e.:

$$E^2 = c^2 P^2 + m_0{}^2 c^4 \qquad (17)$$

Because of eqn(13) it is valid:

$$dE / dE_0 = tr \qquad (18)$$

Due to Lorentz transformations, it is valid also that [14]:

$$tr = 1/vr \qquad (19)$$

4.2.4. Stochastic Behaviour [6]
<u>*At second sight*</u>, taking into account the above mentioned and applying the claim of the minimum contradictions, we conclude that matter-space-time has logical and contradictory behaviour at the same time; <u>*this can be valid when space-time is stochastic.*</u> *Statement VI can be extended to non relativistic forms.* In fact, in a stochastic space time we have from eqns (18,19):

$$\frac{d\overline{E}}{dE_0} = \frac{\overline{dt}}{dt_0} = \overline{tr} = \overline{(\frac{1}{vr})} \neq \frac{1}{\overline{vr}} \qquad (20)$$

where the superscript (¯) denotes the local mean value. Thus, we notice that $d\overline{E} / dE_0 = \overline{dt} / dt_0$, which is compatible to the relativity theory and that $\overline{tr} \neq 1/\overline{vr}$, 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, eq(17) 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 eq(17) which is valid for the flat space-time that is composed of the mean values of a stochastic space-time matter field.

4.3. Compatibility with Quantum Mechanics [5,6]

4.3.1. General
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 $\overline{sr}$ by definition it is valid that:

$$\left\langle \overline{sr} \right\rangle = \frac{1}{V_0}\int \overline{sr}(\vec{r},t)dr^3 \qquad (21)$$

where V_0 is the volume of the reference spacetime. According to this work, a flat space-time has energy. Note that if its energy density is non zero, it holds that for a finite energy the volume of the space-time mentioned cannot be infinite.
Because of corollary I, a space time magnitude has a probability to exist on condition that there exists energy, i.e.matter. In the HMF, by definition, the energy distribution refers to real magnitudes of energy. Therefore, the probability density of a matter field describes the probability density of energy and of any spacetime magnitude to exist in the HMF.
For the probability density it is valid that

$$\int P(\vec{r},t)dr^3 = 1 \qquad (22)$$

Thus, because of eqn (21,22) we will have that:

$$\int P(\vec{r},t)\left\langle \overline{sr} \right\rangle dr^3 = \frac{1}{V_0}\int \overline{sr}\ (\vec{r},t)dr^3$$

and $$\overline{sr}(\vec{r},t) = \left\langle \overline{sr} \right\rangle V_0 P(\vec{r},t) \qquad (23)$$

At first sight, the probability density mentioned could be the density probability that derives from the Quantum Mechanics. Therefore, the question is raised which set of statements of Quantum Mechanics is compatible with the claim for minimum contradiction.

4.3.2. Fourier Analysis [5]
A particle according to this paper can be regarded as a spacetime formation, which changes in time. This change must be a periodic proccess because of the property of particles to be generally stable. For the simple case of one dimension this periodic proccess can be analysed, according to Fourier analysis, in harmonic oscilations.
A space time wave function $\Psi = \Psi(x,t)$ can be written in the form $\Psi = \Psi(x',t)$ where $x' = x'(x,n,t)$ as it will be explained. For a given t, according to Fourier analysis, the spacetime function $\Psi(x',t)$ can take the form [16]:

$$\Psi = \sum_n (A_n \cos(2\pi nx'/L) + B_n \sin(2\pi nx'/L)) \qquad (24)$$

where L is a proper interval which will be defined in the later and n=1,2,....
For $n \to \infty$ Eq.(24) describes a function $\Psi = \Psi(x,t)$
The same form is valid for any t but with different $A_1, A_2, ...A_n,\ B_1, B_2, ...B_n$. Thus, in general we may assume that Ψ has the form of eqn(24) on condition that $A_1, A_2, ...A_n,$ $B_1, B_2, ...B_n$ are functions of t.
By using the exponential form of cos and sin, eqn(24) can be written:

$$\Psi = \sum_n (C_{1n} e^{i(2\pi nx'/L)} + C_{2n} e^{-i(2\pi nx'/L)}) \qquad (25)$$

If
$$x' = x - c_{nx}t$$
$$= x - \lambda_n(\omega_n/2\pi)t = (\lambda_n/2\pi)(x(2\pi/\lambda_n) - \omega_n t) \qquad (26)$$

where $c_{nx}, \lambda_n, \omega_n/2\pi$ are the velocity the wave length and the frequency of the n^{th} harmonic wave, we will have that:

$$2\pi nx'/L = (2\pi n/L)\,(\lambda_n/2\pi)\ (x(2\pi/\lambda_n) - \omega_n t) \qquad (27)$$

It is noted that for the same (x,t), the variable x' has different values for n=1,2,3,4… if c_{nx} has also different values for various n. In this case Ψ, as a function of variable x', cannot be a continuous function of (x,t) ; however, in this case, Ψ can be regarded as a stochastic, statistically interpreted, function i.e. as a function which has a probability to exist for any variable x'=x'(x,t, c_{nx}) for any n=1,2,3,……
If $c_{nx} = const.$, the space-time function Ψ can be continuous since to the same (x,t) corresponds the same Ψ for n = 1,2,3…. . Thus, the question is raised weather $c_{nx} = const.$ is valid.
According to the claim for minimum contradictions, the space-time wave function $\Psi(x,t)$ describes a stochastic space-time structure. Thus, this space-time function is

compatible with this claim on condition that c_{nx} has different values for n=1,2,…..
Thus, eqn(25) can take the form :

$$\Psi = \sum_m A_m e^{-i((2\pi/\lambda_m)x-\omega_m t)} \qquad (28)$$

only on condition that:
1. $\lambda_m = L/m$*, i.e that L is the wave length of the first harmonic*
2.both $\lambda_m = L/n$ *and* $\omega_m = 2\pi c_{mx}/\lambda_m$ *can take values with both signs* $\pm$ *so that all terms of eqn (25) can be included.* 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 4.3.4)
3.the spacetime function Ψ *is a stochastic function which can be only statistically interpreted.*
In the general case of waves which are transmitted to various directions we can write:

$$\Psi = \sum_m A_m e^{-i((2\pi/\lambda_m)\vec{e}_w\vec{r}-\omega_m t)} \qquad (29)$$

where $\vec{e}_w$ is a unit vector which has the direction of wave velocity. This wave function is valid on condition that space-time has not any deformation. When the vibrating medium is spacetime 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 spacetime magnitudes i.e. the changes of the rates of anterior-posterior at various points (r,t) of the HMF (see definitions ii,iii).

4.3.3. De Broglie's principles [5]
Eqn (18) can be viewed in two ways:
a. when dto is a unit of time, eqn (18) describes the duration dt, with respect to an observer and, as was mentioned, it leads to the relativity theory.
b. When dt is a constant period of time in the HMF, then eqn (18) can be written in the form:

$$dE/dE_0 = dt/dt_0 = (f/\nu)/(f/\nu_0) = \nu_0/\nu \qquad (30)$$

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 the spacetime element dU in the unit of time which is observed in the reference spacetime and eqn (30) can be written in the form:

$$dE/dE_{i0} = \nu_{i0} \qquad (31)$$

where $dE_{jo} = dE_{i0}$ 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 (31) shows the way through which a field exists and acts at various points.
Thus, for the same equation we have the following correspodences:

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

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

From eqn(33) we obtain:

$$E = \int (dE_{i0}/dV_0)\nu_{i0}dV_0 =$$
$$= (E_0/V_0)\int \nu_{i0}dV_0 = E_0\langle\nu_{i0}\rangle_E \qquad (34)$$

Eo is the energy of a field with $\langle\nu_{i0}\rangle_E = 1$. Thus, Eo can be regarded as a constant since eqn(34) is valid for any level of energy. Eqn (34) is compatible with Plank's empirical law and its extension i.e. De Broglie's principle for energy when:

$E_0 = h$ (arithmetically)

$\langle\nu_{i0}\rangle_E = \nu$

where ν is the frequency of a harmonic space-time oscillation in the HMF; this oscillation implies local space-time vibrations that show the way in which a matter space-time field acts at various points; as was mentioned, in order that formula (29) is valid, harmonic oscillations are needed which will not take into account the spacetime deformation i.e. oscillations which describe the HMF; note that this ν has different meaning from that of eqn(30).
Taking into account the way through which eqns (31,32,33,34) are obtained, we conclude that they are valid in general i.e. for any matter spacetime system and therefore for a photon or for a particle in general.
In the case of a photon which is described by eqn(17) for $m_0 = 0$ we have:

$$E = \pm\sqrt{c^2P^2} = \pm cP \qquad (35)$$

$$E = h\nu = \pm cP, \quad \nu\lambda = c, \omega = 2\pi\nu \quad and \quad \lambda = \pm h/P \qquad (36)$$

According to the present paper, the wave length has sense since it refers to something that can vibrate and this is the matter spacetime system. Thus, for a photon because of eqns(35,36) we have, relations which are compatible with De Broglie's principles.
In the case of a particle in general, from eqn(17) we obtain:

$$E_{eq} = \pm\sqrt{E^2 - {m_0}^2c^4} = \pm cP \qquad (37)$$

where E_{eq} is the energy of an equivalent photon. Eqn(35) refers to an oscillating matter space-time field which has no energy when the oscillation stops. Eqn(37) refers to an oscillating matter space-time field with energy m_0c^2 when the oscillation stops. Therefore, we may notice that the equivalent energy E_{eq} characterizes the creation of spacetime waves. Thus, we can write:

$$E_{eq} = h\nu_{eq} = hc/\lambda_{eq} = \pm cP, \quad and \quad \lambda_{eq} = \pm h/P \qquad (38)$$

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

$$E = h\nu\ ,\ \omega = 2\pi\nu\ , \quad \nu = c_w/\lambda_{eq} \neq c/\lambda_{eq} \qquad (39)$$

where c_w is different for various n as was mentioned in section 4.3.2. For a particle field in general, because of eqns(38,39), we have relations which are compatible with De Broglie principles. For the same reasons as was mentioned for a photon the wave length which corresponds to a particle in general has sense since it refers to something that can vibrate and this is the matter spacetime system.

4.3.4. Particle Field Space Time Wave

Taking into account eqns (29,38,39) and considering that $\vec{P} = \vec{e}_w h/\lambda$, we have:

$$\Psi = \sum_m A_m e^{-i(\vec{P}_m\vec{r} - E_m t)/\hbar} \qquad (40)$$

Due to the statistical interpretation of Ψ for an energy level E we have:

$$\Psi = e^{-i(\vec{P}\vec{r} - Et)/\hbar} \qquad (41)$$

From this Eq. we obtain:

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

i.e. the known, from the QM, operators for energy and momentum [17,18] .
According to this work energy, momentum and geometry are distributed according to a probability density function $P(\vec{r},t)$; thus, E, $\vec{P}$ are the mean values of the local energy and momentum, i.e.:

$$E = \frac{1}{V_0}\int \varepsilon(\vec{r},t)dr^3 \quad \text{and} \quad \vec{P} = \frac{1}{V_0}\int \vec{p}(\vec{r},t)dr^3 \qquad (43)$$

According to Conclusion I, for a flat matter space-time which is composed of the mean values of the magnitudes that characterize a stochastic space-time field we have that the relativistic equation (17) is valid. From equations (17,42,43), we obtain Schroendinger relativistic equation i.e.:

$$-\hbar^2\partial^2\Psi/\partial t^2 = -\hbar^2c^2\nabla^2\Psi + {m_0}^2c^4\Psi \qquad (44)$$

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.
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 (44) is valid locally and m_o 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 [17]:

$$P(\vec{r},t) = (i\hbar/2m_0c^2)\left(\Psi^*\partial_t\Psi - \Psi\partial_t\Psi^*\right) \qquad (45)$$

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 eq(23), 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 behaviours; 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. According to the up-to-now gained experience, these negative magnitudes can be regarded as characterizing the anti-matter.

5.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). It is noted that these spacetimes are not considered to exist a-priori but they are revealed through experience and through the contradictions that appear because of the Claim for Minimum Contradictions. Note that eq(17) is valid for positive, negative imaginary and negative imaginary values of energy and momentum.

6.Properties of the Stochastic Matter Space Time

6.1. General

For the purposes of this paper, the conclusions and the properties of the stochastic Matter Space Time – written in an explanatory way and deriving from previous works [4,6,20,21]- are necessary. These conclusions relate both to a particle field and to a many bodies system.

6.2. Particle Field Stochastic Space Time

6.2.1. Methodology and Results [6]

In this section we will show the methodology to define the stochastic spacetime-aether geometry and we will give the results without a complete proof process since this exceeds the limits of this paper.

6.2.2. Space Time Operators

We consider a flat spacetime with energy E , momentum $\vec{P}$ and rest energy m_0c^2. With respect to reference spacetime of energy E_0 it can be proved that its relative space-time magnitudes are the following:

Relative time : $$TR = \gamma = \frac{E}{E_0} \qquad (46)$$

Relative volume: $$VR = \frac{E_0}{E}, \qquad (47)$$

Relative length in a direction $\vec{n}$:

$$LR_n = (1-\frac{\vec{v}_n^{\,2}}{c^2})^{1/2}\frac{E_0}{m_0c^2} =$$
$$= (1-c^2\frac{m^2\vec{v}_n^{\,2}}{m^2c^4})^{1/2}\frac{E_0}{m_0c^2} =$$
$$= (1-c^2\frac{\vec{P}_n^{\,2}}{E^2})^{1/2}\frac{E_0}{m_0c^2} \qquad (48)$$

According to what was mentioned, these magnitudes are distributed with the aid of $P(\vec{r},t)$ function of eq(45).
Since these magnitudes are functions of energy and momentum, they have operators defined as follows:

$$\hat{TR} = \frac{i\hbar}{E_0}\frac{\partial}{\partial t},\ \hat{VR} = \frac{-iE_0}{\hbar}\frac{1}{\partial/\partial t},$$
$$\hat{LR}_n = \left(1 - c^2\frac{\partial^2/\partial x_n^{\,2}}{\partial^2/\partial t^2}\right)^{1/2}\frac{E_0}{m_0c^2} \tag{49}$$

6.2.3. Space Time Relative Magnitude Mean Values

According to the methodology of the QM, any equation between particle magnitudes is also valid between the operators of the same magnitudes[17,18]. It can be proved that for a self normalised Ψ function it is valid that the expectation value $\langle S\rangle$ of a space time magnitude S behaves as eigenvalue of S with function Ψ, i.e.:

$$\hat{S}\,\Psi = \langle S\rangle\Psi \tag{50}$$

This self normalization can be achieved by means of $P(\vec{r},t)$ of eq.(45).

However, equatin (50) shows that any equation between operators of particle magnitudes is valid also between the expectation values of the same magnitudes. Thus, we may state the following :

" If the Ψ wave function of a particle field is self normalized any equation between particle magnitudes is valid also between the expectation values of the same magnitudes".

On this basis, we can reach the following results:

$$\langle TR\rangle = \frac{i\hbar}{E_0\Psi}\frac{\partial\Psi}{\partial t},\ \langle VR\rangle = \frac{-iE_0}{\hbar}\frac{\Psi}{\partial\Psi/\partial t},$$
$$\langle LR_n\rangle = \left(1 - c^2\frac{\partial^2\Psi/\partial x_n^{\,2}}{\partial^2\Psi/\partial t^2}\right)^{1/2}\frac{E_0}{m_0c^2} \tag{51}$$

and

$$\hat{TR}\,\Psi = \langle TR\rangle\Psi,\ \hat{VR}\,\Psi = \langle VR\rangle\Psi,$$
$$\hat{LR}_n\,\Psi = \langle LR_n\rangle\Psi \tag{52}$$

6.2.4 Local Relative Space Time Magnitude Mean Values .

Taking into account eq(44), we have that for $\hbar = c = 1$

$$\Box\Psi = -m_o^{\,2}\Psi$$

and $$m_o = i\left(\frac{\Box\Psi}{\Psi}\right)^{1/2} \tag{53}$$

where $\Box = \partial^2/\partial t^2 - \nabla^2$.

As we can notice, the probability density of eq.(45) beyond functions related to Ψ wave function is also dependent on m_0 . Taking into account eqs (23,45,51,53) , we can calculate the mean value of relative time and of relative length in a direction $\vec{n}$ as follows:

$$\overline{tr}(r,t) = \frac{iV_0}{2E_0}\frac{\partial_t\Psi}{(\Psi\Box\Psi)^{1/2}}\left(\Psi^*\partial_t\Psi - \Psi\partial_t\Psi^*\right) \tag{54}$$

and

$$\overline{lr}_n(r,t) = -\frac{iE_0}{2}\frac{\Psi}{\Box\Psi}\left(1 - \frac{\partial^2\Psi/\partial x_n^{\,2}}{\partial^2\Psi/\partial t^2}\right)^{1/2}\left(\Psi^*\partial_t\Psi - \Psi\partial_t\Psi^*\right) \tag{55}$$

By means of integration, eqns(54,55) can provide the real time that passes in a position of the HMF and the real distance at the time t between two points of the HMF.

6.3. (g) and (em) Space-Time Communication [22]

It can be proved that

$$\frac{d}{dt}\langle E_g\rangle = 0 \quad \text{and} \quad \frac{d}{dt}\langle E_{em}\rangle = 0 \tag{56}$$

where since E_{em} is imaginary, we can write:

$$E_{em} = iE_{em-g} \tag{57}$$

where the subscript em-g indicates an equal amount of energy of (em) space expressed in the (g) space. Because of eqns (52,57), we obtain:

$$\frac{d}{dt}\langle E_{em-g}\rangle = 0 \tag{58}$$

Eqns(56,58) show that $\langle E_g\rangle$ and $\langle E_{em-g}\rangle$ are constant in time

Thus, if the (g) space communicates with the (em) one, the changes of $\langle E_g\rangle$, $\langle E_{em-g}\rangle$ are discontinuous so that they are at least in one direction of time derivable and that eqns (56) are valid. Equation(17) has both real and imaginary eigenvalues for $m_0 = 0$. Thus, we

may assume that only photons ($m_0 = 0$) can convert (g) space into (em) and inversely.

6.3. Many Bodies System [4,6]

6.3.1. General

In order that further contradictions are avoided, a matter system in general should be described through the same principles as a particle field does. 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. Thus, eqn(23) can be extended to a many bodies system and it is valid that:

$$\overline{sr}(\vec{r},t) = \left\langle \overline{sr} \right\rangle_i V_o P_i(\vec{r},t) = \left\langle \overline{sr} \right\rangle V_o P(\vec{r},t) \tag{59}$$

where $\left\langle \overline{sr} \right\rangle_i, P_i(\vec{r},t)$ refer to local particle fields and $\left\langle \overline{sr} \right\rangle, P(\vec{r},t)$ to the whole matter system

6.3.2. Conservation Principle – Notion of Time Flow

In a closed system , the conservation principle can be applied as follows:

$$\overline{E}_g + \overline{E}_{em-g} = \text{constant} \tag{60}$$

where $\overline{E}_{em} = i\overline{E}_{em-g}$ and the dash ($^-$) indicates the mean value.

It can be proved that $\overline{V}_g \uparrow \Rightarrow \overline{E}_g \downarrow$; thus, because of eqn(60) the expansion of universe is characterized by the relation $\overline{V}_g \uparrow \Rightarrow \overline{E}_g \downarrow \Rightarrow \overline{E}_{em-g} \uparrow$ i.e. the evolution of Universe expresses the passage from $\overline{E}_g$ to energy $\overline{E}_{em-g}$; since, according to statement VI, energy is equivalent to time, this passage-change expresses what we consider as Time Flow[23].

6.3.3. Equations of the Stochastic matter Space Time [4,21]

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:

$$\Box\Psi = -{m_o}^2\Psi \tag{61}$$

Thus, it is valid that:

$$\frac{\Box\Psi}{\Psi} = -{m_0}^2 = const. \tag{62}$$

and $$\partial_{xi}\frac{\Box\Psi}{\Psi} = 0 \quad \text{(i=1,2,3,4)} \tag{63}$$

These equations should be valid also in the case of many particles so that, as it was mentioned in 6.3.1 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 Ψi. 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(44) is valid but with different m_0. The notion of non continuum but at the same time existing derivatives of a function is odd; however, towards this direction fractal geometry might facilitate us (see 6.3.5), e.g. through Koch curve.

Applying eqn(63) for the (g) and the (em-g) space time, we obtain:

$$\partial_{xi}\frac{\Box\Psi_g(\vec{r},t)}{\Psi_g(\vec{r},t)} = 0, \qquad \partial_{xi}\frac{\Box\Psi_{em-g}(\vec{r},t)}{\Psi_{em-g}(\vec{r},t)} = 0$$

(i=1,2,3,4) (64)

It can be proved that the conservation principle leads to:

$$\partial_t\left(\frac{\partial_t\Psi_g(\vec{r},t)}{\Psi_g(\vec{r},t)} + \alpha\frac{\partial_t\Psi_{em-g}(\vec{r},t)}{\Psi_{em-g}(\vec{r},t)}\right) = 0 \tag{65}$$

where α is the fine structure constant [21]. Eqns(64,65) characterise in general the system of equations of the stochastic matter space time; however, the solution of this system is impossible because of the weakness to find boundary conditions for the complex – incomprehensible function Ψ. Thus, it might be more effective to approach the problem through another way, e.g. through the property of self-similarity (see 6.3.5).

6.3.4. Gravitation [6,20]

The energy $\overline{E}P(\vec{r},t)dr^3$ corresponds to a mass $d\overline{m} = \frac{\overline{E}}{c^2}P(\vec{r},t)dr^3$ and refers to an infinitesimal space time element distributed according to a matter probability density $P(\vec{r},t)$. In order for that mass to move in a direction x_i from the energy level

$\overline{E}P(\vec{r},t)dr^3$

to the energy level

$$\overline{E}(P(\vec{r},t)+\frac{\partial P(\vec{r},t)}{\partial x_i}dx_i)dr^3$$

a force $d\vec{F}=d\overline{m}\vec{g}_{xi}$ is needed so that $d\vec{F}dx_i$ equals the diference of the mentioned energy. The magnitude $\vec{g}_{xi}$ can be regarded as the component of the gravitational acceleration of the field in the direction x_i, since it represents the force which must be applied to a unit of mass in order that mass will be distributed according to a probability density. If a foreign particle enters the field, the probability density of the matter system is modified so that this particle will be taken into account. According to this analysis and taking into account the equivalence between energy and time, we can reach the following formula for the gravitational acceleration

$$\vec{g}(r,t)=\frac{c^2}{P(\vec{r},t)}\nabla P(\vec{r},t)=\frac{c^2}{\overline{tr}(\vec{r},t)}\nabla\overline{tr}(\vec{r},t) \tag{66}$$

Taking into account eqns(28) we obtain:

$$\vec{g}(r,t)=\frac{c^2\nabla\left(\Psi^*\partial_t\Psi-\Psi\partial_t\Psi^*\right)}{\left(\Psi^*\partial_t\Psi-\Psi\partial_t\Psi^*\right)} \tag{67}$$

Equation (66) is valid either for (g) or (em) space; therefore, we have that all forces are based on a unified formula. It is noted that eqn(66), under certain assumptions, is compatible with Newton's law[20].

6.3.5. The Property of Self-similarity

Because of eqn(23), for a relative length in a direction $\vec{n}$ in a matter system it is valid that:

$$\overline{lr}_n(r,t)=\left\langle\overline{lr}_n\right\rangle V_o P(r,t) \tag{68}$$

Applying this equation for two different directions $\vec{n}_1$ *and* $\vec{n}_2$ we obtain:

$$\frac{\overline{lr}_{n1}(r,t)}{\overline{lr}_{n2}(r,t)}=\frac{\overline{dl}_{n1}}{\overline{dl}_{n2}}=\frac{\left\langle\overline{lr}_{n1}\right\rangle}{\left\langle\overline{lr}_{n2}\right\rangle}=c_s \tag{69}$$

where $\overline{dl}_{n1},\overline{dl}_{n2}$ the mean real infinitesimal lengths in the directions $\vec{n}_1$ and $\vec{n}_2$ respectively, corresponding to the same infinitesimal length of the reference spacetime, at any point $(\vec{r},t)$ of the HMF; c_s has the same value in the whole extent since it is equal to a ratio which refers to the whole. Thus, the above relation expresses the self similarity of the matter system at time t in the whole of its extent. It is noted that $\overline{dl}_{n1},\overline{dl}_{n2}$ are lengths which correspond to matter since space-time itself is matter. Taking into account the above mentioned, we can conclude that the stochastic matter space-time has fractal properties because of the self similarity equation (69). It is noted that the geometry of matter systems in nature appears to be fractal-selfsimilar [24,25]; therefore it is expected that this fractal geometry can apply to any matter space-time system. Perhaps the property of self similarity could facilitate us to solve the problem of stochastic spacetimes since observable holistic properties can apply to infinitesimal areas; thus, the weakness due to Ψ function boundary conditions (see 6.3.3) might be overcome.

7. New Phenomena Explanation

7.1.Light Water Electrolysis

Taking into account what was mentioned in section 6.3.2., we can reach the conclusion that an irreversible approaching-distancing between electron and proton can lead to useful energy production which has been absorbed from the (g) space time[19]. On this basis, excess heat phenomena of light water electrolysis can be explained [26,27,28]. In extension, excess mechanical work is expected to be achieved through an irreversible approaching-distancing between positive and negative loads [26].

7.2.Non Locality Effect

The non Locality Effect is a phenomenon of interaction at a distance without transmission with certain velocity of this interaction through some medium. Such a phenomenon has been experimentally verified by Alen Aspect[29], and it might be explained according to this paper. In fact, according to eqn(23), the "non existing" which is dimensionless has a probability to "exist" everywhere. Therefore, *the distance between two different points of a space-time-matter field has a probability to be zero.* Moreover, the "non existing" might be regarded as active due to the energy conservation principle[19]. Thus, an active "non existing" due to zero distance might act everywhere at the same time.

8. Discussion

a. At this point, it would be interesting to compare the present aspect with Putnam's *Minimal Principle of Contradiction*, according to which "There is at least one a priori truth"[30]. According to statement VI, our communication system leads to contradiction.

Thus, the question is raised: Can we say that nothing is truth? If so, according to Putnam, there is the truth: "nothing is truth". However, according to statement VI, "nothing can be stated", therefore, it cannot be stated that: "nothing is true", "it is true that nothing is true", "nothing can be stated", " it is true that nothing can be stated" and so on. For the same reason, it cannot be stated that the minimal principle of contradiction is true i.e. it cannot be stated that it is true that *not every statement is true and false.* As it was mentioned, it can neither be stated that the claim of the minimum contradictions is true since this claim includes the arbitrariness deriving from breaking the silence. We may notice that the difference of the present aspect from Putnam's is due to the inner structure of language i.e. to the anterior-posterior axiom.

b. The claim of the minimum contradiction appears during communication. It is a consequence of empirically confirmed principles and, therefore, it can be regarded as an empirical principle. Due to the existing contradictions, it implies a non definite description of things. There are already expressed points of view according to which language cannot define exactly the things. Heracletus says for speech (or reason) : "… ούτε λέγει ούτε κρύπτει αλλά σημαίνει" (…neither says nor hides but signifies) [31]. This is compatible with an ontological point of view (in Greek αποφατική άποψη) which is characterized by the notion "συναμφότερον" which means that something is accepted as valid even if it is contradictory [31,32]; the latter has been empirically verified through investigation of texts from ancient times until now [32]. The communication vagueness implied by the claim of the minimum contradictions seems to have similarities with the vagueness of Wittgenstein's language games. However this claim derives on the basis of correctness rules in contrast to Wittgenstein's point of view[33]. In all these cases, the present point of view might reinforce what intuitionally was accepted as valid.

It is noted, according to the claim of the minimum contradictions, that there is a logical and an illogical dimension in our understanding the world. This facilitates us to approach in a logically linked way notions such as freedom, will, faith, intuition e.t.c. which are incompatible, in a first sight, with our original logical way of thinking [4].

c. As was mentioned in 7.2 the "non existing" is out of space-time; therefore, it is not characterized by the anterior-posterior axiom; therefore, statement VI cannot apply to it. Thus, the "non existing" seems to be non contradictory and this might be the reason of the logical part of our thought since it might be regarded as active. However, we cannot approach this notion logically; it could be treated through the claim for minimum contradictions.

d. On the basis of the claim for minimum contradictions a model of stochastic matter space time was stated. This model derives from the distribution of the relative magnitudes of a flat relativistic space time based on the probability density of the relativistic Schroendinger Equation whose Ψ wave function describes the relative space time magnitudes in a Hypothetical Measuring Field. The nature of the stochastic space time is, because of its contradictory quality, chaotic and non deterministic. Indeed, the geometry of the stochastic space time is described with the aid of a Ψ wave function which as complex is incomprehensible; in this case, the boundary conditions do not have a real meaning beyond the one we give for simplifying reasons. However, there is a logical structure e.g. the relativistic Schroendinger Equation itself. Besides this, there are relations that express an order; for a particle field stochastic space time, it is arithmetically valid that $\langle E \rangle \langle V \rangle = hc$; this shows a correlation of holistic magnitudes. Moreover, the formula of eq(66) is compatible with Newton law which with a close approximation presents the visible to us order.

e. 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.

References

[1]. A.A.Nassikas, 2000. A Claim for Minimum Contradictions in Physics. a) Congress 2000, St. Petersburg , Russia. b) Galilean Electrodynamics, Special Issues 1, 2001.

[2]. A.A.Nassikas, 2001. The Claim for Minimum Contradictions and its Consequences in Thinking and Physics. Vienna Circle International Symposium.

[3]. A.A.Nassikas, 2002. More on Minimum Contradictions in Physics . Accepted for publ. in Galilean Electrodynamics.

[4]. A.A.Nassikas,1995. The Claim of the Minimum Contradictions. Publ.Trohalia, p.220 (in greek, ISBN 960-7022-64-5)
[5]. A.A.Nassikas and P.F.Parshin, 2000. On the Possibility of a Unique Axiom in Physics. a) Congress 2000, St. Petersburg , Russia. b) to appear in Galilean Electrodynamics, Special Issues II, 2001.
[6]. A.A.Nassikas, 1998. The Hypothesis of the Quantum Space Time - Aether. a) Congress-98 Fundamental Problems of Natural Sciences, Russian Academy of Science. St. Petersburg, Russia. b) Galilean Electrodynamics, Special Issues 2, 2000.
[7]. Aristotle. Organon, Posterior Analytic.
[8]. G.Leibniz. The Monadology (1714), Sections.31,32.
[9]. C.Hartonas, 2000. Basic Logic (in greek). Ziti Publ., Thessaloniki, Greece.
[10]. E.Nagel and J.R.Newman.1958. Goedel's Proof. N.Y.University Press.
[11]. H.Putnam, 1995. Book Review; "Shadows of the Mind" by R. Penrose. Bulletin of the American Mathematical Society.
[12]. R. Penrose , 1994. Shadows of the Mind. Oxford University Press.
[13]. Kleine Enzyklopaedie Mathematik;VEB Verlag Enzyklopaedie Leipzig, 1971.
[14].Kenyon,1990. General Relativity. Oxford University Press.
[15]. W. T. Grandy, 1970. Introduction to Electrodynamics and Radiation. Academic Press N.Y.
[16]. A.C.Bajpai et.al. 1978. Advanced Engineering Mathematics. John Wiley N.Y.
[17]. S. Trahanas,1990 . Relativistic Quantum Mechanics I. Publ. Univ. of Creta, Creece.
[18]. L.I.Shiff,1968. Quantum mechanics. McGraw Hill, N.Y.
[19]. A.A.Nassikas 2000. The Cold Fusion as a Space-Time Energy Pumping Process. Proceedings of the 8th International Conference on Cold Fusion. Ed. F.Scaramuzzi, Societa Italiana di Fisica.
[20]. A.A.Nassikas,1994. The Hypothesis of the Unified Field and the Principle of its Dual Interpretation. III International Conference: "Problems of Space, Time, Gravitation". Russian Academy of Sciences.
[21]. A.A.Nassikas, 1997. The Hypothesis and the Equations of the Unified Matter Field. a) Infinite Energy - Cold Fusion Technology, Inc. Vol.3, No.13&No.14, b) 1996. International Conference "New Ideas in Natural Sciences" St. Petersbourg's Physical Society. St. Petersbourg, Russia.
[22]. A.A.Nassikas 2001. The Notion of Aether as a Possible Consequence of the Claim for Minimum Contradictions. Journal of New Energy, Vol. 6, No1.EEMF,Inc.
[23]. C.K.Whitney, A.A.Nassikas, S.Kircalar 2002. From the Editor. Galilean Electrodynamics, Vol 13, SI, No.1
[24]. B.Mandelbrot,1977.The Fractal Geometry of Nature. Freeman.N.Y.
[25].Gleick,1987. Chaos-Making a New Science.Viking Penguin Inc
[26]. A.A.Nassikas, 2001. Space Time Energy Pump. Int. Conference on Hydrogen Technologies CH-Weinfelden, Jupiter-Verlag.
[27]. Kanarev, Ph., 2000. Water as a New Source of Energy, Second Edition. Publ. Kuban State Agrarian University, Krasnodar Russia.
[28]. Mills, R.L., 1991. Energy/matter Conversion Methods and Structures. International Patent Publication Number WO 92/10838. Infinite Energy, Vol.(3) Issue 17.
[29]. A.Aspect, B.Dalibard, and G. Roger, 1982. Experimental test of Bell's Inequalities Using Time-Varying analyzers. Physical Review Letters 49,1804.
[30]. H.Putnam, 1983. Realism and Reason. There is at Least One a Priori Truth. Cambridge University Press.
[31]. Chr.Giannaras, 1980. An Outline of Introduction to Philosophy (in greek). Publ.Domos Athens.
[32]. C.Zouraris, 1989. Θεοείδεια Παρακατιανή. Exantas Publ. Athens.
[33]. L.Wittgenstein. Philosophical Grammar. Basil Blackwell Oxford, 1974.